

AS Mathematics Exam Questions by Topic Chapter 8: Graphs and Transformations

These questions are taken from the Specimen Exam materials and the real 2018 papers for the new syllabus AS and A-level mathematics courses and arranged by chapter of the textbooks by Goldie et al (available here: <https://amzn.to/39umfr5> and <https://amzn.to/3hE8kBL>). There are a mixture of questions from OCR A, OCR B (MEI) and AQA. Although the style of questions varies a little across the exam boards the content of the syllabus is almost identical so these are suitable for students preparing for any exam board.

Free problem sets for all other chapters, as well as video solutions, full past papers and other content for GCSE and A-level maths can be found at:

<https://mathsaurus.com/>

OCR A AS 2018 Paper 2 Question 2:

- 2 (i) The curve $y = \frac{2}{3+x}$ is translated by four units in the positive x -direction. State the equation of the curve after it has been translated. [2]
- (ii) Describe fully the single transformation that transforms the curve $y = \frac{2}{3+x}$ to $y = \frac{5}{3+x}$. [2]
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OCR B MEI 2018 Paper 3 Question 2:

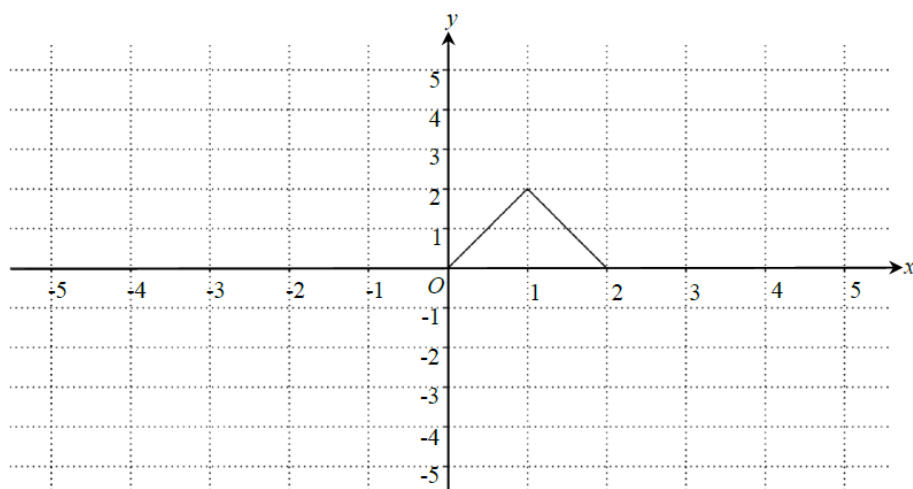
- 2 The curve $y = x^3 - 2x$ is translated by the vector $\begin{pmatrix} 1 \\ -4 \end{pmatrix}$. Write down the equation of the translated curve. [2]
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OCR B MEI Sample Paper 2 Question 2:

- 2 Given that $f(x) = x^3$ and $g(x) = 2x^3 - 1$, describe a sequence of two transformations which maps the curve $y = f(x)$ onto the curve $y = g(x)$. [4]
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OCR A AS Sample Paper 2 Question 1:

- 1 (i) The diagram below shows the graph of $y = f(x)$.



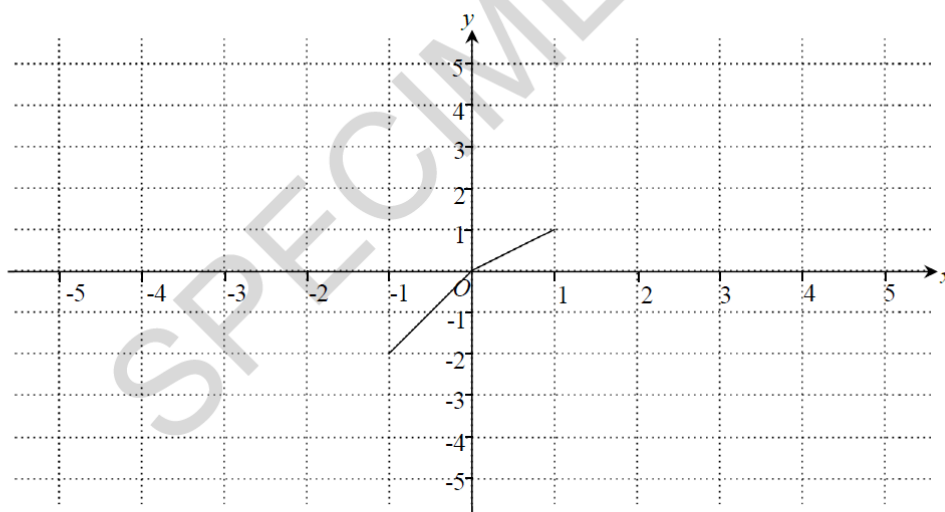
- (a) On the diagram in the Printed Answer Booklet draw the graph of $y = f(x+3)$. [2]
- (b) Describe fully the transformation which transforms the graph of $y = f(x)$ to the graph of $y = -f(x)$. [1]
- (ii) The point (2, 3) lies on the graph of $y = g(x)$. State the coordinates of its image when $y = g(x)$ is transformed to
- (a) $y = 4g(x)$, [1]
- (b) $y = g(4x)$. [1]

OCR A 2018 Paper 1 Question 6:

- 6 The cubic polynomial $f(x)$ is defined by $f(x) = 2x^3 - 7x^2 + 2x + 3$.
- (i) Given that $(x-3)$ is a factor of $f(x)$, express $f(x)$ in a fully factorised form. [3]
- (ii) Sketch the graph of $y = f(x)$, indicating the coordinates of any points of intersection with the axes. [2]
- (iii) Solve the inequality $f(x) < 0$, giving your answer in set notation. [2]
- (iv) The graph of $y = f(x)$ is transformed by a stretch parallel to the x -axis, scale factor $\frac{1}{2}$. Find the equation of the transformed graph. [2]
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OCR A Sample Paper 1 Question 3:

- 3 The diagram below shows the graph of $y = f(x)$.



- (i) On the diagram in your Printed Answer Booklet, draw the graph of $y = f(\frac{1}{2}x)$. [1]
- (ii) On the diagram in your Printed Answer Booklet, draw the graph of $y = f(x-2) + 1$. [2]
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OCR B MEI AS 2018 Paper 1 Question 9:

- 9 The curve $y = (x-1)^2$ maps onto the curve C_1 following a stretch scale factor $\frac{1}{2}$ in the x -direction.
- (i) Show that the equation of C_1 can be written as $y = 4x^2 - 4x + 1$. [2]
- The curve C_2 is a translation of $y = 4.25x - x^2$ by $\begin{pmatrix} 0 \\ -3 \end{pmatrix}$.
- (ii) Show that the normal to the curve C_1 at the point $(0, 1)$ is a tangent to the curve C_2 . [7]
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OCR B MEI AS Sample Paper 1 Question 10:

- 10 (i) Sketch the graph of $y = \frac{1}{x} + a$, where a is a positive constant.
- State the equations of the horizontal and vertical asymptotes.
 - Give the coordinates of any points where the graph crosses the axes. [4]
- (ii) Find the equation of the normal to the curve $y = \frac{1}{x} + 2$ at the point where $x = 2$. [5]
- (iii) Find the coordinates of the point where this normal meets the curve again. [3]
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Edexcel AS Sample Paper 1 Question 13:

13. (a) Factorise completely $x^3 + 10x^2 + 25x$ (2)

(b) Sketch the curve with equation

$$y = x^3 + 10x^2 + 25x$$

showing the coordinates of the points at which the curve cuts or touches the x -axis. (2)

The point with coordinates $(-3, 0)$ lies on the curve with equation

$$y = (x + a)^3 + 10(x + a)^2 + 25(x + a)$$

where a is a constant.

(c) Find the two possible values of a . (3)

OCR A AS 2018 Paper 1 Question 6:

6 Sketch the following curves.

(i) $y = \frac{2}{x}$ [2]

(ii) $y = x^3 - 6x^2 + 9x$ [5]