Collins

# Edexcel

GCSE

# Mathematics

H

## SET A – Paper 2 Higher Tier (Calculator)

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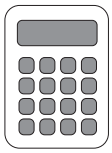
Time allowed: 1 hour 30 minutes

**You must have:**

- Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.



**Instructions**

- Use **black** ink or black ball-point pen.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out**.

**Information**

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  *– use this as a guide as to how much time to spend on each question.*
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

**Name:** .....

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages of your working.**

**1** The following table shows the heights of giraffes at a zoo.

| height ($x$ cm) | frequency |
|---|---|
| $500 \leqslant x < 510$ | 2 |
| $510 \leqslant x < 520$ | 6 |
| $520 \leqslant x < 530$ | 1 |
| $530 \leqslant x < 540$ | 4 |
| $540 \leqslant x < 550$ | 3 |

**(a)** State the modal class interval.

.....

**(1)**

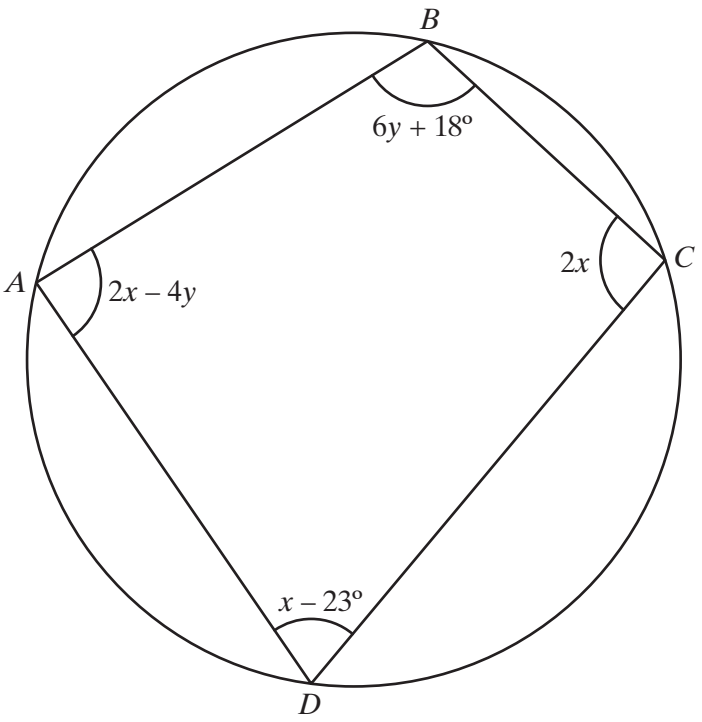
**(b)** Find an estimate for the mean height of the giraffes.

.....

**(2)**

**(Total for Question 1 is 3 marks)**

**2** In the following diagram, $ABCD$ is a cyclic quadrilateral.




Not drawn accurately

Find the value of $x$ and the value of $y$.

$x =$ .....

$y =$ .....

**(Total for Question 2 is 5 marks)**

**3** Solve the inequality $-3 < \frac{2x+7}{4} < 5$, illustrating your answer on a number line.

**(Total for Question 3 is 4 marks)**

**4** Sadiq invests £1000 in a savings account paying a compound interest rate of 1.25%

For the first year only, there is a bonus 0.75% interest.

Calculate the amount (to the nearest pound) he can expect to have in his account after 5 years.

**(Total for Question 4 is 2 marks)**



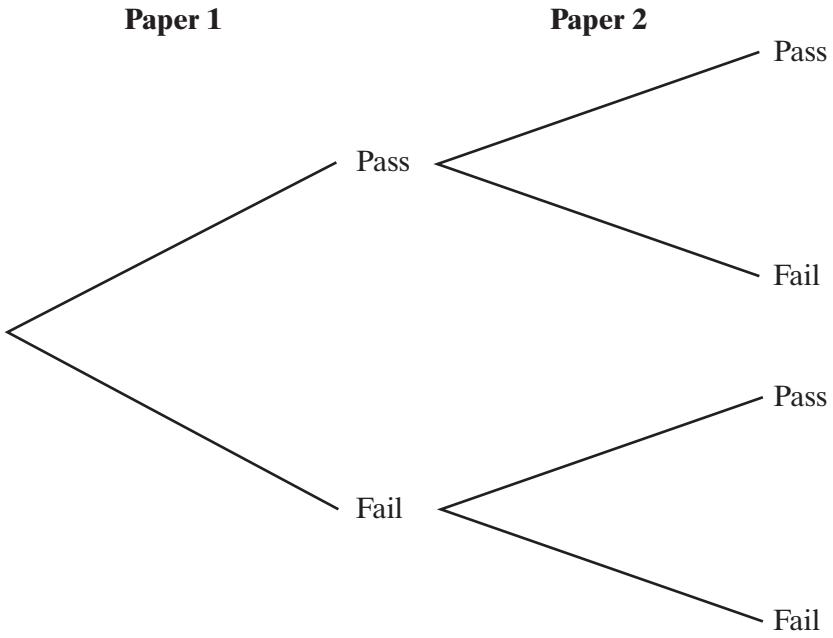
 

**5** A maths test comprises of two papers: paper 1 and paper 2

A student completes paper 1, then tackles paper 2

The probability that a student passes paper 1 is 0.7, and the probability that a student passes paper 2 is 0.8

**(a)** Complete the probabilities on the following tree diagram.




**(2)**

**(b)** Find the probability that the student passes at least one of the papers.

.....

**(2)**

**(Total for Question 5 is 4 marks)**

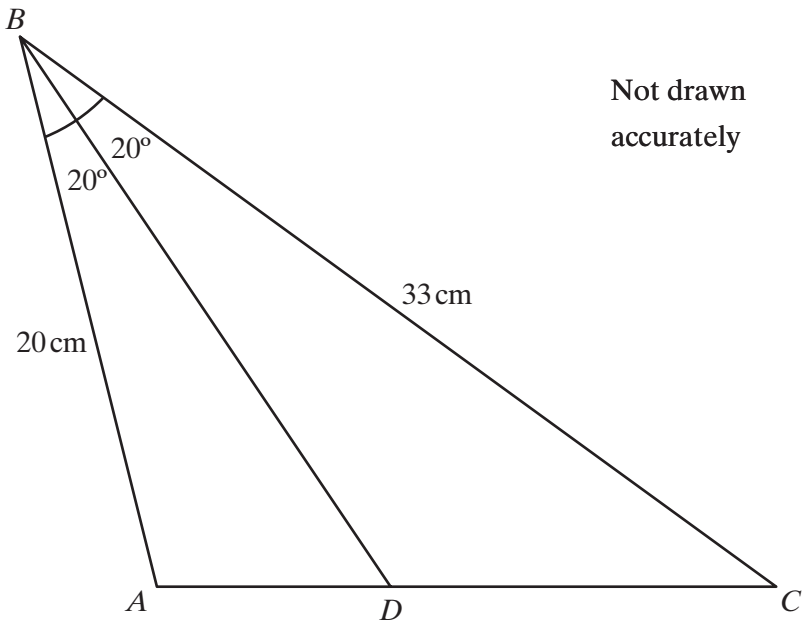
**6** Solve the equation $x^2 + x - 90 = 0$

**(Total for Question 6 is 3 marks)**

**7** Given vector $\mathbf{a} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and vector $\mathbf{b} = \begin{pmatrix} -2 \\ -1 \end{pmatrix}$, calculate the vector $2\mathbf{a} - 3\mathbf{b}$.

**(Total for Question 7 is 2 marks)**

**8** In the following triangle, $AB = 20$ cm, $BC = 33$ cm and angle $ABC = 40°$




Not drawn accurately

**(a)** Find the size of length $AC$, giving your answer to 3 significant figures.

**(3)**

The line BD bisects the angle $ABC$.

**(b)** Find the ratio of the area of triangle $ABD$ : area of triangle $BCD$.

**(3)**

**(Total for Question 8 is 6 marks)**

**9** A quantity $y$ is inversely proportional to the square root of $x$.
Given $y = 12.5$ when $x = 16$, find the value of $y$ when $x = 0.25$

$y =$ .....

**(Total for Question 9 is 4 marks)**

**10** In the diagram below, angle $ABC = 140°$

Using your ruler and compasses only, construct an angle of 35º, making your construction lines clear.

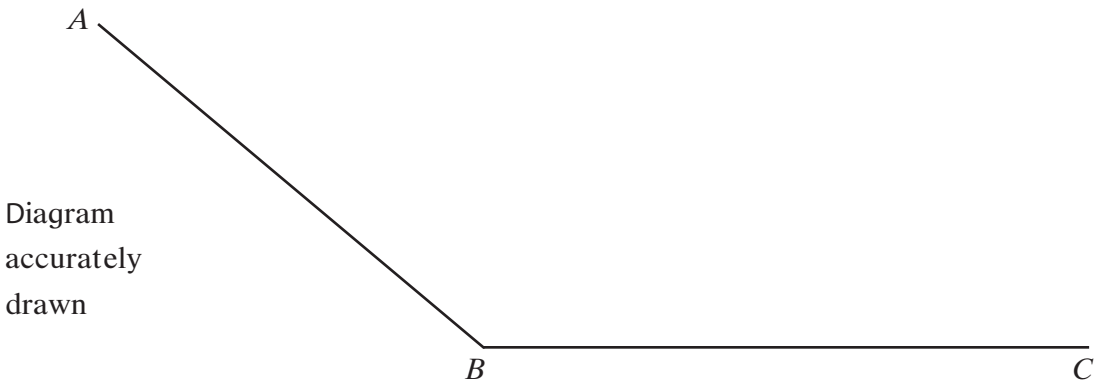


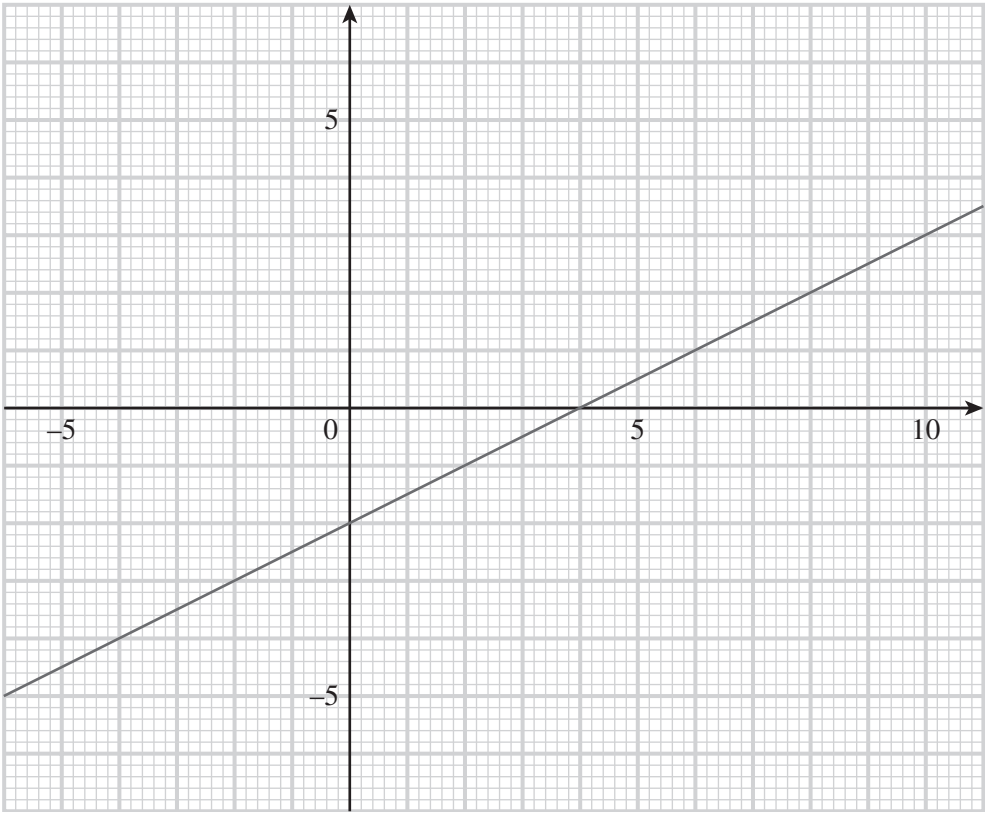

Diagram accurately drawn

**(Total for Question 10 is 2 marks)**



**11** **(a)** Find the equation of the following line $L$, expressing your answer in the form $y = mx + c$




**(3)**

**(b)** Find the equation of the line perpendicular to $L$ that intersects at the point $(10, 0)$.

**(3)**

**(Total for Question 11 is 6 marks)**

**12** Solid A and solid B are mathematically similar.

The ratio of the volume of A to the volume of B is 27 : 125

Given that the volume of the larger solid is 0.1 $m^3$, find the surface area of the smaller solid (in $cm^2$).

.....

**(Total for Question 12 is 5 marks)**

**13** In physics, the resistance (in ohms) of a resistor can be calculated using the formula $R = \frac{V^2}{P}$, where $V$ is the potential difference across the resistor (measured in volts) and $P$ is the power dissipated (measured in watts, W).

Given that the potential difference is 12 V (to the nearest volt), and the power is measured at 13.8 W (to 3 significant figures), find lower and upper bounds for the resistance.

Lower bound = .....

Upper bound = .....

**(Total for Question 13 is 4 marks)**

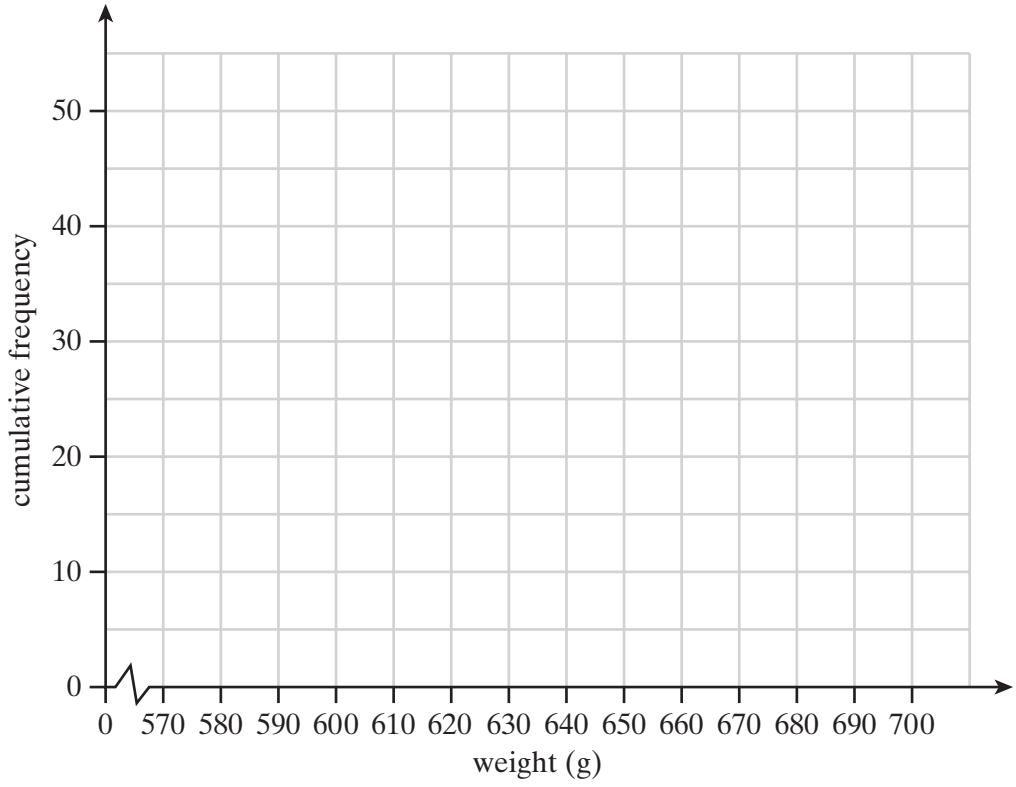
**14** A sample of hedgehogs from a local park were observed and their weight measured.

The following data was tabulated.

| Weight ($x$ g) | Frequency | Cumulative frequency |
|---|---|---|
| $570 \leqslant x < 590$ | 5 | |
| $590 \leqslant x < 610$ | 12 | |
| $610 \leqslant x < 630$ | 10 | |
| $630 \leqslant x < 650$ | 8 | |
| $650 \leqslant x < 670$ | 10 | |
| $670 \leqslant x < 700$ | 5 | |

**(a)** Complete the cumulative frequency column. **(1)**

**(b)** On the following grid, draw a cumulative frequency polygon of the data.




**(2)**

**(c)** A hedgehog is deemed to be healthy if its weight is at least 615 g.
Use the cumulative frequency polygon to determine the percentage of healthy hedgehogs in the sample.

**(3)**

**(Total for Question 14 is 6 marks)**

**15** Consider the functions $f(x) = \frac{1}{x-2} (x \neq 2)$ and $g(x) = x^2$ $(x \geqslant 0)$

**(a)** Find an expression for $f^{-1}(x)$

**(3)**

**(b)** Find an expression for $gf(x)$

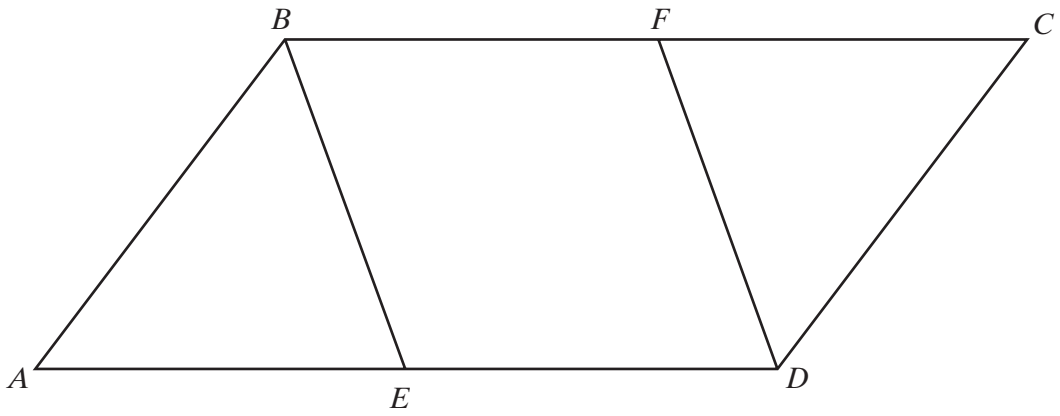
**(1)**

**(c)** Solve the equation $fg(x) = gf(x)$

**(2)**

**(Total for Question 15 is 6 marks)**

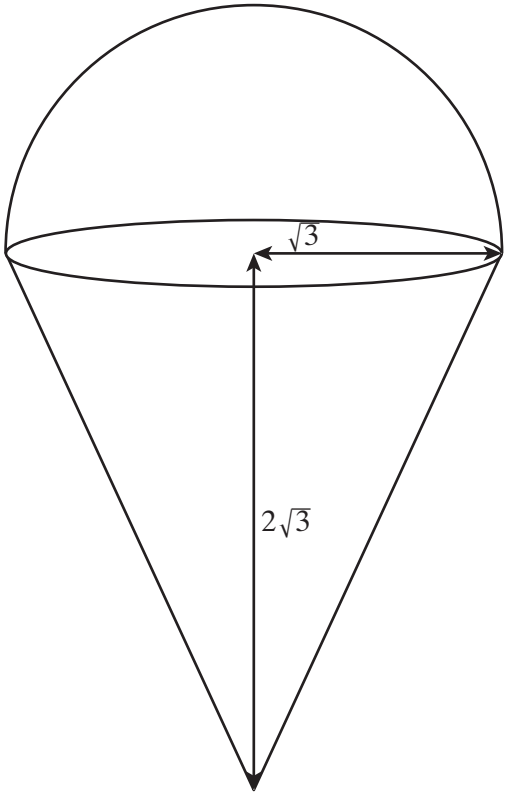
**16** $ABCD$ is a parallelogram.



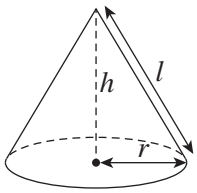

Given $AE = FC$, prove that $BE = FD$.

**(Total for Question 16 is 4 marks)**

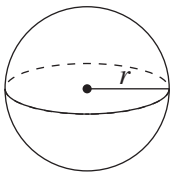
**17** The following shape shows a solid hemisphere of radius $\sqrt{3}$cm, affixed to a cone of perpendicular height $2\sqrt{3}$ cm.




Volume of a cone = $\frac{1}{3}\pi r^2 h$




Volume of a sphere = $\frac{4}{3}\pi r^3$




Find the volume of the composite solid, expressing your answer in the form $a\pi\sqrt{3}$, where $a$ is a constant.

**(Total for Question 17 is 5 marks)**

**18** **(a)** Show that the equation $x^4 + 2x - 7 = 0$ has a solution between $x = 1.3$ and $x = 1.5$

**(2)**

**(b)** Starting with $x_0 = 1.4$, use the iteration formula $x_{n+1} = \sqrt[4]{7 - 2x}$ **three** times to find a solution to the equation $x^4 + 2x - 7 = 0$

Give your final answer to 3 decimal places.

**(3)**

**(Total for Question 18 is 5 marks)**

**19** Find the equation of the line of symmetry of the curve $C$: $y = 3 - 2x - 4x^2$

Hence or otherwise, find the coordinates of the maximum point on the curve $C$.

**(Total for Question 19 is 4 marks)**

**TOTAL FOR PAPER IS 80 MARKS**