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OCR
Oxford Cambridge and RSA

GCSE (9–1)
Delivery Guide

MATHEMATICS

J560
For first teaching in 2015

Mensuration

Version 1

www.ocr.org.uk/gcsemaths

Introduction

GCSE (9–1) *MATHEMATICS*

Delivery guides are designed to represent a body of knowledge about teaching a particular topic and contain:

- Content: A clear outline of the content covered by the delivery guide;
- Thinking Conceptually: Expert guidance on the key concepts involved, common difficulties learners may have, approaches to teaching that can help learners understand these concepts and how this topic links conceptually to other areas of the subject;
- Thinking Contextually: A range of suggested teaching activities using a variety of themes so that different activities can be selected which best suit particular classes, learning styles or teaching approaches.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resources.feedback@ocr.org.uk

Curriculum content

GCSE (9–1) content Ref.	Subject content	Initial learning for this qualification will enable learners to…	Foundation tier learners should also be able to…	Higher tier learners should additionally be able to…	DfE Ref.
OCR 10	**Mensuration**				
10.01	**Units and measurement**				
10.01a	Units of measurement	Use and convert standard units of measurement for length, area, volume/ capacity, mass, time and money.	Use and convert standard units in algebraic contexts.		N13, R1, G14
10.01b	Compound units	Use and convert simple compound units (e.g. for speed, rates of pay, unit pricing). Know and apply in simple cases: speed = distance ÷ time	Use and convert other compound units (e.g. density, pressure). Know and apply: density = mass ÷ volume Use and convert compound units in algebraic contexts.		N13, R1, R11, G14
10.01c	Maps and scale drawings	Use the scale of a map, and work with bearings. Construct and interpret scale drawings.			R2, G15
10.02	**Perimeter calculations**				
10.02a	Perimeter of rectilinear shapes	Calculate the perimeter of rectilinear shapes.			G17
10.02b	Circumference of a circle	Know and apply the formula $\text{circumference} = 2\pi r = \pi d$ to calculate the circumference of a circle.	Calculate the arc length of a sector of a circle given its angle and radius.		G17, G18
10.02c	Perimeter of composite shapes	Apply perimeter formulae in calculations involving the perimeter of composite 2D shapes.			G17, G18
10.03	**Area calculations**				
10.03a	Area of a triangle	Know and apply the formula: $\text{area} = \frac{1}{2}\text{base} \times \text{height}$.		Know and apply the formula: $\text{area} = \frac{1}{2}ab\sin C$.	G16, G23
10.03b	Area of a parallelogram	Know and apply the formula: $\text{area} = \text{base} \times \text{height}$. [Includes area of a rectangle]			G16
10.03c	Area of a trapezium	Calculate the area of a trapezium.			G16
10.03d	Area of a circle	Know and apply the formula $\text{area} = \pi r^2$ to calculate the area of a circle.	Calculate the area of a sector of a circle given its angle and radius.		G17, G18

Curriculum content

GCSE (9–1) content Ref.	Subject content	Initial learning for this qualification will enable learners to…	Foundation tier learners should also be able to…	Higher tier learners should additionally be able to…	DfE Ref.
10.03e	Area of composite shapes	Apply area formulae in calculations involving the area of composite 2D shapes.			G17, G18
10.04	**Volume and surface area calculations**				
10.04a	Polyhedra	Calculate the surface area and volume of cuboids and other right prisms (including cylinders).			G16
10.04b	Cones and spheres		Calculate the surface area and volume of spheres, cones and simple composite solids (formulae will be given).		N8, G17
10.04c	Pyramids		Calculate the surface area and volume of a pyramid (the formula $\frac{1}{3}$ area of base × height will be given).		G17
10.05	**Triangle mensuration**				
10.05a	Pythagoras' theorem		Know, derive and apply Pythagoras' theorem $a^2 + b^2 = c^2$ to find lengths in right-angled triangles in 2D figures.	Apply Pythagoras' theorem in more complex figures, including 3D figures.	G6, G20
10.05b	Trigonometry in right-angled triangles		Know and apply the trigonometric ratios, $\sin\theta$, $\cos\theta$ and $\tan\theta$ and apply them to find angles and lengths in right-angled triangles in 2D figures. *[see also Similar shapes, 9.04c]*	Apply the trigonometry of right-angled triangles in more complex figures, including 3D figures.	R12, G20
10.05c	Exact trigonometric ratios		Know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0°, 30°, 45°, 60°$ and $90°$. Know the exact value of $\tan\theta$ for $\theta = 0°, 30°, 45°$ and $60°$.		R12, G21
10.05d	Sine rule			Know and apply the sine rule, $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$, to find lengths and angles.	G22
10.05e	Cosine rule			Know and apply the cosine rule, $a^2 = b^2 + c^2 - 2bc\cos A$ to find lengths and angles.	G22

[10.01a] Units of Measure (National STEM Centre: CIMT)

http://www.nationalstemcentre.org.uk/elibrary/resource/783/units-of-measure

In this resource learners will be shown how to estimate with metric units of length, mass and capacity, and how to convert between different metric units. There is also an introduction to the Imperial system of measurement. There are activities, extra exercises and mental tests. The resources on this website are free to use, but a login is required.

[10.01a] Measurement (mathsisfun.com)

http://www.mathsisfun.com/measure/index.html

This resource is an introduction to the Metric and Imperial (here referred to as US Standard) systems of measurement. It covers units of measurement for length, mass, time, area and volume. The resource also covers area formulae for various shapes. It is interactive and includes many activities for learners to demonstrate the skills learnt.

[10.01a] Time and Date (bbc.co.uk)

http://www.bbc.co.uk/skillswise/worksheet/ma25time-l1-w-converting-between-hours-and-minutes

Learners often struggle with the conversion between hours and minutes. This worksheet could be used as a starter activity before moving on to cover the more difficult measurement conversions such as length, mass and capacity.

[10.01a] Measure (bbc.co.uk)

http://www.bbc.co.uk/bitesize/ks3/maths/measures/use_of_measure/activity/

This interactive quiz asks the learner to choose units for measuring items in the real world (e.g. a netball court, a truck) and also to read from scales.

[10.01b] Compound Measures (bbc.co.uk)

http://www.bbc.co.uk/schools/gcsebitesize/maths/geometry/compoundrev1.shtml

Learners are introduced to compound units before a demonstration of how to apply speed and density formulae by using worked examples.

[10.01b] Olympic Measures (University of Cambridge)

http://sport.maths.org/content/olympic-measures

This activity invites learners to engage with units of measurement by presenting a variety of records and measurements from Olympic Games events. The events and measurements have been mixed and learners have to rearrange them into the correct order.

[10.01c] Scale Drawing (National STEM Centre: CIMT)

http://www.nationalstemcentre.org.uk/elibrary/resource/761/scale-drawing

An introduction to scale drawing, covering measuring lengths, plans using scales and maps using scales. There are activities, extra exercises, mental tests and slides. The resources on this website are free to use, but a login is required.

[10.01c] Bearings (Centre for Innovation in Maths Teaching, Plymouth)

http://www.cimt.plymouth.ac.uk/projects/mepres/book8/bk8i11/bk8_11i3.htm

This interactive resource could be used as an introduction to bearings. Learners are given worked examples and then questions that can be checked.

[10.02b, 10.03d] Finding Radius, Diameter, Circumference and Area of Circles (YouTube)

https://www.youtube.com/watch?v=Yb1HYyBfLfc

This YouTube video introduces learners to circle terminology and demonstrates how to calculate the circumference and area of a circle. The video explains where π (pi) comes from in a visual way.

[10.02c] Perimeter and Circumference (mathsisfun.com)

http://www.mathsisfun.com/geometry/perimeter.html

This resource demonstrates how to calculate the perimeter of a rectangle, triangle, square, quadrilateral, composite shapes and the circumference of a circle. It includes ten interactive practice perimeter questions, with worked answers that reveal once learners have attempted each question.

[10.02c, 10.03e] Perimeter and Area (National STEM Centre: Nuffield Foundation)

http://www.nationalstemcentre.org.uk/elibrary/resource/6656/perimeter-and-area

This resource provides an opportunity for learners to become more familiar with perimeter and area of rectangles and composite shapes. It gives a simple explanation of how to calculate the perimeter and area of these shapes and includes a 'Student Worksheet' with questions for learners to work through and 'Activity Cards' where learners can practice matching perimeters and areas to a number of these shapes.

[10.02c, 10.03e] Perimeter and Area (bgfl.org)

http://www.bgfl.org/custom/resources_ftp/client_ftp/ks2/maths/perimeter_and_area/index.html

This is an interactive quiz (with three levels) on perimeter and area of rectangles and composite shapes.

[10.02a, 10.03a, 10.03b, 10.03c] Perimeter and Area of Polygons (mathsgoodies.com)

http://www.mathgoodies.com/lessons/toc_vol1.html

This resource displays a list of lessons concerned with perimeter and area, including area of parallelograms and trapeziums. Each item on the list is a link to a specific lesson on perimeter, area, practice exercises or challenging exercises.

[10.03] Area of Plane Shapes (mathsisfun.com)

http://www.mathsisfun.com/area.html

This resource demonstrates how to calculate the area of a rectangle, circle, triangle and composite shapes. It includes ten interactive practice area questions with worked answers for learners to reveal once they have attempted each question.

[10.04a] Volume and Surface Area (bbc.co.uk)

http://www.bbc.co.uk/schools/gcsebitesize/maths/geometry/3dshapesrev3.shtml

This simple resource demonstrates how to calculate the volume and surface area of prisms, including cylinders.

[10.04a] Volume of Prisms (slideshare.net: passyworldofmathematics.com)

http://www.slideshare.net/bigpassy/volume-of-prisms-20505313

This resource includes twenty-four slides on how to calculate the volume of rectangular, triangular and trapezium based prisms. It also covers volume of cylinders. The last few slides also recap on capacity units, including how to convert from one type of capacity unit to another.

[10.05a] Pythagoras' Theorem (bbc.co.uk)

http://www.bbc.co.uk/bitesize/ks3/maths/shape_space/pythagoras_theorem/revision/2/

This interactive resource could be used as an introduction to Pythagoras' theorem. Learners have to identify and calculate the length of sides by applying Pythagoras' theorem.

[10.05a] Pythagoras' Theorem (Centre for Innovation in Maths Teaching, Plymouth)

http://www.cimt.plymouth.ac.uk/projects/mepres/book8/bk8i3/bk8_3i1.htm

This interactive resource allows learners to practice their skills of applying Pythagoras' theorem to right-angled triangles.

[10.05a] Pythagoras' Theorem (mathsisfun.com)

http://www.mathsisfun.com/pythagoras.html

This interactive resource demonstrates how to apply Pythagoras' theorem and has an animation of a visual proof. It includes ten practice questions related to Pythagoras' theorem with worked answers for learners to reveal once they have attempted each question. Some of the questions are quite challenging and would be a good activity for a confident group of learners.

[10.05a] Pythagoras' Theorem (bbc.co.uk)

http://www.bbc.co.uk/education/guides/zcfg4wx/revision/1

This resource begins with a video introducing how Pythagoras' theorem can be used in 3D shapes, before starting with the basics and then moving on to solving problems using Pythagoras' theorem in both 2D and 3D.

[10.05a, 10.05b] Trigonometry (Centre for Innovation in Maths Teaching, Plymouth)

http://www.cimt.plymouth.ac.uk/projects/mepres/allgcse/bka4.pdf

In this comprehensive resource, learners are shown how to calculate area of squares and rectangles, identify different types of triangle, apply Pythagoras' theorem to find lengths in right-angled triangles, apply the trigonometric ratios to find angles and lengths in right-angled triangles and apply the sine and cosine rules. There are numerous worked examples and exercises for the learners to complete.

[10.05b] Trigonometry (bbc.co.uk)

http://www.bbc.co.uk/bitesize/standard/maths_i/measure/trig/revision/1/

This interactive resource could be used as an introduction to trigonometry, with learners meeting the trigonometric ratios and applying them to find lengths and angles in right-angled triangles.

[10.05c] Exact Trigonometric Ratios (www.mikeollerton.com)

http://www.mikeollerton.com/pubs/Handy%20Trig%20Ratios.pdf

An aide-memoir for exact trig ratios.

[10.05d, 10.05e] Sine and Cosine Rules (mathsrevision.net)

http://www.mathsrevision.net/gcse-maths-revision/trigonometry/sine-and-cosine-rule

This resource, which includes two video clips, demonstrates how to apply the sine and cosine rules.

Thinking conceptually

Approaches to teaching the content

Prior to working with the content of mensuration, it would be beneficial if learners gained a thorough understanding of a number of topics such as the four rules of number including the priority of operations, fractions, decimals, index notation, calculation and estimation of powers and roots and algebra.

Mensuration is unique in that it combines real-life applications with abstract mathematical reasoning.

Learners' understanding should be deepened by a hands-on approach to this subject.

Common misconceptions or difficulties learners may have

There are a number of misconceptions that learners may hold regarding mensuration and care should be taken to avoid these becoming ingrained in learners:

There is often confusion between the metric and imperial systems as we use both in this country and learners also struggle to estimate accurately using metric units. It is therefore extremely important when teaching the metric system, that learners develop benchmarks.

Learners recognise that in order to convert from one unit of measurement to another they must multiply or divide, but have difficulty in grasping which operation to perform.

Learners perceive volume as a solid measurement and capacity as a liquid measurement.

Learners sometimes confuse area and perimeter.

Common misconceptions when calculating perimeter are errors in basic addition and missing out some of the measurements. Also learners tend to ignore any lengths that are not given instead of calculating these missing measurements before calculating the perimeter.

Learners often use inappropriate units when calculating measurements i.e. they give an answer of cm instead of cm^2 for area or give an answer of cm^2 instead of cm^3 for volume.

Learners do not really understand the concepts behind the area formulae and have difficulty applying them in context. It is therefore important that learners develop an understanding of area concepts and not just memorise formulae.

There is also an incorrect belief that as area increases, perimeter must necessarily increase too.

Learners often struggle to correctly identify the base and height of a triangle as they are so familiar with the standard triangle, i.e. one with horizontal base and vertical height. When faced with a variety of triangles they tend to always use the bottom line as the base and the height as the line up from the base. This will lead to problems when calculating the area of a triangle as they will often not use the perpendicular height.

Common misconceptions when calculating area are errors in multiplication and learners could easily use the wrong measurements when finding the area of compound shapes.

Learners often confuse radius with diameter and struggle to understand where π (pi) comes from when applying formulae to calculate the circumference and area of a circle.

It is a misconception that $\pi = 22/7$. This is an approximation and not an exact value.

Learners often think that r^2 is the same as $r \times 2$ when applying the formula for the area of a circle and get mixed up with the formulae for circumference and area of circles.

Another misconception is that the volume of a prism can be calculated by finding the area of a single face and then multiplying that by the total number of faces.

Learners do not really understand the concepts behind volume and just see it as the result of substituting numbers into a formula. It is important that learners develop an understanding of volume concepts as opposed to just memorising formulae.

Another misconception is that the diagonal of a square is the same length as its side. Pythagoras' theorem proves that this is not the case.

Learners think Pythagoras' theorem works for all types of triangle, not realising it is just for right-angled triangles.

Common mistakes when using Pythagoras' theorem are learners cannot identify the hypotenuse as the longest length, just adding the side lengths to find the hypotenuse $(a + b = c)$ or forgetting to take the square root of c^2 to find the hypotenuse length. Another common mistake is that learners will sum the squares of the two given sides, regardless of which sides have been given.

A common misconception in trigonometry in right-angled triangles is that the learners fail to identify the opposite, adjacent and hypotenuse sides correctly. They also struggle with the algebra of the ratios when calculating an unknown value. Learners often fail to realise that the sine and cosine rules can be used for any triangles.

Thinking conceptually

Conceptual links to other areas of the specification

Number – learners need a good understanding of the four rules of number and priority of operations when converting measurements, calculating perimeter, calculating area and calculating volume.

Fractions – some area and volume calculations include fractions so it is extremely important that learners are confident with fractions before they attempt to use such formulae. Working with the approximate value of π as 22/7 will require learners to be confident with fractions.

Decimals – some measurement conversions and calculations of perimeter, area and volume include decimals so it is extremely important that learners are confident with decimals before they attempt these calculations. Working with the approximate value of π as 3.14 will require learners to be confident with decimals.

Index notation – some area and volume calculations involve index notation so it is extremely important that learners are confident with this before they attempt to use such formulae.

Calculation and estimation of powers and roots – all Pythagoras' theorem calculations involve powers and roots, as does the application of the cosine rule in triangle measurement.

Algebra – learners need to be confident in substituting numerical values into formulae and expressions as this is essential when applying the area and volume formulae, Pythagoras' theorem and trigonometric ratios. Learners also need to be able to change the subject of a formula and solve equations.

Graphs – learners need to construct and interpret graphs in real-world contexts, which include distance-time graphs, money conversion and temperature conversion. They need to be able to convert between units, interpret straight line gradients as rates of change, apply the concept of instantaneous rate of change for the gradients of curves and also be able to calculate areas under graphs as part of the graphs topic of the specification.

[10.01a, 10.01b] Mensuration (Centre for Innovation in Maths Teaching, Plymouth)

http://www.cimt.plymouth.ac.uk/projects/mepres/allgcse/pr7-es.pdf

These resources allow learners to practice the important skills involved in mensuration to help address some common misconceptions. Each section offers an overview of a particular topic, worked examples to support learning and focused exercises to practice skills.

[10.01a] Measuring Units Matching Game (transum.org)

http://www.transum.org/software/SW/Starter_of_the_day/Students/Measuring_Units_Matching.asp

This game involves the learner dragging cards to match the metric and imperial units with their equivalents. The game provides practice on units of measurement to help address the misconceptions involved with this topic.

[10.01b] Speed, Distance and Time (Centre for Innovation in Maths Teaching, Plymouth)

http://www.cimt.plymouth.ac.uk/projects/mepres/book8/bk8i18/bk8_18i2.htm

This resource offers the opportunity to practice solving real-life speed, distance and time problems. It offers an overview of this topic, worked examples to support learning and focused exercises to practice skills.

[10.02a, 10.02b, 10.03a, 10.03b, 10.03c, 10.03d, 10.04a] Formulae Pairs (transum.org)

http://www.transum.org/software/SW/Starter_of_the_day/Students/Pairs.asp?Topic=3

This game involves the learner matching pairs of diagrams and formulae for basic geometrical shapes. The game addresses the misconception where learners get mixed up with formulae to calculate perimeter and area of shapes.

Thinking conceptually

[10.02c, 10.03e] Changing Areas, Changing Perimeters (NRICH)

http://nrich.maths.org/7534

This resource addresses the misconception that as area increases, perimeter must necessarily increase too. Learners can practice their skills in calculating perimeter and area, ensuring that they use the correct formula for each.

[10.02c, 10.03e] Area and Perimeter (NRICH)

http://nrich.maths.org/7280

This resource addresses the misconception that as area increases, perimeter must necessarily increase too. Learners can practice their skills in calculating perimeter and area, ensuring that they use the correct formula for each.

[10.03d] Blue and White (NRICH)

http://nrich.maths.org/809

This is a challenging puzzle involving the area of circles. This would be a good activity for a confident group of learners. An extension would be to consider the circumferences of the circles in each diagram.

[10.05a] Pythagoras (transum.org)

http://www.transum.org/software/SW/Starter_of_the_day/Students/Pythagoras_Basics.asp?Level=1

This resource provides five different levels of questions on Pythagoras' theorem. Learners can practice their skills in identifying the hypotenuse and correctly applying the theorem. The right-angled triangles are displayed in a variety of ways to ensure understanding.

[10.05a] Bizarre Triangle (transum.org)

http://www.transum.org/Software/SW/Starter_of_the_day/starter_August5.ASP

A puzzle for learners to make a prediction and then calculate the answer. What happens to the area of an isosceles triangle with side lengths 5, 5 & 6 when the length 6 is increased to 8?

[10.04a] Volume (transum.org)

http://www.transum.org/Software/SW/Starter_of_the_day/Students/Volume.asp

This interactive resource provides questions and worked examples on volume and surface area. There are three levels of difficulty and include GCSE style questions. Learners can practice their skills in calculating volumes.

[10.04a, 10.04b] Surface Area (transum.org)

http://www.transum.org/Software/SW/Starter_of_the_day/Students/Surface_Area.asp

This interactive resource provides questions and worked examples on volume and surface area. There are three levels of difficulty and include GCSE style questions. Learners can practice their skills in calculating surface areas.

[10.05a, 10.05b] Trigonometry (National STEM Centre: SMILE)

http://www.nationalstemcentre.org.uk/elibrary/resource/7911/trigonometry

These resources offer the opportunity to practice Pythagoras' theorem and trigonometry in right-angled triangles to help address some common misconceptions. It includes two packs to work through. The first pack includes a wide variety of activities covering Pythagoras' theorem, including checking for right angles and investigating the ratios of the sides of right-angled triangles. The second pack includes a wide variety of activities such as investigating the lengths of the opposite and adjacent sides of a right-angled triangle, leading to the definitions of sine and cosine. Learners will also use the sine and cosine trigonometric ratios to solve problems. The resources are free, but a login is required.

[10.05d, 10.05e] Sine and Cosine Rule (Centre for Innovation in Maths Teaching, Plymouth)

http://www.cimt.plymouth.ac.uk/projects/mepres/step-up/sect4/index.htm

This resource offers learners the chance to practice using the sine and cosine rules to help improve their algebra and to help understand that these rules can be used in any triangle, not just right-angled triangles.

Thinking contextually

Thinking Contextually (Activities)

Many learners fail to make connections between what they are learning and how that knowledge will be used. They struggle to understand the concepts in mathematics unless they can see the relevance to their everyday lives.

Learners will be more successful if they investigate mathematics through real-life scenarios as they can see how these concepts are actually used outside of the classroom. They will then be able to discover the meaningful relationship between abstract ideas and practical applications in the real world, which will, in turn, lead to greater motivation, enjoyment through discovery, improved confidence, independent thinking and better retention of skills.

[10.01b] Alternative Record Book (sport.maths.org)

http://sport.maths.org/content/alternative-record-books

This activity encourages learners to research the results of Olympic events and use this data to calculate speeds and make comparisons between events.

[8.05a, 10.01a, 10.02b] Watching the Wheels Go 'round and 'round (NRICH)

http://nrich.maths.org/1039

This interesting activity increases familiarity with circumference calculations and conversions of metric units in the context of bicycle journeys.

[10.03b] Golden Rectangles (Bowland Charitable Trust)

http://www.bowlandmaths.org.uk/assessment/golden_rectangles.html

This enjoyable activity takes learners back to the American 'gold rush' of the 19th century. The learners have 100 m length of rope to make a rectangular shape of whatever dimensions they choose and have to explore what the maximum area is they can make with this rope. The second part of the activity involves learners investigating whether a rectangle of perimeter 200 m, gives a larger area than two individual rectangles of perimeter 100 m. Then the activity is extended further by considering 300 m of rope. Learners have to practice their skills of perimeter and areas of rectangles to maximise area.

[10.03e] Areas of Circles and Composite Shapes (National STEM Centre: Teachers TV)

www.nationalstemcentre.org.uk/elibrary/resource/6374/areas-of-circles-and-composite-shapes

This video resource demonstrates real-life applications using the surface area of different shapes and the cost of tiling a bathroom. The video can be paused at different stages so that learners can discuss the problem and perform the calculations themselves. The video resource is free, but a login is required.

Thinking contextually

[10.04a] Surface Area and Volume of 3-D Shapes (Centre for Innovation in Maths Teaching, Plymouth)

http://www.cimt.plymouth.ac.uk/projects/mepres/book9/bk9i9/bk9_9i4.html

This interactive resource offers further practice in solving real-life problems using surface area and volume calculations.

[10.05a] Pythagoras' Theorem Problems in Context (Centre for Innovation in Maths Teaching, Plymouth)

http://www.cimt.plymouth.ac.uk/projects/mepres/book8/bk8i3/bk8_3i4.htm

This interactive resource offers further practice in solving problems in context using Pythagoras' theorem.

[10.05b] Trigonometry (regentsprep.org)

http://www.regentsprep.org/regents/math/algebra/AT2/PracTrig.htm

This challenging resource offers further practice in solving real-life problems using trigonometry and area calculations. It consists of eleven questions, some of which are multiple choice.

[5.02a, 10.01c, 10.05b] King Edward VII School Flies to Europe (National STEM Centre: Innovate Educate, King Edward VII School, East Midlands Airport)

http://www.nationalstemcentre.org.uk/elibrary/resource/6791/king-edward-vii-school-flies-to-europe

These resources challenge learners to use a wide range of mathematical skills such as metric and imperial measurement conversions, measurement of angles, bearings, distance and time, scale, formulae and trigonometry to solve four real-life scenarios based on the working of an airport. The resources are free, but a login is required.

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Telephone 01223 553998
Facsimile 01223 552627
Email general.qualifications@ocr.org.uk