



Northstar
New School

NORTHSTAR NEW SCHOOL CURRICULUM HANDBOOK KS4

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INTRODUCTION

Dear Parents/Carers,

It has been an absolute pleasure to welcome all our pupils back on site for their learning at Northstar New School this academic year. The energy and engagement seen in classrooms and around school has been palpable and we are all excited to work with our pupils to develop them further in their educational journey.

Our teachers have done a brilliant job designing an exciting, ambitious and creative curriculum for our pupils– one which is diverse, innovative and accessible for all. Our curriculum offer takes a pupil-centered approach, with a focus on developing independent learners, fostering creativity and developing critical thinking skills for the 21st century learner.

We have worked tremendously hard at NorthStar New School to shape an ambitious and exciting curriculum for our pupils. We have sequenced the learning so that every subject starts with core basic knowledge and thinking and then goes on to explore the *best of what has been thought and said in our world*.

Our pupils will work through programme's of study which reflect ambitious yet achievable accreditation. Pupils at Key Stage 4 take nationally recognized qualifications, including GCSE, as appropriate.

We aim to support children to achieve positive outcomes in relation to their ability. We teach a broad curriculum leading to external accreditation at GCSE level, where applicable. We enhance our curriculum with vocational qualifications such as Entry Levels, Functional Skills, Btec Sport, Btec Food and Edexcel awards.

We have produced this guide to support you with the education of your son/daughter at Northstar New School. This guide will give you an overview of the topics being studied in each subject. We hope you will use the information to ask questions of your child and explore the topics they are studying this year. In addition to this, you can find these on our website under the curriculum area.

We hope you find the information useful. If you have any questions, please direct them to the class teacher or Curriculum Leader and we will be happy to help with any queries.

Yours faithfully,

M. Foley

Deputy Headteacher - Curriculum

ENGLISH

Intent

The school believes that English skills are vital to the development of children, so they are prepared for their future life. A broad and balanced English programme using objectives from the National Curriculum, determines the skills that each year group must cover and recap. A range of genres are studied and promoted. A variety of resources are used to promote a reading and writing culture. Children are given a range of writing opportunities including the use of paired, group and independent writing tasks. A culture of learning from each other is promoted through use of co-operative learning structures. This is developed across both years, so that the children learn to respond appropriately and supportively to each other regardless of gender, age, cultural or ethnic background.

- In years 10 and 11 we start to focus on pupils' long-term goals and adjust our curriculum accordingly.
- Every pupil continues to study English, Maths, PE, Science, PSHE and Citizenship with RSE.
- Pupils also access a range of accredited courses that are updated on an annual basis according to their needs and aspirations.

Qualifications

In KS4, pupils can access qualifications in the following areas: English, maths, science, sports, and food technology. Our accreditation is updated on an annual basis to ensure it meets the needs and aspirations of our pupils.

Special Educational Needs Disability (SEND) / Pupil Premium / Higher Attainers

Children may have work additional to and different from their peers to access the curriculum dependent upon their needs. As well as this, our school offers a demanding and varied curriculum, providing children with a range of opportunities for them to reach their full potential and consistently achieve highly from their starting points.

Implementation

Our school provides daily English lessons that are progressive and support skill development.

In English lessons, teachers plan a sequence of lessons that explore quality texts and give pupils the opportunity to practice writing and reading skills using co-operative learning structures. Teachers model these skills on regular basis and planning, editing, publishing and Edexcel based tasks can be planned in as part of the teaching sequence.

Guided Reading is part of our timetable weekly across the school. Children will investigate a variety of texts and develop their understanding of the variety of texts.

Impact

Assessment for learning strategies is used daily. These will allow a picture to be built up of the pupils' progress, and any areas of strength or weakness which can then be addressed in teachers' planning.

Assessment of learning is completed ½ termly. Children complete independent writing pieces within a unit of work, which are assessed against Edexcel criteria. Teachers will have at least 6 pieces of work through the academic year. There is also extended writing opportunities within the weekly lessons which are encouraged and assessed. Analysis of the data impacts upon teachers planning so pupils' needs can be addressed. Moderation of teacher assessment is also completed termly to ensure that judgements are accurate. Children are formally checked with Frog Education tracking to ensure that they are making at least expected progress in line with their abilities and targets. This is then monitored by SLT. Children who are not on track are identified for intervention/target teaching.

At the end of each ½ term, KS4 teachers use the Teacher Assessment Framework to report Teacher assessment.

Leadership and Management

The DHT's role is to empower colleagues to teach Writing to a high standard and support staff in the following ways:

- By keeping up to date on current issues; disseminating relevant information and providing training for staff members (either directly or through other professionals)
- Leading by example by modelling lessons or styles of teaching
- Having a knowledge of the quality of writing provision across the school and using this to provide a coaching and mentoring role
- Identifying and acting on development needs of staff members
- Monitoring expectations, provision and attainment across the school and providing feedback to develop practice further to raise standards

Monitoring and Evaluation

The quality of teaching and learning is monitored as part of the appraisal process through lesson observations and through the progress and attainment documents. In addition, continuity and progression across the school is monitored by the DHT as is the implementation and impact of Assessment for Learning. The subject action plan identifies actions intended to raise standards.

Exam tasks are to be monitored in line with Edexcel.

The DHT will also provide an annual summary report to the Headteacher in which s/he evaluates the strengths and weaknesses in writing and indicates areas for further improvement.

A named member of the governing body is briefed to oversee the teaching and learning. The link governor meets, at least termly, with the subject leader to review progress.

Partnerships with parents

Parents are kept informed of topics that are being covered through a curriculum map at the beginning of the term, and newsletter sent half-termly. During Parents' Visits curricular targets are shared and a written report is completed termly.

Homework in Key Stage 4 is a choice of activity; they are encouraged to complete an English/mathematics choice on alternate weeks.

Content and assessment overview

The Pearson Edexcel Entry Level Certificate in English is offered at Entry Level 1, Entry Level 2 and Entry Level 3. Each level consists of three components: speaking and listening, writing, and reading and students must take three components from the same entry level.

Each component is internally assessed and externally moderated. Students must complete all three components.

Entry Level 1	
Component 1: Speaking and Listening	Entry Level 1
<i>Non-examination assessment</i> 20% of the qualification – 20 marks	
Content overview Students will focus on: • using appropriate language to communicate effectively • listening and responding to questions and feedback • using presentation skills to communicate • comparing ideas.	
Assessment overview • Internally assessed and externally moderated. • Students complete two tasks. • Tasks are chosen by the teacher. Teachers can use the tasks given by Pearson (see <i>pages 15–22</i>), adapt these tasks or create their own tasks suitable for their students. • Task 1: 8 marks, 8%. AO7, AO8 and AO9 are assessed. • Task 2: 12 marks, 12%. This must include a comparison of two ideas. AO3, AO7, AO8 and AO9 assessed. • <i>Suggested</i> timings per task: 2–4 minutes.	
Component 2: Writing	Entry Level 1
<i>Non-examination assessment</i> 30% of the qualification – 30 marks	
Content overview Students will focus on: • writing for different forms, purposes and audiences • writing to communicate meaning • organising information and ideas.	
Component 3: Reading	Entry Level 1
<i>Non-examination assessment</i> 50% of the qualification – 50 marks	
Content overview Students will focus on: • reading short extracts from both fiction and non-fiction 20th- and 21st-century texts • identifying and interpreting information and ideas • selecting evidence from texts to show understanding • explaining the use of language and structure • showing understanding of an extract.	

Assessment overview

- Internally assessed and externally moderated.
- Tests are provided by Pearson and can be downloaded from the website using your centre's Edexcel Online pass.
- Tests are themed and teachers can choose which tests to give students.
- Students take two tests:
 - non-fiction, 25% and 25 marks
 - fiction, 25% and 25 marks.
- AO1, AO2 and AO4 are assessed.
- *Suggested* timings per test: 30 minutes.

Assessment overview

- Internally assessed and externally moderated.
- Tasks are chosen by the teacher. Teachers can use the tasks given by Pearson (see *pages 29–34*) or adapt these tasks or create their own tasks suitable for their students.
- Students complete two tasks. These can be:
 - one transactional piece of writing and one creative piece of writing
 - two creative pieces of writing
 - two transactional pieces of writing.
- Each task is worth 15% and 15 marks.
- AO5, AO6 are assessed.
- *Suggested* timings per task: 15 minutes.

Entry Level 2

Component 1: Speaking and Listening

Entry Level 2

Non-examination assessment

20% of the qualification – 20 marks

Content overview

Students will focus on:

- using appropriate language to communicate effectively
- listening and responding to questions and feedback
- using presentation skills to communicate
- comparing ideas.

Assessment overview

- Internally assessed and externally moderated.
- Students complete two tasks.
- Tasks are chosen by the teacher. Teachers can use the tasks given by Pearson (see *pages 15–22*) or adapt these own tasks suitable for their students.
- Task 1: 8 marks 8%. AO7, AO8 and AO9 assessed.
- Task 2: 12 marks, 12%. This must include a comparison of ideas. AO3, AO7, AO8, AO9 are assessed.
- *Suggested* timings per task: 3–5 minutes.

Component 2: Writing	Entry Level 2
Non-examination assessment 30% of the qualification – 30 marks	
Content overview Students will focus on: • writing for different forms, purposes and audiences • writing to communicate meaning • organising information and ideas.	
Assessment overview • Internally assessed and externally moderated. • Tasks are chosen by the teacher. Teachers can use the tasks given by Pearson (see <i>pages 29–34</i>), adapt these tasks or create their own tasks suitable for their students. • Students complete two tasks: - o one transactional piece of writing <i>and</i> one creative piece of writing <i>or</i> - o two creative pieces of writing <i>or</i> - o two transactional pieces of writing. • Each task is worth 15% and 15 marks. • AO5, AO6 are assessed. • <i>Suggested</i> timings per task: 30 minutes.	
Component 3: Reading	Entry Level 2
Non-examination assessment 50% of the qualification – 50 marks	
Content overview Students will focus on: • reading short extracts from both fiction and non-fiction 20th- and 21st-century texts • identifying and interpreting information and ideas • selecting evidence from texts to show understanding • explaining the use of language and structure • showing understanding of an extract.	
Assessment overview • Internally assessed and externally moderated. • Tests are provided by Pearson and can be downloaded from the website using your centre's Edexcel Online password. • Tests are themed and teachers can choose which tests to give students. • Students take two tests: - o non-fiction, 25% and 25 marks - o fiction, 25% and 25 marks. • AO1, AO2 and AO4 are assessed. • <i>Suggested</i> timings per test: 35 minutes.	

Entry Level 3	
Component 1: Speaking and Listening	Entry Level 3
Non-examination assessment 10% of the qualification – 10 marks	
Content overview Students will focus on: • using appropriate language to communicate effectively • listening and responding appropriately to questions and feedback • using presentation skills to communicate effectively.	
Assessment overview • Internally assessed and externally moderated. • Students complete one task. • The task is chosen by the teacher. Teachers can use a task given by Pearson (see <i>pages 15–22</i>) or adapt a task or create their own task suitable for their students. • 10 marks, 10%. AO7, AO8 and AO9 are assessed. • <i>Suggested</i> timings for task: 4–6 minutes.	
Component 2: Writing	Entry Level 3
Non-examination assessment 40% of the qualification – 40 marks	
Content overview Students will focus on: • writing for different forms, purposes and audiences • writing to communicate meaning • organising information and ideas.	
Assessment overview • Internally assessed and externally moderated. • Tasks are chosen by the teacher. Teachers can use the tasks given by Pearson (see <i>pages 29–34</i>), adapt these to their own tasks suitable for their students. • Students complete two tasks: ◦ one transactional piece of writing and ◦ one creative piece of writing. • Each task is worth 20% and 20 marks. • AO5, AO6 are assessed. • <i>Suggested</i> timings per task: 40 minutes.	

Component 3: Reading	Entry Level 3
Non-examination assessment 50% of the qualification – 50 marks	
Content overview Students will focus on: • reading short extracts from 19th-, 20th- and 21st-century fiction texts • reading short extracts from 20th- and 21st-century non-fiction texts • identifying and interpreting information and ideas • selecting evidence from texts to show understanding • explaining the use of language and structure • evaluating texts and comparing ideas.	
Assessment overview • Internally assessed and externally moderated. • Tests are provided by Pearson and can be downloaded from the website using your centre's Edexcel Online pass • Tests are themed and teachers can choose which tests to give students. • Students take two tests: - o non-fiction, 25% and 25 marks - o fiction, 25% and 25 marks. • AO1, AO2 and AO4 are assessed in both tests. AO3 is also assessed in the non-fiction test. • <i>Suggested</i> timings per test: 45 minutes.	
Subject content and assessment information The Entry Level Certificate sits below GCSE qualifications. Entry Level 3 represents achievement below a GCSE Grade 1. The Pearson Edexcel Entry Level Certificate in English covers the appropriate aspects of the Key Stage 4 programme study in English. Qualification aims and objectives For speaking and listening to enable students to: • speak confidently, audibly and effectively • use Standard English as appropriate • select and organise information and ideas effectively • listen and respond to questions. For writing to enable students to: • adapt their writing for different purposes and audiences • select and organise ideas, facts and key points • select vocabulary, form, and structural and organisational features to reflect audience, purpose and context, and use Standard English where appropriate • pay attention to the accuracy and effectiveness of grammar, punctuation and spelling.	

For reading to enable students to:

- read in different ways for different purposes
- identify and interpret ideas and information
- seek evidence in the text to support a point of view
- identify and comment on a writer's choice of vocabulary.

Functional Skills Level 1 and Level 2

Qualification's purpose

The Pearson Edexcel Functional Skills Qualification in English at Level 1 and 2 are for learners to develop understanding and skills in English.

The qualifications give learners the opportunity to:

- gain a qualification for work, study and life
- demonstrate the ability at an appropriate level to read, write, speak, listen and communicate in English
- apply these skills effectively to a range of purposes in the workplace and in other real-life situations.

Qualifications aims and outcomes

The qualification gives learners the opportunity to:

- Listen, understand and make relevant contributions to discussions with others in a range of contexts
- Apply their understanding of language to adapt delivery and content to suit audience and purpose
- Read a range of different text types confidently and fluently, applying their knowledge and understanding of texts to their own writing
- Write texts of varying complexity, with accuracy, effectiveness, and correct spelling, punctuation and grammar
- Understand the situations when, and audiences for which, planning, drafting.

Pearson Edexcel Functional Skills Qualification in English at Level 1

Pearson Edexcel Functional Skills Qualification in English at Level 1 indicates that learners should be able to speak, listen, communicate, read and write clearly, accurately, confidently and with effectiveness. Learners should be able to use these functional skills autonomously, applying them to a range of formal and informal contexts, in the workplace and in real life. A key aspect of developing knowledge and skills in English, at Level 1 is to be able to communicate with confidence, effectiveness and with an increasing level of independence.

Component 1: Speaking, listening and communicating

Texts should include narratives, explanations, discussions, instructions, information, descriptions and presentations all of varying lengths.

Content	
L1.1	Identify relevant information and lines of argument in explanations or presentations
L1.2	Make requests and ask relevant questions to obtain specific information in different contexts
L1.3	Respond effectively to detailed questions
L1.4	Communicate information, ideas and opinions clearly and accurately on a range of topics
L1.5	Express opinions and arguments and support them with evidence
L1.6	Follow and understand discussions and make contributions relevant to the situation and the subject
L1.7	Use appropriate phrases, registers and adapt contributions to take account of audience, purpose and medium
L1.8	Respect the turn-taking rights of others during discussions, using appropriate language for interjection

Component 2: Reading

Texts should include a range of straightforward texts on a range of topics and of varying lengths that instruct, describe, explain and persuade.

Content	
L1.9	Identify and understand the main points, ideas and details in texts
L1.10	Compare information, ideas and opinions in different texts
L1.11	Identify meanings in texts and distinguish between fact and opinion
L1.12	Recognise that language and other textual features can be varied to suit different audiences and purposes
L1.13	Use reference materials and appropriate strategies (e.g. using knowledge of different word types) for a range of purposes, including to find the meaning of words
L1.14	Understand organisational and structural features and use them to locate relevant information (e.g. index, menus, subheadings, paragraphs) in a range of straightforward texts
L1.15	Infer from images meanings not explicit in the accompanying text
L1.16	Recognise vocabulary typically associated with specific types and purposes of texts (e.g. formal, informal, instructional, descriptive, explanatory and persuasive)
L1.17	Read and understand a range of specialist words in context
L1.18	Use knowledge of punctuation to aid understanding of straightforward texts

Component 3: Writing

Texts should include straightforward texts such as narratives, instructions, explanations and reports of varying lengths.

Spelling, punctuation and grammar

What learners need to learn	
L1.19	Use a range of punctuation correctly (e.g. full stops, question marks, exclamation marks, commas, possessive apostrophes)
L1.20	Use correct grammar (e.g. subject-verb agreement, consistent use of different tenses, definite and indefinite articles)
L1.21	Spell words used most often in work, study and daily life, including specialist words

Writing composition

What learners need to learn	
L1.22	Communicate information, ideas and opinions clearly, coherently and accurately
L1.23	Write text of an appropriate level of detail and of appropriate length (including where this is specified) to meet the needs of purpose and audience
L1.24	Use format, structure and language appropriate for audience and purpose
L1.25	Write consistently and accurately in complex sentences, using paragraphs where appropriate

Candidates will be given a suggested word quantity range in each Writing assessment.

Pearson Edexcel Functional Skills Qualification in English at Level 2

Pearson Edexcel Functional Skills Qualification in English at Level 2 indicates that learners should be able to speak, listen, communicate, read and write clearly, accurately, confidently and with effectiveness. Learners should be able to use these functional skills autonomously, applying them to a range of formal and informal contexts, in the workplace and in real life. A key aspect of developing knowledge and skills in English, at Level 2 is to be able to communicate with confidence, effectiveness and with an increasing level of independence.

Component 1: Speaking, listening and communicating

Texts should include extended narratives and information (information may be on technical, concrete or abstract topics), discussions, detailed explanations and presentations, all of varying lengths.

Content	
L2.1	Identify relevant information from extended explanations or presentations
L2.2	Follow narratives and lines of argument
L2.3	Respond effectively to detailed or extended questions and feedback
L2.4	Make requests and ask detailed and pertinent questions to obtain specific information in a range of contexts
L2.5	Communicate information, ideas and opinions clearly and effectively, providing further detail and development if required
L2.6	Express opinions and arguments and support them with relevant and persuasive evidence
L2.7	Use language that is effective, accurate and appropriate to context and situation
L2.8	Make relevant and constructive contributions to move discussion forward
L2.9	Adapt contributions to discussions to suit audience, purpose and medium
L2.10	Interject and redirect discussion using appropriate language and register

Component 2: Reading

Texts should include a range of straightforward and complex texts on a range of topics and of varying lengths that instruct, describe, explain and persuade.

Content	
L2.11	Identify the different situations when the main points are sufficient and when it is important to have specific details
L2.12	Compare information, ideas and opinions in different texts, including how they are conveyed
L2.13	Identify implicit and inferred meaning in texts
L2.14	Understand the relationship between textual features and devices, and how they can be used to shape meaning for different audiences and purposes
L2.15	Use a range of reference materials and appropriate resources (e.g. glossaries, legends/keys) for different purposes, including to find the meanings of words in straightforward and complex sources
L2.16	Understand organisational features and use them to locate relevant information in a range of straightforward and complex sources
L2.17	Analyse texts, of different levels of complexity, recognising their use of vocabulary and identifying levels of formality and bias
L2.18	Follow an argument, identifying different points of view and distinguishing fact from opinion
L2.19	Identify different styles of writing and writer's voice

Component 3: Writing

Texts should include straightforward and complex texts such as articles, narratives, explanations and reports of varying lengths.

Spelling, punctuation and grammar

What learners need to learn	
L2.20	Punctuate writing correctly using a wide range of punctuation markers (e.g. colons, commas, inverted commas, apostrophes and quotation marks)
L2.21	Use correct grammar (e.g. subject-verb agreement, consistent use of a range of tenses, definite and indefinite articles) and modality devices (e.g. to express probability or desirability)
L2.22	Spell words used in work, study and daily life, including a range of specialist words

Writing composition

What learners need to learn	
L2.23	Communicate information, ideas and opinions clearly, coherently and effectively
L2.24	Write text of an appropriate level of detail and of appropriate length (including where this is specified) to meet the needs of purpose and audience
L2.25	Organise writing for different purposes using appropriate format and structure (e.g. standard templates, paragraphs, bullet points, tables)
L2.26	Convey clear meaning and establish cohesion using organisational markers effectively
L2.27	Use different language and register (e.g. persuasive techniques, supporting evidence, specialist words), suited to audience and purpose.
L2.28	Construct complex sentences consistently and accurately, using paragraphs where appropriate

Candidates will be given a suggested word quantity range in each Writing assessment.

Progression opportunities

Learners who achieve the Pearson Edexcel Functional Skills Qualification in English at Level 1 can progress to a similar qualification at Level 2.

Learners who achieve the Pearson Edexcel Functional Skills Qualification in English at Level 2 can progress to a GCSE in English or similar qualifications.

Both qualifications offer learners the opportunity to develop their English knowledge and skills as part of an Apprenticeship or in employment.

The choice of resources will be personalized in Schemes of Work by the teacher according to the interests of the group and the criteria set by Edexcel. Several options for texts are given. Tasks will be graded by ability but will be centered on the same topic/text.

POSSIBLE PATHWAYS –texts are subject to change depending on the interests and abilities of the pupils.

KS4 Curriculum overview: *Subject English Year 10*

	Of Mice and Men The boy at the back of the class Frankenstein	Of Mice and Men The boy at the back of the class, Frankenstein	Of Mice and Men The boy at the back of the class Frankenstein
Autumn	To read with fluency, intonation & understanding. To encourage reading for pleasure. (Comprehension): To understand the main events in texts. To be able to make predictions about events in texts. To understand how to explore ideas and meanings. To write using punctuation correctly. Work on spelling, punctuation, and grammar. Informal & formal letter writing. (Descriptive writing, adventurous vocabulary) Extend sentences to become more interesting to read using thesaurus Poetry. Read and write poetry reflecting different styles of writing. SMSC – Listening to and respecting others (links with FBV). Expression of feelings. SMSC What is friendship? What qualities make for a good friend What is loyalty? How is loyalty shown by others? British Values How do we manage people who steal? Why is it not acceptable?	To read with fluency, intonation & understanding. To encourage reading for pleasure. (Comprehension): To understand the main events in texts. To be able to make predictions about events in texts. To understand how to explore ideas and meanings. To write using basic punctuation correctly. To learn spelling (high frequency, sound patterns) and grammar rules. Informal letter writing. Extend sentences to become more interesting to read. Poetry. Read and write poetry reflecting different styles of writing. SMSC – Listening to and respecting others (links with FBV). Expression of feelings. SMSC What is friendship? What qualities make for a good friend What is loyalty? How is loyalty shown by others? British Values How do we manage people who steal? Why is it not acceptable?	To read simple texts using decoding strategies learnt To encourage reading for pleasure. (Comprehension): To remember some events in texts. To be able to make predictions about events in texts with adult support To write using capital letters and full stops To learn spelling (high frequency, sound patterns) and grammar rules. Work on spelling CVC words To attempt to write sentences with support (Descriptive writing) Poetry. Read poetry SMSC – Listening to and respecting others (links with FBV). Expression of feelings. SMSC What is friendship? What qualities make for a good friend What is loyalty? How is loyalty shown by others? British Values How do we manage people who steal? Why is it not acceptable

	Frankenstein	Frankenstein	Frankenstein
Spring	READING: To enjoy and engage with written material including a Victorian novel (reading for pleasure) To understand and follow plots (with support). WRITING: To communicate in the written form with improved accuracy, concentrating on complex sentences using more than one conjunction. To apply basic literacy rules to own written work. To use a variety of punctuation Understanding homophones and using them in sentence To improve their own work by checking for spelling and punctuation <i>To use metaphors and similes</i> <i>To use Using dictionaries</i> SMSC – Topics/themes may include: love and hate, family, control, friendship, loyalty, loneliness, human versa monster, right and wrong. Respect and tolerance for all regardless of gender, race, background, circumstances, belief British Values Tolerance: no one should be treated differently on the basis of belonging to a particular group. By the same token, all parties, sects, faiths and ideologies must tolerate the existence of their rivals. On the other hand, there should be no toleration at all of unequal treatment of men and women.	READING: To enjoy and engage with written material including a Victorian novel (reading for pleasure) To understand and follow plots (with support). WRITING: To communicate in the written form with improved accuracy, concentrating on sentences with conjunctions. To apply basic literacy rules to own written work. To use <i>To use metaphors and similes</i> <i>To use dictionaries</i> SMSC – Topics/themes may include: love and hate, family, control, friendship, loyalty, loneliness, human versa monster, right and wrong. Respect and tolerance for all regardless of gender, race, background, circumstances, belief British Values Tolerance: no one should be treated differently on the basis of belonging to a particular group. By the same token, all parties, sects, faiths and ideologies must tolerate the existence of their rivals. On the other hand, there should be no toleration at all of unequal treatment of men and women.	READING: To enjoy and engage with written material including a Victorian novel (reading for pleasure) To understand and follow plots (with support). WRITING: To communicate in the written form with improved accuracy, concentrating on short sentences. To apply basic literacy rules to own written work. especially capital letters & full Stops. <i>To use similes</i> <i>To use dictionaries</i> SMSC – Topics/themes may include: love and hate, family, control, friendship, loyalty, loneliness, human versa monster, right and wrong. Respect and tolerance for all regardless of gender, race, background, circumstances, belief British Values Tolerance: no one should be treated differently on the basis of belonging to a particular group. By the same token, all parties, sects, faiths and ideologies must tolerate the existence of their rivals. On the other hand, there should be no toleration at all of unequal treatment of men and women.

	Short stories WT Functional Skills EL3	Short stories, WT Functional Skills EL 2	Short stories WT Functional Skills EL 1
Summer	To read texts and answer questions using inference To write up to eight sentences using paragraphs. To spell double consonant words To sequence words in alphabetical order Use the first, second and third place letters to sequence words in alphabetical order To use plurals Make requests and ask concise questions using appropriate language in different contexts. Respond appropriately to questions on a range of straightforward topics SMSC – Through a variety of books and news topics, spiritual, moral, social and cultural areas will be covered	Reading a text and answering questions Writing letters and emails Spelling and punctuating sentences Punctuate simple sentences with a capital letter and a full stop Use a capital letter for the personal pronoun ‘I’ and the first letter of proper nouns SMSC – Through a variety of books and news topics, spiritual, moral, social and cultural areas will be covered	READING: To enjoy and engage with short stories or novels. To understand and follow plots & story-lines (with support) – making predictions. WRITING: To communicate in the written form with improved accuracy with sentences that make sense when read. To apply basic literacy rules to own written work – focusing on EL1 & 2 short sentences. Use full stops and capital letters appropriately. To write two short phrases join by a conjunction (and, then, because). <i>+Using dictionaries/spell-check.</i> SMSC – Through a variety of books and news topics, spiritual, moral, social and cultural areas will be covered

KS4 Curriculum overview: *Subject English Year 11*

	The Tempest or Macbeth FS L1	The Tempest or Macbeth FS EL3	The Tempest Or Macbeth
Autumn	Reading for understanding (understanding Shakespeare). Improving independence. Reading for enjoyment. Reading comprehension. Proof reading Reading with fluency, expression/intonation Reading for a purpose (to perform poetry/Christmas play) Identify and extract relevant information and detail in straightforward explanations Make requests and ask concise questions using appropriate language in different contexts	Reading for understanding (understanding Shakespeare). Improving independence. Reading for enjoyment. Reading comprehension. Proof reading Reading with improved fluency Reading for a purpose (to perform poetry/Christmas play) To read texts and answer questions using inference To write up to eight sentences using paragraphs. To spell double consonant words To sequence words in alphabetical order Use the first, second and third place letters to sequence words in alphabetical order To use plurals Make requests and ask concise questions using appropriate language in different contexts. Respond appropriately to questions on a range of straightforward topics Communicate information and opinions clearly on a range of topics Read correctly words designated for Entry Level 3 Identify, understand and extract the main points and ideas in and from texts Identify different purposes of straightforward texts	Reading for understanding (understanding Shakespeare). Improving independence. Reading for enjoyment. Reading comprehension. Proof reading Sounding out to aid reading Reading for a purpose (to perform poetry/Christmas play) READING: To enjoy and engage with short stories or novels. To understand and follow plots & story-lines (with support) – making predictions. WRITING: To communicate in the written form with improved accuracy with sentences that make sense when read. To apply basic literacy rules to own written work – focusing on EL1 & 2 short sentences. Use full stops and capital letters appropriately. To write two short phrases join by a conjunction (and, then, because). <i>Using dictionaries/spell-check.</i> <i>SMSC – Through a variety of books and news topics, spiritual, moral, social and cultural areas will be covered</i>

	Striker Boy Holes
Spring	READING: - To enjoy and engage with a range of text - To understand the meaning of the things we read - To have and share opinions about the things we read - To differentiate between facts and opinions WRITING: - To identify and respond to different writing styles and techniques - To write in a range of styles and forms showing awareness and understanding of audience and conventions within the media - To write sentences using conjunctions with increasing accuracy and independence SPEAKING & LISTENING: - To further develop receptive and expressive language skills - To communicate effectively in pairs and group situations - To understand and use a wider range of vocabulary SMSC – Stereotyping, how different groups are represented in the media. The impact of media and uses/concerns regarding media influence including social media. Celebrity culture and influence (links with FBV). E-Safety – Policies will be followed when taking photographs for evidence of learning. Pupils will be supervised when using ICT. Pupils to learn about Fake News

	Functional Skills EL3/L1 (preparation for accreditation)	Functional Skills EL3,EL2 andEL1 (preparation for accreditation)	Functional Skills EL2 and EL1 (preparation for accreditation)
Summer	READING: - To enjoy and engage with written material including a Victorian/Gothic novel (reading for pleasure) - To understand and follow plots (with support). WRITING: - To communicate in the written form with improved accuracy, concentrating on complex sentences using more than one conjunction. - To apply basic literacy rules to own written work. - To use a variety of punctuation - Understanding homophones and using them in sentence - To improve their own work by checking for spelling and punctuation - To use metaphors and similes - To use dictionaries To write a review for Northstar New School SMSC - Personal enjoyment. Target setting. Working with others. To consider ethical and moral debates. E-Safety – Supervised use of ICT, Safeguarding and E-safety policies will be followed when photographing evidence of learning.	READING: - To enjoy and engage with a range of texts. - To understand the meaning of the things we read. - To have and share opinions about the things we read. - To differentiate between facts and opinions WRITING: - To identify and respond to different writing styles and techniques - To write in a range of styles and forms showing awareness and understanding of audience and conventions within the media - To write sentences using conjunctions with increasing accuracy and independence To write a review for Northstar New School SMSC - Personal enjoyment. Target setting. Working with others. E-Safety – Supervised use of ICT, Safeguarding and E-safety policies will be followed when photographing evidence of learning.	READING: - To enjoy and engage with a range of texts (reading for pleasure). - To be able to apply a range of strategies to read accurately and with some fluency including sounding out - To show understanding of the things they read - To encourage reading for pleasure and knowledge. - To be critical and understanding of what they are reading (esp, text/messaging) WRITING: To write simple sentences To write accurate sentences using conjunctions. To describe using adjectives To work on spelling, punctuation and grammar. To write a review for Northstar New School SMSC – to feel empathy, understand emotion To discuss ethical and moral issues, the law, communities, role models, cultural differences and equality E-Safety – Supervised use of ICT, Safeguarding and E-safety policies will be followed when photographing evidence of learning.

- Study texts are used only as guidance. Teachers can choose to change the study text if they think it is not suitable for their group. Some texts may take more than one term to complete.
- All pupils will have Guided Reading at least 3 x per week, studying a variety of genres and poetry.
- The overview is a snapshot of what is being taught. The medium term plans have specific details and in depth description of tasks and activities that will take place in the lesson.

FUNCTIONAL SKILLS ENTRY LEVELS

Entry Level 1

Follow simple text on a familiar topic or experience.
Recognise and read simple sentence structures in order to extract meaning.
Recognise that there are different types of text, for example from layout, visuals, headings.
Read a limited meaningful sight vocabulary of familiar words.
Identify familiar key words in simple written sources.
Identify the meaning of simple signs and symbols.
Use visuals as clues to the meaning of words.
Recognise the letters of the alphabet in both upper and lower case.
Decode simple regular words
Follow single-step instructions in a familiar context, asking for instructions to be repeated if necessary.
Listen and respond to requests for personal information.
Listen to and identify simply expressed feelings and opinions.
Respond to straightforward questions.
Listen for and follow the gist of short explanations.
Use key words to help identify specific information in short explanations.
Speak clearly to be heard and understood.
Make statements of fact clearly.
Make simple requests using appropriate terms and conventions, for example relating to politeness.
Ask questions to obtain specific information.
Respond to others in simple exchanges in everyday contexts.
Listen to others talk about familiar topics.
Speak clearly in discussion with others so that they can be heard and understood.
Use verbal and non-verbal conventions as appropriate when discussing familiar topics with others

Use written words and phrases to record or present basic information, e.g. a shopping list, a note to a friend.
Select, from a given range, a format for written text appropriate to its purpose
Construct a simple sentence, using a capital letter and full stop.
Use a capital letter for 'I'.
Spell correctly some personal key words and familiar words.
Use strategies to aid spelling, for example look, say, cover, write, check; tracing letters in the air.
Write the letters of the alphabet using upper and lower case.

ENTRY L2

Identify the purposes of simple everyday texts.
Follow and understand the main events of short chronological texts.
Follow and understand the main steps in short instructional texts.
Identify linking words and adverbials in instructions and directions, for example next, then, right and straight on.
Identify punctuation and capital letters to support understanding.
Use simple sentence structure and word order to help decipher unfamiliar words and predict meaning.
Identify plausible meanings of sentences using context and own experience to predict unknown words.
Identify common sources of information.
Locate specific information in short printed and electronic sources
Use illustrations and captions to locate information.
Use phonic and graphic knowledge to decode words.
Recognise high frequency words.
Recognise words with common spelling patterns.
Use initial letters to find out and sequence words in alphabetical order
Use a simplified dictionary to find the meaning of unfamiliar words.
Follow the gist of straightforward narratives, descriptions and conversations.
Identify the main points in short explanations and presentations.
Listen for detail in short explanations and instructions.
Follow short straightforward oral instructions.
Give appropriate responses to straightforward questions or requests.
Speak clearly to be heard and understood in straightforward exchanges
Ask questions and make requests to obtain information in everyday situations.
Express statements of fact about familiar topics.
Give short accounts and descriptions in familiar contexts.
Follow the gist and main points of discussions on familiar topics.
Make appropriate contributions to discussions on familiar topics.

Ask questions to clarify understanding
Respond to straightforward questions
Use written words and phrases, including adjectives, to record or present simple information.
Select and use an appropriate format and basic style to match the purpose of their writing.
Construct simple and compound sentences, using common conjunctions to connect two clauses, e.g. as, and, but.
Use punctuation correctly, e.g. capital letters including for proper nouns, full stops, question marks.
Spell correctly words relating to personal details and familiar common words
Produce legible text in short familiar formats.

ENTRY L3

Follow key events in different types of straightforward text.
Identify the main points and ideas in straightforward texts.
Identify the purposes of different types of texts.
Skim title, headings and illustrations for general meaning and purpose.
Use organisational features, including images to support understanding.
Use punctuation and capitalisation in texts to aid understanding.
Use context to work out unfamiliar words.
Use knowledge of words, spelling and sentence patterns to support
understanding for example, nouns, adjectives, connectives, verbs, prefixes and suffixes and plausible meaning.
Scan texts to locate information
Obtain information through detailed reading
Show understanding of straightforward instructional texts
Identify common and specialist key words, including words on forms.
Find the meaning of unfamiliar words in a simple dictionary
Use alphabetical order to support dictionary use.
Follow the gist of spoken communication in different contexts.
Listen for detail and identify specific information.
Use visual and verbal feedback signals to aid understanding.
Respond to spoken information and opinions.
Respond to questions on familiar topics.
Speak with appropriate clarity, speed and phrasing.
Use appropriate language and register in different formal and informal, familiar situations.
Give short explanations, accounts and descriptions.
Ask questions and make requests to obtain information
Follow and understand the main points in discussions on different topics.

Make relevant contributions at an appropriate point.
Respect turn- taking conventions.
Respond appropriately to the contributions of others
Plan and draft writing for different purposes.
Use short paragraphs to organise writing.
Write in a logical order, for example chronologically
Write in complete sentences, for example, with one or more clauses in familiar forms of written communication.
Use pronouns so their meaning is clear
Use correct basic grammar for example, appropriate verb tense, subject-verb agreement.
Use punctuation correctly, for example capital letters, full stops, questions marks, exclamation marks, commas.
Spell correctly common words and relevant key words for work and special interest.
Use knowledge of soundspelling links and letter patterns to spell a greater range of words.
Produce legible and reasonably neat text.
Proof read and correct simple grammatical and spelling errors in own writing

Functional Skills - English Level 1

Speaking, Listening and Communicating

Scope of study

Text: this should include narratives, explanations, discussions, instructions, information, descriptions and presentations all of varying lengths.

Identify relevant information and lines of argument in explanations or presentations
Make requests and ask relevant questions to obtain specific information in different contexts
Respond effectively to detailed questions
Communicate information, ideas and opinions clearly and accurately on a range of topics
Express opinions and arguments and support them with evidence
Follow and understand discussions and make contributions relevant to the situation and the subject
Use appropriate phrases, registers and adapt contributions to take account of audience, purpose and medium
Respect the turn-taking rights of others during discussions, using appropriate language for interjection

Reading

Scope of study

Text: this should include a range of straightforward texts on a range of topics and of varying lengths that instruct, describe, explain and persuade.

Identify and understand the main points, ideas and details in texts
Compare information, ideas and opinions in different texts
Identify meanings in texts and distinguish between fact and opinion
Recognise that language and other textual features can be varied to suit different audiences and purposes
Use reference materials and appropriate strategies (e.g. using knowledge of different word types) for a range of purposes, including to find the meaning of words
Understand organisational and structural features and use them to locate relevant information (e.g. index, menus, subheadings, paragraphs) in a range of straightforward texts
Infer from images meanings not explicit in the accompanying text
Recognise vocabulary typically associated with specific types and purposes of texts (e.g. formal, informal, instructional, descriptive, explanatory and persuasive)
Read and understand a range of specialist words in context
Use knowledge of punctuation to aid understanding of straightforward texts

Writing

Scope of study

Text: this should include straightforward texts such as narratives, instructions, explanations and reports of varying lengths.

Spelling, punctuation and grammar
Use a range of punctuation correctly (e.g. full stops, question marks, exclamation marks, commas, possessive apostrophes)
Use correct grammar (e.g. subject-verb agreement, consistent use of different tenses, definite and indefinite articles)
Spell words used most often in work, study and daily life, including specialist words
Writing composition
Communicate information, ideas and opinions clearly, coherently and accurately
Write text of an appropriate level of detail and of appropriate length (including where this is specified) to meet the needs of purpose and audience
Use format, structure and language appropriate for audience and purpose
Write consistently and accurately in complex sentences, using paragraphs where appropriate

Functional Skills - English Level 2

Speaking, Listening and Communicating

Scope of study

Text: this should include extended narratives and information (information may be on technical, concrete or abstract topics), discussions, detailed explanations and presentations, all of varying lengths.

Identify relevant information from extended explanations or presentations
Follow narratives and lines of argument
Respond effectively to detailed or extended questions and feedback
Make requests and ask detailed and pertinent questions to obtain specific information in a range of contexts
Communicate information, ideas and opinions clearly and effectively, providing further detail and development if required
Express opinions and arguments and support them with relevant and persuasive evidence
Use language that is effective, accurate and appropriate to context and situation
Make relevant and constructive contributions to move discussion forward
Adapt contributions to discussions to suit audience, purpose and medium
Interject and redirect discussion using appropriate language and register

Reading

Scope of study

Text: this should include a range of straightforward and complex texts on a range of topics and of varying lengths that instruct, describe, explain and persuade.

Identify the different situations when the main points are sufficient and when it is important to have specific details
Compare information, ideas and opinions in different texts, including how they are conveyed
Identify implicit and inferred meaning in texts
Understand the relationship between textual features and devices, and how they can be used to shape meaning for different audiences and purposes
Use a range of reference materials and appropriate resources (e.g. glossaries, legends/ keys) for different purposes, including to find the meanings of words in straightforward and complex sources
Understand organisational features and use them to locate relevant information in a range of straightforward and complex sources
Analyse texts, of different levels of complexity, recognising their use of vocabulary and identifying levels of formality and bias
Follow an argument, identifying different points of view and distinguishing fact from opinion
Identify different styles of writing and writer's voice

Writing

Scope of study

Text: this should include straightforward and complex texts such as articles, narratives, explanations and reports of varying lengths.

Spelling, punctuation and grammar
Punctuate writing correctly using a wide range of punctuation markers (e.g. colons, commas, inverted commas, apostrophes and quotation marks)
Use correct grammar (e.g. subject-verb agreement, consistent use of a range of tenses, definite and indefinite articles) and modality devices (e.g. to express probability or desirability)
Spell words used in work, study and daily life, including a range of specialist words
Writing composition
Communicate information, ideas and opinions clearly, coherently and effectively
Write text of an appropriate level of detail and of appropriate length (including where this is specified) to meet the needs of purpose and audience
Organise writing for different purposes using appropriate format and structure (e.g. standard templates, paragraphs, bullet points, tables)
Convey clear meaning and establish cohesion using organisational markers effectively
Use different language and register (e.g. persuasive techniques, supporting evidence, specialist words), suited to audience and purpose.
Construct complex sentences consistently and accurately, using paragraphs where appropriate

Please Note:

Many of the linked resources identified in the Level 1 section of this document would also be applicable to the development of similar skills at Level 2, albeit with a slightly higher level of complexity/higher expectations in terms of accuracy and sophistication in the candidate's written expression. Level 1 and Level 2 candidates often study the same topics alongside one another in dedicated Functional Skills courses

KS4 MATHS

Intent

At Northstar New School we aim to teach children how to make sense of the world around them by developing their ability to calculate, reason and solve problems. We aim to support children in achieving economic well-being by equipping them with a range of computational skills and the ability to solve problems in a variety of contexts.

Our aims in the teaching of mathematics are:

- to promote enjoyment of learning through practical activity, exploration and discussion;
- to develop confidence and competence with numbers and the number system;
- to develop the ability to solve problems through decision-making and reasoning in a range of contexts;
- to develop a practical understanding of the ways in which information is gathered and presented; to explore features of shape and space, and developing measuring skills in a range of contexts;
- to help children understand the importance of mathematics in everyday life.
- to become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.

Implementation

Teachers are provided with Planning, Preparation and Assessment time (PPA) weekly to plan the specifics of their curriculum.

At our school, we teach mathematics to all children, whatever their ability or individual need. We provide learning opportunities that enable all pupils to make good progress. Every child has an equal right to be taught mathematics, in daily lessons of approximately 1 hour. There may be times when it is more appropriate for Key Stage 4 sessions to be over an hour.

We aim for children to master the key areas and domains in Mathematics, narrowing the gap between the most and least able learners. The expectation is that most pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress will always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly will be challenged to deepen their understanding by being offered rich and sophisticated problems and not accelerate through to new content. All children will be given the opportunity to sit Edexcel qualified exams at Entry Level 1-3 and Foundation Level 1-2 according to their abilities.

Mathematics is a symbolic, abstract language. To decode this language, symbols need to come alive and speak so clearly to children that it becomes as easy to understand as reading a story. We believe that all students, when introduced to a key new concept, should have the opportunity to build competency in this topic by taking the concrete-pictorial-abstract approach.

Concrete – students should have the opportunity to use concrete objects and manipulatives to help them understand what they are doing.

Pictorial – students should then build on this concrete approach by using pictorial representations. These representations can then be used to reason and solve problems.

Abstract – with the foundations firmly laid, students should be able to move to an abstract approach using numbers and key concepts with confidence.

All classrooms have some concrete resources that can be used in the teaching of mathematics. Some more topic specific resources are in a central location.

During our daily lessons we encourage children to practice fluency, problem solving and reasoning skills and ask mathematical questions. We develop their ability to independently select and use appropriate concrete apparatus to support their conceptual understanding and build procedural fluency. They can independently access and use a wide range of resources to support their work. We develop the children's ability to represent problems using visualisation skills, including jottings and pictorial representations. ICT is used in mathematics lessons for modelling ideas and methods. Wherever possible, we provide meaningful contexts and encourage the children to apply their learning to everyday situations. Although mathematics is best taught discretely, it has many cross-curricular links. Teachers need to use opportunities in other subjects to rehearse skills in a context. Mathematics involves developing confidence and competence in number work, geometry, measures and statistics and the using and applying of these skills.

All classrooms will have a display area specifically for mathematics. This is called a working wall and will display items that children need to support and develop the unit's learning. For example, key vocabulary, success criteria, models, key questions.

Special Educational Needs Disability (SEND) / Pupil Premium / Higher Attainers

Children may have work additional to and different from their peers to access the curriculum dependent upon their needs. As well as this, our school offers a demanding and varied curriculum, providing children with a range of opportunities for them to reach their full potential and consistently achieve highly from their starting points.

Impact

Assessment for Learning is fundamental to raising standards and enabling children to reach their potential. Assessment in mathematics takes place daily using a range of strategies such as marking and feedback of work and verbal discussions with children. Children will be monitored according to Edexcel criteria.

Children are also given the opportunity to sit Entry Level 1.2.3 exams and Foundation Level 1 and 2 exams working towards GCSE. These exam tasks will be monitored internally as well as externally.

Leadership and Management

The DHT's role is to empower colleagues to teach mathematics to a high standard and support staff in the following ways:

- By keeping up to date on current issues; disseminating relevant information and providing training for staff members (either directly or through other professionals)
- Leading by example by modelling lessons or styles of teaching
- Having a knowledge of the quality of mathematics provision across the school and using this to provide a coaching and mentoring role
- Identifying and acting on development needs of staff members
- Monitoring expectations, provision and attainment across the school and providing feedback to develop practice further to raise standards
- Providing necessary equipment and maintaining it to a high standard

Monitoring and Evaluation

The quality of teaching and learning is monitored as part of the appraisal process through lesson observations and through the progress and attainment documents. In addition, continuity and progression across the school is monitored by the SLT as is the implementation and impact of Assessment for Learning. The mathematics action plan identifies actions intended to raise standards.

The DHT will also provide an annual summary report to the Headteacher in which s/he evaluates the strengths and weaknesses in mathematics and indicates areas for further improvement.

A named member of the governing body is briefed to oversee the teaching and learning. The governor meets, at least termly, with the SLT to review progress.

Partnerships with parents

Parents are kept informed of topics that are being covered through a newsletter sent half-termly. During Parents' Visits curricular targets are shared and a written report is completed termly. Homework is a choice of activity; they are encouraged to complete an English/mathematics choice on alternate weeks.

WRM – Year 10 Scheme of Learning

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Similarity						Developing Algebra					
	Congruence, similarity and enlargement			Trigonometry			Representing solutions of equations and inequalities			Simultaneous equations		
Spring	Geometry						Proportions and Proportional Change					
	Angles & bearings		Working with circles		Vectors		Ratios & fractions		Percentages and Interest		Probability	
Summer	Delving into data				Using number					Expressions		
	Collecting, representing and interpreting data				Non- calculator methods		Types of number and sequences		Indices and Roots		Manipulating expressions	

WRM – Year 11 Scheme of Learning

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Graphs						Algebra					
	Gradients & lines	Non-linear graphs		Using graphs		Expanding & factorising	Changing the subject		Functions			
Spring	Reasoning						Revision and Communication					
	Multiplicative	Geometric		Algebraic		Transforming & constructing	Listing & describing		Show that...			
Summer	Revision						Examinations					

Qualification at a glance

Content and assessment overview

The Pearson Edexcel Entry Level Certificate in Mathematics qualification is available at Entry Level 1, Entry Level 2 and Entry Level 3. Entry Level 2 (EL2) content subsumes the content of Entry Level 1 (EL1). Entry Level 3 (EL3) content subsumes the content of EL2 and EL1. The Pearson Edexcel Entry Level Certificate in Mathematics consists of one externally set test and one externally set task for Entry 1 and 2 and two externally set tests and one externally set task for Entry 3. Students must complete all their assessment at the same Entry Level.

Entry Level 1 assessments

Content overview – for test and task	
• Number: Count; Read, write and order; Fractions and decimals; Pattern; Facts; Equipment • Geometry: 2D shapes; 3D shapes; Position, movement and pattern • Measures: Units; Measuring instruments • Statistics	
Component 1: Test	Component 2: Task
60% of the qualification 12 marks	40% of the qualification 8 marks

Entry Level 2 assessments

Content overview – for test and task	
• Number: Count; Read, write and order; Fractions and decimals; Pattern; Facts; Operations; Equipment • Geometry: 2D shapes; 3D shapes; Position, movement and pattern; Angles • Measures: Units; Measuring instruments • Statistics	
Component 1: Test	Component 2: Task
60% of the qualification 18 marks	40% of the qualification 12 marks

Entry Level 3 assessments

Content overview – for calculator and non-calculator tests	
Can appear on either or both tests Number: Count; Read, write and order; Fractions and decimals; Pattern; Facts; Operations	
Can appear on the non-calculator test	Can appear on the calculator test
- Algebra - Geometry: 2D shapes; 3D shapes; Position, movement and pattern; Angles - Statistics	- Numbers: Equipment - Ratio and proportion - Geometry: Perimeter and area - Measures: Units; Measuring instruments
Component 1: Non-calculator test	Component 2: Calculator test
36% of the qualification 18 marks	24% of the qualification 12 marks
Content overview – for task	
All Entry Level 3 content can be assessed in the task.	
Component 3: Task	
40% of the qualification 20 marks	

For all assessments

Information for all tests/tasks
Externally set tests/tasks, administered and marked by the Centre and moderated by Pearson. There is no set time for when each test/task is completed or how long the student takes to complete each test. Please see page 20-21, Assessment information, for more details.
Assessment overview Students should answer all questions. Tests will assess mathematical techniques. The tests consist of closed-response, graphical and short-open-response questions. Tasks will assess communication and problem-solving skills. The tasks consist of short-open-response questions based on practical skills tasks. Calculators may not be used in the tests but in the tasks, except the Entry Level 3 Calculator test. Information on the use of calculators in the assessments for this qualification can be found in <i>Appendix 2: Calculators</i>. Students must complete the test(s) and task for the Entry Level that they are entered for. There will be three tests and three tasks available for each Entry Level.

Subject content and assessment information

Qualification aims and objectives

The aims and objectives of this qualification are to enable students to:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that students develop conceptual understanding and the ability to recall and apply knowledge with increasing speed and accuracy
- reason mathematically by following a given line of enquiry, conjecturing relationships and generalisations, and developing an argument or justification making use of mathematical language
- solve problems by applying their mathematics to a variety of routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Functional Skills Level 1 and Level 2

Qualifications purpose

The Pearson Edexcel Functional Skills Qualifications in Mathematics at Level 1 and Level 2 are for learners who want to develop understanding and skills in mathematics.

The qualifications give learners the opportunity to:

- demonstrate a sound grasp of the underpinning skills and basics of mathematical skills appropriate to the level, and
- apply mathematical thinking to solve simple problems in familiar situations.

Qualifications aims and outcomes

Functional Skills mathematics qualifications at these levels should:

- indicate that students can demonstrate their ability in mathematical skills and their ability to apply these, through appropriate reasoning and decision making, to solve realistic problems of increasing complexity;
- introduce students to new areas of life and work so that they are exposed to concepts and problems which, while not of immediate concern, may be of value in later life; and
- enable students to develop an appreciation of the role played by mathematics in the world of work and in life generally.

Progression opportunities

Learners who achieve the Pearson Edexcel Functional Skills Qualification in Mathematics at Levels 1 and 2 can progress to:

- further mandatory mathematical study, such as GCSE
- the workplace
- further vocational study.

Functional Skills

Qualification in Mathematics at Level 1

Content area: using numbers and the number system – whole numbers, fractions, decimals and percentages

Content area description:

Learners at Level 1 are expected to be able to count in steps of various sizes, including negative numbers; and read, write and understand positive whole numbers to one million. They can order and compare whole numbers of any size, and fractions, ratios and decimals, and recognise the effect of multiplying and dividing by powers of 10, 100 and 1000. They can identify, compare and extend a range of numerical and spatial patterns, use, understand and calculate with fractions, decimals and percentages and calculate simple interest. See below for specific content on numbers and the number system.

Content	
1	Read, write, order and compare large numbers (up to one million)
2	Recognise and use positive and negative numbers
3	Multiply and divide whole numbers and decimals by 10, 100, 1000
4	Use multiplication facts and make connections with division facts
5	Use simple formulae expressed in words for one or two-step operations
6	Calculate the squares of one-digit and two-digit numbers
7	Follow the order of precedence of operators
8	Read, write, order and compare common fractions and mixed numbers
9	Find fractions of whole number quantities or measurements
10	Read, write, order and compare decimals up to three decimal places
11	Add, subtract, multiply and divide decimals up to two decimal places
12	Approximate by rounding to a whole number or to one or two decimal places
13	Read, write, order and compare percentages in whole numbers
14	Calculate percentages of quantities, including simple percentage increases and decreases by 5% and multiples thereof
15	Estimate answers to calculations using fractions and decimals
16	Recognise and calculate equivalences between common fractions, percentages and decimals
17	Work with simple ratio and direct proportions

Content area: using common measures, shape and space

Content area description:

Learners at Level 1 are expected to be able to work out simple relationships between common units of measurement to define quantities, also involving mathematical terms for position and direction. They can apply and use calculations with common measures including money, time, length, weight and capacity. They can visualise, draw and describe 2-D and 3-D shapes and use properties of 2-D shapes in calculations. See below for specific content on common measures, shape and space.

Content	
18	Calculate simple interest in multiples of 5% on amounts of money
19	Calculate discounts in multiples of 5% on amounts of money
20	Convert between units of length, weight, capacity, money and time, in the same system
21	Recognise and make use of simple scales on maps and drawings
22	Calculate the area and perimeter of simple shapes including those that are made up of a combination of rectangles
23	Calculate the volumes of cubes and cuboids
24	Draw 2-D shapes and demonstrate an understanding of line symmetry and knowledge of the relative size of angles
25	Interpret plans, elevations and nets of simple 3-D shapes
26	Use angles when describing position and direction, and measure angles in degrees

Content area: handling information and data

Content area description:

Learners at Level 1 are expected to be able to select, construct and interpret a range of statistical diagrams in various contexts; select and use methods and forms to present and describe outcomes. They can extract and interpret information from tables, diagrams, charts and graphs; apply simple statistics and recognise features of charts to summarise and compare sets of data; recognise and use the probability scale and interpret probabilities. See below for specific content on information and data.

Content	
27	Represent discrete data in tables, diagrams and charts including pie charts, bar charts and line graphs
28	Group discrete data and represent grouped data graphically
29	Find the mean and range of a set of quantities
30	Understand probability on a scale from 0 (impossible) to 1 (certain) and use probabilities to compare the likelihood of events
31	Use equally likely outcomes to find the probabilities of simple events and express them as fractions

Solving mathematical problems and decision making

Learners at Level 1 are expected to be able to use the knowledge and skills listed above to recognise and obtain a solution or solutions to a straightforward problem. A straightforward problem is one that requires learners to either work through one step or process or to work through more than one connected step or process.

Individual problems are based on the knowledge and/or skills in the mathematical content areas (number and the number system; common measures, shape and space; information and data). At Level 1 it is expected that learners will be able to address individual problems, some of which draw on a combination of any two of the mathematical content areas and require learners to make connections between those areas.

Assessment weighting

Learners at Level 1 are required to demonstrate their understanding of underpinning skills and their ability to apply mathematical thinking to solve problems, as set out below.

Assessment weighting		
Underpinning skills	Learners at Level 1 are expected to be able to do maths when not as part of a problem.	25%
Problem solving	Learners at Level 1 are expected to be able to: 1. read, understand and use mathematical information and mathematical terms used at this level; 2. recognise and obtain a solution or solutions to a straightforward problem 3. use knowledge and understanding to a required level of accuracy; 4. analyse and interpret answers in the context of the original problem; 5. check the sense, and reasonableness, of answers; and 6. present results with appropriate explanation and interpretation demonstrating simple reasoning to support the process and show consistency with the evidence presented.	75%

Functional Skills

Qualification in Mathematics at Level 2

Content area: using numbers and the number system – whole numbers, fractions, decimals and percentages

Content area description:

Learners at Level 2 are expected to be able to use numbers of any size; read, write and make use of positive and negative integers of any size; use, order and compare integers, fractions, decimals, percentages and ratios as well as recognise the value of a digit in any whole or decimal number. They can use numerical and spatial patterns for a purpose and calculate with, and convert between, numbers written as fractions, decimals, percentages and ratios. See below for specific content on numbers and the number system.

Content	
1	Read, write, order and compare positive and negative numbers of any size
2	Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation
3	Evaluate expressions and make substitutions in given formulae in words and symbols
4	Identify and know the equivalence between fractions, decimals and percentages
5	Work out percentages of amounts and express one amount as a percentage of another
6	Calculate percentage change (any size increase and decrease), and original value after percentage change
7	Order, add, subtract and compare amounts or quantities using proper and improper fractions and mixed numbers
8	Express one number as a fraction of another
9	Order, approximate and compare decimals
10	Add, subtract, multiply and divide decimals up to three decimal places
11	Understand and calculate using ratios, direct proportion and inverse proportion
12	Follow the order of precedence of operators, including indices

Content area: using common measures, shape and space

Content area description:

Learners at Level 2 are expected to be able to handle relationships between measurements of various kinds, use angles and coordinates when involving position and direction and make use of geometric properties in calculations with 2-D and 3-D shapes and understand the relationships between them. See below for specific content on measures, shape and space.

Content	
13	Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting
14	Convert between metric and imperial units of length, weight and capacity using a) a conversion factor and b) a conversion graph
15	Calculate using compound measures including speed, density and rates of pay
16	Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles)
17	Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)
18	Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements
19	Use coordinates in 2-D, positive and negative, to specify the positions of points
20	Understand and use common 2-D representations of 3-D objects
21	Draw 3-D shapes to include plans and elevations
22	Calculate values of angles and/or coordinates with 2-D and 3-D shapes

Content area: handling information and data

Content area description:

Learners at Level 2 are expected to be able to construct, interpret and evaluate a range of statistical diagrams. They can calculate and interpret probabilities. They can calculate, analyse, compare and interpret appropriate data sets, tables, diagrams and statistical measures such as common averages (mean, median, mode) and spread (range), and use statistics to compare sets of data. They can identify patterns and trends from data as well as recognise simple correlation. See below for specific content on information and data.

Content	
23	Calculate the median and mode of a set of quantities
24	Estimate the mean of a grouped frequency distribution from discrete data
25	Use the mean, median, mode and range to compare two sets of data
26	Work out the probability of combined events including the use of diagrams and tables, including two-way tables
27	Express probabilities as fractions, decimals and percentages
28	Draw and interpret scatter diagrams and recognise positive and negative correlation

Solving mathematical problems and decision making

Learners at Level 2 are expected to be able to use the knowledge and skills listed above to recognise and obtain a solution or solutions to a complex problem. A complex problem is one which requires a multistep process, typically requiring planning and working through at least two connected steps or processes.

Individual problems are based on a combination of the knowledge and/or skills from the mathematical content areas (number and the number system; measures, shape and space; information and data). At Level 2 it is expected that learners will be able to address individual problems, some of which draw on a combination of all three mathematical areas and require learners to make connections between those areas.

Assessment weighting

Learners at Level 2 are required to demonstrate their understanding of underpinning skills and their ability to apply mathematical thinking to solve problems, as set out below.

Assessment weighting		
Underpinning skills	Learners at Level 2 are expected to be able to do maths when not as part of a problem.	25%
Problem solving	Learners at Level 2 are expected to be able to: 1. read, understand, and use mathematical information and mathematical terms; 2a. identify suitable operations and calculations to generate results; 2b. recognise and obtain a solution or solutions to a complex problem 3. use knowledge and understanding to a required level of accuracy; 4. analyse and interpret answers in the context of the original problem; 5. check the sense and reasonableness of answers; and 6. present and explain results clearly and accurately demonstrating reasoning to support the process and show consistency with the evidence presented.	75%

SCIENCE

Intent:

At Northstar New School, Science should be fully inclusive to every child. Our aims are to fulfil the requirements of the National Curriculum for Science;

providing a broad, balanced and differentiated curriculum; ensuring the progressive development of knowledge, skills and vocabulary and for the children to develop a love of Science. Furthermore, we aim to inspire in pupils a curiosity and fascination about the natural and man-made world and a respect for the environment that will remain with them for the rest of their lives. This include the lesson they complete in the classroom but also the other experiences they are offered, such as educational visits, residential and enrichment days.

The aims of teaching Science in our school are to:

- Equip children to use themselves as starting points for learning about Science, and to build on their enthusiasm and natural sense of wonder about the world
- Develop through practical work the skills of observation, prediction, investigation, interpretation, communication, questioning and hypothesizing, and increased use of precise measurement skills and ICT
- Encourage and enable pupils to offer their own suggestions, and to be creative in their approach to science, devising their own invitations and taking lines of enquiry in a way that interests them
- Gain enjoyment from their scientific work
- Enable children to develop their skills of co-operation through working with others, and to encourage where possible, ways for children to explore science in forms which are relevant and meaningful to them
- Teach scientific enquiry through contexts taken from the National Curriculum for science
- Encourage children to collect relevant evidence and to question outcome and to build resilience to persevere as it is likely they will need to repeat results or will encounter unexpected results that do not support their hypothesis
- Encourage children to treat the living and non-living environment with respect and sensitivity
- Stress the need for personal and group safety by the correct usage and storage of resources
- To critically question the world around them
- To enable children to appreciate that we do not always know the answers when carrying out scientific enquiry as the world around them is continually changing and developing
- Equip children with the language to be able to discuss their learning and confidently explain their scientific understanding in small groups

Special Educational Needs Disability (SEND) / Pupil Premium / Higher Attainers

Children may have work additional to and different from their peers to access the curriculum dependent upon their needs.

As well as this, our school offers a demanding and varied curriculum, providing children with a range of opportunities for them to reach their full potential and consistently achieve highly from their starting points.

Implementation:

To ensure high standards of teaching and learning in science, we implement a curriculum that is progressive throughout the whole school. Science is taught in discrete lessons for at least 1 hour in Key Stage 4. We ensure that teachers have the same expectations during science lessons that they would have when teaching English or Mathematics and that any mathematical task (such as measuring or drawing graphs) is pitched at an age-appropriate level to ensure sufficient challenge. It is vital that any mathematical or English barriers should not impede a child's scientific learning, thus meaning dialogic learning is a central part to our science teaching.

The Science curriculum at NUS is based upon the 2014 Primary National Curriculum in England, which provides a broad framework and outlines the knowledge and skills taught in each Key Stage. Teachers plan lessons for their class using our progression of knowledge and skills document, which incorporates Working Scientifically. When teaching Science, teachers should follow the children's interests to ensure their learning is engaging, broad and balanced. Before planning a unit of work, teachers should assess children's prior knowledge and understanding to ensure work is pitched at the correct level. A variety of teaching approaches are used based on the teacher's judgement. Teaching key subject specific vocabulary is also a key part of science curriculum. The vocabulary children will need for that unit are identified on the school's progression document and this builds upon the vocabulary they have learnt in earlier years. The key vocabulary will be identified in the vocabulary document on the children's knowledge organisers.

Science assessment is based on teacher's assessment of children. This is then reported on the school's assessment document and the percentage of children working at, above and below the expected standard are identified. At the end of a unit, teachers will identify if a child is working at the expected standard for that objective.

Edexcel qualifications will be on offer for those who have a keen interest and engaging attitude.

Teachers will plan lessons based on the Edexcel programme of study for Entry Levels.

The qualification recognises achievement at National Curriculum Levels 1, 2 and 3. The qualification is part of a suite offered by Edexcel.

Science provides excellent opportunities to enhance the learning of more able pupils through planning lines of enquiry, asking open ended problems, analysing results and drawing conclusions based on scientific findings.

At Northstar New School, we provide a variety of opportunities for Science learning inside and outside the classroom. Learning outside of the classroom setting, is an essential part to learning Science. It is essential children observe and immerse themselves in their local environment to apply their learning practically to real-life situations.

Impact

Within science, we strive to create a supportive and collaborative ethos for learning by providing opportunities for children to question and investigate to

discover answers for themselves and take their learning in a direction they are interested in.

Our science curriculum is well thought out and is planned to demonstrate progression. We focus on progression of knowledge and skills and discrete vocabulary progression also which form parts of the units of work.

The Edexcel Entry Level Certificate in Science qualification enables students to:

- acquire a body of basic scientific knowledge and an understanding of some important scientific ideas
- develop basic experimental and investigative abilities
- recognise the difference between scientific and non-scientific ideas and explanations
- develop a basic understanding of some of the important technological and environmental applications of science and the economic, ethical and social implications
- develop literacy, numeracy and ICT skills as appropriate to them and the centre resources that are available
- develop an interest in science leading to further study at a higher level, for example, the Edexcel GCSE.

Key features and benefits of the qualification

Key features and benefits are:

- provides entitlement to the Programme of Study for Key Stage 4 Science
- recognises achievement at National Curriculum Levels 1, 2 and 3
- meets the needs of students with special educational needs
- meets the requirements of students with learning and behavioural difficulties
- motivates students by recognising small steps of achievement
- no terminal examination
- flexible teaching and assessment approaches
- clear links to the Edexcel GCSE in Science.

The SLT will continually monitor the impact the teaching of science is having on the children's learning through book scrutinises to ensure the progress of knowledge and skills that are being taught. They will also ensure the knowledge taught is retained by the children and continually revisited and that the learners are able to apply the skills they have been taught to a variety of different settings, showing independence with their learning.

KS4 Overview

The Edexcel Entry Level Certificate in Science

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- develop basic experimental and investigative abilities
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- meets the requirements of students with learning and behavioural difficulties
- motivates students by recognising small steps of achievement
- no terminal examination
- flexible teaching and assessment approaches
- clear links to the Edexcel GCSE in Science.

These qualifications are designed for Key Stage 4 students who are not yet ready to follow a Level 1 programme through either an academic or vocational pathway.

There are nine topics that focus on the following important areas of the Key Stage 4 Programme of Study.

- 1 Classification and variation
- 2 Changes in humans and plants
- 3 Drugs and bacteria
- 4 The Earth, its atmosphere and chemical reactions
- 5 Acids and metals
- 6 Fuels
- 7 Waves and radiation
- 8 Earth and space
- 9 Electricity and energy

The topics have been chosen to ensure that students develop a grasp of some important concepts and that they are presented in a way that maximises engagement.

To ensure students have the opportunity to fulfill their potential, the topics are aligned to content in the Edexcel 2011 GCSE in Science. This ensures that students can either:

- start to gain GCSE foundation tier knowledge but then drop back to Entry level if the GCSE is too demanding

or

- complete the Entry Level qualification and then build on their knowledge by attempting to learn the GCSE foundation tier knowledge.

Alignment of the content to the Edexcel 2011 GCSE in Science also means that some resources you use to deliver the GCSE, for example practical equipment and books, can be of use when teaching at Entry level, as long as you take appropriate steps to ensure students can access any learning materials at the appropriate level.

Knowledge and understanding

This Edexcel Entry Level Certificate in Science requires students to demonstrate a knowledge and understanding of:

- basic scientific concepts
- scientific terms, conventions, symbols and technical vocabulary
- applications of science in everyday life.

Skills

The Edexcel Entry Level Certificate in Science requires students to apply:

- experimental skills to perform simple experiments in which they carry out fair testing, follow procedures, take basic measurements, record observations and organise and present their results
- analytical skills to interpret experimental data and draw conclusions
- communication skills to communicate observations and ideas using basic scientific and technical vocabulary
- simple mathematics to solve scientific problems.

Topic 1: Classification and variation

Biology

In this topic, students will explore:

- the structure of a simple animal cell and a simple plant cell
- the classification of living things
- variations in humans
- inheritance of characteristics
- genetic disorders
- evolution.

Students are expected to undertake practical work and to collect data to test simple ideas. They should draw conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. Students should be encouraged to use ICT, for example to write up experiments, make bar charts, calculate percentages, produce posters and reports.

Entry Level 1	Entry Level 3
Students at this level are likely to be able to: label the nucleus in a generalised animal cell distinguish between plant and animal cells use a simple branching key to sort living things into kingdoms give examples of some characteristics of animals which live in water and on land, using drawings or images use a simple branching key to sort vertebrates into classes describe some differences between individuals and give one reason for these differences identify one continuously varying trait in humans from a given list identify one discretely varying trait in humans from a given list identify inherited characteristics from a given list name one disease that can be inherited recognise appropriate scientific vocabulary.	Students at this level are likely to be able to: label the nucleus in a cell and recognise it as containing chromosomes which control the cell label the cell wall and chloroplasts in a generalised plant cell use data to complete a simple branching key to sort living things into kingdoms give examples of some characteristics of animals which live in a variety of habitats and describe how these characteristics help the animal to survive use data to complete a simple branching key to sort vertebrates into classes describe some differences between individuals and give the reasons for these differences give examples of continuously varying characteristics in humans give examples of discretely varying characteristics in humans give examples of characteristics that are inherited and those that are changed by the environment name at least two diseases that can be inherited and some of their related symptoms use appropriate scientific vocabulary.

Topic 2: Changes in humans and plants

Biology

In this topic, students will explore:

- keeping body conditions constant
- hormones
- the nervous system
- changes in plant growth.

Students are expected to undertake some practical work to make observations and draw simple conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. The use of ICT to present experimental work should be encouraged.

Spreadsheets may be used to tabulate data and produce graphs where appropriate.

Entry Level 1	Entry Level 3
Students at this level are likely to be able to: recall that sweating lowers body temperature recall that hormones are chemical messengers state that insulin controls the amount of sugar in the body recall that messages to and from the brain are carried by nerve cells state that plants grow towards light.	Students at this level are likely to be able to: state that sweating lowers body temperature and shivering raises it state that hormones are chemical messengers that travel around the body in the blood state that insulin is made in the pancreas, controls blood sugar levels and cannot be produced by some people with diabetes recall that there are two types of diabetes recall that some muscle actions take place without conscious control recall that plant growth can be affected by both light and gravity.

Topic 3: Drugs and bacteria

Biology

In this topic, students will explore:

- the general effects of the four major drug types on the human body
- how reaction times are affected by drugs
- the implications of drug misuse
- the spread of infectious diseases by pathogens
- measures to reduce the spread of infectious diseases
- use of antibiotics to control infection.

Students are expected to undertake some practical work to make observations and draw simple conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. The use of ICT to present experimental work should be encouraged.

Spreadsheets may be used to tabulate data, produce graphs where appropriate, produce reports, surveys etc. Information can be obtained from websites.

Entry Level 1	Entry Level 3
Students at this level are likely to be able to: recognise that non-medical drugs are often harmful list several drugs (both medical and recreational) state one chemical in tobacco and how it affects the human body state one harmful effect of alcohol describe a benefit of a common medical drug, e.g. aspirin, cough mixture measure the reaction time of an individual using a simple method or computer simulation use given data to identify the effect of alcohol on reaction times identify a simple pattern from a graph, e.g. how the number of cigarettes smoked by an individual relates to an increased risk of the individual dying from lung cancer state that infectious illness are caused by microbes describe some of the methods by which pathogens spread describe a simple method used to limit the spread of pathogens/control infection identify a simple pattern from a graph, e.g. how the concentration of an antibiotic affects microbial cultures.	Students at this level are likely to be able to: describe the effects of specific drugs classify drugs into different types describe the effect of tar and nicotine on the lungs describe the short- and long-term effects of alcohol describe some benefits and side effects of common medical drugs measure the reaction time of an individual using a simple method or computer simulation a number of times, and record measurements in a suitable chart so that graphs or averages can be produced find out the effect of alcohol on reaction times by selecting information from more than one source provided for them identify a simple pattern from a graph and suggest reasons for the pattern, e.g. how the number of cigarettes an individual smokes relates to an increased risk of the individual dying from lung cancer and give reasons for trends shown give examples of infectious diseases caused by bacteria, viruses and fungi and their method of spread explain methods used to limit the spread of pathogens/control infection identify a simple pattern from a graph and suggest reasons for the pattern, e.g. how the concentration of an antibiotic affects microbial cultures.

Topic 4: The Earth, its atmosphere and chemical reactions

Chemistry

In this topic, students will explore:

- the atmosphere – how it has changed over time
- igneous, sedimentary and metamorphic rocks
- atoms and chemical reactions.

Students are expected to undertake practical work to achieve many of the outcomes for this topic. They should make observations and draw conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. The use of ICT to present experimental work should be encouraged.

Entry Level 1	Entry Level 3
Students at this level are likely to be able to: • recall some of the main gases that made up the Earth's earliest atmosphere and make up the atmosphere of the Earth today • give one example of a process or action which would result in a change in the composition of the Earth's atmosphere today, e.g. driving a car • identify different types of rock using an identification chart • name some rocks • describe advantages and disadvantages of quarrying limestone, communicating their ideas in a simple way • describe atoms and reactions in a simple way, e.g. using drawings • recall that limestone breaks down when heated to produce new substances and that these new substances can be reacted further.	Students at this level are likely to be able to: • describe the gases in the Earth's earliest atmosphere and the atmosphere today and use scientific terms to explain how the percentage of the gases has changed • describe different processes which change the percentages of gases in the atmosphere using scientific terms, e.g. photosynthesis, deforestation • describe the properties of different rocks and identify rocks as igneous, sedimentary or metamorphic without the need for an identification chart • name at least one rock that belongs to each rock type • describe advantages and disadvantages of quarrying limestone, communicating ideas in simple sentences • describe atoms using simple sentences • describe reactions using simple sentences and word equations • describe the products formed during the thermal decomposition of calcium carbonate and recall the products of the further reaction of these products.

Topic 5: Acids and metals

Chemistry

In this topic, students will explore:

- some properties of metals and non-metals
- metals in the Earth
- neutralisation reactions
- how to test for some gases.

Students are expected to undertake practical work to achieve many of the outcomes for this topic. They should make observations and draw conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. Students should be encouraged to use ICT to present experimental work.

Entry Level 1	Entry Level 3
Students at this level are likely to be able to: • make limited use of scientific terms (e.g. reaction) in discussions • describe properties of groups of materials, e.g. metals and non- metals • describe how to test for hydrogen and carbon dioxide gases • state the different-coloured flames obtained when specified metals are placed in a Bunsen burner flame • use simple texts, with help, to obtain information, e.g. about recycling materials • describe reactions between acids and metals and metal compounds • give uses for metal salts • know that chlorine gas can be made from hydrochloric acid and can be used in making bleach.	Students at this level are likely to be able to: • make some use of scientific terms (e.g. neutralisation, reaction) in discussions and written work • use the properties of materials to sort them into groups, e.g. metals and non-metals • identify hydrogen and carbon dioxide gases using appropriate tests • identify metals using a simple flame test • describe reactions between acids and metals and metal compounds, and know what type of salt is formed • describe uses of metal salts • know that electricity is used to break down hydrochloric acid to form hydrogen and chlorine.

Topic 6: Fuels

Chemistry

In this topic, students will explore:

- fuels
- useful substances produced from crude oil
- pollution and the environment, including the greenhouse effect
- sustainability.

Students are expected to undertake practical work to achieve many of the outcomes for this topic. They should make observations and draw conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. The use of ICT to present experimental work should be encouraged.

Entry Level 1	Entry Level 3
Students at this level are likely to be able to: • describe global warming in a simple way, e.g. using drawings or a poster • make limited use of simple scientific terms (e.g. fuel) in discussions • know how fuels burn and how fires are extinguished • describe how to test for water and carbon dioxide gas • know the uses of products made from crude oil • use simple texts, with help, to obtain information, e.g. about recycling materials • discuss the pollution produced by burning fossil fuels and the harm caused to the environment, in a general context.	Students at this level are likely to be able to: • describe global warming using simple sentences (perhaps within a leaflet) and outline its impact on the environment • make some use of scientific terms (e.g. fossil fuels, biofuels) in discussions and written work • use a simple word equation for burning and understand the hazards of incomplete combustion • identify the products formed when a fuel is burned, using appropriate tests • describe useful products derived from crude oil • select information from given sources that are provided to obtain information, e.g. recycling materials • discuss the impact on the environment of the different pollutants produced by burning fossil fuels.

Topic 7: Waves and radiation

Physics

In this topic, students will explore:

- uses of converging lenses
- how to describe waves
- the visible spectrum
- the electromagnetic spectrum
- ionising and other radiation.

It is expected that most of the outcomes for this topic will be achieved via practical work. Students should be encouraged to draw conclusions from their data and use appropriate scientific, technical and mathematical language, conventions and symbols. As ICT contributes to how science works, students should be encouraged to use ICT facilities. For example, they can use a word-processing package to write up experiments and produce booklets. Spreadsheets may be used to tabulate data and produce graphs where appropriate.

Entry Level 1	Entry Level 3
Students at this level are likely to be able to: • identify the lens in a diagram of a camera • measure the focal length of a convex lens • complete a diagram to show how light from a distant source is bent inwards by a lens • identify that a fat lens is stronger than a thin lens • recall that there are two lenses in a simple telescope • match particle movement to the type of wave (limited to sound and water waves) • label a diagram of a wave with crest and trough • identify the largest amplitude/wavelength on a diagram of different waves • recall that you can use a prism to split up light • state some of the colours in the visible spectrum (not necessarily in order) • recall that we can detect invisible radiation in sunlight with special beads • complete a chart of the electromagnetic spectrum from a given word box • recall that electromagnetic waves carry energy • state one harmful effect of an electromagnetic wave • state some uses of electromagnetic waves • recall that radioactive sources emit radiation which cannot be seen.	Students at this level are likely to be able to: • explain the benefits of using a telescope • describe how to find the focal length of a convex lens • measure the focal length of several lenses to find a pattern between the thickness and focal length • label the focal point/length on a completed diagram to show how light from a distant source is bent inwards by a lens • label the eyepiece and objective lens in a diagram of a simple telescope • state that the eyepiece is a stronger lens than the objective lens • describe the movement of particles for a sound or water wave • draw and label a wave with wavelength and amplitude • identify the largest frequency on a diagram of different waves • describe amplitude as 'loudness' and frequency as 'pitch' • describe how to find the colours of the visible spectrum using a prism • list the colours in the visible spectrum in order • describe how to use UV beads • complete a chart of the electromagnetic spectrum without a word box • recall that the gamma/high frequency end of the electromagnetic spectrum carries more energy than radio waves • relate the harmful effects of electromagnetic radiation to the energy carried • state a use for each region of the electromagnetic spectrum • list the names of the radiation emitted by radioactive sources.

Topic 8: Earth and space

Physics

In this topic, students will explore:

- the structure of the Earth
- the nature, location and harmful effects of earthquakes
- different ways of finding out information about our Universe, including the use of optical telescopes and their limitations
- the use of secondary data on the Solar System and earthquakes.

As ICT contributes to how science works, students should be encouraged to use word processing software and internet searches to produce booklets/information leaflets on earthquakes and their effects, and also on how and why we explore Space. This topic also provides opportunities to look at how ideas on the Solar System, and our understanding of it, have changed with time. Students should use scientific, technical and mathematical language, conventions and symbols where appropriate.

Entry Level 1	Entry Level 3
Students at this level are likely to be able to: • use simple texts and the internet, with help, to obtain information about, e.g., the effects of earthquakes • use secondary data sources, with help, to produce a fact sheet on the Solar System • show a basic understanding of how earthquakes occur, communicating their ideas in a simple way, e.g. using drawings • describe how our understanding of the Solar System has changed over time • discuss the social and economic benefits of locating earthquakes, in a general context • make limited use of scientific terms (e.g. core, planet, moon) in discussions.	Students at this level are likely to be able to: • select, with little, if any, help, information from given sources about, e.g., the cause and effect of earthquakes • use secondary data sources with little or no help to produce a fact sheet, e.g. on the Solar System • show an understanding of the causes of earthquakes, communicating their ideas using simple sentences • describe how our understanding of the Solar System and the Universe has developed over time, outlining scientific evidence for developments in our understanding • discuss the social and economic benefits of locating earthquakes, in a specific context • make some use of scientific terms (e.g. mantle, tsunami, Solar System) in discussions and written work.

Topic 9: Electricity and energy

Physics

In this topic, students will explore:

- the generation of electricity using a variety of energy sources
- avoiding wastage and the efficient and safe use of electricity.

As ICT contributes to how science works, students should be encouraged to use word-processing software and internet searches to produce booklets/information leaflets on renewable and non-renewable energy sources. They should use scientific, technical and mathematical language, conventions and symbols where appropriate.

Entry Level 1	Entry Level 3
Students at this level are likely to be able to: • use simple texts and the internet, with help, to obtain information about, e.g., safety precautions when near electricity cables and pylons and when using electricity in the home • use secondary data sources with help to, e.g., produce a fact sheet on renewable sources of energy, including wind, solar, wave, hydro • show a basic understanding of the production of electricity using magnets and coils, communicating their ideas in a simple way, e.g. using drawings • describe how our use of energy sources has changed over time, e.g. why electricity has meant that heating/cooking/lighting/communicating is easier and quicker than previous methods • discuss the social and economic benefits of energy-saving devices such as lamps and various domestic insulations, in a general context • make limited use of scientific terms (e.g. electric current, volts, watts, transformer) in discussions.	Students at this level are likely to be able to: • use given information sources with little, if any, help, to obtain information about, e.g., safety precautions when near electricity cables and pylons, and when using electricity in the home • use secondary data sources with little, if any, help to, e.g., produce a fact sheet on renewable sources of energy, including wind, solar, wave, hydro • show an understanding of, e.g., the production of electricity using magnets and coils, communicating their ideas using simple sentences • describe how our use of energy sources has changed over time, outlining the development of the scientific ideas involved, e.g. why electricity has meant that heating/cooking/lighting/communicating is easier and quicker than previous methods • discuss the social and economic benefits of energy-saving devices such as lamps and various domestic insulations in a specific context • make some use of scientific terms (e.g. induced current amps, kilowatt-hour) in discussions and written work.

GEOGRAPHY

Geography Intent:

At Northstar New School geography education should be fully inclusive to every child. Our aims are to fulfil the requirements of the National Curriculum for Geography; providing a broad, balanced and differentiated curriculum; ensuring the progressive development of geographical concepts, knowledge and skills; and for the children to develop a love for geography.

Furthermore, we aim to inspire in pupils a curiosity and fascination about the world and its people that will remain with them for the rest of their lives. Teaching should equip pupils with knowledge about diverse places, people, resources and natural and human environments, together with a deep understanding of the Earth's key physical and human processes. (The 2014 Primary National Curriculum in England)

Geography teaching at NUS has a wide application to everyday life, teaching the children to enjoy learning about the world and to have a better understanding of how people live in different locations.

The aims of teaching geography in our school are:

- to inspire pupils' curiosity to discover more about the world
- to enable children to know about the location of the world's continents, countries, cities, seas and oceans.
- to develop in children the skills of interpreting a range of sources of geographical information, including maps, diagrams, globes, aerial photographs and Geographical Information Systems (GIS)
- to help children understand how the human and physical features of a place shapes it location and can change over time
- to provide opportunities to study mathematics across the curriculum through geography lessons

Special Educational Needs Disability (SEND) / Pupil Premium / Higher Attainers

Children may have work additional to and different from their peers in order to access the curriculum dependent upon their needs. As well as this, our school offers a demanding and varied curriculum, providing children with a range of opportunities in order for them to reach their full potential and consistently achieve highly from their starting points.

Implementation:

To ensure high standards of teaching and learning in geography, we implement a curriculum that is progressive throughout the whole school. Geography is taught as part of a termly topic, focusing on knowledge and skills stated in the National Curriculum. At NNS, we ensure that geography has the same importance given to it as the core subjects, as we feel this is important in enabling all children to gain 'real-life' experiences.

The geography curriculum at Northstar New School is based upon the 2014 Primary National Curriculum in England, which provides a broad framework and outlines the knowledge and skills taught in each Key Stage. Teachers plan lessons for their class using our progression of knowledge and skills document. Teachers can use this document to plan their geography lessons suitable to their class's interests and what they want to learn. The progression document ensures the curriculum is covered and the skills/knowledge taught is progressive from year group to year group.

When teaching geography, the teachers should follow the children's interests to ensure their learning is engaging, broad and balanced.

Geography teaching focuses on enabling children to think as geographers. A variety of teaching approaches are used based on the teacher's judgement.

Geography provides excellent opportunities to enhance the learning of more able pupils through the investigations, analysing sources and writing extending pieces

At Northstar New School we provide a variety of opportunities for geography learning inside and outside the classroom.

Educational visits are another opportunity for the teachers to plan for additional geography learning outside the classroom. At Northstar New School, the children have had many opportunities to experience geography on educational visits. The children have explored the local area including orienteering within the school grounds and conducting river studies in our local area. Local museums also provide an opportunity to further geography learning.

Impact:

Within geography, we strive to create a supportive and collaborative ethos for learning by providing investigative and enquiry-based learning opportunities. Emphasis is placed on investigative learning opportunities to help children gain a coherent knowledge of understanding of each unit of work covered throughout the school.

Our geography curriculum is high quality, well thought out and is planned to demonstrate progression. We focus on progression of knowledge and skills and discreet vocabulary progression also form part of the units of work. Children will deepen their understanding of the interaction between physical and human processes and how this affects landscapes and environments.

We measure the impact of our curriculum through the following methods:

- Assessing children's understanding of topic linked vocabulary before and after the unit is taught.
- Summative assessment of pupil discussions about their learning.
- Images and videos of the children's practical learning.
- Interviewing the pupils about their learning (pupil voice).
- Moderation staff meetings where pupil's books are scrutinised and there is the opportunity for a dialogue between teachers to understand their class's work.
- Annual reporting of standards across the curriculum.
- Marking of written work in books.

Year 10 Geography – Topics may vary according to the interests and abilities of the pupils.

Unit	Knowledge	Skills
Changing Economic World Development & UK	The use of different developmental indicators and their reliability. The causes and impacts of an unequally developed world. The various strategies for reducing the global development gap. A case study on how tourism is closing the gap in Kenya <u>UK</u> Major changes in the UK have affected, and will continue to affect, employment patterns and regional growth. Including • Post-industrial shift in the economy • How industry can become more sustainable • Improvements in infrastructure The north-south divide	The use of keywords in geographical writing. Analyzing world maps to pick out global trends. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.
Challenge of Natural Atmospheric Hazards	How natural hazards pose major risks to people and property. How global atmospheric circulation helps to determine patterns of weather and climate. Tropical storms develop due to physical conditions. Tropical storms have significant effects on people and the environment. The UK is affected by several weather hazards. Extreme weather events in the UK have impacts on human activity. Climate change is the result of natural and human factors and has a range of effects. Managing climate change involves both mitigation and adaptation.	Creating physical diagrams, such as low pressure. Analyzing sources and videos. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.

Resource Manage- ment Water Focus	How food, water and energy are fundamental to human development. The changing demand and provision of resources in the UK create opportunities and challenges. An overview of resources in relation to the UK for food, water and energy. How the demand for water resources is rising globally but supply can be insecure, which may lead to conflict. The different strategies can be used to increase water supply. Including Chinese south to north transfer scheme Water conservation and management Increasing water supplies in developing countries	Defining different strategies and outlining key advantages and disadvantages. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.
Living World Ecosystems & Rain- forests	How ecosystems exist at a range of scales and involve the interaction between biotic and abiotic components. The characteristics and features of a local small-scale ecosystem— The tropical rainforest eco- systems have a range of distinctive characteristics. How deforestation has economic and environmental im- pacts. The way tropical rainforests need to be managed to be sustainable.	Describing trends in maps and graphs. Describing and comparing vid- eo and images. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.
Physical Landscapes UK Rivers	How the shape of river valleys changes as rivers flow downstream. The distinctive fluvial landforms resulting from different physical processes. The different management strategies used to protect river landscapes from flooding.	Describing the sequence of physical processes. Sketching and labelling landforms. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.

Urban Environments London	The growing percentage of the world's population lives in urban areas. How urban change in cities in the UK leads to a variety of social, economic and environmental opportunities and challenges in London. Including • The location and importance • Cause of population growth • How urban growth has created opportunities • How urban growth has created challenges A case study of the Olympic Park as an example of regeneration. Urban sustainability requires management of resources and transport.	Developing skills in comparing sets of data, using connectives, such as whereas. Analyzing a range of sources including media, photographs and numerical data. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.
Fieldwork	Knowledge will change depending on the chosen fieldwork enquiry. The factors to consider when choosing an appropriate field site. The choice of appropriate primary and secondary data collection. The way to choose the correct sample size. The way to choosing the correct data presentation. How to reach appropriate conclusions and evaluation.	Selecting appropriate sites, data collection and sample sizes. Analyzing and describing a range and graphs and diagrams. Developing skills in de-tailed explanation through chains of reasoning. Developing evaluative skills through decision-making.

Year11 Geography - Topics may vary according to the interests and abilities of the pupils

Unit	Knowledge	Skills
Changing Economic World Nigeria	<u>Nigeria</u> How rapid development can lead to significant social, environmental and cultural change. Including • Location and importance • The role of TNCs • Trading relationships Environmental consequences	Developing skills in comparing sets of data, using connectives, such as whereas. Analyzing a range of sources including media, photographs and numerical data. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through the use of decision making.
Challenge of Natural Hazards Tectonics	How earthquakes and volcanic eruptions are the result of physical processes. The effects of, and responses to, tectonic hazards vary between areas of contrasting levels of wealth. Nepal and Chile. How a range of management can reduce the effects of a tectonic hazard.	Describing the sequence of physical processes. Analyzing trends in graphs and world maps. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.
Living World Hot Deserts	How hot desert ecosystems have a range of distinctive characteristics. The development of hot desert environments creates opportunities and challenges, including the Thar Desert case study. How the areas on the fringe of hot deserts are at risk of desertification. How strategies can be used to reduce the impact of desertification in hot deserts.	Describing and analysis data, such as climate graphs. Identifying and describing features in images. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.

Physical Landscapes UK Rivers	To know the diverse range of landscapes in the UK. That the coast is shaped by several physical processes. How distinctive erosional and depositional coastal landforms are the result of rock type, structure and physical processes. The different management strategies can be used to protect coastlines from the effects of physical processes. A case study of the Holderness Coastline including its landforms and management techniques.	Describing the sequence of physical processes. Sketching and labelling landforms. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.
Urban Environments Rio de Janeiro	A growing percentage of the world's population lives in urban areas. How urban growth creates opportunities and challenges for Rio. Including • The location and importance • Cause of population growth • How urban growth has created opportunities How urban growth has created challenges	Developing skills in comparing sets of data, using connectives, such as whereas. Analyzing a range of sources including media, photographs and numerical data. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.
<u>Pre-release and Re-trieval</u>	Knowledge is dependent on pre-release material.	Developing skills in reading and analyzing dense texts to formulate a viewpoint. Developing skills in detailed explanation through chains of reasoning. Developing evaluative skills through decision-making.

Pearson BTEC Level 1/Level 2 First Award in Sport

BTEC First Awards are primarily designed for use in schools as an introductory Level 1/Level 2 course for learners who want to study in the context of a vocational sector. The knowledge, understanding and skills learned in studying a BTEC First will aid progression to further study and, in due course, prepare learners to enter the workplace. These qualifications are intended primarily for learners in the 14–16 age group but may also be used by other learners who wish to gain an introductory understanding of a vocational area. When taken as part of a balanced curriculum, there is a clear progression route to a Level 3 course or Apprenticeship. BTECs are vocationally related qualifications, where learners develop knowledge and understanding by applying their learning and skills in a work-related context. The qualifications are popular and effective because they enable learners to take responsibility for their own learning and to develop skills that are essential for the modern-day workplace. These skills include: teamworking, working from a prescribed brief, working to deadlines, presenting information effectively, accurately completing administrative tasks and processes. BTEC Firsts motivate learners, and open doors to progression to further study and responsibility in the workplace.

The Pearson BTEC Level 1/Level 2 First Award:

- is for learners aged 14 years and over
- is a Level 1/Level 2 qualification; the grades range from Level 2 P to Level 2 D*. Learners who do not achieve at Level 2 may be graded at Level 1. Learners whose level of achievement is below a Level 1 will receive an unclassified (U) result
- is a 120-guided-learning-hour qualification (equivalent in teaching time to one GCSE)
- has 25 per cent of the qualification that is externally assessed. Pearson sets and marks these assessments
- will be available on the Regulated Qualifications Framework (RQF)
- presents knowledge in a work-related context
- gives learners the opportunity to develop and apply skills in English and mathematics in naturally occurring, relevant contexts
- provides opportunities for synoptic assessment, see Annexe B for more detailed information.

Unit 1: Fitness for Sport and Exercise

Level: **1 and 2**

Unit type: **Core**

Guided learning hours: **30**

Assessment type: **External**

Learning aims

In this unit you will:

- A know about the components of fitness and the principles of training
- B explore different fitness training methods
- C investigate fitness testing to determine fitness levels.

Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Understand the rules, regulations and scoring systems for selected sports			
1A.1Describe the rules, regulations and scoring systems of a selected sport. #	2A.P1 Describe the rules, regulations and scoring systems of two selected sports. #	2A.M1 For each of two selected sports, explain the role and responsibilities of officials and the application of rules, regulations and scoring systems. #	2A.D1 Compare and contrast the roles and responsibilities of officials from two selected sports, suggesting valid recommendations for improvement to the application of rules, regulations and scoring systems for each sport. #
1A.2Apply the rules of a selected sport in two given specific situations.	2A.P2 Apply the rules of a selected sport in four specific situations.		
1A.3Describe the roles of officials from a selected sport.	2A.P3 Describe the roles and responsibilities of officials from two selected sports.		
Learning aim B: Practically demonstrate skills, techniques and tactics in selected sports			
1B.4Describe the components of fitness and technical demands of two selected sports.	2B.P4 Describe the components of fitness and technical and tactical demands of two selected sports.		
1B.5Demonstrate relevant skills and techniques effectively, in two selected sports, in isolated practices.	2B.P5 Demonstrate relevant skills, techniques and tactics effectively, in two selected sports, in conditioned practices.	2B.M2 Demonstrate relevant skills, techniques and tactics effectively, in two selected sports, in competitive situations.	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim C: Be able to review sports performance			
1C.6 Produce, with guidance, an observation checklist that can be used effectively to review own performance in two selected sports. #	2C.P6 Independently produce an observation checklist that can be used effectively to review own performance in two selected sports. #		
1C.7 Review own performance in two selected sports, identifying strengths and areas for improvement.	2C.P7 Review own performance in two selected sports, describing strengths and areas for improvement.	2C.M3 Explain strengths and areas for improvement in two selected sports, recommending activities to improve own performance.	2C.D2 Analyse strengths and areas for improvement in two selected sports, justifying recommended activities to improve own performance.

*Opportunity to assess mathematical skills #Opportunity to

assess English skills

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with Section 8 Internal assessment.

For this unit, appropriate sports are those that will allow all criteria to be satisfied.

The sports should, therefore, have rules, a clear method of victory and a range of skills, techniques and tactics. Learners do not have to fulfil all the criteria using the same two selected sports throughout. The unit assessment criteria give learners the flexibility to explore a variety of different sports should they wish to do so. Alternatively, learners may decide to select the same two sports throughout as evidence to meet the assessment criteria.

The assessment evidence can be submitted in a variety of ways through presentations, written reports, observation records/witness statements.

For learning aim A, to apply the rules in different situations learners should be encouraged to do this in the role of one of the officials in a selected sport, therefore demonstrating practically the application of rules in each specific situation. When using alternative methods of delivery, it is very important that learners have a range of evidence. For example, assessors should ensure that a wide range of audio and video clips is produced for an appropriate sample of learners within the centre to support assessment decisions.

For learning aim B, learners need to ensure they cover the components of physical fitness relevant to their chosen sports, clearly describing how they are used within each sport.

For learning aim B, for the assessment of the demonstration of skills, techniques and tactics (level 2) and skills and techniques (level 1), it is important that assessors understand the differences between the standards.

For 1B.5, it is expected that learners will have attempted each of the core skills and techniques over the duration of delivery of the sports within isolated practices (skills and techniques used/demonstrated independently without any pressure or external forces).

For 2B.P5, learners need to apply relevant skills, techniques and tactics for each of the two selected sports within conditioned practices. A conditioned practice is a situation where players are given the opportunity to demonstrate a specific skill under some pressure in a similar environment to a game/competitive situation.

For example, practising a corner in football – six players defending the corner and five attacking the corner. For 2B.M2, learners are required to demonstrate the skills, techniques and tactics applied in a competitive situation. This should be in line with the rules of the sport. The competitive situation should have officials officiating the game/competition and should clearly show the learner participating within the situation.

Learners may demonstrate their practical participation through a variety of clips from a variety of different situations, but it is important that each criterion is awarded by assessors only for full coverage of the assessment requirements in each of the two selected sports the learner is demonstrating.

For learning aim C, learners should be encouraged to complete their self-analysis while watching a recording of their performance; this will support them to complete their observation checklist. Learners can give verbal or written feedback to the assessor as evidence of the attainment of their review of their own performance. Verbal presentations must be supported by an assessor's observation record, which clearly shows learners' achievements against the target assessment criteria.

Unit 2: Practical Performance in Sport

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **30**

Assessment type: **Internal**

Learning aims

In this unit you will:

- A. understand the rules, regulations and scoring systems for selected sports
- B. practically demonstrate skills, techniques and tactics in selected sports
- C. be able to review sports performance

Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Understand the rules, regulations and scoring systems for selected sports			
1A.1Describe the rules, regulations and scoring systems of a selected sport. #	2A.P1 Describe the rules, regulations and scoring systems of two selected sports. #	2A.M1 For each of two selected sports, explain the role and responsibilities of officials and the application of rules, regulations and scoring systems. #	2A.D1 Compare and contrast the roles and responsibilities of officials from two selected sports, suggesting valid recommendations for improvement to the application of rules, regulations and scoring systems for each sport. #
1A.2Apply the rules of a selected sport in two given specific situations.	2A.P2 Apply the rules of a selected sport in four specific situations.		
1A.3Describe the roles of officials from a selected sport.	2A.P3 Describe the roles and responsibilities of officials from two selected sports.		
Learning aim B: Practically demonstrate skills, techniques and tactics in selected sports			
1B.4Describe the components of fitness and technical demands of two selected sports.	2B.P4 Describe the components of fitness and technical and tactical demands of two selected sports.		
1B.5Demonstrate relevant skills and techniques effectively, in two selected sports, in isolated practices.	2B.P5 Demonstrate relevant skills, techniques and tactics effectively, in two selected sports, in conditioned practices.	2B.M2 Demonstrate relevant skills, techniques and tactics effectively, in two selected sports, in competitive situations.	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim C: Be able to review sports performance			
1C.6 Produce, with guidance, an observation checklist that can be used effectively to review own performance in two selected sports. #	2C.P6 Independently produce an observation checklist that can be used effectively to review own performance in two selected sports. #		
1C.7 Review own performance in two selected sports, identifying strengths and areas for improvement.	2C.P7 Review own performance in two selected sports, describing strengths and areas for improvement.	2C.M3 Explain strengths and areas for improvement in two selected sports, recommending activities to improve own performance.	2C.D2 Analyse strengths and areas for improvement in two selected sports, justifying recommended activities to improve own performance.

*Opportunity to assess mathematical skills #Opportunity to

assess English skills

Unit 3: Applying the Principles of Personal Training

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **30**

Assessment type: **Internal**

Learning aims

In this unit you will:

- A design a personal fitness training programme
- B know about the musculoskeletal system and cardiorespiratory system and the effects on the body during fitness training
- C implement a self-designed personal fitness training programme to achieve own goals and objectives
- D review a personal fitness training programme.

Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Design a personal fitness training programme			
1A.1 Design a safe four-week personal fitness training programme to meet an activity/sport goal taking into consideration personal information, with guidance. #	2A.P1 Independently design a safe six-week personal fitness training programme to meet an activity/sport goal taking into consideration personal information. #	2A.M1 Design a safe six-week personal fitness training programme to meet an activity/sport goal which meets the needs of the individual, showing creativity in the design. #	2A.D1 Justify the training programme design, explaining links to personal information. ##
Learning aim B: Know about the musculoskeletal system and cardiorespiratory system and the effects on the body during fitness training			
1B.2 Outline the structure and function of the musculoskeletal and cardiorespiratory systems	2B.P2 Describe the structure and function of the musculoskeletal and cardiorespiratory systems	2B.M2 Explain the short-term effects on the musculoskeletal and cardiorespiratory systems during the fitness training programme	
1B.3 Outline some of the short-term effects on the musculoskeletal and cardiorespiratory systems during the fitness training programme	2B.P3 Summarise the short-term effects on the musculoskeletal and cardiorespiratory systems during the fitness training programme		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim C: Implement a self-designed personal fitness training programme to achieve own goals and objectives			
1C.4 Safely implement, with guidance, a four-week personal fitness training programme, maintaining a training diary. # *	2C.P4 Safely implement a six-week personal fitness training programme, maintaining a training diary. # *	2C.M3 Safely implement a successful six-week personal fitness training programme, maintaining a training diary summarising outcomes for each session. # *	2C.D2 Safely implement a successful six-week personal fitness training programme, maintaining a training diary to evaluate performance and progress. # *
Learning aim D: Review a personal fitness training programme			
1D.5 Review the four-week personal fitness training programme set for an activity/sport goal, identifying results, strengths and areas for improvement.	2D.P5 Review the six-week personal fitness training programme set for an activity/sport goal, describing results, strengths and areas for improvement.	2D.M4 Explain the results, strengths of the training programme set for an activity/sport goal and areas for improvement, providing recommendations for future training and performance.	2D.D3 Fully explain the results, strengths and improvements for the training programme, justifying recommendations for future training and performance.

*Opportunity to assess mathematical skills #Opportunity to assess English skills

BTEC Level 1 Award in Home Cooking Skills (QCF)

Qualification's purpose

The Pearson BTEC Level 1 and Level 2 Awards in Home Cooking Skills are suitable for learners to develop:

- knowledge, understanding and confidence to cook meals at home
- an understanding of how to economise when planning a meal
- an ability to transfer skills learned to different recipes
- an ability to inspire others by transferring that knowledge.

Progression opportunities

Learners who have achieved the BTEC Level 1 Award in Home Cooking Skills can progress on to the BTEC Level 2 Award in Home Cooking Skills. The intended destinations for learners successfully achieving these qualifications include: • GCSEs and/or A Levels • Apprenticeships BTEC specialist qualifications may also enhance learners' self-development by providing them with valuable life skills.

Centre-devised assessment (internal assessment)

Each unit has specified learning outcomes and assessment criteria. To pass an internally assessed unit, learners must meet all the assessment criteria. Centres may find it helpful if learners index and reference their evidence to the relevant learning outcomes and assessment criteria. Centres need to write assignment briefs for the learners to show what evidence is required. Assignment briefs should indicate clearly, which assessment criteria are being targeted. Assignment briefs and evidence produced by learners must also meet any additional requirements in the Information for tutors' section of the unit. Unless otherwise indicated in Information for tutors, the centre can decide the form of assessment evidence (e.g. performance observation, presentations, projects, tests, extended writing) if the methods chosen allow learners to produce valid, sufficient and reliable evidence of meeting the assessment criteria.

Unit 1: Home Cooking Skills (Level 1)

Level: Unit reference number: Credit value: Guided learning hours: 1 F/600/8662 4 40 Unit aim

This unit aims to give learners the knowledge, skills and confidence to enjoy cooking meals at home. Learners will gain understanding of how to economise when planning meals to cook at home. The unit will encourage learners to transfer skills learnt to other recipes to continue cooking for themselves and their families and to inspire others by passing on their knowledge. The unit is based on the proposition that being able to cook is an essential life skill which empowers people to make changes that have benefits to health and wellbeing.

Key Stage 4: Citizenship

Curriculum Intent

A high-quality citizenship education helps to provide students with the knowledge, skills and understanding to prepare them to play a full and active part in society. In particular, citizenship education should foster students' keen awareness and understanding of democracy, government and how laws are made and upheld. The teaching of citizenship provides students with the skills and knowledge to explore political and social issues critically, to weigh evidence, debate and make reasoned arguments. It also prepares students to take their place in society as responsible citizens, manage their money well and make sound financial decisions.

The Citizenship curriculum supports students to develop in many diverse aspects of life. The curriculum teaches students how to build their confidence and resilience, developing responsible, respectful and active citizens who are able to play their part and become actively involved in public life as adults. Citizenship develops and deepens the students' understanding of the fundamental British values of democracy, individual liberty, the rule of law and mutual respect and tolerance.

The curriculum in Citizenship helps by promoting equality of opportunity so that all students can thrive together, understanding that difference is a positive, not a negative and that individual characteristics make people unique. It promotes an inclusive environment that meets the needs of all students, irrespective of age, disability, gender reassignment, race, religion or belief, sex or sexual orientation.

The study of citizenship develops the students' confidence, resilience and knowledge so that they can recognise risks from criminal exploitation, gang activity, radicalisation and extremism and they learn about the support available to them.

The citizenship curriculum develops the students' spiritual, moral, social and cultural education and fosters a sense of enjoyment and fascination in learning about themselves, others and the world around them, enabling them to reflect on their experiences. It allows for the moral development of students including developing their ability to recognise the difference between right and wrong and to readily apply this understanding in their own lives by recognising legal boundaries and, in doing so, respecting the civil and criminal law of England. The curriculum develops the students' interest in investigating and offering reasoned views about moral and ethical issues and enables them to understand and appreciate the viewpoints of others on these issues.

The curriculum provides provision for the cultural development of students including the understanding and appreciation of the wide range of cultural influences that have shaped their own heritage and that of others. It provides cultural capital for students giving them the ability to recognise and value the things we share in common across cultural, religious, ethnic and socio-economic communities, a knowledge of Britain's democratic parliamentary system and its central role in shaping our history and values, and in continuing to develop Britain.

Through the study of Citizenship the students:

- acquire a sound knowledge and understanding of how the United Kingdom is governed, its political system and how citizens participate actively in its democratic systems of government;
- develop a sound knowledge and understanding of the law and the justice system in our society and how laws are shaped and enforced;
- develop an interest in, and commitment to, participation in volunteering as well as other forms of responsible activity, that they will take with them into adulthood; and,
- equip pupils with the skills to think critically and debate political questions, to enable them to manage their money on a day-to-day basis, and to plan for future financial needs.

Impact

Pupils would have acquired knowledge and understanding of how the UK is governed through its political system and how they can actively participate in its democratic system of government. They should understand the role of law and the justice system which supports it, in addition to understanding how these laws are made and enforced. Pupils should have developed an interest in participating in volunteering as well as other forms of responsible activity that they can transfer into adulthood. They can now think critically and debate political questions to enable them to manage their money on a day-to-day basis and plan for the future.

Implementation

By the time our pupils leave NNS they will have developed a wider scope of understanding of what it means to be a citizen and they will have improved their communication skills. They will also have increased their capacity to develop and express their own opinion on a topic, thinking critically. Pupils will show their successes throughout debating and being able to develop an argument using their own knowledge on each topic. The focus is placed on analytical thinking and questioning which helps pupils gain a coherent knowledge and understanding from basic topics such as different types of families or religions in our community, to more complex ones like society, gender equality or global conflicts. So, by the time our pupils leave our school, they will be able to ask perceptive questions, think critically, weigh evidence, sift arguments, and develop perspective and judgement. Pupils will also be able to demonstrate and apply the British Values of Democracy, Rule of Law, Tolerance of different cultures and religions, Mutual Respect and Individual Liberty

Curriculum overview

Citizenship builds on the key stage 3 programme of study to deepen pupils' understanding of democracy, government and the rights and responsibilities of citizens. Pupils develop their skills to be able to use a range of research strategies, weigh up evidence, make persuasive arguments and substantiate their conclusions. They experience and evaluate different ways that citizens can act together to solve problems and contribute to society.

Pupils are taught about:

- parliamentary democracy and the key elements of the constitution of the United Kingdom, including the power of government, the role of citizens and Parliament in holding those in power to account and the different roles of the executive, legislature and judiciary and a free press;
- the different electoral systems used in and beyond the United Kingdom and actions citizens can take in democratic and electoral processes to influence decisions locally, nationally and beyond;
- other systems and forms of government, both democratic and non-democratic, beyond the United Kingdom;
- local, regional and international governance and the United Kingdom's relations with the rest of Europe, the Commonwealth, the United Nations and the wider world;
- human rights and international law;
- the legal system in the UK, different sources of law and how the law helps society deal with complex problems;
- diverse national, regional, religious and ethnic identities in the United Kingdom and the need for mutual respect and understanding;
- the different ways in which a citizen can contribute to the improvement of his or her community, to include the opportunity to participate actively in community volunteering, as well as other forms of responsible activity; and,
- income and expenditure, credit and debt, insurance, savings and pensions, financial products and services, and how public money is raised and spent.

The pupils study a range of topics including:

Topics	
Year 10	• Principles and values in British society today • Identities • The UK and identity • Values in a democratic and diverse society • The rights, responsibilities and role of the media • Press regulations and censorship • The role of the UK within key international organisations • The UK and the EU • International disputes and conflicts • Making a difference in society
Year 11	• Law and contemporary society • Rules and law • Rights and responsibilities within the legal system • Rights and entitlements of citizens at differing ages • How laws protect citizens and deal with criminals • Criminality in the UK today • Universal human rights

RSE KS4 OVERVIEW

In Key Stage 4, RSE builds on the subjects covered in earlier years, focusing on making positive and healthy lifestyle choices and on improving personal health and emotional wellbeing. Students are given information on access to services and where to go for confidential advice.

RSE Topics: Relationships; Self-esteem/respect; E-Safety; Pornography; Safe Sex; HIV/AIDS; Teenage Pregnancy.

Year 10

Students will discuss changing relationships, with a focus on sexual relationships and knowing when you are ready. Students will discuss the signs of both healthy and abusive relationships. Students will learn how to identify signs of an abusive relationship and where to seek advice and guidance. Students will also consider the strategies for handling break ups. Students will increase their knowledge of the law and sexual offences, which will include child sexual exploitation and revenge pornography.

RELATIONSHIPS AND SEXUAL FEELINGS

Students continue to expand their knowledge and understanding of different relationships and how they change over time. Students will be able to negotiate the relationships and friendships that they want and make them feel good (inclusive of all sexual orientations). Students will learn how to challenge prejudice, bullying, homophobia, bi-phobia and transphobia effectively.

RISK TAKING

Students will discuss how to assess a situation for risk. During Year 10 they develop assertiveness skills to resist unhelpful pressure, and negotiation skills to keep themselves safe. Students will recognise behaviours that can change their attitude to risk taking, such as drinking alcohol, taking drugs or reacting to peer pressure. Students explore the facts and laws about drug, alcohol and tobacco misuse, and the personal and social consequences of misuse for themselves and others. They understand ways of recognising and reducing risk, minimising harm and getting help in emergency and risky situations.

RIGHTS OF THE CHILD

In Year 10, students expand their knowledge about the law and the rights of the child. They understand their rights to confidentiality even if they are under 16. They revisit the age of consent in the context of The Sexual Offences Act 2003. Students look again at harmful relationships and understand that any form of violence against women and men, domestic/child abuse is a serious abuse of human rights. Students learn about Forced Marriage, and that it's a criminal offence to force someone to marry.

PORNOGRAPHY

During Year 10, students develop skills to critically reflect on the media and pornography, and to separate fantasy from reality in terms of sex, sexual activity and body image. They consider definitions and categories of pornography, particularly in how the Law relates to sex and pornography. Students will learn to uphold a positive view of sex and relationships based on equality, mutual respect between consenting partners, shared pleasure and the importance of negotiating safer sex.

SAFE SEX

Students continue to develop a sense of responsibility for looking after their own sexual health. They increase their knowledge, skill base and capacity to make rational and informed choices in birth control and barrier protection from sexually transmitted infections (regardless of sexuality). They cover how HIV and STIs, including Chlamydia are transmitted. There is a focus on HIV/AIDS and the prejudice, discrimination and stigma faced by people living with HIV. Students learn how to access a range of local and national sexual health advice, contraception and support services.

YEAR 11

Students will further develop their knowledge of pregnancy, options and parenthood. Students will be taught about self-examination and cancer identifications. There will be a further opportunity for students to develop their knowledge of domestic violence, which will include information on seeking help. Students will also discuss the implication and laws surrounding forced marriage. Students will receive guidance on how to access sexual health and support services including overcoming possible barriers to access.

RSE Topics: Relationships; Self-esteem/respect; Parenting; Abortion; Forced Marriage; Cancer and self examination.

During year 11, students will further develop their knowledge of pregnancy, options and parenthood. Students will be taught about self examination and cancer identifications. There will be a further opportunity for students to develop their knowledge of domestic violence, which will include information on seeking help. Students will also discuss the implication and laws surrounding forced marriage. Students will receive guidance on how to access sexual health and support services, including overcoming possible barriers to access.

RELATIONSHIPS

In Year 11 students will revisit what makes a healthy (sexual) relationship and readiness for a sexual relationship. They will develop the skills and confidence to stand up for their beliefs and choices. They will be able to show respect and empathy for others and advocate for those who are vulnerable. Students will consider the consequences of close relationships including having children and how this will create family ties which impact on their lives and those of others. They will learn about statutory and voluntary organisations which offer support in human relationships e.g. Relate.

SEXUALLY TRANSMITTED INFECTIONS

STI's are revisited in Year 11 in more detail. Students learn about the wide variety of bacterial and viral STI's: how they are transmitted; their symptoms (or lack of); treatment; complications if left untreated and prevention. Students will know how to access testing services and what's involved in testing. They will understand that the services are confidential. Barriers such as insecurity and embarrassment, low perceived personal risk and myths about sexual health and family planning clinics are addressed to increase confidence in the use of services.

PREGNANCY/PARENTING

Students understand the importance of delaying parenthood until they are ready, emotionally, educationally and economically. They consider the benefits of a stable marriage or partnership in bringing up children. Students will know the signs of pregnancy, and understand the options available for unplanned pregnancy, including abortion, adoption and the realities of life for young parents. Students will be given information on how to access support services.

KS4 DESIGN AND TECHNOLOGY

Promoting the importance and development of creativity, problem solving and enterprise skills in our learners. We aim to enable our learners to engage with the issues affecting tomorrow's society and to be adaptable as individual problem solvers.

We strongly believe that creativity and design are essential skills required by the nation. We are preparing our learners for a vast range of future careers, some of which do not even exist yet!

“Design Technology should be the subject where mathematical brainboxes and science whiz kids turn their bright ideas into useful products” James Dyson

CURRICULUM INTENT

Year 10 - In depth principles of design and technology

In depth knowledge of polymers and polymer production methods

In-depth knowledge of timber and the various methods of manufacture and use.

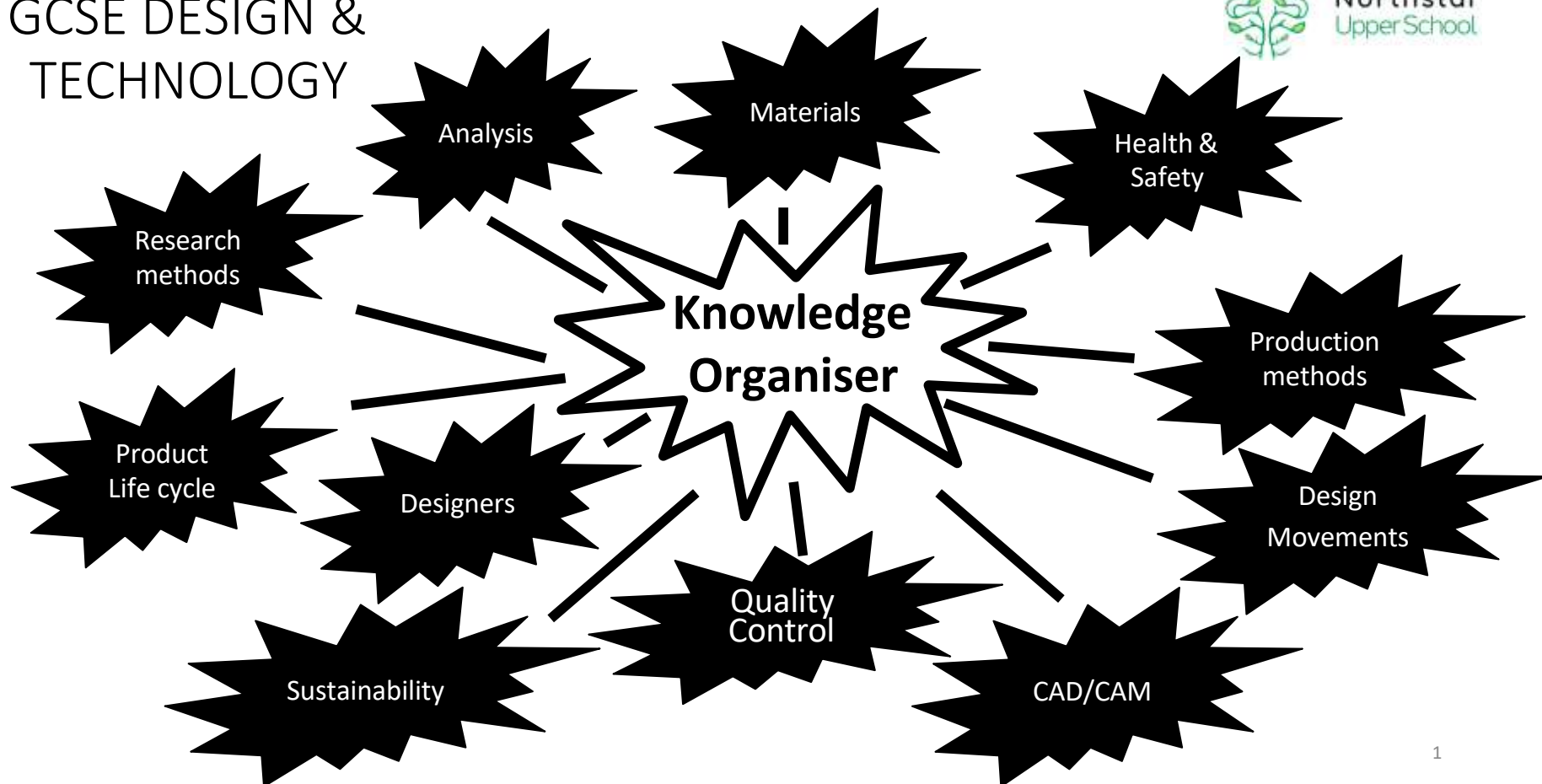
The implications of wider issues when designing products for society.

Year 11 - The iterative design challenge

Students research, design, develop and manufacture a prototype product for a 'real world' client. They experience the true 'iterative design journey'.

Student name:

GCSE DESIGN & TECHNOLOGY



Student name:

GCSE DESIGN & TECHNOLOGY

Revision checklist. Ensure you have covered all the topics below to give yourself the best chance of performing well in the examination.



Topic	Page number	Tick when completed		Page number	Tick when completed
Timber	3		Manufacturing processes (Polymers)	18	
Manufacturing processes (Timber)	4		Selection of materials	19	
Standard components	5		Paper & Board	20	
Scales of manufacture	6		Textiles	21	
Designers and Design movements	7		Sustainability and the environment	22	
Companies	8		Cooperatives, Fair Trade, Planned Obsolescence	23	
Environmental issues. (The 6 R's)	9		Electronic Systems	24	
Research (Ergonomics & Anthropometrics)	10		Mechanical systems (Levers)	25	
Renewable energy	11		Modern/Smart materials	26	
Design Strategies	12		Push and Pull marketing (CAD & CAM)	27	
Metals	13		Design Brief & Specification	28	
Measurement & production aids	14		Communication of ideas	29	
Quality Control & Quality Assurance	15		CAD/CAM/ Prototypes	30	
Polymers	16		Finishing materials	31	
Reinforcing materials	17				2

Student name:
DT Knowledge Organiser



Materials & Their
Properties

Timber

Natural timber: General name for wood materials. Properties can change according to direction of grain. At the end of its life, wood can be burnt as fuel or broken down into fibres. Wood is biodegradable.

Hardwood: Come from trees that shed their leaves each autumn.

OAK: Very strong and hard, easy to work with, open grained light brown colour. Use in furniture.

BIRCH: Hard but easy to work with. Close fine grain, very light brown colour. Furniture and turned items

ASH: Tough and flexible. Open grained, light and creamy brown colour. Tool handles, ladders, pool cues

MAHOGANY: Fairly strong/durable. Some interlocking grain, reddish colour. High quality furniture

BALSA: Soft. Off white colour. Used in modelling

Softwood: Come from coniferous trees. They keep their leaves all year round. They grow faster than hardwoods. They have a more open grain and also typically cost less. Softwood trees can come from managed forests. As they are cut down new ones are planted. They are a renewable resource.

PINE: Strong and durable, easy to work with. Straight grained, yellowish colour. Used in construction and furniture

LARCH: Tough, water resistant and durable. Straight or spiralled grain. Yellow/brownish colour. Used in boats, exterior cladding

SPRUCE: Strong and hard. Low resistance to decay. Yellowish colour. Used in construction

Standard form & Sizes

Trunks are cut into planks in a saw mill. Planks are limited by size of tree. Planks are available in range of sizes, lengths, widths and thicknesses. They can be **rough cut/sawn** or **PSE planed square edge**. PSE sizes are smaller than rough cut as they have been made smooth. Wood can be seasoned. (Dried to remove moisture) This makes the wood less likely to bend/warp. Wood can also come in variety of sections that have been shaped called mouldings.

Manufactured Timbers

These are made by gluing layers of wood fibres/veneers together. They often use waste materials from the cutting of timber. Top layers are often a high quality wood to give a good look or added protection. Manufactured boards come in very large sheets. Common sheet sizes are (8ft by 4ft). Sheets are available in standard thicknesses (3, 6, 9, 12, 15 etc...)

MDF (Medium - density fibreboard): Made from fine wood particles combined with glue. Smooth and easily machined. Used in furniture

PLYWOOD: Layers of Veneer cut or shaved from timber and glued at 90 degrees to each other. Interior and exterior grades available. Used in furniture and boat building

CHIPBOARD: Made from chips of timber mixed with glue and pressed together. Often covered with a laminate or polymer such as Melamine Formaldehyde. Used for cupboards and kitchen worktops.

Key Words

You must know the meanings of the key words below:

grain
hardwood
softwood
veneer

Key Point

Hardwood/Softwood refer to the type of tree that the wood comes from and not the properties

Manufacture boards offer consistent properties as they come in sheet form.

You must be able to:
Explain the difference between hard and soft wood

Describe the characteristics and common uses of a variety of timbers.
Explain how timber is converted to usable material



Student name:
DT Knowledge Organiser



Wasting, addition & deforming/reforming processes

Tools Equipment & processes

Manufacturing Processes 2: Timber based materials

Wasting Processes typically carried out by hand:

Sawing tools:

Tenon saws used for straight cuts

Coping saws, fret saws and jig saws used for cutting curves

Band saws used for cutting straight lines

Circular saws for cutting straight cuts in large pieces of timber

Chisels

There are four chisels

Bevel edge for corners less than 90 degrees

Firmer chisel for general waste removal

Mortise chisel for joints and deep holes

A gouge for carving

Planing

This uses a wedge shaped blade to shave off thin layers of wood.

Jack plane is used to reduce timber size

Smoothing plan used to smooth surface

Block plane used on end grain

A rasp can remove large amounts of wood when sculpting or carving shapes

Smoothing

Can be done by sanding using abrasive glass paper wrapped around a block. This can also be done using belt, disc or bobbin sanders.

Wasting processes typically carried out using machines:

Thin layers of manufactured board can be cut using the laser cutter.

Wood can be turned into round shapes using a lathe. E.g bowls and table legs

Drills make holes by clamping material tightly and boring in a clockwise direction. This can be done with portable power drills or a fixed pillar drill

A planer thicknesser cuts timber to size with a rotary blade.

Computer numerically controlled (CNC) routers make grooves and decorative edges.

Addition processes:

Timber can be permanently bonded(stuck) using (PVA) glue

Laminating can be used to create curved wooden shape. Adhesives are applied to thin layers of wood clamped into a mould or former. Once the adhesive is dry the timber becomes rigid in the shape of the mould.

Deforming

Strips of timber can be bent by heating them in steam to make them pliable (soft/flexible). Once pliable they can shaped around a former until cool.

Reforming(Laminating)

Sheets glued together and shaped and clamped around former until dry.

Key Words

You must know the meanings of the key words below:

Turning

CNC

former

Key points

There is a wide variety of different wasting tools designed to carry out specific tasks

You must be able to: Identify different processes and equipment used to manufacture products from timber based materials

Select an appropriate tool to carry out a process needed on timber and justify reasons for your choice



Student Knowledge Organiser



Materials & Their
Properties

Standard Components

Stock Forms: These are standard shapes/sizes in which material are available. To minimise effort designers try to use stock form or closet size that is required for their product that requires smallest amount of processing/changes.



Reasons for using standard components:

They can be used in many different products.
Materials can be purchased in bulk reducing cost.
Processes can be automated speeding up the process.
Efficient use of labour
Consistency in quality of manufacture produced
Parts can be made in range of standard size.



Used with paper & board:

Clips



Fasteners



Rivets



Sticky tape



Bindings



Used with timber:

Hinges



Screws



Handles, draw runners
Knock down fittings



Brackets



Nails



Used with Polymers:

Caps



Nuts and bolts



Fasteners



Used with Textiles:

Zips



Buttons



Poppers and studs



Velcro



Sequins

Beads



Used with Metals:

Nuts, bolts, washers



Hinges



Rivets



Electrical components:

Resistors



Capacitors



Diodes



Switches



LEDs



Transistors



Motors



Micro controllers



Mechanical components:

Levers



Linkages



Gears



Pulleys

Cams



Belts



Key Words

You must know the meanings of the key words below:
Standard component

Key points

Standard components are parts that are used in many different products
It is much cheaper to buy a standard component

You must be able to:

Explain why standard components are used
List standard components used with a variety of materials



Student Knowledge Organiser



Tools Equipment &
processes Pages 92 & 93

Scales of Manufacture

Scales of manufacture: This is about making identical products. As the quantity increases the processes used may be the same but tools and equipment may be different



Type :

One off/ bespoke production

Batch production:

Mass production:

Continuous production:

Characteristics:

One product made for a specific customer. Usually takes a long time to make and high level of skill. High cost! €€€€€€€€€€

A group of identical products. Processes could be automated. Jigs might be used. Equipment set up costs are high.

Large quantities of identical products. Use of production line. Automated processes and dedicated jigs. Cost per product lower than batch manufacturing

Extremely large quantities 24/7. Typically used for chemicals or materials. Equipment and processes are fully automated with dedicated jigs and fixtures. Set up costs are very high. Cost per product low compared to other methods

Example:

A wedding dress, Wedding cake



Chairs, clothing from high street store



Cars, Nuts & Bolts



Petrol, Steel



Influences of Quantity on Selection of Equipment:

ECONOMIES OF SCALE:

As quantities increase there are opportunities for getting bigger discounts, buying materials in larger quantities and reducing labour costs by using automated machines.

E.G If one person cuts one shape from card with scissors. A laser cutter/die cutter might be used instead to speed up manufacturing. Equipment costs more initially but is faster and labour is reduced so less money needed to pay workers. This has effect of reducing overall cost for products/companies

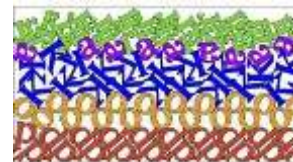


Material management:

Material used in manufacturing was be done so efficiently. Most materials come in wide variety of shapes/sizes & different stock forms.

Designers use stock from to reduce machining/waste.

Designers tessellate shapes nested together using computers to reduce waste.



Key Words

You must know the meanings of the key words below:

One off/bespoke production
Batch production
Mass production
Continuous production
Economies of scale
Stock form

Key points

If a large quantity I manufactured total cost can be reduced by using automated equipment and less labour.

The quantity of products manufactured has a significant effect on equipment selection & manufacturing methods

You must be able to:

Describe different scales of production and give examples. Explain why equipment changes with scales of production

DT Knowledge Organiser



Design movements

Approaches to Designing.

Designers

Name	Key facts
Harry Beck	 <i>Designed the London underground map influenced by the layouts used in electronics. This has been copied with transport systems across the world</i>
Marcel Breuer	<i>Studied at the Bauhaus. Invented steel furniture inspired by bike handles. A famous example is the Wassily Chair</i>
William Morris	<i>A textile designer who was key player in Arts & Crafts. The movement was founded by the principles of traditional craftsmanship</i>
Charles Rennie Mackintosh	<i>Scottish architect who influenced the Art Nouveau movement. He was inspired by Japanese architecture.</i>
Ettore Sottsass	<i>Founder of the Memphis design group in 1981. Designs incorporated symmetric shapes and colourful decoration</i>
Gerrit Rietveld	<i>Dutch architect and designer. He simplified designs to vertical and horizontal lines and used black, white and primary colours</i>

Bauhaus Key Features

*Uniting art with craft and mass-production.
Form follows function.
Honest materials.
Minimalism.*

Designers

Walter Gropius, Marcel Breuer



Art Nouveau Key Features

The distinguishing ornamental characteristic of Art Nouveau is its undulating, asymmetrical line, often taking the form of flower stalks and buds, insects and other natural objects

Designers

William Morris, Louis Comfort Tiffany



Memphis Key Features

*A flat style that is often accented with bright, saturated colour choices.
Geometric shapes are the primary art element and few actual photos are used*

Designers

Ettore Sottsass, Philippe Stark

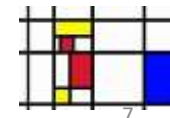


De Stijl Key Features

De Stijl art mainly consists of the three primary colours (red, blue, and yellow), the three primary values (black and white) and horizontal and vertical lines.

Designers

Gerrit Rietveld, Max Bill, Mondrian



Key Words

You must know the meanings of the key words below:

*Bauhaus
Arts and Crafts
Art Nouveau
De Stijl
Memphis*

Key points

Understanding the work of past and present designers help new designers to inform their own work.

You must be able to:

*Analyse the work of at least 2 different designers
Use the work of past and present designers to help develop your own designs*

Student name:

DT Knowledge Organiser



Approaches to Designing.

Companies

Name of Company	Key facts about the company	Name of Company	Key facts about the company	Key Words You must know the meanings of the key words below: <i>Aesthetics</i> <i>Fast fashion</i> <i>Moisture wicking fabric</i> Key points <i>Understanding the work of design companies helps designers to develop their own ideas</i> You must be able to: <i>Analyse and evaluate the work of at least two different design companies.</i> <i>Explain what was special about the first iphone</i> <i>Explain what James Dyson invented and what made it unique.</i> <i>Explain what Under Armour sports wear is designed to do.</i> <i>Explain what Zara began working on with Greenpeace in 2011.</i>
Alessi 	<i>Italian design company that produces household utensils. Many products are post modern in style. An example is the Juicy Salif designed by Philippe Starck.</i>	The GAP 	<i>The GAP is an American clothing company that trades globally. It serves a broad target audience although initially it targeted a younger audience. A lot of sales happen over the web with over 18 visitors in a year.</i>	
Apple 	<i>Company founded by Steve jobs, Steve Wozniak and Ronald Wayne in 1976. Famous for selling Macintosh personal computers. Later designed IMac G3, the ipod a portable music player and very popular Iphone. The first phone combined elements of the G3 and Ipad with a touch screen mobile phone.</i>	Primark 	<i>An international trading company with its main base in Ireland. Low cost fashion. Lots of its clothes are made in places such as China, India and Bangladesh. It does not own the factories that it produces clothing in.</i>	
Braun 	<i>German company founded by Max Braun in 1921. Well known for its popular shaving and grooming products and functional approach to design</i>	Under Armour 	<i>American sportswear company founded in 1996 by Kevin Plank, a former American footballer. They developed moisture wicking clothing that uses micro fibres to keep athletes cool/dry. They sell wide range of accessories/clothing</i>	
Dyson 	<i>British design engineering company formed by James Dyson in 1991 as a way of bringing his bagless vacuum cleaner ideas to market. By 2001 47% of all vacuum cleaners sold in UK were the Dyson brand. Dyson vacuums are known for not losing suction as they don't have bags and use cyclone dust separation. Dyson now makes many different products including heaters, fans and hairdryers.</i> 	Zara 	<i>A Spanish company founded by Amancio Ortega and Rosalia Mera. Known for selling products that respond to current trends. (JUST IN TIME approach to manufacturing) Worked with Greenpeace in 2011 to eliminate toxins from its clothing</i>	

Student name:
DT Knowledge Organiser



Social issues in the Design & Manufacture of Products

Approaches to Designing.

Ecological, environmental & Social issues

Effects of the use of raw materials

Deforestation. Trees removed and land converted to other uses. Loss of animal habitats & impact on climate change
Mining can cause erosion and contamination of soil. Sinkholes can be traced back to mining. Oil is needed for plastics. Oil spills can have devastating effect on environment, killing wildlife. Some raw materials used in bio fuels are farmed. Over farming and use of pesticides can contaminate land and kill wildlife
Carbon released from manufacturing can cause global warming
Designers must consider the distance their product travels from source to manufacture, distribution and final disposal.



The 6 R's

Reduce

How can the amount of materials and components used be reduced? Is the product really necessary?



Rethink

How can the design of the product be changed so its less harmful to the environment? Can a better way be found?



Refuse

Should the product be manufactured if it is not sustainably designed? Is packaging necessary? Can it be removed?



Recycle

Is the product made using recycled materials? Could the materials be recycled once the no longer of use.



Reuse

Could the product be used in a different way once it no longer functions? Could it be taken apart and used to repair other products?



Repair

Is the product easy to repair? Are replacement components readily available in case of failure?



Social footprint

Designers should consider how they design and manufacture their product to ensure it is made in a socially considerate way

Atmosphere pollution

This occurs when pollutant are released into the atmosphere. Air pollution has been linked to severe respiratory illnesses such as cancer and asthma

Oceanic pollution

This happens when chemicals and industrial waste is released into the oceans. This has a negative impact on marine life

Fairtrade

This helps people in developing countries get a fair deal for their product/produce.

Workers get paid a minimum rate even if global prices fall. Receive a fairtrade premium that can be invested in education and health care. People buy fairtrade because of its values

The Fairtrade Certification Mark show that it meets fair trade standards



Key Words

You must know the meanings of the key words below:

Deforestation
Recycle
Atmosphere pollution
Oceanic pollution
Fair trade

Key points

Fair trade help people in developing countries get a fair deal for the products that they produce

You must be able to:

Explain how the 6 R's can be used by designers to evaluate the impact of their products on the environment
Explain the benefits of fair trade for the producers and consumers of products
Explain what the potential impacts of oceanic pollution are.

Student name:
DT Knowledge Organiser



Designing products.

Research & Investigation

Market research

Information is collected to find out if there is a need of a product on the market
Interviews via face to face/internet
discuss client needs

Focus groups

Group of people to assembled to test a product and give feedback. They are often consumers of the potential product



Product analysis

Designers learn from success/failures of previous/current products. They look at how they are assembled, function, wider impact on society and environment



Gathering data

ACCESSFM

Primary data

Raw data taken first hand or from original research. This can be done through questionnaires, surveys, focus groups and then data is analysed



Secondary data

Data that is freely available that has been collected from other parties and sources. This could include using catalogues, datasheets and information about materials



Ergonomics

Definition:

In 3 words this is **human object interaction**. It is about understanding how people interact with products. It will consider things such as shape of hands, colour, sounds and weight of a product.

EXAMPLE

For instance a designer will consider the shape of a persons hand when they design a handle for a garden tool.



Anthropometrics

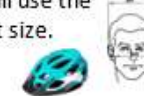
Definition:

The study of the human body and how it moves. It uses anthropometric data from the 5th percentile (smallest) to 95th percentile (largest). By doing this it ensures 90% of the population are catered for.

Anthropometric data is measurements taken from the population of millions of people of different sizes and is placed in charts to help design products

Uses:

For example when designing a bike helmet designers will use the head circumference of people to make sure it is correct size.



Key Words

You must know the meanings of the key words below:

Market research
Primary data
Secondary data,
~~ERGONOMICS~~
Anthropometric data

Key points

Designers use anthropometric data to ensure dimensions are correct

You must be able to:

Explain what is a focus group
Explain the difference between primary and secondary data
Explain what ergonomics is.
Explain what ergonomics is.
Explain the difference between the 5th, 50th and 95th percentile. 5th is smallest/shortest, 50th is average and 95th is the tallest, biggest and heaviest.
Explain how ergonomics/~~anthropometrics~~ helps in the design of products

Student name:
DT Knowledge Organiser



Energy generation &
Storage Pages

Non renewable energy sources

Definition: Sources that will eventually run out. Fossil fuels & nuclear power.

Fossil fuels: Remains of dead organisms. E.g. coal, oil, natural gas. They can be burnt to create steam/power to turn turbines and create electricity. Burning fossil fuels releases carbon dioxide. Global warming. They will run out but are easy to find and generate large amounts of electricity.



Nuclear power: Steam needed to drive turbines is created in a nuclear reactor. Nuclear fission uses uranium to create heat. This is non renewable! Nuclear power means less need for fossil fuels. They can be very dangerous (radioactive waste can cause health problems). Waste can stay hazardous for thousands of years.



Renewable Energy Sources

Definition: Sources that will not run out. (Sustainable) They can replenish themselves. E.g. solar, wind, hydro electric, tidal and biomass

Solar: Solar panels (Photovoltaic cells) convert sun energy into electricity. Sunlight will not run out for billions of years. No waste products/gasses are emitted. Installation costs are high. Don't work at night



Wind: Turbines catch wind and turn this into energy. Energy depends on wind so need to be carefully positioned. No waste or gasses. Can be noisy and could make landscape look ugly



Hydro electrical: To harness energy water is held in a dam before being released thus turning turbines to create energy. Clean and sustainable. Dams can destroy habitats and cause flooding. It harnesses energy from the sea.



Biomass: Fuel created from crops, scrap wood and animal waste. Readily available. Biomass crops use up carbon dioxide. Can be very expensive way of producing energy



Storing energy

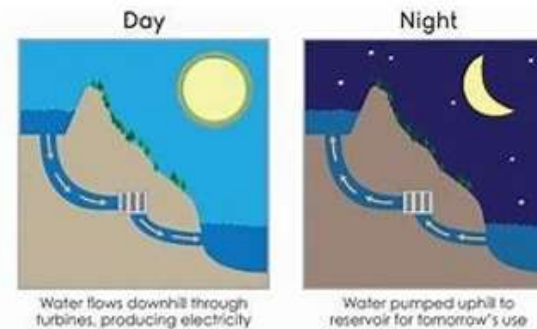
Purpose:

Batteries convert energy into electricity. Rechargeable batteries are popular as can be used lots of times reducing costs and waste for landfill.



Kinetic pumped storage systems

Store energy in water for. Usually this is pumped from lower reservoir to a higher reservoir. During times of high demand this can be released to turn turbines & create extra energy



Key Words

You must know the meanings of the key words below:

Non renewable energy
Source
Fossil fuel
Nuclear power
Renewable energy
Solar energy
Wind energy
Hydro electrical energy
Biomass
battery

Key Points

Renewable energy can be replenished quickly and will not run out. Energy can be stored using batteries and kinetic pumped storage systems

You must be able to: Describe how energy can be generated and be stored.

Explain the advantages/disadvantages of using renewable energy sources to power products and systems.

User-Centred Design

Approaches to Designing

Iterative design

Cyclic approach
Each idea is tested/
evaluated leading to
new ideas
Dyson vacuum
cleaner DC01. 1000s
of prototypes

Design Strategies

User - Centred Design

Needs/Wants
considered at each
design stage



Systems Thinking

Top down approach.
Often used with
electronic, mechanical
systems.
Considers inputs,
outputs and processes
involved



Advantages

User involved feels listened
to. Has ownership of final
product.
More likely final product will
meet users needs

J

Disadvantages

Need time to meet and discuss
ideas with user
Product may not suit wide
audience limiting end use and
profit

L

Key Words

You must know the meanings of the key words below:
Iterative design
User-centred design
Systems thinking
Design fixation

Key points

User centred design
considers the needs
and wants of the end
user at each stage of
the design process

You must be able to:
Describe the main
features of iterative
design, user centred
design and a systems
approach to design.
Explain the
advantages and
disadvantages of
each system

Iterative Design

Advantages

Problems are
considered/discovered earlier
& dealt with quickly
Focuses on most critical
aspects
Feedback constantly gathered
and used
Evidence can be provided early
in process for stake holders to
support decision making



Disadvantages

Lose sight of end goal as
can be over reflective
Prototypes are time
consuming and expensive



Systems thinking

Advantages

Does not require highly specialist
knowledge
Easy to communicate system to non
specialists, clients & stakeholders
System designed in blocks. Easy to fault
find



Disadvantages

Can lead to unnecessary
components being used
Can lead to larger systems and
extra cost if planned incorrectly

££££££££££££££££
££££££££££££££££

Student name:
DT Knowledge Organiser



Materials & Their Properties

Making Metal: Metal ore is extracted from the ground by mining/quarrying. The metal is refined from ore by using heat and a lot of energy. This can happen through electrolysis or using chemicals to remove unwanted elements. After refining metals are melted and cast into products and shaped into stock forms. They can be treated to soften metal by annealing which softens the metal and improves its malleability. Metals can be recycled by melting.



Ferrous Metals: Contain iron. They are commonly used with other metals. They have a melting point of 1600 C or higher. Most ferrous metals are prone to rust and corrosion and can be picked up by a magnet.



Cast Iron: Hard & compressive strength. Engine mounts, pipes, cookware

Low carbon steel: Tough, easy to machine. Nuts and bolts, car body panels

High carbon steel: Strong & hard. Springs, high tension wires



Non – Ferrous Metals: Do not contain iron. They have good resistance to corrosion and do not tarnish. They are not magnetic.

Aluminium: Light weight, strong. Drinks cans, cooking pans

Copper: Conducts heat/electricity. Wiring & water pipes

Tin: Soft & malleable, corrosion resistant. Tin cans, solder

Zinc: Hard & brittle. Low melting point. Coating for Steel



Common Alloys

An alloy is a mixture of 2 or more metals. They can be ferrous or non ferrous. They have better properties than a pure metal.

Brass: Copper and Zinc. Low friction, corrosion resistant, malleable. Used in locks & musical instruments



Stainless Steel: Iron & Chromium with small amount of Carbon. Tough, strong, corrosion resistant, difficult to machine. Used in kitchen equipment & medical instruments.



High Speed Steel: Iron with small amounts of carbon, tungsten, Molybdenum, Vanadium and Chromium. Very hard even at high temperatures. Used for saw blades, drill bits, files & wood turning tools.

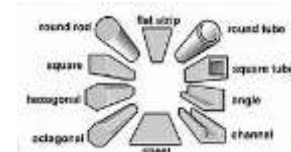


Stock Forms

Metals come in standard shapes including, sheet, rod, square bar and tube.

They come in standard sizes, lengths, thicknesses.

Metal Ingots can be melted into standard shapes.



Key Words

You must know the meanings of the key words below:

Ferrous metal

Non – ferrous metal

Alloy

Key Point

Alloys are designed to have better properties for an application than just using a pure metal.

You must be able to:

The difference between ferrous and non ferrous metals.

Describe the characteristic properties and common uses of a variety of metals.

Explain how metal ore is converted into usable material

Student name:

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Tools Equipment & processes

Measurement and Production Aids

Measurement and Reference Points:

Measurements can be taken from a **datum surface**, or reference point, product, or angle. Sometimes 2 datum surfaces are used at right angles to complete a measuring task. Sometimes a datum surface can be created on a material. E.g. A file can be used to create a smooth surface on metal.



Production Aids:

To achieve precision, aids are used. The main aids used in Design & Technology are **jigs, templates and patterns**. These are known as **production aids**.

Production aids are often used in batch production

The use of CAM (Computer aided design) and CNC (Computer numerical control) means the use of jigs, templates and patterns are less widely used.



Jigs:

Jigs are tools used for repeatability and accuracy in manufacture.

They ensure things are made exactly the same without the need for marking out.

They can be used for things like drilling holes or holding wood in position to be cut. PCB jigs can be used to fault find in electronics



Templates:

Templates can be drawn or cut around repeatedly.

They are useful when creating identical shapes

They can be made from inexpensive material. (cardboard, newsprint, MDF)



Patterns:

There are two types used in technology.

Textiles patterns

Usually paper or card. Used to trace garment parts onto fabric before cutting out. Being a specialist pattern maker is a highly skilled job.

Casting patterns

Used when casting metal or plastic resin. Used to prepare cavity where molten material will be poured. It is a replica of the product that will be cast. It can be made from wood & plastic.



Key Words

You must know the meanings of the key words below:

Datum surface

Jig

Template

Pattern

Key points

Textiles or fabric patterns are used to trace parts of a garment onto fabric.

Production aids are used to ensure accuracy and precision in manufacturing

You must be able to: Explain the importance and meaning of reference points used in measuring.

Explain the reasons why production jigs are used. Describe how jigs, templates and patterns are used in manufacture

Student name:

DT MIND MAPS



Tools Equipment & processes

Ensuring Accuracy

Difference between accuracy and Precision

Accuracy is the degree of closeness to a true value, measurement or standard.



Precision is how repeatable the measurement is.

It is possible to be accurate but not precise and vice versa



Why is accuracy important?

Accuracy is very important when manufacturing products/prototypes. A working drawing/specification will provide dimensions (sizes). If you don't stick to the working drawing/specification things may not function. This could cause the product to be remade. Meaning extra cost, time and labour.



Tools that improve accuracy

Jigs, templates and patterns are used in batch production to ensure accuracy. The use of CAD (Computer aided design) and CAM (Computer aided manufacture) also helps be more precise.



Quality Control & Quality Assurance

Tolerance:

Tolerance is permissible limits of variation of a part /product. This would normally be found on a cutting list/product specification. Not considering tolerances can lead to poor fits, wasted material and additional cost if having to remake a product. Another example is electrical components. Using an incorrect component could result in the product not functioning correctly or stopping operating after a period of time.



Quality Control:

Quality control is product orientated. It is about checking a product meets quality standards set by a specification.



Quality assurance is about putting systems in place to ensure quality in the manufacture of a product. E.g. Training staff to use equipment or servicing machines and equipment.



It takes less time to do things right than to explain why you did it wrong.

Henry Wadsworth Longfellow

Key Words

You must know the meanings of the key words below:

Accuracy

Precision

Tolerance

Quality Control

Quality assurance

Key points

Taking tolerances into account reduces the likelihood of improper fits or manufactured parts

It is possible to be accurate but imprecise

You must be able to:
Explain the reasons why accuracy is important when manufacturing products and prototypes

Explain the meaning of quality control/quality assurance.

Explain the importance of tolerances when manufacturing products

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Characteristics & uses

Materials & Their Properties

Polymers

Making Polymers: Polymers are made from chains of monomers in a process called **Polymerisation**. Most polymers are **synthetic** made from oil. The oil is refined and separated into different chemicals by **fractional distillation**. Chemicals are broken down by a process called **cracking**. Fossil fuels are a **finite resource**. Extracting them can have impact on environment. Some polymers break down under sunlight. (UV light). To resist this chemicals are added that will not degrade



Thermosetting Polymers: Thermosetting polymers cannot soften when heated but may char. They have permanent chemical bonds. They come as resins (liquid) or powder. They are cured (set) with other chemicals to create the polymer. They cannot be reused and end up in landfill at the end of their life.

Types of Thermosetting Polymers, Characteristics & typical uses:

EPOXY RESIN: Made by mixing chemical with hardener. Hard and resists well to chemicals. Used as an adhesive e.g. Aradite



POLYESTER RESIN: Made by mixing resin with hardener. Can be reinforced with glass fibre (GRP). Stiff hard and brittle. Used on car bodies and boats



UREA FORMALDEHYDE: Hard, strong & good insulator. Used on plug sockets and switches



MELAMINE FORMALDEHYDE: Hard, resists some chemicals. Used for kitchen worktops and cupboards



PHENOL FORMALDEHYDE: Hard, high strength to weight ratio. Excellent flame resistance. Used for snooker balls, countertops, coatings & adhesives



Thermoforming Polymers: Thermoplastics. Soften when heated and shaped when hot. Can be reshaped if heated again. Available in sheets 1.5, 2 mm etc.. They also come as films, foam or rods in different lengths/thicknesses. They are available as pellets for injection moulding and powders for dip coating. They can be sorted and recycled



Types of Thermoforming Polymers, Characteristics & typical uses:

PET (Polyethylene terephthalate) Transparent used for blow moulding & vacuum forming. Softens at 80C. Used for drinks bottles & food packaging



HDPE (High density polyethylene) Strong & stiff softens at 130C, Used for bowls, pipes & buckets.



PVC (Polyvinylchloride) Stiff, hard wearing softens at 100 -125C. Used in pipe, packaging.



HIPS (High impact polystyrene) Light, strong, used for vacuum forming. Used for blister packaging



PP (Polypropylene) Tough & flexible. Used for carpets and ropes



PMMA (Polymethylmethacrylate) Commonly known as Acrylic/Perspex. Hard wearing. Used for baths, windows & signs



Recycling symbols:



Key Words

You must know the meanings of the key words below:

Polymer
Synthetic
Fractional distillation
Cracking
Finite resource
Thermosetting
Thermoforming
Key Points
Thermoforming polymer can be reshaped/recycled.
Thermosetting cannot

Most synthetic polymers are made from non renewable fossil fuels

You must be able to:

Explain how polymers are converted into materials
Explain the difference between thermosetting and thermo forming polymers
Describe the properties of polymers
Describe forms of different polymers.
Describe what happens at the end of their lives.

Student Knowledge Organiser



Materials & Their
Properties Pages 80 & 81

Working with materials

Meting the properties needed by a Product:

Properties of individual materials can sometimes be modified/changed to improve them.

Sometimes a material will meet lots of requirements for a product but not all of them.

Sometimes a product has to be modified to satisfy the applications of the material available

Examples of how material properties can be modified:

Additives added to paper/board to prevent moisture transfer. E.g food packaging



Timber can be dried to reduce warping. (bending)



Annealing can soften metal making it less hard allowing the grains in micro structure to grow.



Aluminium can be anodized making it harder.

Stabilizers can be added to polymers to stop them becoming brittle. Useful in windows!



Flame retardants can be added to textiles to reduce the risk of fire hazards.



Photosensitive board can be used for making PCB boards. This way using chemicals and light unwanted Copper can be removed



Reinforcing materials

Reinforcing the design to enhance performance:

Products can be reinforced/stiffened or even made more flexible

Reinforcement allows part of a product to be stiffened or have greater strength. This can lower the weight and price of a product.



Methods of reinforcement:

Bending/folding and lamination can all increase stiffness and thickness of material. This can be used with most sheet materials, paper, card, fabrics and metal



Webbing are ribs of material used to increase stiffness of a product. E.g A battery casing



Interfacing is used in textiles to increase strength of a product. In shirts, collars are made stiff/rigid using interfacing placed onto the wrong side of the shirt.



Key Words

You must know the meanings of the key words below:

Reinforcement

Webbing

Interfacing

Key points

The properties of some materials can often be enhanced to make them suitable for specific applications

The method used to enhance the properties of a product depends upon the type of product, what it is made from and what properties are needed.

You must be able to:
Explain why reinforcement is used in products

Describe how the properties of a material can be enhanced

Describe a range of examples of how products can be modified to improve performance.

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Tools Equipment &
processes Pages

Manufacturing Processes: Polymers

Wasting Processes:

Thin sheets of Polymers can be sawn using coping saws , fret saws and band saws.

Holes can be drilled using power drills or pillar(pedestal) drills

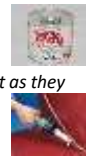


Addition processes:

Solvent cement is an adhesive. It can bond (join polymers). It dissolves the surface to mix/join them so they solidify together.

Thermoplastics can be welded . The faces can be heated using an electrical welding gun or hot plate. On melting of the surfaces they are pushed together forming a joint as they cool.

3d printing involves printing out a CAD(computer aided design model). A complex Shape can be made in a single operation. Instead of using numerous machines. The 3d printer deposits material one layer at a time until the item is finished.



Deforming and Reforming:

Bends can be made in thermo plastics using a **line bender**. This heats just the area where the plastic is needed to be bent. The plastic once hot can be bent against a former or jig until it cools and goes rigid.

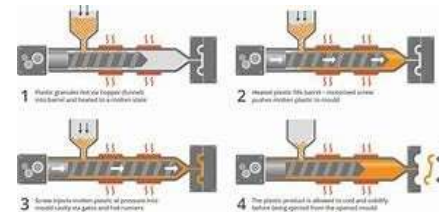
3D products can be made using a **vacuum former** where the plastic is heated around a mould and then the air around the mould is sucked out of the former.

Yoke/Press moulding heats plastic sheet until it is flexible. It is then pressed between a mould and yoke. Once cool it retains the shape of the mould.



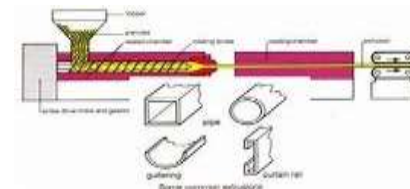
Injection moulding:

Plastic powder/granules are fed into a hopper. Heaters melt the plastic as a screw moves it towards a mould. This is forced into the mould and pressure maintained until cooled.



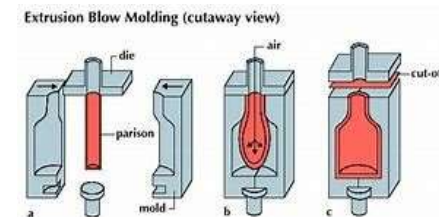
Extrusion:

Similar to injection moulding without using a mould. The plastic is forced through a die in a continuous stream to create long tubes/sections.



Blow moulding:

Similar to extrusion. An air supply and split mould are used to make hollow products such as bottles.



Key Words
You must know the meanings of the key words below:

Line bending
Moulding
Vacuum forming
Injection moulding
Extrusion
Blow moulding

Key points

Most industrial polymer moulding processes use reusable metal moulds and are designed to make large quantities

You must be able to:
Identify the processes and equipment used to manufacture products from polymers
Select an appropriate tool to carry out a process needed on a polymer and justify your choice

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Type of material, Commercial product and important properties

Materials & Their Properties

Selection of Materials

Functionality and choice of material:

Material has functionality, mechanical & physical properties needed for what it has been designed for.

Designers consider products and how they can be manufactured from the material.

Designers also have to consider customer needs.



Factors affecting material selection:

Aesthetics (looks) colour, texture and finish

Environment. Can the product be recycled or reused.

Availability of materials. Location and stock form.

Costs. Can materials be bought in bulk. Discounted prices.

Social Factors. For example not using a material for its environmental impact or for political reasons.

Ethical considerations: Eg fair trade products, not using parts made in sweat shops. Using wood from managed forests. (FSC) Forestry Stewardship Council. Trees are replanted for everyone cut down.

Cultural factors, such as fashion or religious beliefs.



Properties required in commercial products:

Type of material	Product	Properties
Paper and boards	Flyers and leaflets	Can be printed onto.
	Food packaging	Absorbency, ability to be printed on, aesthetics & cost

Timber based materials	Children's toys	Aesthetics/looks that appeal to children Resistance to corrosion . Toughness in case dropped. Hardness to resist scratches
	Flat pack furniture	Toughness to resist damage. Hardness to resist scratches.
Metals and alloys	Cooking utensils	Thermal conductivity so heat will go through. Resistance to corrosion. Malleability for ease of making. Hardness to avoid scratches. Density, lightweight so easy to lift.
	Hand tools	Strength, toughness, to resist impact. Malleability, ability to be shaped into tool.
Polymers	Seating	Compressive strength to support weight of person. Resistance to corrosion. Lightweight so can be lifted easily
	Electrical fittings	Electrical conductivity, Insulation to protect user. Toughness so doesn't break. (Safety)
Textiles	Sportswear	Aesthetics that appeal to user. Hardwearing so lasts long time. Non flammable
	Furnishings	Aesthetics to appeal to user. Hardwearing to last. Non Flammable
Electronic and mechanical systems	Motor vehicles	Toughness so doesn't react on impact Lightweight to reduce fuel use Resistance to corrosion Hard so lasts a long time
	Domestic appliances (fridges etc..)	Resistance to corrosion Strong to support weight and resist damage Electrical conductivity. Should be insulated to prevent electric shocks.

Key Words
You must know the meanings of the key words below:

Functionality
Aesthetics
Sustainable

Key points

Selecting material is not just about material properties

You must be able to: Describe a wide range of factors that can influence choice of material for a product.

Explain the important properties required by commercial products.



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Typical Relative Properties of Materials

Materials & their
properties Pages 62 & 63

Paper & Board

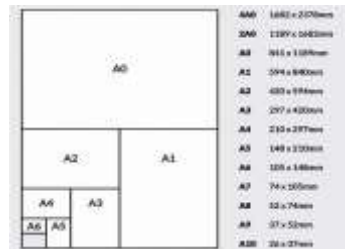
Sources and Disposal

Paper and card are made from cellulose fibres from wood and grasses.
Chemicals are added to produce a surface finish or texture
Wood pulp can be sourced from managed trees (This is where new trees are planted to replace those that are cut down).
This helps reduce environmental impact (damage)
Most card and paper can be recycled by being processed and mixed with wood pulp.
Recycled paper cannot be used for food packaging.
Paper will biodegrade
Foil lined board is a composite and cannot be recycled



Standard Sizes and Forms

Paper is available in sheets or rolls
Sheets of paper come in standard sizes
A6 is smallest size, A0 is the largest size
Paper is weighed in gsm. The higher the number, the thicker the paper is.
Paper is normally 80 gsm.
Card is normally 200 gsm or more.



Types of Paper and Board

Type	Properties	Uses
Layout & tracing paper	Translucent. 50-90gsm	Working drawings & tracing
Bleed proof paper	Smooth, resistant to ink to stop seeping, sharp images 70-150gsm	Printed leaflets & with felt tips
Cartridge paper	Cream, lightly textured 100-150 gsm	Drawing & painting
Grid paper	Squares & grids 60-100gsm	Sketches & model making
Corrugate cardboard	2 or more layers. Good strength to weight ratio 250 gsm	Boxes & packaging
Duplex board	White, tough & lightly textured. Can prevent moisture transfer	Food packaging
Foil lined board	Aluminium stuck to cardboard	Drink cartons, ready meals
Foam core board	Polystyrene centre, paper either side	Architectural models
Solid white board	High quality board	Book covers
Inkjet card	Strong card, often coated	Greeting & business cards

Key Words
You must know the meanings of the key words below:

GSM
Ply
Biodegradable

Key points
Paper and card can be recycled, however composites added to paper mean this type of paper cannot normally be recycled
E.G Foiled line board cannot be recycled

You must be able to:
Explain that paper and card have different thicknesses for different functions

You must be able to:
Explain what card is good for printing on.
Explain what gsm stands for?
Why recycled paper cant be used for duplex board

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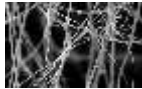


Characteristics & Properties

Materials & Their Properties

Textiles

Fibres and Fabrics: Fabric is made from fibres. These are hair like and range in size. From short staple fibres to continuous and long filaments. Individual fibres are weak. They are spun together to form **yarn**. Fibres can be treated to make them flame proof. (fire retardant)



Fabric Construction: Knitted fabrics are interlocking loops arranged across a warp & weft. Woven Fabrics are interlaced yarns. It is strongest along the straight grain but lacks elasticity. Woven fabric has a selvedge that will not fray. Fabric will fray once cut. Non woven fabric (felt) are entangled fibres. Non woven fabric are made using chemicals to mat them together with heat (bonding) or by stitching. (interlocking)



Natural Fibres: Come from animals or plants
Animal fibres include wool, silk, alpaca, angora, camel, hair, cashmere & mohair
Plant fibres include cotton, linen, jute & hemp
Natural fibres are bio degradable



Synthetic Fibres: Are made from chemicals. (typically oil) Oil is a fossil fuel. Oil is processed to extract chemicals needed for the fibres. Typically synthetic fibres do not bio degrade.



Natural fibre, characteristics & properties:

COTTON: From seeds of cotton plant. Strong, cool, durable, absorbent & creases easily. Used in Denim, calico, t shirts, underwear.



WOOL: From sheep. Warm, soft, absorbent and crease resistant. Used in felt, jumpers, suits, carpets.



SILK: From cocoon of silk moth. Smooth, lustrous and strong. Used in chiffon, velvet, shirts and ties



Synthetic fibre, characteristics & properties:

Polyamide (Nylon) From chemical monomers. Strong, durable, warm, crease resistant. Used in tights, sportswear, carpets



Polyester Produced from coal and oil. Strong and durable, elastic, crease resistant. Used in sportswear



Elastane (Lycra) Produced from polyurethane chemicals. High stretch, used to improve look of garments. Combine with other materials to improve look and comfort of garments. Used in sportswear, underwear, socks, suits/blazers



Blended Fibres: Use a mix of fibres to combine different properties

E.g. Polycotton has good absorbency and is quick drying



Availability and use of Textiles

Most are sold by the roll in different widths and weights. Ply refers to numbers of layers of fabric, Care should be considered not to waste material when laying out patterns. Textiles can often be reused/recycled.



Key Words

You must know the meanings of the key words below:

Yarn
Knitted
Woven
Selvedge
Natural fibres
Synthetic fibres

Key points

Fabrics are constructed from fibres by knitting, weaving or non woven blended methods such as felting

You must be able to:

Explain how fabric is constructed from fibres
Explain the difference between natural, synthetic and blended fibres
Describe the properties of common used textiles



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DT MIND MAPS



New and Emerging
Technologies: Pages 126 & 127

Impact on Production

Impact on Sustainability and the Environment

Sourcing raw materials impacts on future of planet
Finite resources will eventually run out. Trees should be replanted to ensure a continuous supply to prevent deforestation



Non finite resources are easy to replenish and should be used to improve sustainability of products

Designers should reduce waste created through designing, making and using products. This can be achieved by making products through biodegradable products or making products easy to disassemble or reuse



New and emerging technologies can have an impact on the environment. See below:

- Continuous improvements are incremental improvements to a product or process
- Efficient working can reduce waste in terms of time and resources
- New technology can help reduce pollution. E.g electric cars are beginning to replace petrol/diesel polluting engines



Sustainability, Cultures & Society

Impact on Culture

Changes in fashion/trends can influence new and emerging technologies.:

- Product Designers are often influenced by what is in fashion. E.g clothing
- Designers need to keep on top of trends to keep producing popular products
- New technologies can create trends. Apples phone apps completely changed how people used their mobile phones.



- People with different faiths/beliefs should be respected when designing products



Inclusive Design

Inclusive design is about designing products and systems that can be used by everyone, Ideally this should be without special adaptations

Exclusive Design

Exclusive design is when products are designed for a particular group or limited audience. E.g car seats designed for babies and very young children

Impact On Society

Products can have negative and positive effects on wider society. These are sometimes unexpected or unintended.

- E.g Smart phones have completely changed how people communicate in last decade
- Although easier to communicate in different locations, Some feel it is negative as people don't talk directly with each other as much.

Products should be developed so they do not have a negative impact on others.

- Disabled people have specific needs. E.g cash machines are positioned lower on walls so they can be accessed by people in wheel chairs



- The elderly have needs . E.g A mobile phone may be designed with large buttons and text
- Designers must be careful not to offend. An example where this went wrong is with the plastic £5 note introduced in 2016. It was found to contain animal fat, which was a problem for some Hindus and Sikhs, may who are vegetarian



Key Words

You must know the meanings of the key words below:

Continuous improvement Trend

Inclusive design

Key points

New technologies can be used to reduce pollution such as electric car engines

Trends can be started through the emergence and subsequent use of new technologies

You must be able to:

Explain the difference between finite and non finite resources

How designers can reduce waste when designing/manufacturing new products

Why designers need to consider people with different religious backgrounds

Student name:

DT MIND MAPS



New and Emerging
Technologies:

Impact on Industry

Impact on industry

New and emerging technologies can take several forms

AUTOMATION is use of computer systems and control technology. This could be use of robots (very efficient) in product manufacture.

BUILDINGS & WORKPLACES can be made better. E.g. Self cleaning windows, saves time, maintenance costs and make things look nice.

USE OF CAM (Computer aided design), CNC (Computer numerical control) & RAPID PROTOTYPING

Fewer hand tools used in manufacture. Greater consistency and accuracy.



Impact on Enterprise

Business innovation helps to drive enterprise. This can take different forms.

CROWD FUNDING allows people to raise awareness and money for a project/idea. There will typically be an end funding goal.

People donate money in return for rewards

The internet has made crowd funding easy. (JUST GIVING pages etc..) Websites can be set up with online payments for users. These websites typically take a share of money raised for hosting the page.

It is useful for independent people to gain money to access more funding.

JustGiving™

Virtual Marketing & Retail:

This is web based marketing. It includes website banner advertising, email marketing and social media to promote products.

Cooperatives

Is a business that is jointly run by its members. Members share benefits/profits that are made.

A cooperative benefits from buying power of entire cooperative. Its very democratic

A small number of people can set up a cooperative making them easy to set up.



Fair Trade

Helps workers get fair deal/price for products they make. A living wage.



Planned Obsolescence

Is a strategy used where products are designed to be no longer useful after a set period of time. Change can be driven by lack of compatibility of parts, fashion, improved technology or manufacturing processes. Often new products with new technology replace the old product.

Impact On Employment:

Increased automation could result in fewer jobs

More jobs for people trained in CAD/CAM less opportunities for skilled hand machine workers.

Need to retrain staff in new and emerging technologies.

Workers need to be flexible and able to update their skills in response to change.

Many important jobs didn't exist 5 -10 years ago. For example a mobile apps designer.

Workers in modern workplace need to be literate in computer based tools



Key Words

You must know the meanings of the key words below:

Automation
Crowd funding
Co – operative

Key points

Co-operatives are run by and for the benefit of their members

Automation in manufacture can help increase efficiency in production

You must be able to:

Explain the impact of new and emerging technologies on industry and enterprise.

Discuss the potential effects of the use of new and emerging technologies on employment



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 Organiser**



Approaches to Designing.

Electronic Systems

Input devices

Features

Use a real world signal such as light, sound and movement and change it to an electronic signal or current/voltage. E.g switches & sensors.



Processes

Features

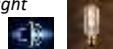
Acts like the brain of a system. Can alter signal and create functions such as counting/timing. Programmable components include micro controllers



Output devices

Features

Take an electronic signal & turn it into a real signal. E.g sound, light



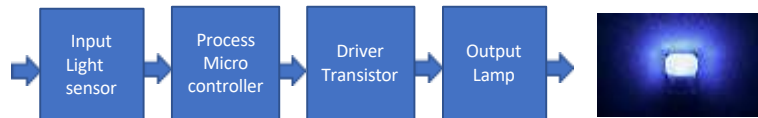
Drivers

Features

Increase the signal in the output. Devices can draw correct current to work better

Systems Block diagrams

- Electronic systems can be represented as block diagrams
- Block diagrams give a top down view of how system will work
- The arrows show signals moving in and out of a block
- The blocks represent components and alter signals
- In the example below a light sensor would detect the light level of a child's room.



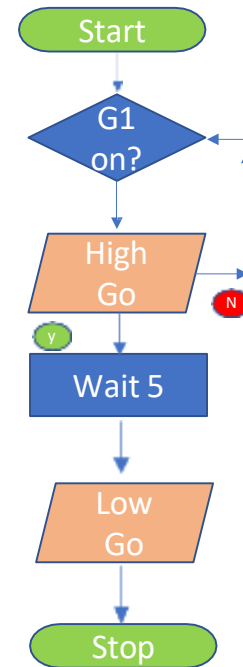
- The micro controller can be programmed to turn lamp on for a timed period when it goes dark. They can be programmed using raw code

Electronic System components

Components & what they do?

Component name	Circuit symbol	What it does
Push to make switch (Input)		Allows current to flow through it when pressed
Light dependent resistor (Input)		Has a resistance that changes depending on light level
Thermistor (Input)		Resistor changes depending on temperature
Micro-controller (Process)		Small computer integrated that can be programmed to provide function such as counting/timing
Buzzer (Output)		Produces buzzer sound
Speaker (Output)		Turns signals into sound
Lamp (Output)		Produces a light

Flowchart



A flowchart for a micro controller. The lamp can be turned on for 5 seconds

Key Words

You must know the meanings of the key words below:

Electronic systems
 Input device

Process

Output device

Microcontroller

Key points

Electronic systems consist of input, process and output stages, with drivers added as appropriate.

Micro controllers can be programmed to add functionality to products such as timing and counting

You must be able to: Describe the four stages that make up an electronic system.

Understand, select and use appropriate input, process and output devices in products.

Explain how light dependent resistors work?

Explain the main methods of programming microcontrollers.

Student name:
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Northstar
Upper School

Mechanical systems.
Pages 48 & 49

Mechanical Systems 1

Types of Motion

Rotating: Motion in the movement of a circle.



Linear: Motion going in a straight line in one direction



Reciprocating: Motion moving backwards and forwards



Oscillating: Motion swinging backwards and forwards like a pendulum



Principles of levers

Levers are a simple machine. They change **effort** or force needed to move something

They consist of a rigid bar that moves around a **fulcrum**.

A load is applied at one position on the lever

Effort is applied at another position. Enough effort results in the lever moving

Changing the distance between fulcrum and load increases/decreases amount of effort needed to move a load. There are 3 types of lever

First Order Lever (First class lever)

The fulcrum is between the load and the effort



The effort is further away from the fulcrum. This means the effort needed to move lever is less than load.

The amount of mechanical advantage is proportional to the distance of the effort from fulcrum to the distance of load from the fulcrum

Mechanical advantage is the ratio of the output force to the input force applied to a mechanical device. E.g. In a steering system, the driver applies a relatively small force to the steering wheel and this results in much larger steering force at wheels

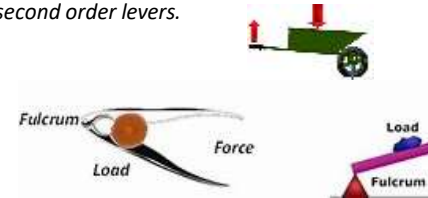
Seesaws, scissors are first order levers

Second Order Lever

The load is applied between the effort and the fulcrum.

There is mechanical advantage because the load is nearer the fulcrum than the effort.

Nutcrackers and wheel barrows are examples of second order levers.

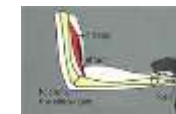


Third Order Lever

The effort is applied between the load and the fulcrum.

Effort needed is greater than the load because effort is nearer the fulcrum.

Lifting a dumbbell is an example of a third order lever. The load is the weight. The fulcrum is the elbow and the effort is the bicep muscle.



Key Words

You must know the meanings of the key words below:

Rotary
Linear
Reciprocating
Oscillating
Lever
Effort
Fulcrum

Key Point

There are four types of motion: rotating, linear, reciprocating and oscillating.

You must be able to:

Explain how first/second order levers can give clear mechanical advantage making it easier to move a load.
Explain the difference between different types of motion.
Describe the common features of all levers.
Identify which lever does not give mechanical advantage to the effort used.



Student name:
DT Knowledge Organiser



Materials & Their
Properties

New Materials

Modern materials: New processes have led to the development of titanium alloys with improved properties. (Metal foams and Graphene)
One way of altering a material to perform a new function is coating the material in nano material. Materials coated in metals can improve surface quality to improve hardness and prevent corrosion. Changing physical state of material. E.g. LCDs Liquid crystal display



Metal Foams: Metal foams are made from metal with gas pores. They look like metal sponges. They have properties of metal but are much lighter. (75-95% lighter)
They are used for crash resistant vehicles.



Graphene: Graphene is a form of Carbon. Atoms are arranged hexagonally. It is 200 times stronger than Steel. It is flexible, transparent and conducts heat and electricity well. Used in smart phone windows and touch panels.



Nanomaterials: Made of tiny particles less than 100 nanometres in size. Nano coatings can repel dirt, water with self cleaning properties



Smart materials: Change property in response to external stimulus. This is reversible if the stimulus changes. A smart material seems to think.
Stimulus that might cause changes to a smart material could be: light, heat, cold, moisture, stress or even PH levels.
Shape memory allows respond to heat. They can used in spectacle frames and heated if bent to return to original shape.
Thermochromic pigments change colour in response to temperature. These pigments can be used for thermometers and food packaging.
Photochromic pigment change colour in response to light changes. E.g in transition lenses



Composites: Combine 2 or more materials to get a better property. E.g. Carbon fibre has six times strength of concrete.
The materials in a composite are not mixed at chemical level.
Common composites include: Glass reinforced polyester. (GRP) used in body building and boat hulls.
Carbon reinforced polyester (CRP) used to make tent poles, bikes and sports equipment.
Composites cannot be recycled and are disposed of in landfill.



Technical Textiles: Manufactured for properties rather than looks. Their fibres are spun and then woven into fabric. Examples include Kevlar in body armour and fire resistant clothing worn by firefighters. Conductive fibres allow circuits to be incorporated into fabrics. They can control things such as light and temperature. Micro fibres incorporate tiny capsules that reduce body odour and can be used in medical textiles.



Key Words
You must know the meanings of the key words below:

Metal foam
Graphene
Nanomaterials
Composite
Technical textiles

Key points
Composite combine 2 or more properties.
Smart materials change in response to external stimulus

You must be able to:
Describe characteristics of new materials
Explain what is a smart material and a composite material
List technical textiles, smart and composite materials.
You must be able to give examples of typical uses.



Student name:

DT MIND MAPS



New and Emerging Technologies:

Impact on Production

Advantages of CAD

It is extremely accurate.
Easy to modify or revise existing designs
Storage space reduced.
Rotate models on computer screen
Simulation software can be used to see how something will function. Spot problems
Designs can be exported to CAM equipment for manufacture



Disadvantages of CAD

Can be expensive to buy, so high start up costs.
Need appropriate hardware to run software.
Need very good specification which adds to cost.
Time & money spent training staff.
Staff need to regularly update their skills



Advantages of CAM

Complex shapes produced much more easily than by hand
Every product is accurate, exactly the same.
Very high levels of precision/accuracy
Machines can run 24/7
Increase speed of manufacture when producing large numbers of products.



Disadvantages of CAM

Set up costs can be very high
Operators need training to use equipment, this adds costs and time
One-off products can be slower to produce than manufacturing by hand in some instances



CAD:

(Computer aided design) Software used to create 2D drawings & 3D models on a computer screen

CAM:

(Computer aided manufacture) Software used to control machines to make products. (laser cutters, vinyl cutters & 3d plotters)

Push & Pull

Technology Push

When new products are produced because of new materials/processes being used/available. **Research and development are key to this process**

Market Pull

Products are developed as result of market forces (needs/wants). Market research is used to gauge opinion and needs of target market



Key Words

You must know the meanings of the key words below:
Computer aided design (CAD)
Computer aided manufacture
Lean manufacture
Just in time
Technology push
Market pull

Key points

Different production systems/techniques improve efficiency

CAD/CAM improves accuracy of design/manufacture but often require high setup costs

You must be able to:
Explain the impact of CAD/CAM on production

Explain how production techniques and systems improve manufacturing efficiency

Improving manufacturing efficiency

Lean manufacturing aims to make products in most effective and efficient way possible. It where possible eliminates waste during manufacturing.

This includes:

Moving products unnecessarily around a factory.

Making too many products

Time workers spend looking for tools

Doing just what the customer wants. (no extras!)

(JIT) JUST IN TIME production deliver materials only when needed. Less money is tied up in materials. Could be delivery problems if suppliers don't deliver on time thus slowing manufacture. Could stop manufacturing leaving equipment unused and customers waiting.

(FMS) FLEXIBLE MANUFACTURING SYSTEMS react to unpredicted change. They change systems or the order of making components to help make the end product. They might even redesign the product.

Increased automation is improving manufacturing efficiency but can mean fewer jobs for people.

Student name:
DT Knowledge Organiser



Design Specification

Designing products.

Design Brief

Design brief

A short description of a problem and how it will be solved.
It is typically written in a few short paragraphs



Client needs/wants
You must consider the needs, wants, interests of the end users of the product



Situation

The situation normally identifies a need that requires a solution.
E.G Developing numeracy skills can equip young children well for school.



Definition/purpose:

A design specification is a list of measurable criteria that the product must meet. Each point must be concise and be justified.
It provides detail on the specific requirements of the product.
A good specification will include; aesthetics, function, ergonomics, components and materials, sustainable issues and social issues.

Design Specification	Assessing my design
1. I will design a product that meets the needs of the user and is aesthetically pleasing.	1. I will design a product that meets the needs of the user and is aesthetically pleasing.
2. I will design a product that is functional and meets the needs of the user.	2. I will design a product that is functional and meets the needs of the user.
3. I will design a product that is sustainable and meets the needs of the user.	3. I will design a product that is sustainable and meets the needs of the user.
4. I will design a product that is socially responsible and meets the needs of the user.	4. I will design a product that is socially responsible and meets the needs of the user.
5. I will design a product that is safe and meets the needs of the user.	5. I will design a product that is safe and meets the needs of the user.
6. I will design a product that is easy to use and meets the needs of the user.	6. I will design a product that is easy to use and meets the needs of the user.
7. I will design a product that is affordable and meets the needs of the user.	7. I will design a product that is affordable and meets the needs of the user.
8. I will design a product that is reliable and meets the needs of the user.	8. I will design a product that is reliable and meets the needs of the user.
9. I will design a product that is durable and meets the needs of the user.	9. I will design a product that is durable and meets the needs of the user.
10. I will design a product that is innovative and meets the needs of the user.	10. I will design a product that is innovative and meets the needs of the user.

Manufacturing Specification

Definition/purpose:

A manufacturing Specification should contain information needed to make the design.
It should include the following information:
The scale of production to be used: Is the product to be batch or mass produced or made as a one off item?
A drawing of the final design. This should include assembly and construction details.
Details of components and materials needed & any standard components. This could be a cutting list
Details of how quality will be ensured, such as quality control and quality assurance. This can be a flow diagram or visual making diary

ACCESSFM



Aesthetics – How will the product look. E.g. Colour, texture, shape.

Client- Who is the product for? Gender and age of user.

Cost- How much will it cost to manufacture your product? How much will it cost consumer?

Environment- What impact will the product have on the environment? How can it be designed and be made to be more sustainable?

Safety- How will product be designed to be safe to use?

Size- What will the dimensions be in millimetres of the finished product? This should include Height, Length and Depth.

Function- What will the product do and how will it work?

Materials- What materials/components will be used to make the product

Key Words

You must know the meanings of the key words below:

Design brief

Design specification

End user

Manufacturing

specification

Key points

ACCESSFM is a tool used to help designers

write a specification

You must be able to:

Explain what is a design brief

Explain what is a design specification?

Explain what should be

included in a

manufacturing

specification

Write a design brief

and design

specification for a product

Modify a design brief

as a result of user

feedback

Produce a

manufacturing

specification for a

product



Student name:
DT Knowledge Organiser



Working
drawings

System & Schematic
drawings

Designing products:

Communication of ideas



Sketching

Freehand sketching
is fast
Do not have to be to
scale/accurate &
include exact
dimensions



3d sketching

This could be
isomeric, perspective
drawing. Perspective
drawing uses
vanishing points to
help create a
realistic view

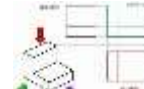


Exploded drawings

Show how
parts/objects fit
together.
They should show
relative size to each
other
Useful for showing
how to assemble
parts. E.g. furniture

Purpose:

Also known as orthographic
drawing communicate drawings in
sizes. They are drawn in British
standard BS58888:2006
3rd angle shows 3 views. Top,
front, side
The drawing should be completed
in scale. Half size is written as 2:1



Purpose:

They show how a system would
work. They include input, process
and output blocks. They show
how components are linked
together. A systems drawing may
include a feedback loop



Mathematical modelling

Computer based tools

Physical Modelling

Other ways of
communicating

Purpose

Simulate real life situations using
formula.
Can be used to demonstrate a system.
Used in aircraft testing, bridge building,
wind tunnels



Purpose

Using CAD (Computer aided design)
orthographic drawings can be produced.
Virtual models can test how things fit
together
They can involve complicated Maths
formula.



Purpose

Making a physical model/prototype from
things such as card gives an idea of shape
and size.
Models can test fit and size. Toile is used in
textiles and breadboarding is used to
construct electronic circuits.



Purpose

Use of films, audio, interviews to get
primary (first hand research)
Use of annotation to add meanings to
sketches and drawings. They can explain
the reason for design choices and
modifications.



Key Words

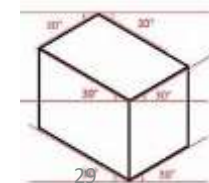
You must know the
meanings of the key
words below:

Scale, perspective,
isometric drawing,
exploded drawing,
annotation.

Key Point

Exploded drawings
show how the parts of
a product fit together.
Good annotation is
essential to
discuss/explain features
of designs and how
they link to the design
specification

You must be able to:
Produce sketches using
perspective and
isometric drawing.
You must be able to
annotate a drawing
effectively to discuss
features of your design
State 3 ways of
drawing in 3d.
Know the angle used
for isometric projection.
Describe the purpose of
an exploded drawing



Student name:
DT Knowledge Organiser



Prototypes

Designing products.

Computer based tools

Effects of tools

Designers can have virtual meetings across the other side of the world. Almost anyone anywhere with access to computers can do this and discuss designs with clients.

Clients & stakeholders

Reduces cost as do not have to travel to communicate globally. Quick response time with emails. Virtual meetings can happen using networks. Can involve lots of stakeholders in process

Presentation of ideas

Key part of using computer tools is getting face to face feedback.



Use of CAD/CAM

CAD (Computer aided design) CAM (Computer aided manufacture

Can be used to model
Good for demonstrating to clients
Allows products to be viewed from different angles
Files can be sent directly to computer aided manufacturers
Can be shared via emails, memory sticks

Spreadsheet software

Good for calculations, costings, quantities
Used for cutting lists.
Graphs can be used to demonstrate growth etc to clients



Definition/purpose:

Full sized versions of an intended product/system
They help check function and look of a product.

They can reduce waste of materials, time and money by spotting problems before manufacture

Evaluating prototypes

The designer will use prototypes to get feedback from a client, to test a need for a market, to check functionality, to check looks (aesthetics), to check ergonomics (how it reacts with a user), to make refinements prior to manufacture



CAFÉ QUE

Definition/purpose:

A tool for evaluating a prototype or system

Cost: Cost of materials. Will the product be good value for money?

Aesthetics: How does the product appeal to the 5 senses and its target market?

Function: Does it work? Does it do its intended job?

Ergonomics: Has usability and human factors been considered?

Quality: How will quality be ensured during manufacture?

User: Who is the intended user? Does the prototype meet their needs? If not how can it be changed?

Environment: How sustainable is the product? Can it be made out of recycled materials? Can components be easily changed? Does it use biodegradable materials?



Key Words

You must know the meanings of the key words below:

Virtual meeting software
Presentation software
Spreadsheet software
Prototype
Evaluation

Key Point

Spreadsheet software can be used to share data (e.g. anthropometrics, measurements, quantities relating to a product)

Virtual meetings allow designers to meet with clients almost anywhere in the world
Making prototypes ensures problems are found and dealt with early on

You must be able to:
Explain the benefits of computer based tools when communicating ideas.

Describe how to share and communicate using computers
Explain why designers produce prototypes

Student Knowledge Organiser



Materials & Their Properties

Finishing Materials

Purpose of finishing:

The main reasons are for making something look nice and improve function. Finish can make something last longer and for example make something waterproof. A painted front door will not warp or bend as the paint protects it from the elements.



Metal based materials:

Dip coating involves putting powder onto metal, dipping it in fluid and then heating it to create a smooth finish.



Galvanising Metal is dipped in a bath of molten zinc to prevent it rusting.



Polymers:

The main finishing technique is **polishing** to remove fine scratches. Polishing includes using abrasive liquids and surfaces to remove scratches until very smooth.



Waxes can be used to fill gaps in the polymer.

Vinyl decals can be added for decoration. **Plastics** can also be printed directly onto.



Textile based materials:

Block and screen printing can be used to apply decoration to fabric. Fabric can be dyed by hand or machine. Stain resistant finishes can be applied.



Timber based materials:

Timber can be **painted** with brushes or sprayed. Oil, water based and solvent paints can be used. Paints can protect and decorate wood. Paint is available in a extremely wide range of colours.



Timber can be treated with **Polyurethane varnish**. This is tough, heat proof and waterproof. Varnish can come in different colours. It is normally applied in three layers and then smoothed using glass paper.



Tanallising is pressure treating wood to preserve it. Wood is placed in a closed container and vacuum created. Pressure is then applied which pushes preservative into the wood.

Papers and boards:

Screen printing, block printing, lithography, flexography, letter press are used to put text /designs onto paper



Embossing presses a shape into the material. This gives a tactile 3d effect.



Ultraviolet varnishing applies a glossy coating which is then dried using UV light



Electronic and mechanical systems:

Printed Circuit boards (PCBS) can be lacquered. This provides a waterproof layer for the tracks.



Gears can be lubricated to reduce friction and reduce heat and noise



Key Words

You must know the meanings of the key words below:

Polishing
Varnishing
Embossing
PCB lacquering

Key points

Finishing a material can improve its looks (aesthetics), durability and resistant to damage.

Screen /block printing are methods used for textiles & paper /board

You must be able to:
Explain the purpose of finishing materials
Describe how surface finishes are applied to a range of materials



Educational Overview of Arts Award Levels: Discover, Explore, Bronze, and Silver

Arts Award Discover

Overview

Arts Award Discover is the introductory level of the Arts Award program. It is designed for young people to engage with the arts and begin exploring their interests. There is no age limit, making it accessible to all young people.

Requirements

To achieve Arts Award Discover, young people create a personal 'arts log' that documents:

- 1. Participation in Arts Activities:**
 - Engage in various art forms and activities.
- 2. Researching Artists or Craftspeople:**
 - Investigate the work and life of artists or craftspeople.
- 3. Sharing Arts Discoveries:**
 - Present their findings and experiences to others.

Evidence Collection

Participants can use drawings, photographs, written work, or recordings to create their arts log.

Arts Award Explore

Overview

Arts Award Explore builds on the Discover level by encouraging a deeper engagement with the arts. This level introduces more structured activities and personal responses.

Requirements

To achieve Arts Award Explore, young people must create a personal arts log that includes:

- 1. Participation in a Range of Arts Activities:**
 - Document different art forms and provide personal responses about what inspired them.
- 2. Researching Artists, Craftspeople, and Arts Organizations:**
 - Explore the work and impact of artists or organizations.
- 3. Creating a Piece of Artwork:**
 - Produce their own original artwork.
- 4. Sharing with Others:**
 - Present their achievements and what they enjoyed about the process.

Evidence Collection

Participants can choose the format of their arts log, such as a diary, scrapbook, or digital presentation.

Bronze Arts Award

Overview

The Bronze Arts Award is a Level 1 qualification on the Regulated Qualifications Framework (RQF) and is aimed at young people aged 11 to 25. It requires a total of 60 hours, including guided and independent learning.

Requirements

To achieve a Bronze Arts Award, young people must collect evidence in an individual arts log or portfolio of their experiences:

1. **Developing Interests, Knowledge, and Skills:**
 - Actively participate in any art form to develop new skills.
2. **Experience as an Audience Member:**
 - Attend at least one arts event and provide a review of the experience.
3. **Researching an Artist or Craftsperson:**
 - Investigate the career and work of an artist or craftsperson who inspires them.
4. **Passing on an Arts Skill:**
 - Teach an arts skill to others.

Evidence Collection

Participants create a portfolio or logbook that documents their journey, including photos, written reflections, and reviews.

Silver Arts Award

Overview

The Silver Arts Award is a Level 2 qualification on the RQF, designed for young people aged 14 and above but open to those aged 11 to 25. It requires a total of 95 hours of guided and independent learning.

Requirements

To achieve a Silver Arts Award, young people must complete two units and collect evidence in an individual arts portfolio:

Unit 1: Arts Practice and Pathways

1. **Identifying and Planning an Arts Challenge:**
 - Set and plan a personal arts challenge.
2. **Implementing and Reviewing the Arts Challenge:**
 - Execute the challenge and reflect on the outcomes.
3. **Reviewing Arts Events/Experiences:**
 - Attend, review, and share views on various arts events.
4. **Researching Future Opportunities and Careers:**
 - Explore potential career paths and opportunities in the arts.

○

Unit 2: Arts Leadership

1. Identifying a Leadership Role and Planning a Leadership Project:

- Plan a project where they take on a leadership role.

2. Planning the Practical Issues:

- Address practical aspects like budgeting, scheduling, and resources.

3. Being an Effective Arts Leader:

- Demonstrate leadership skills through the project.

4. Working Effectively with Others:

- Collaborate and work effectively with a team.

5. Reviewing the Project and Leadership Development:

- Reflect on the project's success and their development as a leader.

Evidence Collection

Participants compile a detailed portfolio that includes planning documents, reviews, personal reflections, and evidence of leadership activities.

These structured programs provide a comprehensive pathway for young people to explore, engage, and develop their skills and interests in the arts, while also gaining qualifications recognized on the RQF.

Careers 8-19 July 2024

8.7.24		9.7.24	10.7.24	11.7.24	12.7.24	15.7.24	17.7.24
Introduction to careers week	10:00-12:00	Work Experience Days	Work Experience Days	KOSTALAS PT Brief Introduction	London Ambulance visit careers talk	Fire brigade visit careers talk	References and feedback
Job Adverts for Northstar jobs released		RP, KJ & JRT at library half a day	ZB, JTG and ABR	Session for pupils	Jobs interviews at Northstar	Jobs at Northstar carry out duties for next two days	
Filling in job applications	13:00 -13:45	Feedback from line manager Angelica	Feedback from line manger Angelica	Career Pathways to becoming a PT			
	14:00 – 14:30			Q &A			



Vacancy: Personal Assistant x2

Roles and Responsibilities:

We are looking for someone who is:

Able to schedule meetings and manage calendars

Answer phones calls and take messages

Help with daily time management

Run errands as requested

Person Specification:

-
- Must be organised and punctual
 - Ability to work under pressure
 - Be proactive

Applications to be submitted by 7.7.24

Please see Mr Macdonald or Ms Foley for further information and application forms.



Northstar
New School

Roles and Responsibilities:

We are looking for someone who is:

Able to schedule meetings and manage calendars

Answer phones calls and take messages

Help with daily time management

Run errands as requested

Person Specification:

- Must have good understanding of IT
-
- Ability to adapt and problem solve
 - Work with a range of people

Applications to be submitted by 7.7.24

Please see Mr Macdonald or Ms Foley for further information and application forms.

Vacancy:



Northstar
New School

Administrative Assistant x2

Roles and Responsibilities:

We are looking for someone who is:

Able to schedule meetings and manage calendars

Answer phones calls and take messages

Help with daily time management

Run errands as requested

Person Specification:

- Good knowledge of photocopier and printer
- Able to multi-task
- Be able to make quick decisions

Applications to be submitted by 7.7.24

Please see Mr Macdonald or Ms Foley for further information and application forms.