

Unit Title:	Application of maths within design
OCR unit number	4
Level:	2
Credit value:	5
Guided learning hours:	38
Unit reference number	Y/503/5856

Unit purpose and aim

This unit aims to develop the learner's knowledge and understanding of mathematics. Within the context of this unit, learners will use mathematical principles including number, algebra, measurement, geometry and trigonometry to help develop solutions to design problems.

Learners will use specific mathematical principles within the design of products and be exposed to realistic design challenges that encourage them to select appropriate methods for solving design problems.

Learning Outcomes	Assessment Criteria	Teaching Content
<p>The Learner will:</p> <p>1 Be able to use number to solve design problems</p>	<p>The Learner can:</p> <p>1.1 Solve design problems using arithmetic techniques: addition subtraction multiplication division percentages ratios</p>	<ul style="list-style-type: none"> • With and/or without the use of a calculator: <ul style="list-style-type: none"> ○ add and subtract using numbers with up to 3 digits ○ add and subtract numbers up to 2 decimal places ○ multiply and divide numbers up to 2 decimal places ○ calculate percentages and ratios
<p>2 Be able to use algebra to solve design problems</p>	<p>2.1 Solve simple algebraic equations</p> <p>2.2 Transpose simple algebraic equations</p>	<ul style="list-style-type: none"> • Examples of simple algebraic equations are: <ul style="list-style-type: none"> ○ $V=IR$ ○ $P = I^2R$ ○ find w when $A = lw$

Learning Outcomes	Assessment Criteria	Teaching Content
3 Be able to use geometry to solve design problems	3.1 Solve design problems using geometry: <ul style="list-style-type: none"> • area of regular two-dimensional (2D) shapes • area of compound 2D shapes • volume of regular three-dimensional (3D) bodies • volume of compound 3D bodies 	<ul style="list-style-type: none"> • Regular and compound 2D shapes could include: <ul style="list-style-type: none"> ○ squares ○ rectangles ○ triangles ○ circles ○ I-shapes ○ parallelograms • Regular and compound 3D bodies could include: <ul style="list-style-type: none"> ○ cylinders ○ cuboids ○ cones ○ spheres ○ truncated prisms ○ cylinders with a dome end
4 Be able to use trigonometry to solve design problems	4.1 Solve design problems using trigonometry: <ul style="list-style-type: none"> • use Pythagoras' theorem • calculate compound area • calculate volume • identify unknown dimensions 	<ul style="list-style-type: none"> • Pythagoras' theorem • Angle ratios • Triangles with a compound area, volume • Use trigonometry to find missing dimensions

Assessment

This unit is centre assessed and externally verified. In order to achieve the unit you must produce a portfolio of evidence which, on request, will need to be made available to the OCR external verifier. Portfolios of work must be produced independently and centres must confirm to OCR that the evidence is authentic.

Evidence requirements

Learners must solve a given range of design problems that require the application of the mathematical content in each learning outcome.

Learners must show evidence of their working out in order to successfully solve each of the design problems.

Guidance on assessment and evidence requirements

Where possible a context-led approach to learning should be used. It is not expected that a single design brief would cover the full range of mathematical content of the unit and therefore a range of briefs may be necessary.

This unit could be delivered alongside Unit 3 Concept Development, where learners could use mathematics to support the development and feasibility of design work. Evidence may be in the form of worksheets or extracts from design folio work.

National Occupational Standards (NOS) mapping/signposting

NOS can be viewed on the relevant Sector Skills Council's website or the Occupational standards directory at www.ukstandards.co.uk.

Occupational standards	Unit number	Title
Engineering Technical Support suite 2 2007	TS2-02	Using and Interpreting Engineering Data and Documentation
Engineering Technical Support suite 2 2007	TS2-19	Assisting in Obtaining Resources for Engineering Activities
Mechanical Manufacturing Engineering suite 2 2008	O45NMME2-02	Using and Interpreting Engineering Data and Documentation
Mechanical Manufacturing Engineering suite 2 2008	O45NETS3-02	Using and Interpreting Engineering Data and Documentation
Design and Draughting	O15NDD03ECRS1.19	Complete chosen engineering designs

Functional skills signposting

This section indicates where learners may have an opportunity to develop their functional skills.

Functional Skills Standards					
English		Mathematics		ICT	
Speaking and Listening		Representing	✓	Use ICT systems	
Reading		Analysing	✓	Find and select information	
Writing		Interpreting	✓	Develop, present and communicate information	

Resources

Equipment

For effective delivery of this unit centres should have access to the following resources and equipment.

- Computer system with Internet access, word processing and business presentation software.
- Projector or interactive white board for lesson delivery.
- Access to a library of resources for revision purposes.
- A range of design related mathematics activities.

Additional information

For further information regarding administration for this qualification, please refer to the OCR document '*Admin Guide: Vocational Qualifications*' (A850) on the OCR website www.ocr.org.uk .