

TRANSFORMATIONS OF FUNCTIONS

GRADE 7

Examination Practice Questions

You should have:

A ruler, protractor, compasses, a pen, pencil, eraser, calculator.
For some questions, you may need tracing paper.

Instructions

- Use **black** ink or ball-point pen.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

Information

- The marks for each question are shown in brackets.
- Use the number of marks for each question as a guide as to how much time to spend on each question. As a rough guide, you can multiply the number of marks by 1.2 to see how many minutes you should spend on a question.
- Questions been carefully compiled from or modelled on a variety of past papers and will generally get more challenging as the document progresses. Some of the later questions will go beyond the core grade level for this topic.

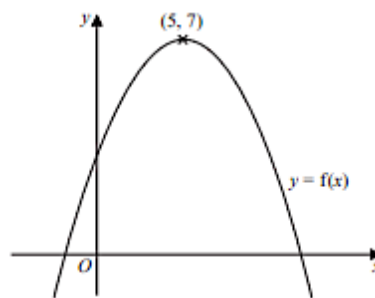
Advice

- Read each question carefully before you start to answer it.
- Don't forget to have fun.
- Check your answers at the end.

Q1.

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The diagram shows a sketch of the curve with equation $y = f(x)$



There is only one maximum point on the curve.
The coordinates of this maximum point are $(5, 7)$

Write down the coordinates of the maximum point on the curve with equation $y = f(x) + 3$

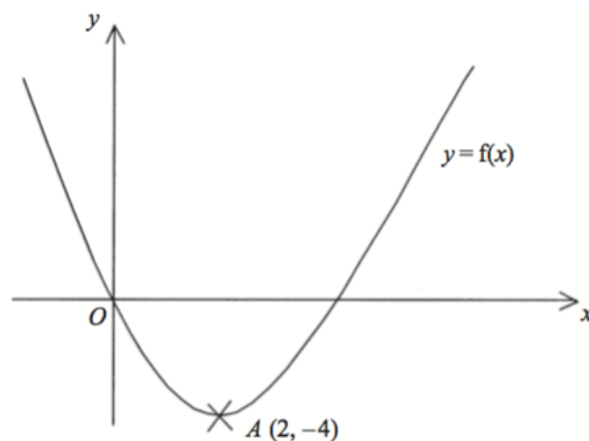
.....

(1 mark)

Q2.

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This is a sketch of the curve with equation $y = f(x)$.
It passes through the origin O .



The only vertex of the curve is at $A(2, -4)$.

Write down the coordinates of the vertex of the curve with equation $y = f(x) - 5$.

.....

(1 mark)

Q3.

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The curve with equation $y = f(x)$ has one turning point.

The coordinates of this turning point are $(-6, -4)$

Write down the coordinates of the turning point on the curve with equation $y = f(x) + 5$

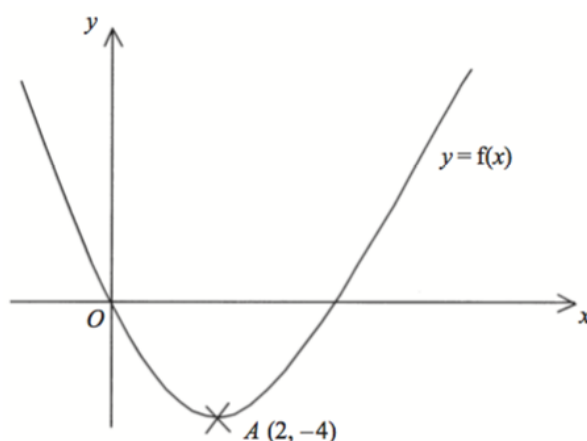
.....

(1 mark)

Q4.

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This is a sketch of the curve with equation $y = f(x)$.
It passes through the origin O .



The only vertex of the curve is at $A(2, -4)$.

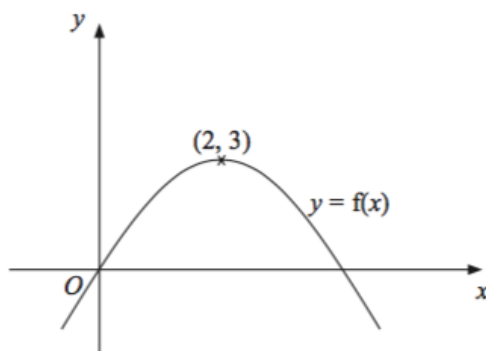
Write down the coordinates of the vertex of the curve with equation $y = f(x - 3)$.

.....

(1 mark)

Q5.

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The diagram shows part of the curve with equation $y = f(x)$.

The coordinates of the maximum point of this curve are $(2, 3)$.

Write down the coordinates of the maximum point of the curve with equation $y = f(x - 2)$

.....

(1 mark)

Q6.

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A curve has equation $y = f(x)$. There is only one maximum point on the curve.

The coordinates of this maximum point are $(4, 3)$

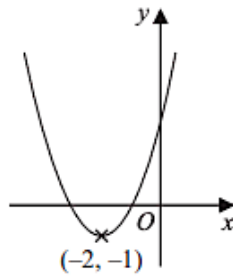
Write down the coordinates of the maximum point on the curve with equation $y = f(x - 5)$

.....

(1 mark)

Q7.

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The diagram shows the curve with equation $y = f(x)$

The coordinates of the minimum point of the curve are $(-2, -1)$

Write down the coordinates of the minimum point of the curve with equation $y = \frac{1}{2}f(x)$

.....

(1 mark)

Q8.

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A curve has equation $y = f(x)$

The coordinates of the minimum point on this curve are $(-9, 15)$

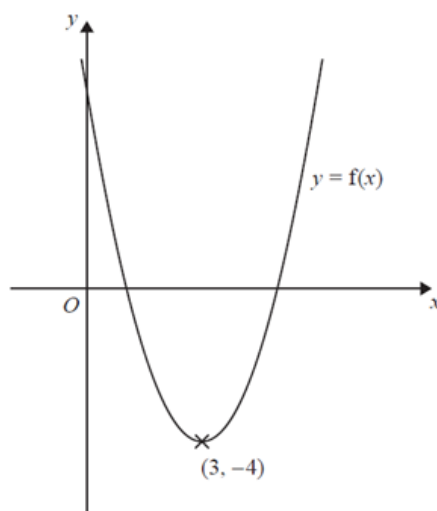
Write down the coordinates of the minimum point on the curve with equation $y = \frac{1}{3}f(x)$

.....

(1 mark)

Q9.

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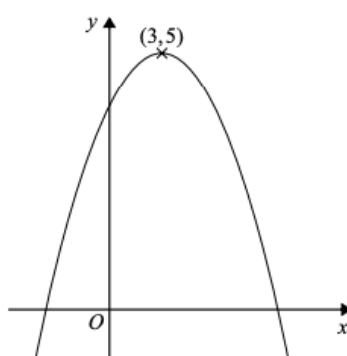
The diagram shows part of the curve with equation $y = f(x)$.
The coordinates of the minimum point of this curve are $(3, -4)$.

Write down the coordinates of the minimum point of the curve with equation $y = f(2x)$

.....
(1 mark)

Q10.

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The diagram shows part of the curve with equation $y = f(x)$
The coordinates of the maximum point of the curve are $(3, 5)$

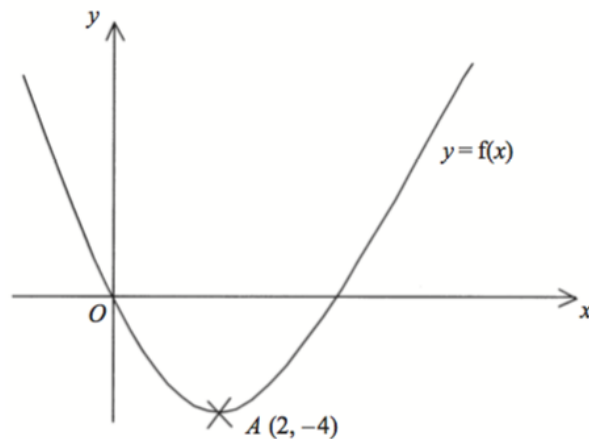
Write down the coordinates of the maximum point of the curve with equation $y = f(3x)$

.....
(1 mark)

Q11.

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This is a sketch of the curve with equation $y = f(x)$.
It passes through the origin O .



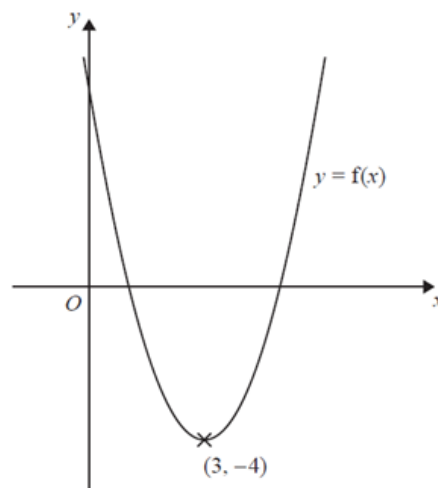
The only vertex of the curve is at $A(2, -4)$.

Write down the coordinates of the vertex of the curve with equation $y = -f(x)$.

.....

(1 mark)**Q12.**

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The diagram shows part of the curve with equation $y = f(x)$.
The coordinates of the minimum point of this curve are $(3, -4)$.

Write down the coordinates of the minimum point of the curve with equation $y = f(-x)$

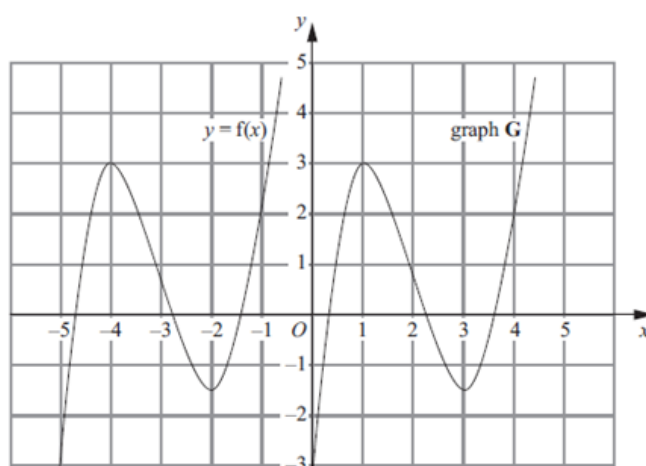
.....

(1 mark)

Q13.

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The graph of $y = f(x)$ is shown on the grid.



The graph of $y = f(x)$ has a maximum point at $(-4, 3)$.

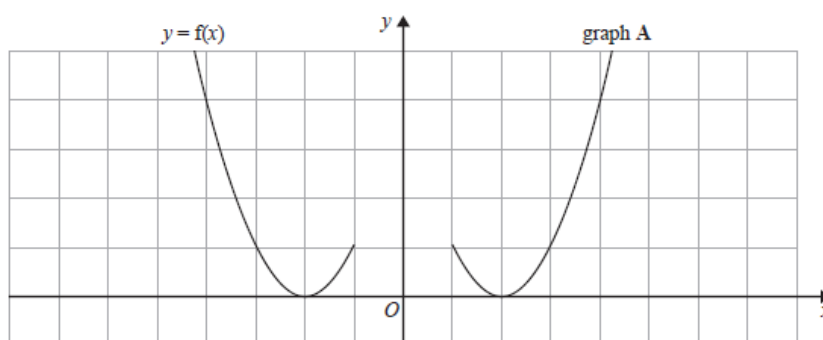
Write down the coordinates of the maximum point of the graph of $y = f(-x)$.

.....
(2 marks)

Q14.

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The graph of $y = f(x)$ is shown on the grid.



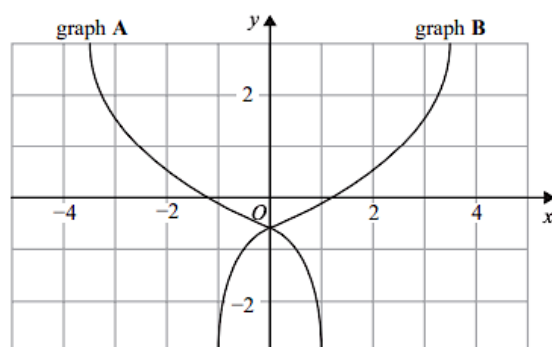
Graph A is a reflection of the graph of $y = f(x)$.

Write down the equation of graph A.

.....
(1 mark)

Q15.

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On the grid, graph A has been reflected to give graph B.

The equation of graph A is $y = g(x)$.

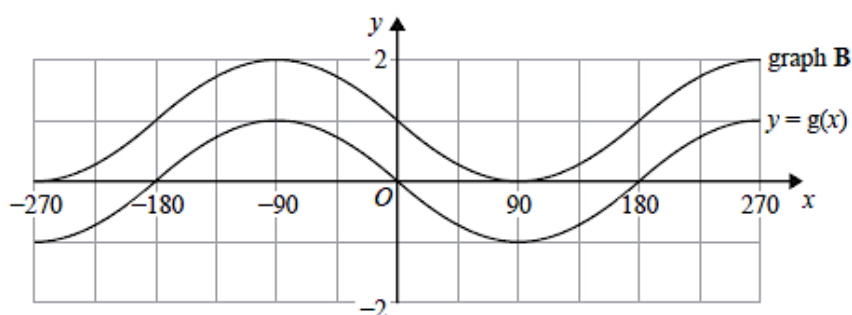
Write down the equation of graph B.

.....
(1 mark)

Q16.

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The graph of $y = g(x)$ is shown on the grid.



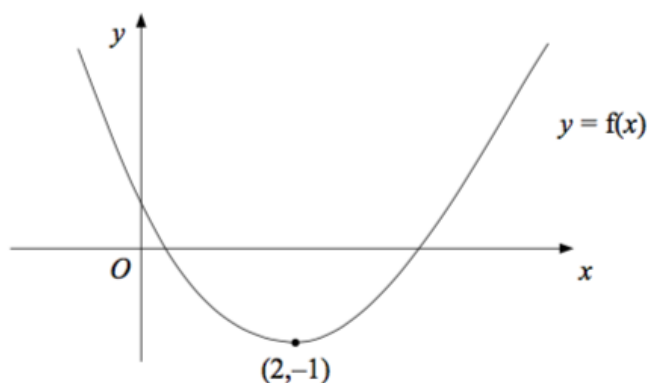
Graph B is a translation of the graph of $y = g(x)$.

(a) Write down the equation of graph B.

.....
(1 mark)

Q17.

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The diagram shows part of the curve with equation $y = f(x)$

The minimum point of the curve is at $(2, -1)$. The curve $y = f(x)$ is reflected in the y axis.

Find the equation of the curve following this transformation.

.....
(1 mark)

Q18.

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The curve with equation $y = f(x)$ is transformed to give the curve with equation $y = f(x) - 4$

Describe the transformation.

.....
(1 mark)

Q19.

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The equation of a curve **C** is $y = x^2 + 3x + 4$

The curve **C** is transformed to curve **S** under the translation $\begin{pmatrix} 4 \\ 6 \end{pmatrix}$

Find an equation of curve **S**.

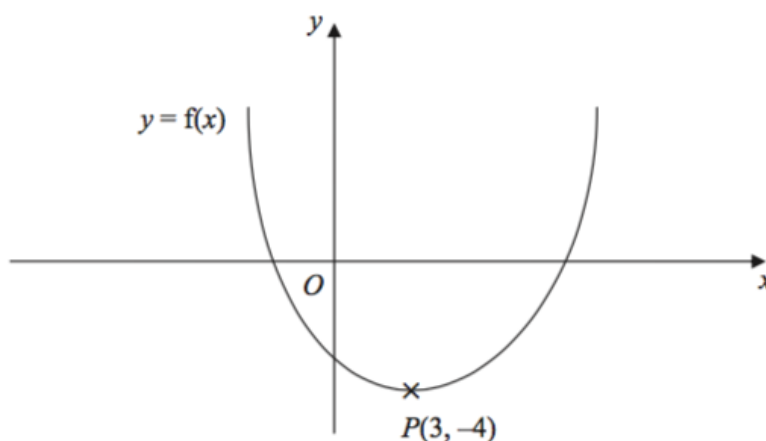
.....
(2 marks)

Q20.

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This is a sketch of the curve with the equation $y = f(x)$.

The only minimum point of the curve is at $P(3, -4)$.



Write down the coordinates of the minimum point of the curve with the equation $y = f(x + 5) + 6$

.....

(2 marks)

Q21.

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The graph of the curve C with equation $y = f(x)$ is transformed to give the graph of the curve S with equation $y = f(-x) - 3$

The point on C with coordinates $(7, 2)$ is mapped to the point Q on S .

Find the coordinates of Q .

.....

(2 marks)

Q22.

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The graph of $y = h(x)$ intersects the x -axis at two points.

The coordinates of the two points are $(-1,0)$ and $(6,0)$

The graph of $y = h(x + a)$ passes through the point with coordinates $(2,0)$, where a is a constant.

Find the two possible values of a

.....
(2 marks)

Q23.

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Give the vector for the translation that maps the curve with equation $y = x^2$ on to the curve with equation $y = x^2 - 6x + 10$.

.....
(2 marks)

QUESTIONS FROM MATHEMATICAL COMPETITIONS

Q1.

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The line with equation $y = 2x + 3$ is reflected in the x -axis.

What is the equation of the new line?

Q2.

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The graph of $y = \frac{1}{x}$ is reflected in the line $y = 1$. The resulting image is reflected in the line $y = -x$.

What is the equation of the final graph?

- A $y = \frac{-1}{(x+2)}$ B $y = \frac{1}{(x-1)}$ C $y = \frac{1}{(x-2)}$ D $y = \frac{-1}{(x-1)}$
E $y = \frac{-1}{(x-2)}$

The following sequence of transformations is applied to the curve $y = 4x^2$

1. Translation by $\begin{pmatrix} 3 \\ 3 \end{pmatrix}$
2. Reflection in the x -axis
3. Stretch parallel to the x -axis with scale factor 2

What is the equation of the resulting curve?