Unit 101: Exploring Non-resistant Materials

Unit code: J/502/5355

QCF Level 3: BTEC National

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit introduces learners, through practical exploration, to underpinning knowledge and understanding of non-resistant materials, which have common properties and working characteristics but individual distinctions, to inform future practical work by the learner.

Unit introduction

This unit is about developing learners' understanding of the properties of selected non-resistant materials such as clay, paper, plaster, plastics, fibres and pliable metals and their related technologies. The choice will depend on the centre's resources and facilities. Learners are not expected to have experience of working with all the listed materials, but the unit is richer for the inclusion of as many different materials as the centre can use.

For practitioners working three dimensionally within the field of art, craft and design, an understanding of materials, techniques and processes is essential. The ability to skilfully manipulate materials and techniques to exploit their full potential, within both expected and unexpected contexts, is the backbone of any designer's work. This involves exploring how materials can be prepared, worked, joined together and treated to meet design intentions and is developed from extensive research and investigations as ongoing professional practice. Practitioners keep thorough records of their explorations and their findings as personal reference material, to ensure forms and finishes can be reproduced with control and consistency, to extend existing ideas, change directions and discover the unexpected through improvisations and unusual combinations.

It is essential that learners set time aside for research, investigation and experimentation without the pressures of finished outcomes, therefore the emphasis of this unit is on exploratory work. Learners will discover how to conduct tests and samples to acquire technical and visual information and increasingly recognise the relevance of exploratory activities. They will learn how to manipulate and join non-resistant materials and that their malleable and flexible characteristics are suited to changes and adjustments at different stages. An important aspect of this exploration is the continual analysis, evaluation and recording of information and referencing the knowledge and understanding gained to inform further work. Learners should develop their own methods of recording these investigations and keep a sketchbook or journal investigations, observations and conclusions. This can include photographs, drawings, written notes and references to others' works to evidence what they have learned. The sharing of results to extend learners' knowledge is a component of this unit.

Learners must have a full health and safety induction in the practice of working in a workshop environment and be shown the correct use of tools, equipment and protective clothing.

Learning outcomes

On completion of this unit a learner should:

1 Be able to investigate non-resistant materials safely

2 Be able to select and prepare non-resistant materials to meet specified requirements

3 Know about the properties and working characteristics of non-resistant materials.

Unit content

1 Be able to investigate non-resistant materials safely

Non-resistant materials: ceramics materials eg earthenware, stoneware, smooth, grogged, liquid, paper clay, oxides, glazes; plaster eg liquid, semi-set, hard, impregnated with scrim; paper eg tissue, newsprint, papier-mache, pulped, wet, dry, with glue, with plaster, shredded, pliable card (different thicknesses); plastics eg polythene, perspex, thin, transparent, opaque, moulded, vacuum formed; wire eg copper, silver, galvanised; fibres eg fabrics, leather, string, hair, grasses, threads

Working methods: eg methodical, sequential, material manipulation, construction; prepare materials eg wedging clay, soft working, controlled drying, leather hard consistency, paper pulping, constructing armatures; construction eg pinching, coiling, slabbing, throwing, casting, modelling, mixing, moulding, cutting, joining, gluing, assembling, vacuum forming, laminating; finishing techniques eg painting, texturing, burnishing, heat treatments, firing, varnishing, glazing; specialist tools; equipment eg hand tools, banding wheels, throwing wheels, spray gun, hot air gun, glue gun, kiln, blow torch; storing eg wrapping, polythene, unwrapping clay (stages of hardness), dry materials, plaster, oxides, other powdered materials, wet materials, casting slip, plaster, paper pulp; researching eg contextual examples, artists, designers, historical, contemporary; producing samples, testing materials

Health and safety: thinking and working safely within workshop studio environment; following procedures; COSHH wearing protective clothing; looking after specialist tools, storing materials

2 Be able to select and prepare non-resistant materials to meet specified requirements

Select non-resistant materials: eg evaluate notes on tests, consider results of explorations; consider fitness for purpose; evaluate design constraints

Prepare non-resistant materials: eg measuring and preparing; list components, required tools, equipment, fastenings, fittings, glues, adhesives; adhere to health and safety standards

Shape, form and use finishing techniques: eg shaping, moulding, cutting, tearing, sawing, carving, planing, sanding, smoothing (by hand, with machine)

Construction techniques: eg joining, assembling, fixing, forming, deforming, manipulation by moulding, bending, decorating, preserving, enhancing finished artefacts, applying treatments, surface finishes; health and safety

3 Know about the properties and working characteristics of non-resistant materials

Properties: eg malleability, pliancy, plasticity, fluidity, strengths, weaknesses, weight, fragility, durability, ease of workability

Working characteristics: eg plasticity, shrinkage, changing stages, softness, hardness, heat treatments, wet, leather hard, dry (before or after firing, before or after mixing with water), mixing with other materials; tactile qualities eg rough, raised, indented, smooth, adding other materials; finishes; fine detailing eg colours at changing stages, burnished, polished, glossy, opaque, matt, transparent

Record: findings eg tests, working methods, outcomes, experiments, changes in materials; links eg with research, with others' work; in appropriate form eg notebook, sketchbook, journal, visual diary; potential; constraints; qualities (aesthetic, technical); formal elements

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 investigate non-resistant materials and their related techniques safely [CT, IE, TW, SM, RL]	**M1** conduct purposeful investigations about diverse non-resistant materials	**D1** conduct independent and detailed investigations into diverse non-resistant materials and techniques
P2 select and prepare non-resistant materials to meet specified requirements [TW, SM]	**M2** select and effectively prepare non-resistant materials to coherently meet specified requirements	**D2** apply knowledge and investigations to fully explore the potential of non-resistant materials while meeting specified requirements.
P3 identify the properties and characteristics of non-resistant materials. [RL, IE]	**M3** describe properties and characteristics of non-resistant materials.	

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

This unit has been designed to give learners the opportunity to experience working with materials for three-dimensional making, which have particular properties of malleability and pliancy, but which may change through different treatments and approaches. Learners should have access to as wide a range of materials, techniques and processes as are available in the centre, the relevant workshops equipped with appropriate tools and equipment and to library and internet facilities to research artists' works. Learners should also be encouraged to see the potential in recycling materials from everyday life and to use these creatively in 'low tech' ways. Delivery should consist mainly of demonstrations and of monitoring learners' practical work. There is potentially complex and technical information to absorb, so learners should focus on a limited range of explorations at one time and have the opportunity to absorb and apply understanding gained before moving on to another range.

Learning outcome 1 involves learners exploring techniques when working with non-resistant materials. In delivering this unit, tutors could break it down into the areas that learners are going to experience, such as clay, paper, plaster, wire and fibre, or employ an integrated approach. A full health and safety induction should be given in each area, which may include protective clothing such as masks and how potentially hazardous materials should be stored. Tutors should demonstrate how the materials can be prepared, manipulated and joined and timetable learners to practise techniques and processes and to explore personal investigations, experimentations and approaches. Work can follow established procedures, systematic, scientific and sequential investigations to the purely experimental for discovering unexpected outcomes, with regards to health and safety considerations. Learners need to develop procedures for trialling, sampling and recording intended finishes, as natural accompaniments to designing and making. As some are time consuming activities, learners should share findings and results and could work in small groups. Regular reviews and revisions should take place to consolidate and reinforce information.

Delivery techniques should include explanatory demonstrations, close supervision, monitoring that materials are used appropriately, discussions, structured guidance, regular reviews and exposure to historical and contemporary examples of artefacts produced in non-resistant materials. Learners need to be made aware of possibilities as well as technical and budgetary constraints. The importance of clearing up before the end of each session must be instilled, particularly wet wiping all tools and surfaces to minimise dust. Learners should become familiar with and use creatively the materials available to them and are not expected at this level to be creating their own glaze mixtures or firing their own work.

Learning outcome 2 follows on from outcome 1 in that without direct experience of handling, manipulating and working with materials and reviewing their work to record investigations, learners would not meaningfully understand the properties and working characteristics of non-resistant materials. Delivery could take the form of explanatory demonstrations of degrees of strength, flexibility, ductility, malleability, as appropriate, to ensure learners understand how different materials have different properties and how they can therefore be selected for different purposes.

From the initial induction phase a more structured task should be given in the form of a brief. This should allow learners to investigate and select from the range of non-resistant materials in the Unit content. Delivery at this stage should take the form of close supervision, monitoring that materials are used appropriately and structured guidance. Learners need to be made aware of possibilities as well as technical and budgetary constraints. The importance of clearing up before the end of each session must be instilled. Tutors should also direct learners to research relevant works of practitioners and for them to make links with their own investigations.

Learning outcome 3 is a synthesis of the first two outcomes in that without direct experience of handling, manipulating and working with materials and reviewing their work to record investigations, learners would not meaningfully understand the properties and working characteristics of non-resistant materials. Delivery should take the form of explanatory demonstrations of degrees of strength, flexibility, malleability, pliancy, as appropriate, as well as surface finishes, to ensure learners understand how different materials have different properties and how they can therefore be selected for particular purposes.

Learners should collate handouts and notes for personal reference as good working practice. Time should be set aside, such as at the end of each working session, so learners can record the materials and techniques they used, all stages of the explorations, not just the end result, while they are still fresh in their memories. They should also comment on the visual results, with particular reference to the formal elements. These records can take the form of a combination of written notes, drawings, diagrams, photographs, sample pieces or any other relevant method and include links with artists' works. Delivery may take the form of setting questions and one to one discussions. Tutors may give handouts of technical information, but learners should be encouraged to make their own personal recordings to aid memory of the practical work and to develop their independence. Tutors should direct learners to research relevant works of practitioners, for them to make links with their own investigations and tutors should also monitor that recordings are clearly organised, so learners may use the information in the future, rather than continually relying on tutors.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction to unit and assignment programme.
Assignment 1: Organic Forms Introduction to ceramics workshop and health and safety considerations.
Following a demonstration, learners make a series of thumb pots in stoneware and earthenware clays. Leave to be bisque fired.
Working from observation, learners select a seed head and model this in clay, copying the form and texture as exactly as possible, working with two thumb pots joined together. Leave to be fired. Review.
Learners experiment with making a flat sheet of paper into relief and 3D by scoring, folding, bending, slotting, overlapping, rolling, weaving etc, working without glue (self supporting structures), with glue and with alternative means of fixing, eg pinning, stitching, stapling etc. Explore textures with paper, without drawing, eg scoring, tearing, cutting, scrunching etc.
Working from the clay model and the paper explorations of forms and textures, learners translate the clay model into a paper model. Review.
Working from the paper model, learners construct a frame from rolled newspaper tubes (rigid). Cover with plaster impregnated scrim. Translate textures by building up with liquid plaster and/or adding small items provided (eg seeds, pebbles, glass and metal fragments etc). Leave to set.
Learners review plaster model. Working from plaster model, construct a wire frame. Cover with soft fibres, considering form, texture and colour.
Learners use fired thumb pots as stoneware glaze tests, thoroughly recording. Glaze model.
Learner-initiated private study time: Learners photograph stages of work. Record all processes, materials, techniques used and health and safety considerations.
Learner-initiated private study time: Collect examples of artists' works, noting visual and technical connections.
Learners present all samples and records of explorations for group critique.

Topic and suggested assignments/activities and/assessment
Assignment 2: Vessels Working from research drawings of glass and metal vessels, learners construct an A3 version using soft materials, considering textures, colours and methods of joining.
Learners make drawings from selected details of the texture and colours using, eg inks, collage, trailing, pens/ sticks, monoprinting, layering media and materials.
Learners roll out earthenware and stoneware clay slabs and explore slip decoration techniques from above visual studies, eg painting, paper and wax resist, sgrafitto, trailing, monoprinting, building up layers. Cut up as tiles and leave to be bisque fired.
Learner-initiated private study time: Learners draw and construct a card version of the soft vessel. Make paper patterns of each shape.
Learners cover large sheets, applying colours and textures from detail drawings. Use sections to cover card models to develop surface decoration/texture.
Learners glaze slip painted tiles in different transparent glazes, stoneware and earthenware.
Learners select stoneware or earthenware finish from test tile results, select clay. Roll out clay slabs sufficient to cut out each piece. Construct clay vessel and decorate with slips. Leave to fire, then glaze.
Learner-initiated private study time: Learners record all processes, materials, techniques used and health and safety considerations.
Learner-initiated private study time: Learners collect examples of artists' works, noting visual and technical connections.
Learners present all samples and records of explorations for group critique.
Review of unit and assessment.

Assessment

The unit enables learners to explore the possibilities and limitations of non-resistant materials. The focus of the unit is on exploration, rather than the production of finished artefacts. Learners should make notes and analyse the results of the various materials and their characteristics: performance through different stages, strengths, weaknesses, impact, durability, fragility, aesthetic qualities, ease of working, capacity to accommodate detailing and quality of finishes. The process of experimentation should not be restricted but should be clearly documented. It is particularly important for learners to develop the habit of making accurate and comprehensive records of their exploration. These records, alongside actual work and tutor observation notes, will provide evidence for assessment purposes.

For P1, learners must show basic practical skills for conducting investigations, including being able to follow appropriate procedures for preparing, forming, using and storing non-resistant materials to produce a series of samples, tests, models or artefacts. Learners must use materials, techniques, tools and equipment safely and clean up properly. Explorations with materials may be minimal and show a basic level of skills. Learners may require close supervision and frequent reminders of processes.

For P2, learners must present evidence of their research and practical investigations towards specified requirements, including technical information about materials, techniques and processes, their methods of working and how results were achieved. Information may be limited, basic and lack consistency. The appraisal of learners' tests may be limited. Language used in notes/annotations may be basic.

For P3, learners must review the main properties and working characteristics of non-resistant materials, what changes take place at different stages and how these can be controlled and utilised. They should explain how materials and techniques can be used to produce particular outcomes and visual qualities, but explanations may be limited and some of the judgements reached may be tutor led and expressed using limited visual and critical analysis. There may be minimal evidence of links with practitioners' works and examples selected may not be consistently relevant. Learners' vocabulary will be basic.

For M1, learners must work purposefully and in a consistent organised way; and they must prepare materials, tools and equipment efficiently. They must show competent practical skills when manipulating and exploring materials and techniques. Learners must research different approaches, but they may be cautious about exploring beyond the familiar. They may consult the tutor to clarify activities to ensure understanding and regularly take stock and review methods and results. Learners must apply visual analysis to their practical work.

For M2, learners can, consult with tutors but they should record all discoveries made and information acquired to refer to at later times. These records should be clear and informative, showing visual connections with their own and others' works. Observations about the properties of non-resistant materials and techniques must be thought through and the potential for future application identified. Reviewing and recording must be a regular and purposeful activity. Annotations must include observations about aesthetic considerations. The information will be clearly organised with reflection given to the layout and design of the reference book.

For M3, learners must evidence their understanding of the properties of non-resistant materials by comparing a diverse range of materials and techniques, particularly at different stages of working, such as degrees of malleability and rigidity, structural possibilities and limitations, quality of finishes. They must use specific examples to compare the similarities and differences between works in different materials and how these were achieved, thus expanding information to evidence greater understanding at this level.

For D1, investigations must be thorough. Learners should take risks or explore personal directions and to make discoveries, but within understood parameters. Learners must analyse their practical investigations and professionals' works to identify possible applications in their own work. They must recognise the potential in unexpected results. Recording must be thorough, with expanded information detailing the reasons for identified qualities.

For D2, learners must show a strong understanding of the qualities of materials the relevance of the techniques used to achieve particular results, by referring to their own investigations and others' works. They need to analyse works by practitioners to inform their understanding and to learn how professionals manipulate materials, techniques and processes to achieve their outcomes.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3 M1, M2, M3 D1, D2	**Assignment 1:** Organic Forms	Potter explores natural forms and techniques.	Continuous tutor monitoring and observation of practical work. Regular tutor/learner reviews of explorations. Presentation at group critique. Sketchbook and finished artefacts. Tutor written feedback.
P1, P2, P3 M1, M2, M3 D1, D2	**Assignment 2:** Vessels	Ceramic artist producing self-initiated work.	Continuous tutor monitoring and observation of practical work. Regular tutor/learner reviews of explorations. Presentation at group critique. Sketchbook and finished artefacts. Tutor written feedback.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Art and Design sector suite. This unit has particular links with the following unit titles in the BTEC Art and Design suite:

Level 1	Level 2	Level 3
Creative Use of Materials, Techniques and Processes	3D Visual Communication	Exploring Materials, Techniques and Processes
Introduction to 3D Design Crafts	Working with 3D Design Crafts Briefs	Extending Non-resistant Materials
		Exploring Resistant Materials

Essential resources

Specialist workshop facilities, equipped to the appropriate standard for this level of work, are essential to simulate professional working environments. Learners need access to a range of non-resistant materials, hand and/or machine tools and equipment. For ceramics, safe storage of raw materials and work in progress, a kiln room with an air extraction system, organised shelving for different temperature firings and suitable space for experimental work are all needed. Plaster working should be in a separate area from ceramics. Dry plaster must be stored safely and disposed of appropriately. Sink traps should be provided for learners working with plaster and ceramics materials. There should be sufficient storage for paper, card and fibre work and a suitable atmosphere for drying. Facilities for paper pulp making and soaking fibres should be available. For plastics, suitable tools for cutting, with fume extraction facilities, should be available. Learners need a clean area for recording trials and experiments. For contextual research, learners need access to a library, computers, the internet, books, journals and a photocopier.

Employer engagement and vocational contexts

Centres should develop links with local practitioners who work with non-resistant materials, such as ceramicists, basket makers, designer makers working in mixed media and constructed textiles, model makers, modellers, mould makers, and animators. Organised visits to such workshops and other working environments would provide understanding of how practitioners use and organise materials, tools and equipment.

Centres should develop links with practising artists, craftspeople and designers, to deliver assignments to learners or to provide work experience.

Links with employers are essential to the delivery of the programme for work experience and future employment.

Vocational learning support resources:

- Learning and Skills Network – www.vocationallearning.org.uk

Business and finance advice:

- local and regional Business Link – www.businesslink.gov.uk

Assignments should be vocationally relevant; centres should consider the delivery of 'live projects', for example, to support the vocational content of the unit and programme.

Creative and Cultural Skills (www.ccskills.org.uk), the Sector Skills Council for Arts, Crafts and Design, has launched the web portal Creative Choices (www.creative-choices.co.uk). This portal has a range of information about careers in the arts, crafts and design sector, including job descriptions.

Indicative reading for learners

Textbooks

Balchin J – *Papier Mache* (Heinemann Library, 2000) ISBN 043111111618

Bawden J – *The Art and Craft of Papier Mache* (Mitchell Beazley, 1993) ISBN 0802112455

Beard P – *Resist and Masking Techniques* (A&C Black, 2004) ISBN 978-0713668285

Bosworth J – *Ceramics with Mixed Media* (A& C Black, 2006) ISBN 978-0713667714

Colclough J – *Mould Making* (A&C Black, 1999) ISBN 978-0713644890

Connell J – *Colouring Clay* (A&C Black, 2007) ISBN 978-0713676280

Fouchier S – *Felt* (A&C Black, 2009) ISBN 978-0713684940

Gault R – *Paper Clay* (A&C Black, 2005) ISBN 978-0713668278

Grey M – *Textile Translations: Mixed Media* (D4daisy books, 2008) ISBN 978-0955537110

Hamer F and Hamer J – *The Potter's Dictionary of Materials and Techniques* (A&C Black, 2004) ISBN 978-0713664089

Hardy M – *Handbuilding* (A&C Black, 2006) ISBN 978-0713679427

Harvey R – *Plaster of Paris: Techniques from Scratch* (Gentle Breeze Publishing, 1996) ISBN 978-0965078696

Harvey S – *Craft Workshop: Plaster* (Southwater, 2002) ISBN 978-1842156810

Hiebert H – *Papermaking with Garden Plants and Common Weeds* (Storey Books, 2006) ISBN 978-1580176224

Hughes A – *Stitch, Cloth, Paper and Paint* (Search Press, 2008) ISBN 978-1844482337

Kallenberg L – *Modelling in Wax for Jewellery and Sculpture* (KP Books, 2000) ISBN 978-0873418515

Lefteri C – *The Plastics Handbook* (Rotovision, 2008) ISBN 978-2888930020

Leitner C – *Paper Textiles* (A&C Black, 2005) ISBN 978-0713674446

Midgley B – *The Complete Guide to Sculpture, Modelling and Ceramics Techniques and Materials* (Grange Books, 1999) ISBN 978-1856279710

Minogue C – *Impressed and Incised Ceramics* (A&C Black, 2002) ISBN 978-0713661187

Payne C – *The Encyclopedia of Modelmaking Techniques* (Quantum Publishing, 2004) ISBN 978-07567541l2

Plowman J – *Papermaking Techniques Book* (North Light Books, 2001) ISBN 978-1840923353

Vaughan S – *Handmade Baskets* (Search Press, 2006) ISBN 978-1840923353

Wardell S – *Slipcasting* (A&C Black, 2007) ISBN 978-0713676723

Warnes J – *Living Willow Sculpture* (Search Press, 2000) ISBN 978-0855328344

Welch E – *Friendly Plastic for Starters (Fantastic Plastic)* (RARE BIRD, 2003) ISBN 978-0954464905

Journals

Blueprint	Wilmington Media
Crafts	Crafts Council
Creative Review	Centaur Communications Ltd
Design Week	Centaur Communications Ltd
New Design	DWB Associates

Websites

www.craftscouncil.org.uk	Crafts Council
www.design-council.org.uk	Design Council

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	trying out alternative or unusual ways of working with materials and techniques selecting practitioners' works which make links with own their work exploring materials and techniques from contextual research recognising potential in unexpected results investigating materials and techniques
Creative thinkers	trying out alternative or unusual ways of working with materials and techniques
Reflective learners	reviewing prior to recording the properties of materials and techniques discussing results of investigations to inform their own understanding of materials and techniques evaluating results of practical investigations
Team workers	following health and safety procedures with awareness of risk to self and others helping others practically when working with tools and equipment sharing findings about physical and visual properties of materials and techniques with others
Self-managers	being organised and carrying out investigations about materials and techniques systematically.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Independent enquirers	investigating and experimenting with materials and techniques, extending research and using the results to inform outcomes
Creative thinkers	adapting creatively to experimentation and absorbing results into design development
Reflective learners	keeping accurate and informative records using analysis and evaluative language
Team workers	sharing the results of investigations, giving and receiving feedback
Self-managers	working to deadlines, setting targets, listing resources needed in advance
Effective participators	engaging in their own learning, taking ownership and responsibly in specialist studios.

Functional Skills – Level 2

Skill	When learners are ...
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching the work of artists, craftspeople or designers using CD ROMs, DVDs and the internet
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	using equations for glaze mixing formulae, completing kiln firing logs
Identify the situation or problem and the mathematical methods needed to tackle it	planning and making models and finished works to scale the construction of models or finished works enlarge images or models working out angles for constructions working out sizes of individual shapes for construction dependent on thickness of materials
Select and apply a range of skills to find solutions	measuring shapes and edges to fit together, straight and curved scaling up or down drawings for models or final pieces multiplying or dividing numbers mixing chemicals using set square and protractor for working out and cutting to correct angles constructing 3D forms from flat shapes
Use appropriate checking procedures and evaluate their effectiveness at each stage	checking that constructed forms are at correct angle
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	adapting measurements when working with materials of different thicknesses using templates to check angles, curves, shapes and sizes
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting their own work and the work of artists, craftspeople and designers to a tutor or group discussing their own, their peers' and others' views on their work and the work of artists, craftspeople and designers listening and responding to what others say
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	researching the works of artists
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	transcribing their research annotating information.