CAMBRIDGE
International Education

Specimen Paper Answers
Paper 4 Calculator (Extended)

Cambridge IGCSE™/Cambridge IGCSE™ (9–1) Mathematics 0580/0980

For examination from 2025

v0.3

Cambridge Pathway

Contents

Introduction

These specimen answers have been produced by Cambridge International ahead of the examination in 2025 to exemplify approaches to the questions for those teaching Cambridge IGCSE Mathematics (0580). Questions have been selected from Specimen Paper 4, Questions 4, 9, 16, 17, 21, 23 and 24.

These are model answers. The working is accompanied by a brief commentary explaining alternative approaches or key considerations for the answers. Comments include more information about common misconceptions and key steps in working for students to be aware of.

The specimen materials are available to download from the School Support Hub at
www.cambridgeinternational.org/support

2025 Specimen Paper 04

2025 Specimen Paper Mark Scheme 04

Past exam resources and other teaching and learning resources are available on the School Support Hub
www.cambridgeinternational.org/support

Details of the assessment

The syllabus for Cambridge IGCSE Mathematics 0580 is available at **www.cambridgeinternational.org**

Assessment overview

All candidates take two components.

Candidates who have studied the Core subject content, or who are expected to achieve a grade D or below, should be entered for Paper 1 and Paper 3. These candidates will be eligible for grades C to G.

Candidates who have studied the Extended subject content, and who are expected to achieve a grade C or above, should be entered for Paper 2 and Paper 4. These candidates will be eligible for grades A* to E.

Candidates should have a scientific calculator for Paper 3 and Paper 4. Calculators are **not** allowed for Paper 1 and 2.

Please see the *Cambridge Handbook* at **www.cambridgeinternational.org/eoguide** for guidance on use of calculators in the examinations.

Core assessment

Core candidates take Paper 1 and Paper 3. The questions are based on the Core subject content only:

Paper 1: Non-calculator (Core)	
1 hour 30 minutes	
80 marks	50%
Structured and unstructured questions	
Use of a calculator is **not** allowed	
Externally assessed	

Paper 3: Calculator (Core)	
1 hour 30 minutes	
80 marks	50%
Structured and unstructured questions	
A scientific calculator is required	
Externally assessed	

Extended assessment

Extended candidates take Paper 2 and Paper 4. The questions are based on the Extended subject content only:

Paper 2: Non-calculator (Extended)	
2 hours	
100 marks	50%
Structured and unstructured questions	
Use of a calculator is **not** allowed	
Externally assessed	

Paper 4: Calculator (Extended)	
2 hours	
100 marks	50%
Structured and unstructured questions	
A scientific calculator is required	
Externally assessed	

Question 4

Specimen answer

4 $\mathrm{f}(x) = 3x - 5$

The domain of $\mathrm{f}(x)$ is $\{-3, 0, 2\}$.

Find the range of $\mathrm{f}(x)$.

$\mathrm{f}(-3) = 3 \times -3 - 5 = -14$
$\mathrm{f}(0) = 3 \times 0 - 5 = -5$
$\mathrm{f}(2) = 3 \times 2 - 5 = 1$

{ ......−14, −5, 1...... } [2]

Examiner comment

This is new syllabus content and candidates need to understand the terms domain and range.

The range is found by finding the value of f(*x*) for the three given values of the domain.

The correct three values for the range score 2 marks. B1 is awarded if two of the values are correct.

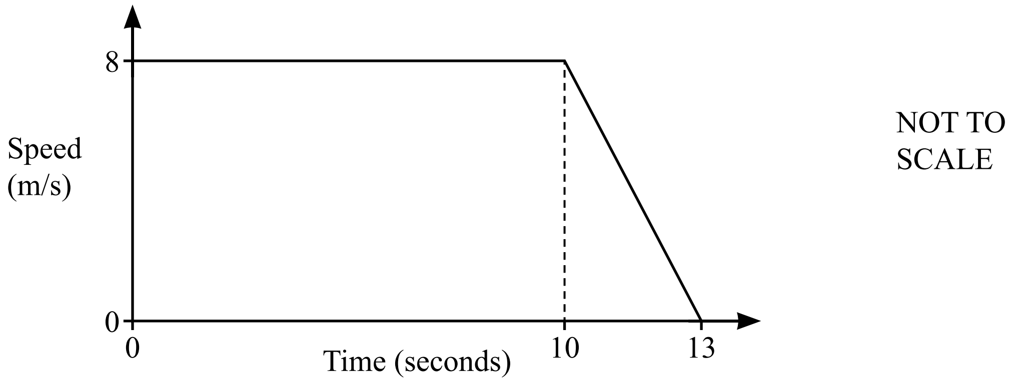
Common errors and general guidance for candidates

- Candidates should be aware that the domain of a function is the set of values of the input and the range of a function is the set of values of the output.
- On the calculator paper, candidates are expected to use their calculator to evaluate answers.
- In calculations involving negative numbers, common errors include use of incorrect signs in the calculation and omitting a negative sign when writing the result.

Question 9

Specimen answer

9



The diagram shows the speed–time graph of part of a car journey.

(a) Find the deceleration of the car between 10 and 13 seconds.

$$\text{Gradient} = \frac{8-0}{10-13} = -\frac{8}{3}$$

$$\text{Deceleration} = \frac{8}{3}$$

$\frac{8}{3}$ .... m/s^2 [1]

(b) Calculate the total distance travelled during the 13 seconds.

$$\text{Distance} = \text{area under graph} = \frac{1}{2} \times (10 + 13) \times 8 = 92$$

92 .... m [2]

Examiner comment

(a) The question asks for the deceleration which means that the answer is the absolute value of the gradient of the line between the times of 10 seconds and 13 seconds. The units for speed (m/s) and time (s) are shown on the axes and no change of units is required to give a deceleration in m/s^2. There is 1 mark for writing the correct deceleration and it is acceptable to give this as an improper fraction. The mark scheme indicates that equivalent answers are acceptable, for example $2\frac{2}{3}$ or 2.67.

(b) The total distance travelled in 13 seconds is the area under the speed–time graph from time = 0 seconds to time = 13 seconds. The correct answer of 92 scores 2 marks.

The required area is a trapezium with parallel sides of 13 and 10 and a height of 8. Candidates need to recall the formula for the area of a trapezium because it is not given on the formula list. An alternative approach is to divide the area into a rectangle and a triangle and add these two areas. If the final answer is not correct, the method mark is awarded for showing a correct calculation for one of the areas: trapezium = $\frac{1}{2}(10 \div 13) \times 8$ or rectangle = 10×8 or triangle = $\frac{1}{2} \times 3 \times 8$.

Common errors and general guidance for candidates

- Candidates should check the units given on the axes of the graph and the units required in the answer to make sure that no change of units is needed.
- A common error when finding the deceleration is to write the negative value to indicate a negative acceleration rather than the positive value which is the deceleration.
- The formula for the area of a triangle is given on the formula list. If a candidate cannot confidently recall the formula for the area of a trapezium, they should divide the shape into simpler areas and add these to get the answer.
- Common errors are to use incorrect values for the dimensions of the shapes such as 13 in place of 3 for the base of the triangle or 8 in place of 10 for the top of the trapezium. To avoid this error, the diagram can be annotated with the correct dimensions.

Question 16

Specimen answer

16 *A* is the point (7, 2) and *B* is the point (−5, 8).

(a) Calculate the length of *AB*.

$\sqrt{(7--5)^2+(2-8)^2} = 6\sqrt{5} = 13.416...$

.................13.4................. [3]

(b) Find the equation of the line that is perpendicular to *AB* and that passes through the point (−1, 3). Give your answer in the form $y = mx + c$.

Gradient of $AB = \dfrac{2-8}{7--5} = -\dfrac{1}{2}$

Gradient of perpendicular $= \dfrac{1}{-1/2} = 2$

Substitute (–1, 3) into $y = 2x + c$

$3 = 2 \times -1 + c \rightarrow c = 3 + 2 = 5$

$y =$ ....$2x + 5$................. [4]

Examiner comment

(a) Candidates are expected to be able to calculate the length of a line given the coordinates of its end points. The x-coordinates and the y-coordinates of the two points are subtracted to find the lengths of the x- and y-components of the line. Pythagoras' theorem is then applied to find the length of the line.

The question does not ask for the answer as an exact value, so a decimal answer is expected. The answer given correct to 3 significant figures scores 3 marks. If a more accurate answer is given, 3 marks are awarded for an answer in the range of 13.41 to 13.42.

If the answer is not correct, two method marks are awarded for a correct method at the stage of showing the square root. If the lengths of the two sides of the triangle are worked out as 12 and 6 before applying Pythagoras' theorem, these method marks are awarded at the stage $\sqrt{12^2+6^2}$. A correct method reaching the stage AB^2 without showing the square root, for example $12^2 + 6^2$, is awarded one method mark.

The method marks can be awarded if the correct subtractions (7 – –5) and (2 – 8) are shown and the results used correctly even if the values of 12 and 6 were incorrectly evaluated.

(b) The first step is to use the given coordinates to find the gradient of the line *AB*.

Candidates should know that the product of the gradient of a line and the gradient of a line perpendicular to the line is –1. This relationship is used to find that the gradient of the required line is 2.

The equation of the perpendicular line is found by substituting the given coordinates (–1, 3) into the equation $y = 2x + c$ to find the value of c.
The question specifies that the answer is required in the form $y = mx + c$, so the answer $y = 2x + 5$ scores 4 marks. If the answer is not correct, one method mark is awarded for each correct stage of working shown: one method mark for the gradient of *AB*, one method mark for the gradient of the perpendicular,

and one method mark for substituting to find the value of c. The final two method marks are dependent on showing a correct method for the previous stage of working even if the result of that stage was incorrectly evaluated.

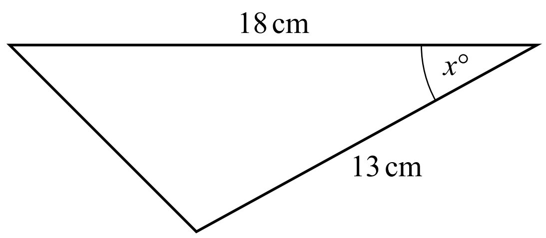
Common errors and general guidance for candidates

- Candidates are encouraged to write down the complete calculation to find the length of the line and enter it into their calculator in a single step, taking care to use the correct signs. This reduces the chance of making errors when carrying out intermediate steps.
- Candidates should take care to include brackets correctly in their working. Omission of brackets or incorrect positioning of brackets in the expression for the length of the line will lead to an incorrect result. Examples of errors are $\sqrt{7--5^2+2-8^2}$ or $\sqrt{7-(-5^2)+(2-8)^2}$.
- A common error when finding the length is to subtract the squares rather than adding them, for example $\sqrt{7+-5^2+(2+8)^2}$.
- Another common error is to use the coordinates of *A* and *B* incorrectly to find the components of the length: (7 – 2) and (–5 – 8) in place of (7 – –5) and (2 – 8). Sketching the line and indicating the coordinates and lengths may help avoid this error.
- When the question specifies a form for the answer, it must be given in this form to gain full credit. A correct equation of the perpendicular line in a different form, for example $y - 2x = 5$, would gain the three method marks only.
- A common error when finding the gradient is to use $\frac{x_B - x_A}{y_B - y_A}$ or $\frac{y_B - y_A}{x_A - x_B}$ in place of $\frac{y_B - y_A}{x_B - x_A}$.
- A common error when finding the perpendicular gradient is to find the reciprocal of the gradient rather than the negative reciprocal of the gradient.
- A common error when finding the value of *c* is to substitute the coordinates of either point *A* or *B* rather than (–1, 3), the coordinates of the point that the perpendicular line passes through.

Question 17

Specimen answer

17



NOT TO SCALE

The area of the triangle is 50 cm^2.

Calculate the value of $\sin x$.

$$\text{Area} = \frac{1}{2}ab\sin C$$

$$\frac{1}{2} \times 18 \times 13\sin x = 50$$

$$\sin x = \frac{2 \times 50}{18 \times 13} = 0.42735\ldots$$

$\sin x =$ ....0.427............ [2]

Examiner comment

This question requires use of the formula area of triangle = $\frac{1}{2}ab\sin C$ which is given on the formula list.

The method mark is awarded for substituting the values 18, 13 and 50 correctly into the area formula. No rearrangement is needed for this mark. The formula is then rearranged to find the value of sin *x*.

The answer should be given correct to 3 significant figures but an unrounded answer with 4 or more significant figures in the range 0.4273 to 0.4374 would also score 2 marks.

Common errors and general guidance for candidates

- Candidates should read the question carefully to ensure their answer is what is required. A common error in this question would be to find angle $x = 25.3°$ which is a step further than required.
- Candidates should know which formulas are given on the formula list and should refer to this when they are using one of these formulas.
- A sensible first step is to substitute the given values into the formula before doing any rearrangement.
- Candidates should take care when rearranging formulas involving fractions. A common error here would be to rearrange incorrectly to $\sin x = \frac{50}{2 \times 18 \times 13}$ rather than $\sin x = \frac{2 \times 50}{18 \times 13}$.

Question 21

Specimen answer

21 Simplify.

$$\frac{5p^2 - 20p}{2p^2 - 32}$$

$$\frac{5p(p-4)}{2(p^2-16)} = \frac{5p(p-4)}{2(p+4)(p-4)} = \frac{5p}{2(p+4)}$$

$\frac{5p}{2(p+4)}$ .... [3]

Examiner comment

When a question asks for an expression to be simplified, this means it should be written in its simplest form.

In this case there are two acceptable forms for the final answer for 2 marks: either $\frac{5p}{2(p+4)}$ with the denominator factorised or $\frac{5p}{2p+8}$ with the denominator expanded.

If the final answer is not correct the partial marks are awarded for correctly factorising the numerator and the denominator. For these marks, the expressions do not need to be written as part of an algebraic fraction. B1 is awarded for factorising the expression on the numerator to $5p(p-4)$. The second B1 is awarded for fully factorising the denominator to $2(p+4)(p-4)$. These B marks are still awarded if there is incorrect simplification after the correct expressions have been written.

Common errors and general guidance for candidates

- When simplifying an algebraic fraction there will be a common factor in the numerator and the denominator which can be cancelled out.
- Factorise the simpler expression first, as this will give a hint about one of the factors in the other expression. In this question, factorising the numerator to $5p(p-4)$ indicates that the denominator must also have a factor of $(p-4)$.
- A common error is to incorrectly cancel numbers or letters after reaching a correct answer, for example cancelling p in the numerator and denominator: $\frac{5p}{2p+8} = \frac{5}{2+8}$.

Question 23

Specimen answer

23 Serge walks 7.9 km, correct to the nearest 100 metres.
The walk takes 133 minutes, correct to the nearest minute.

Calculate the maximum possible average speed of Serge's walk.
Give your answer in kilometres/hour.

Distance LB = 7.85 km UB = 7.95 km
Time LB = 132.5 min UB = 133.5 min

Maximum speed in km/h = $\frac{7.95}{132.5} \times 60 = 3.6$

.......................3.6....................... km/h [3]

Examiner comment

This question combines a speed calculation involving a change of units with a bounds calculation. Candidates are expected to know the formula speed = distance ÷ time. The correct answer of 3.6 scores 3 marks.

The first step is to find the values of distance and time to use in the speed calculation. The accuracy used for these two values is different and it is good practice to write down the upper and lower bound of each value before writing the speed calculation. B1 is awarded for writing either the upper bound of the distance or the lower bound of the time.

The next step is to calculate the speed. The question asks for a speed in km/h meaning that the time should be converted from minutes to hours. To find the maximum speed divide the upper bound of distance by the lower bound of time. The method mark is awarded for using the speed formula correctly and dividing a distance by a time, even if the units have not been converted from minutes to hours.

Common errors and general guidance for candidates

- Candidates should be confident in conversion between common metric units. The accuracy given as correct to the nearest 100 metres needs to be changed to 0.1 km to find the bounds of the distance.
- A common error is to assume that the maximum speed is the upper bound of the distance divided by the upper bound of the time rather than the upper bound of the distance divided by the **lower** bound of the time. To avoid this error, candidates could try all four possible combinations of upper and lower bounds in the division to help identify the combination that gives the largest result.
- A common error is to give an answer with incorrect units. In this case an answer of 0.06 is the result of dividing distance in km by time in minutes and should be multiplied by 60 to give 3.6 km/h as required by the question.

Question 24

Specimen answer

24 The straight line $y = 2x + 1$ intersects the curve $y = x^2 + 3x - 4$ at the points A and B.

Find the coordinates of A and B.
Give your answers correct to 2 decimal places.

Use the two equations to eliminate y

$x^2 + 3x - 4 = 2x + 1$

$x^2 + x - 5 = 0$

$$x = \frac{-1 \pm \sqrt{1^2 - 4 \times 1 \times -5}}{2 \times 1} = \frac{-1 \pm \sqrt{21}}{2}$$

$x = 1.79$ $x = -2.79$

$y = 2 \times 1.79 + 1 = 4.58$ $y = 2 \times -2.79 + 1 = -4.58$

A (1.79 , 4.58)

B (–2.79 , –4.58)

[6]

Examiner comment

The coordinates of the points of intersection are found by solving the pair of simultaneous equations. Although 6 marks are awarded for the correct solutions, it is important to show all stages of working leading to these values.

The first step is to eliminate either x or y from the equations. In this case, the most appropriate method is to equate to eliminate y as no rearrangement of either equation is required. This equation is then rearranged to give a 3-term quadratic equation. One method mark is awarded at the stage of eliminating y from the equations.

The quadratic equation is then solved using the quadratic formula. In this case, $a = 1$, $b = 1$ and $c = -5$ and candidates should show these values substituted into the formula before evaluating the two solutions. Two method marks are awarded for showing correct substitution into the quadratic formula. If the substitution is only partially correct, then one method mark is awarded. The method marks for showing use of the quadratic formula are awarded for the solution of the 3-term quadratic equation the candidate has shown after eliminating y, even if they have made errors leading to this equation. The method marks are not awarded for attempting to solve $x^2 + 3x - 4 = 0$.

The solutions are substituted into one of the initial equations to find the corresponding values for y. Use of $y = 2x + 1$ is a simpler substitution than use of $y = x^2 + 3x - 4$.

The two pairs of values are rounded to 2 decimal places and written in the correct positions in the coordinate brackets on the answer line. Note that the answers can be written in either order as the positions of A and B have not been specified. If the values are written to more than 2 decimal places, then B5 is awarded for all four values correct to greater accuracy than required. B4 marks are awarded for the correct x-values with incorrect y-values.

Common errors and general guidance for candidates

- The question asks for answers to be given correct to 2 decimal places. This indicates that the quadratic equation cannot be factorised and that the quadratic formula should be used. This formula is given on the formula list.
- When a question specifies the accuracy required in the answer, full marks are only awarded for an answer given to this degree of accuracy.
- Candidates should show their substitution into the quadratic formula clearly. Use of a calculator equation solver function is not allowed.
- Common errors when using the quadratic formula are to use a short division line or a short square root sign, for example $x = -1 \pm \frac{\sqrt{1^2 - 4 \times 1 \times -5}}{2 \times 1}$ or $x = \frac{-1 \pm \sqrt{1^2} - 4 \times 1 \times -5}{2 \times 1}$. The substitution must be shown correctly for the method marks to be awarded, even if the solutions are evaluated correctly.
- A common error in solving simultaneous equations is to reach the correct solutions but to write them in the wrong positions on the answer line, for example in this case (1.79, –2.79) and (4.58, –4.58).

For further information about common mistakes made by candidates, please refer to the examiner reports which are published after the first exam series in 2025 on the School Support Hub at **www.cambridgeinternational.org/support**

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