

Our specification is published on our website (www.aga.org.uk). We will let centres know in writing about any changes to the specification. We will also publish changes on our website. The definitive version of our specification will always be the one on our website, this may differ from printed versions.

You can download a copy from our All About Maths website (<http://allaboutmaths.aga.org.uk/>)

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General Information - Disclaimer



This teaching guidance will help you plan by providing examples of the content of the specification.

It is not, in any way, intended to restrict what can be assessed in the question papers based on the specification.

Contexts

The following is a list of likely contexts that will be used in our papers. It is not exhaustive:

- working for a company
- running your own business
- going on holiday
- going on an outing
- going to a sports or entertainment event
- organising a party or other event
- shopping
- hobbies
- personal finance.

Assumed knowledge

Functional Skills Level 1 assumes all the knowledge and skills from the Entry Level Certificates in Mathematics.

Functional Skills Level 2 assumes all the knowledge from Functional Skills Level 1.

Command words

The following command words are the ones we will generally use. For specific purposes we may use other command words.

- **Work out:** this will be the usual instruction when one or more calculations are required to get to the required answer.
- **Calculate:** this will be used when the student is expected to use a calculator to carry out a given calculation.
- **'How many ... can ...'** implies that we are asking for the maximum number.
- **Simplify:** this implies that a full simplification is required. For example, if asked to simplify $8a + 3a + a$, the answer $11a + a$ is insufficient.

1

Use of number and the number system

Students at Level 2 are expected to be able to use numbers of any size; read, written 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 number 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.

NS18

Read, write, order and compare positive and negative numbers of any size

Teaching Guidance

Students should be able to:

- know and use the word integer
- read a positive integer value in number form and write it in words
- read a positive integer value in word form and write it in number form
- compare integers and know which is the smallest or largest
- order a list of integers
- compare and interpret integers in context.

GCSE Link – N1

Notes

This section deals with integer values only. See NS24 for fractions and NS26 for decimals.

Identifying integers will only be explicitly tested in Level 1.

Numbers used in contexts are likely to be less than one million, as numbers greater than one million cannot be used in calculations (see NS19). Writing and ordering numbers greater than one million may be tested in the underpinning skills section.

Examples

1 Write 32 490 113 in words.

2 Write four million, seven hundred and sixty eight thousand in digits.

3 Write these numbers in order, starting with the smallest.

4 650 203 4 605 203 4 650 302 4 065 230 4 560 023

4 Write these numbers in order, starting with the largest.

-7032 -7302 -7023 -7320 -7203 -7230

5 Circle the coldest temperature.

0°C -12°C 8°C -7°C 17°C -1°C

NS19

Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation

Teaching Guidance

Students should be able to:

- add, subtract or multiply numbers up to one million with or without a calculator
- divide a number up to one million by an integer up to 12 without a calculator
- divide a number up to one million by another number up to one million with a calculator
- round numbers to the nearest 5, 10, 50, 100, 500, 1000 etc
- estimate a solution by using rounded values
- check that a given solution is sensible by using rounded values.

GCSE Link – N2, N14, N15

Notes

In non-calculator multiplications, at least one of the numbers will be a 1-digit or 2-digit number.

When rounding numbers less than 10 we expect students to round to the nearest whole number. For numbers greater than 10 we expect them to round to the nearest 10, 100, 1000, etc.

Examples

- 1 Work out $659453 + 27839$
- 2 Joe's company made a profit of £126 400 in the first quarter of the year. In the second quarter their profit dropped by £38 750
Work out their profit in the second quarter.
- 3 Steph has a monthly salary of £2058.
Work out her annual salary.
- 4 7 workers at a company share equally a bonus of £18 795
How much do they get each?
- 5 Use approximations to estimate the answer to 41674×8.96
(We would expect students to round the values to 40 000 and 9)
- 6 Amir tries to work out $561228 \div 21.87$. On his calculator, the answer starts 2566.2...

Use approximations to decide if this answer is sensible.
(We would expect students to round the values to 600 000 and 20, with the outcome 30 000 and the decision 'No').

NS20

Evaluate expressions and make substitutions in given formulae in words and symbols

Teaching Guidance

Students should be able to:

- substitute values into an algebraic expression
- use formulae given as a series of instructions in words
- use algebraic formulae.

GCSE Link – A2

Notes

Students are expected to remember and use the same formulae as in GCSE Mathematics (see Use of Measures, shape and space).

In other cases, formulae will be given in the paper, either in the stem of a context or in the related question part.

Examples

1 Work out the value of $3c - 7d$ when $c = 12.3$ and $d = -7.2$

2 To convert from degrees Celsius to degrees Fahrenheit:

step 1 divide the number of degrees Celsius by 5

step 2 multiply your answer to step 1 by 9

step 3 add 32 to your answer to step 2

Convert -10°C to degrees Fahrenheit.

3 The volume of a cone, V , is given by the formula $V = \frac{\pi r^2 h}{3}$

r is the radius of the cone

h is the perpendicular height of the cone

Work out the volume of a cone with radius 4.5 cm and perpendicular height 9.2 cm

- 4 The value of an investment, V , is given by the formula $V = I \times \left(\frac{100+r}{100}\right)^n$

I is the amount of the original investment

r is the interest rate as a percentage

n is the number of years since the initial investment

Work out the value of an initial investment of £10 000 at an interest rate of 3% after 5 years.

NS21

Identify and know the equivalence between fractions, decimals and percentages

Teaching Guidance

Students should be able to:

- convert between fractions, decimals and percentages
- use a decimal multiplier when working out a percentage of an amount
- use a decimal multiplier when increasing an amount by a percentage
- use a decimal multiplier when decreasing an amount by a percentage.

GCSE Link – N10, N12, R9

Notes

Students will not be expected to convert between recurring decimals and fractions, although they will be expected to know that one third is approximately 33% and that two thirds is approximately 67%

Examples

1 Complete the table

| Fraction | Decimal | Percentage |
|-----------------|---------|------------|
| $\frac{2}{5}$ | 0.4 | |
| $\frac{17}{20}$ | | 85% |
| | 0.24 | 24% |

2 Serena spent 35% of her pocket money.

What **fraction** of her pocket money did she have left?

3 Which calculation increases 745 by 2%?

Circle your answer.

$$745 \times 0.02$$

$$745 \times 0.2$$

$$745 \times 1.02$$

$$745 \times 1.2$$

- 4 Which calculation decreases 3200 by 15%?

Circle your answer.

$3200 \div 0.15$

$3200 \div 0.85$

3200×0.15

3200×0.85

NS22

Work out percentages of amounts and express one amount as a percentage of another

Teaching Guidance

Students should be able to:

- work out an integer percentage of an amount without a calculator
- work out any percentage of an amount using a calculator
- express one amount as a percentage of another.

GCSE Link – N12, R9

Notes

When working without a calculator, students are expected to use the base values of 1%, 10%, 25% and 50% to work out amounts, eg to work out 32% of 6700, work out $6700 \div 10 \times 3 + 6700 \div 100 \times 2$

Examples

- 1 Work out (without a calculator) 89% of 38 000 (students would be expected to subtract 10% and 1%)
- 2 Calculate 5.6% of £476 900
- 3 An estate agent charges 1.25% commission on house sales.
The estate agent sells a house for £184 500
Work out the commission.
- 4 Express 56 as a percentage of 80 (without a calculator).

NS23

Calculate percentage change (any size increase and decrease), and original value after percentage change

Teaching Guidance

Students should be able to:

- increase or decrease a number by any percentage
- express an increase or decrease in an amount as a percentage of that amount
- work out an original amount given the new amount and the percentage increase or decrease.

GCSE Link – N12, R9

Notes

Students will only be expected to work out an original amount without a calculator if the increase or decrease is a multiple of 10% or 25%

Examples

- 1 Increase 1680 by 17%
- 2 Decrease 354 750 by 12.5%
- 3 A restaurant increases the price of a pizza from £8 to £8.50
Work out the percentage increase.
- 4 The value of a car decreases from £12 500 to £9250
Work out the percentage decrease.
- 5 The number of people working in a call centre increases by 20% to 48
Work out (without a calculator) the original number of people working at the call centre.
- 6 The average attendance of a football team increases by 7% to 28 676
Work out the previous average attendance.
- 7 At the end of the school holidays, the price of a flight drops by 34% to £396
Work out the price of the flight during the school holidays.

NS24

Order, add, subtract and compare amounts or quantities using proper and improper fractions and mixed numbers

Teaching Guidance

Students should be able to:

- convert between improper fractions and mixed numbers
- add or subtract fractions and mixed numbers
- order a list of proper fractions and/or improper fractions and/or mixed numbers.

GCSE Link – N1, N2, N8, N12

Examples

1 Write $\frac{46}{13}$ as a mixed number.

2 Write $3\frac{8}{11}$ as an improper fraction.

3 Work out $\frac{3}{4} + \frac{7}{8}$

4 Work out $4\frac{1}{2} - 2\frac{7}{10}$

5 Write the following numbers in order, starting with the smallest.

$$\frac{1}{4}$$

$$\frac{3}{20}$$

$$\frac{1}{5}$$

$$\frac{7}{40}$$

- 6 Write the following numbers in order, starting with the largest.

$$8\frac{1}{3}$$

$$8\frac{5}{12}$$

$$8\frac{1}{6}$$

$$8\frac{3}{8}$$

- 7 A factory makes packets of crisps.

$\frac{1}{4}$ of the packets are salt and vinegar and $\frac{5}{16}$ of the packets are cheese and onion.

Which flavour has more packets? (You must show your working)

- 8 Work out $\frac{4}{7} + \frac{9}{10}$

Give your answer as a mixed number.

Teaching Guidance

Students should be able to:

- write one number as a fraction of another
- write one number as a fraction of another in its simplest form.

GCSE Link – N8, R3

Notes

We would not expect students to express one number as a fraction of another when the fraction was greater than 1

Examples

- 1 Write 16 as a fraction of 24
- 2 Write 20 out of 48 as a fraction in its simplest form.
- 3 Jamil scored 72 out of 100 in a test.
What fraction of the marks did he get?
Give your answer in its simplest form.

NS26 Order, approximate and compare decimals**Teaching Guidance**

Students should be able to:

- order a list of decimals to any number of decimal places
- approximate a decimal so that it can be used in a non-calculator question
- compare the proximity of two or more decimal values to another value.

GCSE Link – N1, N15

Notes

We expect students to round to the nearest 0.1 or 0.25

Examples

- 1 Write this list in order, starting with the smallest.

0.7201 0.7102 0.72 0.701

- 2 Use a decimal approximation to estimate the value of 480×0.247

- 3 A rectangular table measures 0.314 m by 0.683 m

Estimate the area of the table.

- 4 Which is closer to 0.5, 0.4802 or 0.6117?

You must show your working.

NS27

Add, subtract, multiply and divide decimals up to three decimal places

Teaching Guidance

Students should be able to:

- add or subtract decimals to 3 decimal places with or without a calculator
- multiply a decimal to 3 decimal places by an integer from 2 to 12 with or without a calculator
- multiply a decimal to 3 decimal places by a decimal to 1 decimal places without a calculator
- multiply a decimal to 3 decimal places by a decimal up to 3 decimal places with a calculator
- divide a decimal to 3 decimal places by an integer from 2 to 12 without a calculator
- divide a decimal up to 3 decimal places by a decimal up to 3 decimal places with a calculator.

GCSE Link – N2, N12

Notes

Decimals up to 2 decimal places are covered in Level 1, but may be used at Level 2, particularly in money contexts. In such cases, another Level 2 specification reference will also be covered in the question. In the underpinning skills section, at least one decimal must be to 3 decimal places.

Examples

- 1 Work out (without a calculator) $4.672 + 1.759$
- 2 Work out (without a calculator) $7.2 - 4.638$
- 3 Work out (without a calculator) 3.165×8
- 4 Work out (without a calculator) 5.973×0.2
- 5 Work out 2.634×4.5
- 6 Work out (without a calculator) $7.842 \div 3$
- 7 Work out $57.043 \div 8.149$

NS28

Understand and calculate using ratios, direct proportion and inverse proportion

Teaching Guidance

Students should be able to:

- express two values as a ratio
- express two values as a ratio in its simplest form
- express two values as a ratio in the form $1 : n$ or $n : 1$
- divide a value in ratio (with up to three parts)
- given a ratio and one value, work out the other value and/or the total
- understand that a ratio in the form $1 : n$ or $n : 1$ indicates a multiplicative relationship
- use direct proportion numerically to solve problems
- use proportion to solve best buy problems
- use inverse proportion numerically to solve problems.

GCSE Link – R4, R5, R6, R7, R10

Notes

We will only expect students to answer proportion questions numerically. We will not expect students to write or interpret proportion equations. We could, of course, present such an equation as a formula to be used as we could any other formula.

Examples

- 1 Write 3 years 4 months to 1 year 8 months as a ratio.
- 2 Will is 56 years old. Hannah is 42 years old.
Write Will's age to Hannah's age as a ratio in its simplest form.
- 3 Write $12 : 8$ as a ratio in the form $1 : n$
- 4 Write $3400 : 18\,700$ in the form $n : 1$ (which could be followed by or replaced by)
How many times larger is 18 700 than 3400?
- 5 Share £5000 in the ratio $2 : 3 : 11$

- 6 Chen and Aidan share some money in the ratio 5 : 7
Chen receives £85
How much does Aidan receive?
- 7 A car is towing a caravan.
The lengths of the car, tow bar and caravan are in the ratio 3 : 1 : 5
The length of the car is 15 feet.
What is the total length of the car, tow bar and caravan?
- 8 Cheryl is paid £28.35 for 3 hours work.
At the same rate, how much would she be paid for 8 hours work?
- 9 A pack of 6 batteries costs £4.68
A pack of 8 of the same batteries costs £6.44
Which pack is better value?
- 10 It takes 3 men 12 hours to paint a fence.
Working at the same rate, how long would it take 4 men to paint the fence?

NS29

Follow the order of precedence of operators, including indices

Teaching Guidance

Students should be able to:

- apply order of precedence (sometimes called BIDMAS or BODMAS) to a set of calculations
- enter a given calculation into a calculator using the correct functions.

GCSE Link – N3, N6, N7

Notes

When a division is part of a calculation we may use the divide symbol or we may use fraction notation.

Examples

1 Work out (without a calculator) $47 - (53 - 28)$

2 Work out (without a calculator) $(12 - 2 \times 5)3$

3 Work out (without a calculator) $\frac{3(4+6)}{29-5^2}$

4 Work out $(8 + 3)^2 \times 68 - 200 \div 4$

2

Use of measures, shape and space

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.

M10

Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting

Teaching Guidance

Students should be able to:

- calculate with amounts of money, giving answers in correct form
- calculate an amount after two or more periods of compound interest
- calculate the interest earned after two or more periods of compound interest
- calculate an amount after a percentage increase or decrease
- calculate with VAT
- calculate with income tax
- budget using income (including salary), expenditure and savings.

GCSE Link – N2, N13, N15, R1, R9, R11, R16, G14

Notes

VAT and income tax will be given at the rate applied by the UK government.

Compound interest will only be assessed on the calculator paper.

Calculations with money are generally a Level 1 skill, so questions including this will have to have a Level 2 aspect.

Students should know the difference between simple interest and compound interest, although questions will usually be set around compound interest.

Examples

- 1 £6000 is invested in an account that pays compound interest at 2.3% per annum.
 - (a) Work out the value of the investment after 5 years.
 - (b) Work out the total interest earned after 5 years.

2 The price of a magazine is £2.40

Work out the price after an increase of 7.5%

3 In a sale, all goods receive a 12% discount.

Work out the price of a shirt costing £35 before the discount is applied.

4 A price is £256.80 + VAT at 20%

Work out the final price.

5 Joe has an annual salary of £28 000

He has a personal tax allowance of £12 500

He pays income tax at 20% on the rest of his salary.

How much income tax does he pay each year?

6 Lisa has a net monthly income of £1950

The table shows her monthly expenditure.

| Item | Amount |
|---------------|--------|
| Mortgage | £700 |
| Utilities | £280 |
| Food | £400 |
| Entertainment | £175 |
| Travel | £90 |

Lisa saves the rest of her net income.

How much does she save per year?

M11

Convert between metric and imperial units of length, weight and capacity using **a)** a conversion factor and **b)** a conversion graph

Teaching Guidance

Students should be able to:

- use a conversion factor given as a direct proportion, a ratio or a formula to convert between metric and imperial units
- use a conversion graph to convert between metric and imperial units.

GCSE Link – N13, A2, A5, A14, R1, R4, R10

Notes

Students are not expected to know any of the conversions between metric and imperial units. They will be given in the question if needed. However, it may be useful for them to be familiar with some basic conversions such as 2.5 cm \approx 1 inch, 8 km \approx 5 miles, 1 litre \approx 1.76 pints, 4.5 litres \approx 1 gallon, 1 kilogram \approx 2.2 pounds.

Although most conversions are inexact we may present them as equalities with rounded values, eg

Use 1 pound = 0.45 kilograms.

Examples

1 Convert 5 metres into feet and inches.

Use 2.5 cm = 1 inch and 12 inches = 1 foot

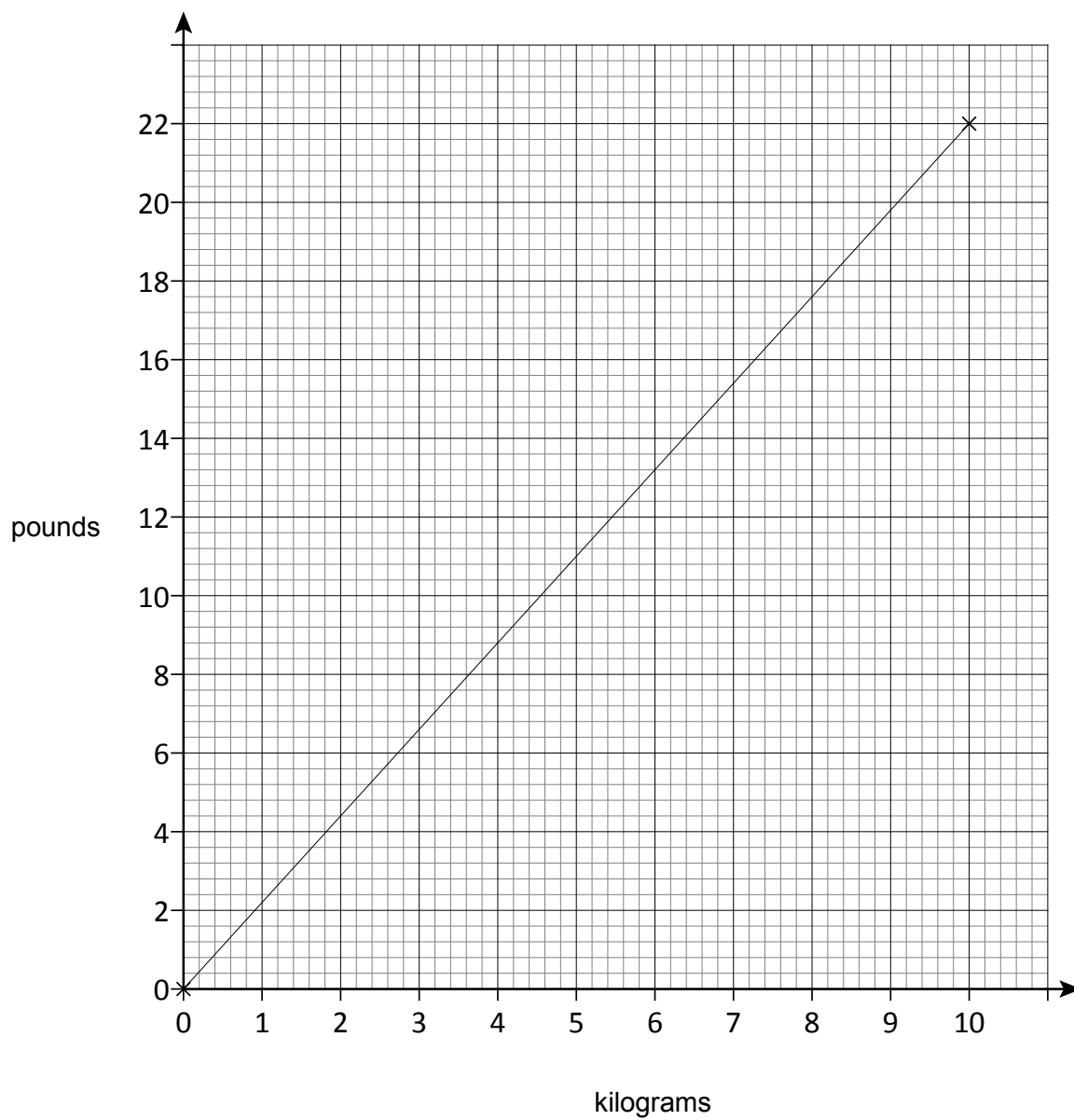
2 kilometres : miles = 8 : 5

Convert 32.5 miles into kilometres.

3 The formula $G = 0.22L$ converts a capacity in litres, L, into a capacity in gallons, G.

Convert 65 litres into gallons.

- 4 Use the graph to convert 6.4 kilograms into pounds.



M12

Calculate using compound measures including speed, density and rates of pay

Teaching Guidance

Students should be able to:

- use any two of distance, time and speed to calculate the other
- use any two of mass, volume and density to calculate the other
- use any two of hourly rate, number of hours worked and total pay to work out the other
- understand and use compound units such as miles per hour (mph), kilograms per square metre (kg/m^2)
- understand compound and measures and units that they may be unfamiliar with, but which are given in the question, eg population density in people per square kilometre.

GCSE Link – N13, A2, A5, R1, R10, R11

Notes

Other than speed, density and rates of pay an explanation of or formula for the compound measure will be given.

Units will not be given in the form using the index -1 , eg ms^{-1}

Although it may not be entirely functional, we may assume in questions that journeys are made at a constant speed.

Examples

- 1 Sidrah drives 120 miles in 2 hours 30 minutes.
Work out her average speed.
- 2 An aircraft flies 2800 kilometres at a speed of 840 kilometres per hour.
How long, in hours and minutes, does the flight last?
- 3 An object has mass 17 kilograms and volume 1.25 m^3
Work out the density of the object.
- 4 The density of an object is 18 g/cm^3 and its mass is 207 g
Work out the volume of the object.

5 Erica is paid

£9.60 per hour from Monday to Friday

£12.40 per hour on Saturday and Sunday

One week, she works 6 hours each day from Monday to Thursday and 10 hours on Sunday.

Work out her total pay for the week.

6 Feeding troughs for cows should have a length of at least 0.6 metres per cow.

How many cows can be fed from a trough with a length of 10 metres?

M13

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)

Teaching Guidance

Students should be able to:

- work out the perimeter of a triangle
- work out the length of one side of a triangle given its perimeter and the other two sides
- remember and use the formula for the area of a triangle
- remember and use the formula for the circumference of a circle
- remember and use the formula for the area of a circle
- work out the perimeter of compound shapes that include at least one triangle and/or at least one circle or part of a circle
- use a formula to work out a perimeter or area.

GCSE Link – N13, A2, G1, G14, G16, G17, G18

Notes

Students should use the 'pi' button on their calculator, but we will accept values of pi in the range 3.14 to 3.142. Answers in mark schemes will apply this range.

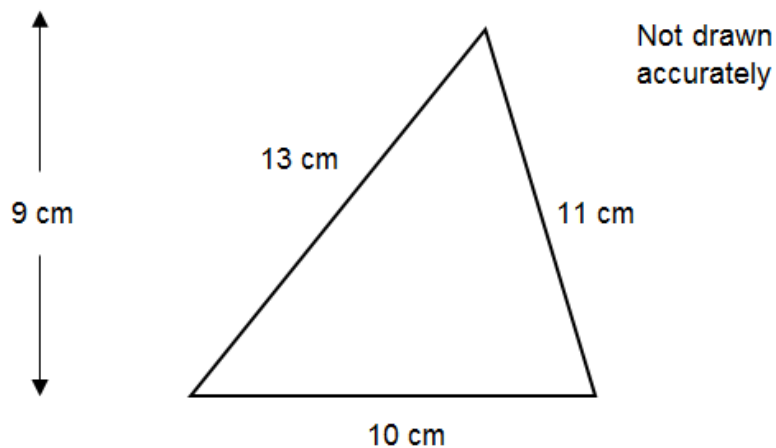
Students will not be expected to give answers in terms of pi, but in purely numerical form. Answers given in terms of pi are unlikely to score full marks.

Students should understand that lengths may be given in questions which do not need to be used in the questions. They should be familiar with selecting the appropriate information.

In questions involving sectors of circles, the sector will be a fraction of the circle where the denominator of the fraction is a factor of 360

Examples

1



Work out the perimeter and area of the triangle.

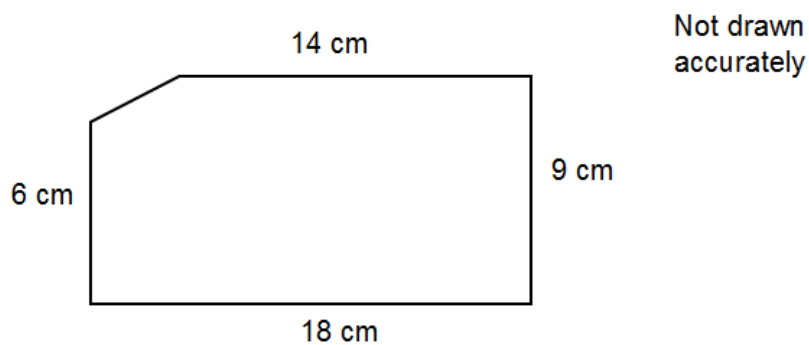
2 A circle has radius 8 cm

Work out the circumference and area of the circle.

3 A circle has diameter 30 mm

Work out the circumference and diameter of the circle.

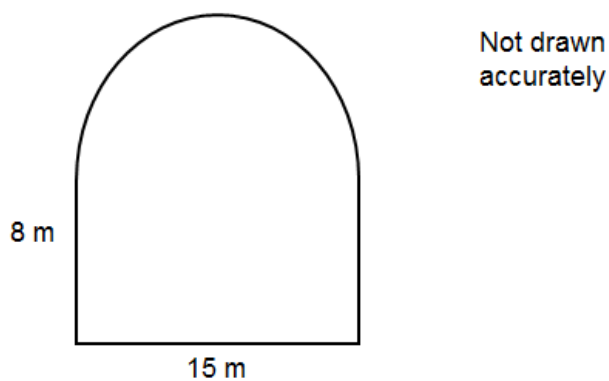
4 A shape is made by removing a triangle from a rectangle.



Work out the area for the shape.

- 5 A shape is made from a rectangle and a semicircle.

The rectangle has length 15 m and width 8 m



Work out the area of the shape.

- 6 The area, A , of a regular pentagon with side length p is given by the formula

$$A = \frac{p^2}{4} \times \sqrt{25 + 10\sqrt{5}}$$

Work out the area of a regular pentagon with side length 22 mm

M14

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)

Teaching Guidance

Students should be able to:

- remember and use the formula for the volume of a cylinder
- remember and use the formula for the surface area of a cylinder
- use a formula to work out a volume or surface area.

GCSE Link – N13, A2, G1, G14, G16, G17, G18

Notes

The notes for M13 pertain here also.

An 'open cylinder' is one with a base, but no top. The volume would be equal to a 'closed cylinder' with the same radius and height, but the surface area would be different.

Examples

- 1 Work out the volume of a cylinder with radius 6 cm and height 13 cm
- 2 Work out the surface area of a cylinder with radius 6 cm and height 13 cm
- 3 A Christmas bauble is a sphere with radius 1.75 cm

Work out the surface area of the sphere.

Use the formula $S = 4\pi r^2$ where S is the surface area and r is the radius.

- 4 The formula for the volume, V , of a pyramid is $V = \frac{1}{3} Ah$

where A is the area of the base and h is the perpendicular height.

Work out the volume of a pyramid with a square base of side length 4 cm and perpendicular height 6 cm

M15

Calculate actual dimensions from scale drawings and create a scale drawing given actual measurements

Teaching Guidance

Students should be able to:

- use a scale given as a ratio in the form $1 : n$
- use a scale given as a statement, eg 1 cm represents 2 km
- measure a length on a scale diagram or map and use it to work out an actual length
- create a scale drawing given actual lengths and a scale
- understand the word 'plan' as an overhead view.

GCSE Link – R2, R4, G1, G13, G15

Notes

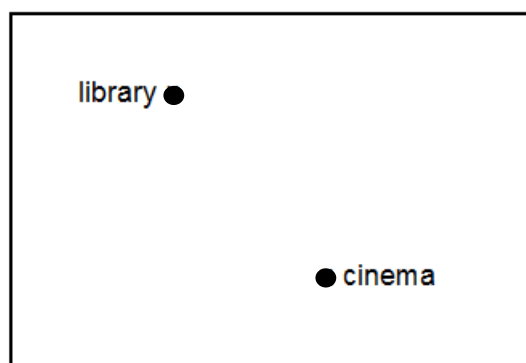
A tolerance of ± 2 mm is usually allowed when measuring or drawing.

Students are expected to have access to a ruler, protractor and pair of compasses during exams.

Examples

1 The map shows part of a city.

Scale: 1 cm represents 50 metres



Work out the actual direct distance from the library to the cinema.

- 2 The scale on a drawing is 1 : 10 000

In real life, the length of a street is 85 metres.

What is the length of the street on the drawing?

- 3 An office needs a rectangular desk measuring 50 cm by 30 cm, etc (full list given, with criteria about placement if appropriate).

Show on the grid how these items can be placed in the office (grid and scale given).

M16

Use coordinates in 2-D, positive and negative, to specify the position of points

Teaching Guidance

Students should be able to:

- use a Cartesian coordinate system to plot and identify points in all four quadrants
- use the (x, y) system to identify the position of a point
- understand the terms 'x-coordinate', 'y-coordinate', 'x-axis' and 'y-axis'
- use two numbers or letters to identify a point or square in a real-life situation such as a board game.

GCSE Link – A8, G11

Examples

- 1 Three of the vertices of a rectangle are at $(1, -3)$, $(1, 7)$ and $(5, 7)$

Work out the position of the remaining vertex.

- 2 Here is the board in a board game.

| | A | B | C | D |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | ★ | |
| 3 | | | | |
| 4 | | → | | |

The arrow is in square B4

Which square is the star in?

M17

Understand and use common 2-D representations of 3-D objects

Teaching Guidance

Students should be able to:

- interpret a solid drawn on isometric paper
- draw a solid on isometric paper
- interpret a 2-D diagram of a 3-D object
- sketch a 2-D diagram of a 3-D object.

GCSE Link – G13

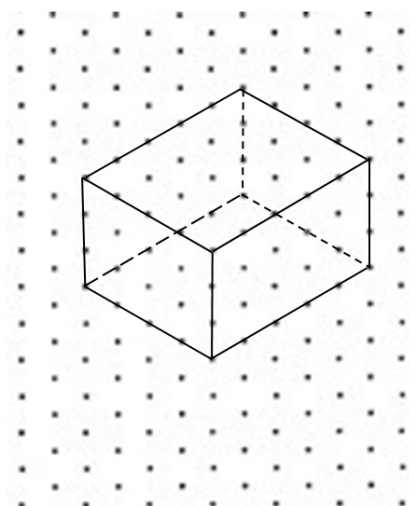
Notes

If needed, isometric paper will be provided in the exam paper.

Rulers should be used when drawing straight edges.

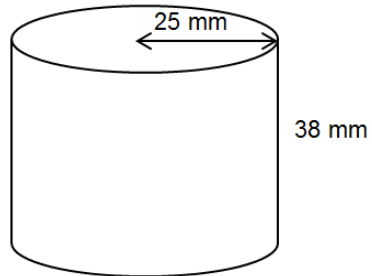
Examples

- 1 A solid is drawn on the centimetre isometric paper.



Describe the solid, including its dimensions.

- 2 On the centimetre isometric paper, draw a cuboid with dimensions 6 cm by 5 cm by 1 cm
- 3 Describe the solid sketched below, including its dimensions.



M18**Draw 3-D shapes including plans and elevations****Teaching Guidance**

Students should be able to:

- interpret a plan of an object
- draw a plan of an object
- understand and use the words plan, elevation and base
- draw an elevation of an object from a given side.

GCSE Link – G13

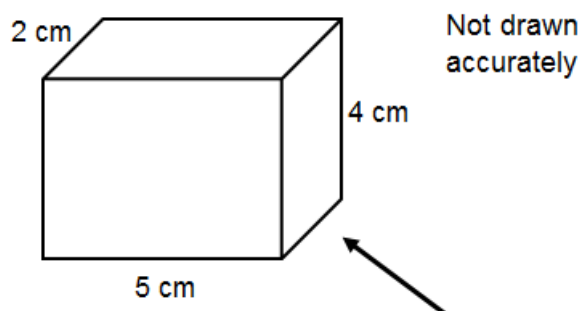
Notes

The required side for an elevation will be identified by an arrow.

Students should include internal lines on plans and elevations to identify changes in depth.

Examples

- 1 The diagram shows a cuboid.



- (a) Draw on the centimetre grid (provided) a plan of the cuboid.
- (b) Draw on the centimetre grid (provided) the elevation of the cuboid in the direction of the arrow.

M19

Calculate values of angles and/or coordinates with 2-D and 3-D shapes

Teaching Guidance

Students should be able to:

- apply the properties of angles at a point and angles at a point on a straight line
- understand and use the equality of vertically opposite angles, alternate angles and corresponding angles on parallel lines
- understand that allied or co-interior angles sum to 180°
- know that the angles in a triangle sum to 180°
- know that the angles in a quadrilateral sum to 360°
- understand the terms 'interior angle' and 'exterior angle' when used with polygons
- apply the properties of shapes and lines to a 2-D coordinate system.

GCSE Link – A8, G1, G3, G4

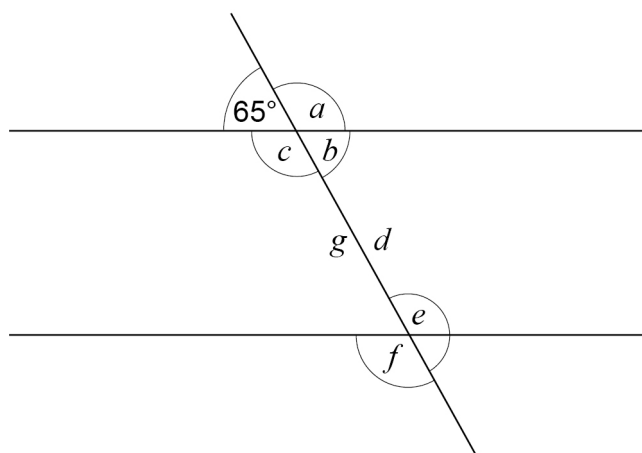
Notes

The names of the types of angles given above will not be tested.

3-D coordinates will not be tested.

Examples

1



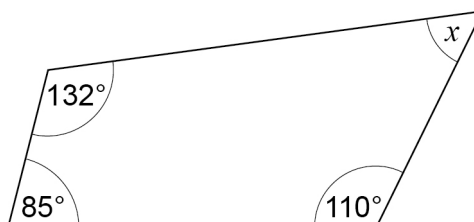
In the diagram, a straight line crosses two straight, parallel lines.

Work out the values of angles a , b , c , d , e , f and g

- 2 Two of the angles in a triangle are 23° and 98°

Work out the size of the third angle.

3

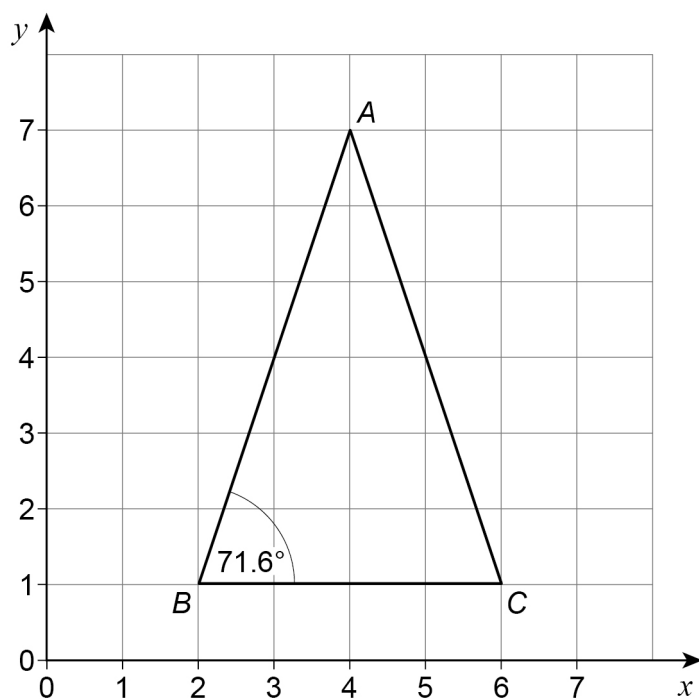


Work out the size of angle x .

- 4 The interior angle of a polygon is 72°

Work out the exterior angle.

- 5 Isosceles triangle ABC is shown on the coordinate system.



- Work out the size of angle BAC
- Work out the midpoint of line AB
- Write the coordinates of a point in the triangle that is nearer to point A than to point B

3

Handling information and data

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.

H6

Calculate the median and mode of a set of quantities

Teaching Guidance

Students should be able to:

- identify the median in an even or odd number of discrete data
- work out the median from a statistical diagram showing quantitative data
- identify the mode in a number of discrete data
- identify the mode from a statistical diagram
- understand that some data have no mode or joint modes
- understand that 'modal' is the adjective from 'mode'.

GCSE Link – S2, S4

Examples

1 The number of complaints received by a company each day for 9 days was

12 7 13 8 13 10 17 12 13

Work out the median number of complaints and the modal number of complaints.

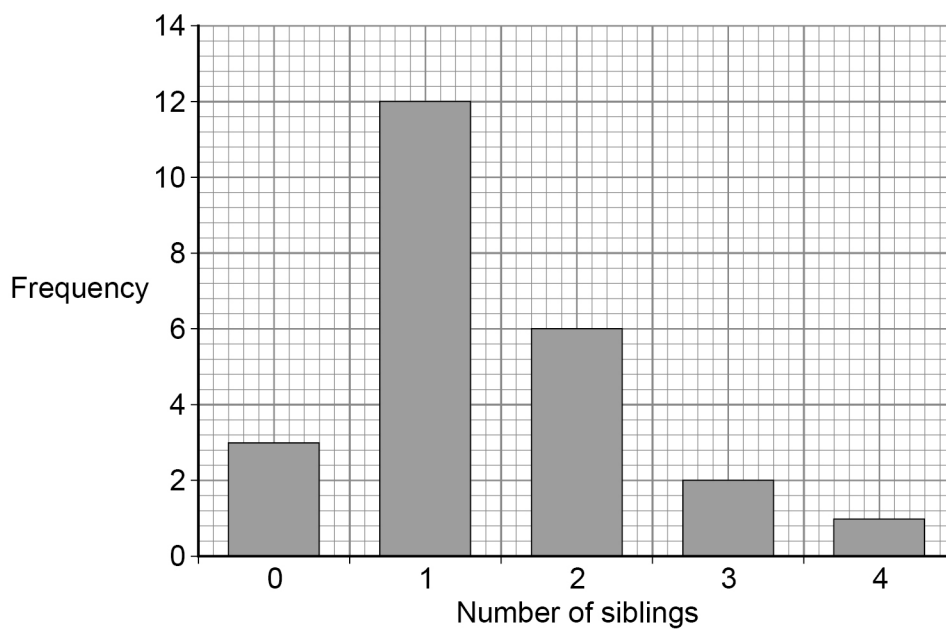
2 10 people took their driving test.

The list shows the number of faults each person had on the test.

2 5 5 4 7 1 2 0 7 3

Work out the median number of faults and the modal number of faults.

- 3 The bar chart shows the number of siblings of students in a class.



- (a) Write down the modal number of siblings.
- (b) Work out the median number of siblings.

H7

Estimate the mean of a grouped frequency distribution from discrete data

Teaching Guidance

Students should be able to:

- work out an estimate of the mean from a grouped frequency table
- understand that the actual mean may be higher or lower than their estimate.

GCSE Link – S4

Notes

Students should realise that if they are given a table with blank columns the expectation is that they will use the columns to help them arrive at a solution.

Examples

- 1 The number of goals scored in a season by 92 football clubs is shown in the table.

| Number of goals, g | Frequency | | |
|----------------------|-----------|--|--|
| $50 < g \leq 60$ | 10 | | |
| $60 < g \leq 70$ | 24 | | |
| $70 < g \leq 80$ | 33 | | |
| $80 < g \leq 90$ | 17 | | |
| $90 < g \leq 100$ | 6 | | |
| $100 < g \leq 110$ | 2 | | |
| | | | |

Work out an estimate of the mean number of goals scored per team.

H8

Use the mean, median, mode and range to compare two sets of data

Teaching Guidance

Students should be able to:

- work out which of two sets of data has the higher mean, median and mode and relate this to having a higher average
- know that mean, median and mode are all types of average
- identify which is the most appropriate measure of average to use in a certain situation
- understand that a person or company may choose which measure of average to use to their advantage
- work out which of two sets of data has the higher range
- know that range is a measure of spread
- understand that the range can be affected to a large degree by one piece of data.

GCSE Link – S4

Notes

If students are asked to compare data, unless stated otherwise we expect them to compare at least one measure of average and the range.

Students should not just work out the values, but must relate them to the context, eg in a question comparing performance in a series of tests, 'John had the higher mean' will not attract full marks unless accompanied by 'this means that on average his score was better'.

Examples

1 The number of 'likes' received by two bloggers for 10 of their posts is shown.

| | | | | | | | | | | |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Jerry | 172 | 184 | 130 | 212 | 198 | 176 | 181 | 203 | 177 | 145 |
| Kate | 251 | 176 | 89 | 112 | 213 | 184 | 92 | 99 | 166 | 273 |

Statistically compare the sets of data.

H9

Work out the probabilities of combined events including the use of diagrams and tables

Teaching Guidance

Students should be able to:

- work out a probability from a two-way table
- work out a probability from a Venn diagram
- work out a probability from a tree diagram
- work out a probability from a frequency tree
- know when it is appropriate to add probabilities
- know when it is appropriate to multiply probabilities.

GCSE Link – P1, P2, P3, P6, P7, P8

Notes

Set notation will not be tested, but the sign for the universal set should be understood.

Examples

1 A survey asked 100 people about how they like their coffee.

The two-way table shows the results.

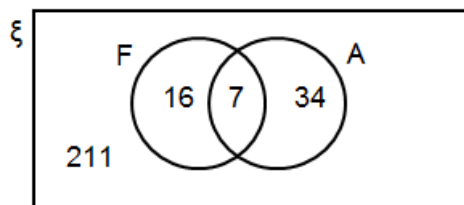
| | Milk | No milk |
|----------|------|---------|
| Sugar | 37 | 14 |
| No sugar | 41 | 8 |

One of the 100 people is chosen at random.

- Work out the probability that the person takes sugar.
- Work out the probability that the person has sugar, but no milk.

- 2 268 passengers are on a flight.

The Venn diagram shows if they are in first class (F) and if they are travelling alone (A)

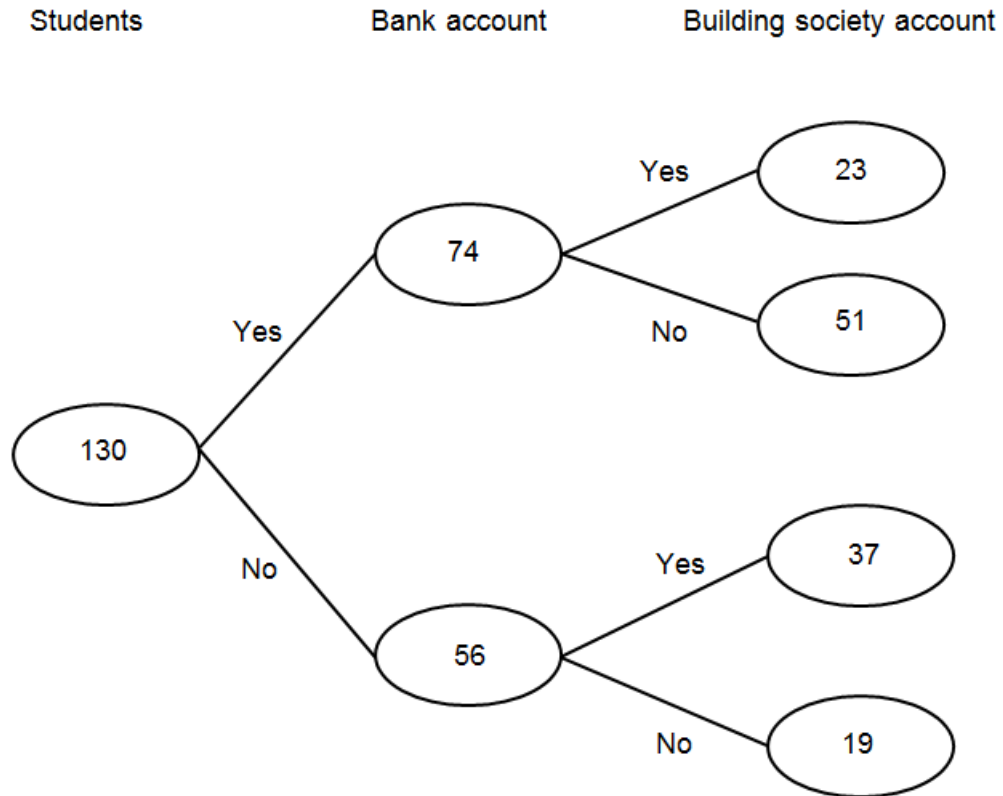


A passenger is chosen at random.

- (a) Work out the probability that the passenger is flying alone in first class.
- (b) Work out the probability that the passenger is in first class.
- (c) Work out the probability that the passenger is not travelling alone.

3 130 students are asked if they have a bank account and a building society account.

The results are shown in the frequency tree.



One of the students is chosen at random.

- (a) Work out the probability that the student has a bank account.
- (b) Work out the probability that the student has a building society account.
- (c) Work out the probability that the student has a bank account and a building society account.

H10**Express probabilities as fractions, decimals and percentages****Teaching Guidance**

Students should be able to:

- give and understand a probability as a (simplified) fraction
- give and understand a probability as a decimal
- give and understand a probability as a percentage
- know that the probabilities of an exhaustive set of outcomes sum to 1, or 100%

GCSE Link – P3, P4

Notes

Unless specified in the question, probabilities can be given in any of the three forms.

Probabilities will not be accepted in words or using a ratio.

Examples

- 1 One counter is chosen at random from a bag containing red counters, blue counters and green counters.

The probability that the counter is red is 23% and the probability that the counter is blue is 46%

Work out the probability that the counter is green.

- 2 Sue says that the probability that she wins a game is $\frac{5}{4}$

Why must Sue be wrong?

H11

Draw and interpret scatter diagrams and recognise positive and negative correlation

Teaching Guidance

Students should be able to:

- plot points to form a scatter diagram
- draw and use a line of best fit
- identify positive correlation, negative correlation and no correlation
- compare, by sight, strengths of correlation
- identify outliers and relate them to the given context.

[GCSE Link – S6](#)

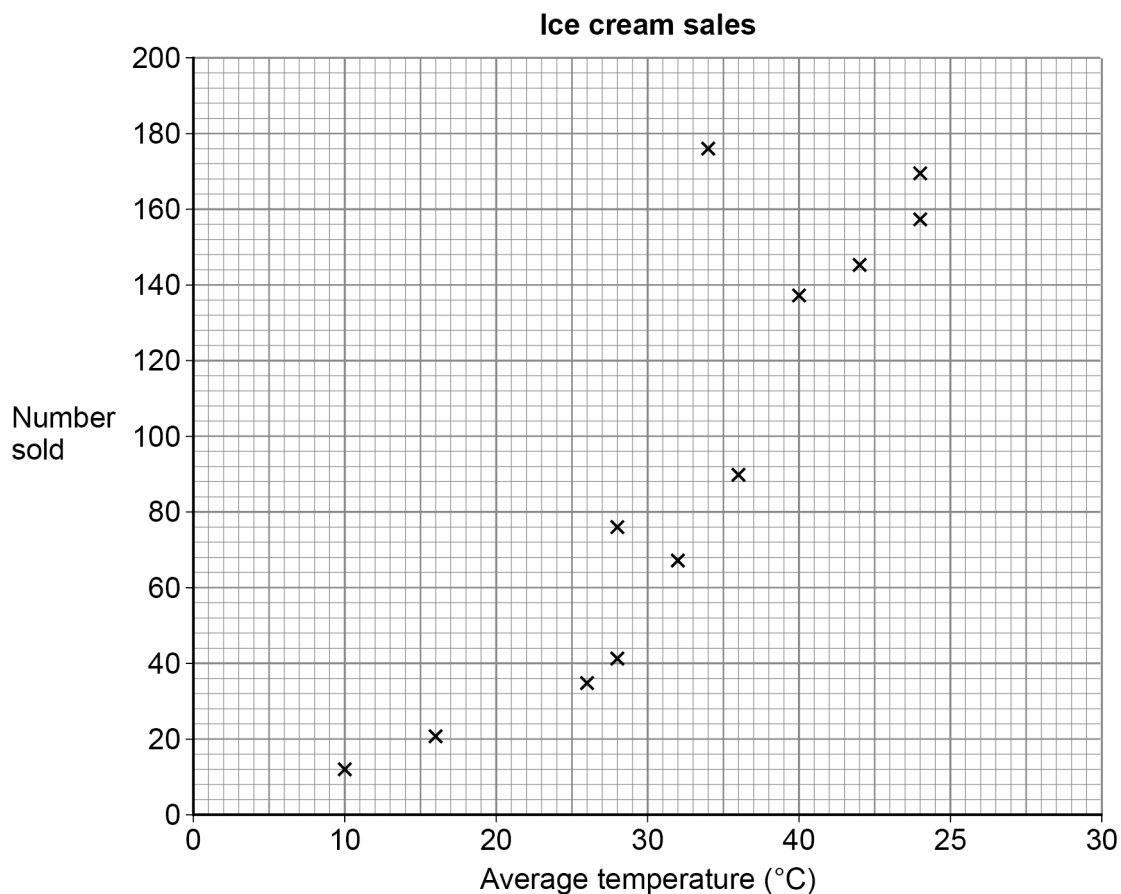
Notes

In general, students will not explicitly be told to plot points or draw a line of best fit, so they should know to do this when using scatter diagrams.

Students should understand the difference between identifying the type of correlation (positive, negative or none) and describing a relationship (eg as one goes up the other goes down).

Examples

- 1 The scatter diagram shows the average temperature at noon for 12 months and the average number of ice creams sold per day by a shop in the same months.



- What type of correlation is shown?
- Describe the relationship between average temperature and ice cream sales.
- Identify the outlier and give a possible explanation for it.
- Use the diagram to estimate average ice cream sales per day at the shop in a month when the average noon temperature is 11°C

Get help and support

Visit our website for information, guidance, support and resources at aqa.org.uk/maths

You can talk directly to the Maths subject team

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