

COMPLETING THE SQUARE: GRAPHS

AtoZrevision



GRADE 8

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.**AtoZrevision.com**

Write down the coordinates of the turning point on the graph of $y = (x + 12)^2 - 7$.

.....
(1 mark)

Q2.**AtoZrevision.com**

Given that $x^2 - 6x + 1 = (x - 3)^2 - 8$ for all values of x , find the minimum point on the curve.

.....
(1 mark)

Q3.**AtoZrevision.com**

It can be shown that $x^2 + 10x + 29 \equiv (x + 5)^2 + 4$

Write down the coordinates of the turning point of the graph of $y = x^2 + 10x + 29$.

.....
(1 mark)

Q4.**AtoZrevision.com**

$$f(x) = x^2 - 9x + 14$$

Given that $f(x)$ can be written in the form $\left(x - \frac{9}{2}\right)^2 - \frac{25}{4}$ find

(a) the minimum value of $f(x)$,

(b) the value of x for which this minimum occurs.

.....
(2 marks)

Q5.

AtoZrevision.com

Given that $x^2 + 10x + 35 = (x + 5)^2 + 10$, what is the value of x when $x^2 + 10x + 35$ has its least value?

.....
(1 mark)

Q6.

AtoZrevision.com

$x^2 + 8x + 15$ can be written as $(x + 4)^2 - 1$.

Hence state the coordinates of the vertex of the curve $y = x^2 + 8x + 15$.

.....
(1 mark)

Q7.

AtoZrevision.com

State the least value of $x^2 + 8x + 19$ and the value of x at which this occurs.

.....
(3 marks)

Q8.

AtoZrevision.com

Find the coordinates of the turning point of the graph of $y = x^2 + 6x + 17$.

.....
(3 marks)

Q9.

AtoZrevision.com

Use the method of completing the square to find the least value of $x^2 + 10x + 3$.

.....
(3 marks)

Q10.

AtoZrevision.com

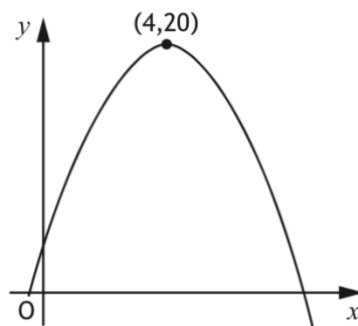
Write down the turning point of the graph of $y = x^2 - 6x + 20$

.....
(3 marks)

Q11.

AtoZrevision.com

The graph shows a parabola.



The equation of the parabola is of the form $y = b - (x + a)^2$.

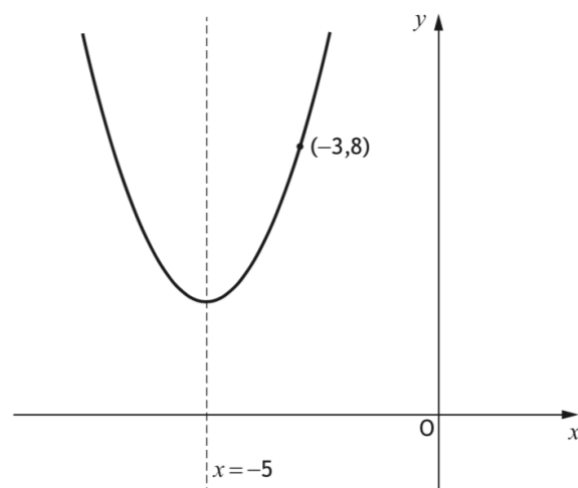
State the value of b .

.....
(1 mark)

Q12.

AtoZrevision.com

The graph below shows a parabola with equation of the form $y = (x + a)^2 + b$.



The equation of the axis of symmetry of the parabola is $x = -5$.

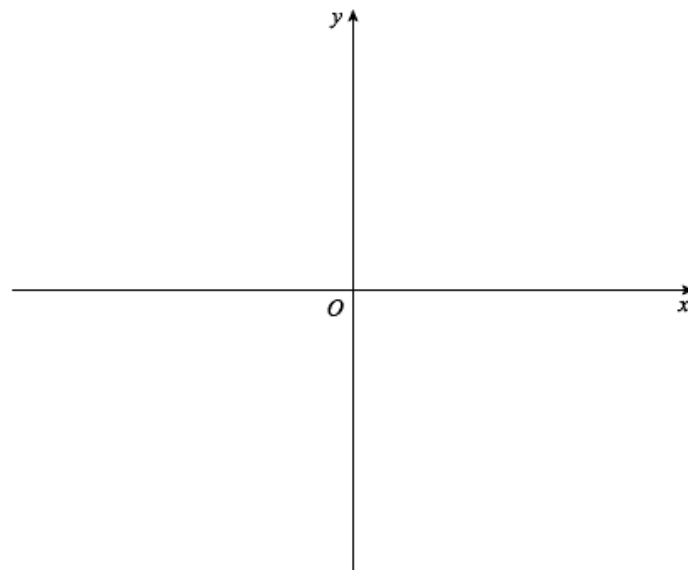
State the value of a .

.....
(1 mark)

Q13.

AtoZrevision.com

Sketch the graph of $y = (x - 2)^2 - 3$
Show the coordinates of any turning points.



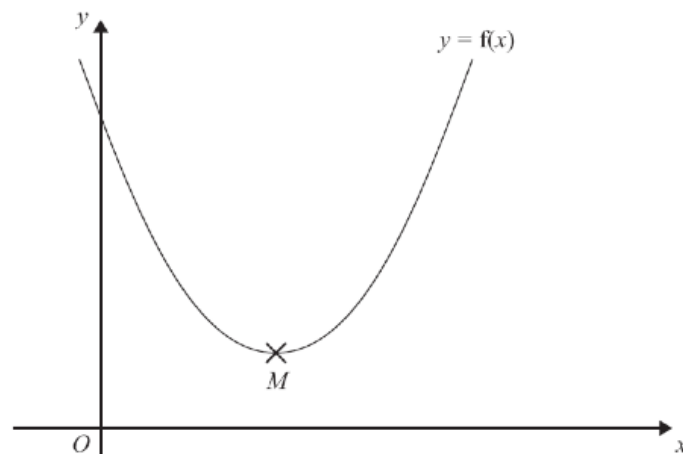
(3 marks)

Q14.

AtoZrevision.com

The equation of a curve is $y = f(x)$ where $f(x) = x^2 - 8x + 21$.

The diagram shows part of a sketch of the graph of $y = f(x)$.



The minimum point of the curve is M .

Write down the coordinates of M .

.....

(1 mark)

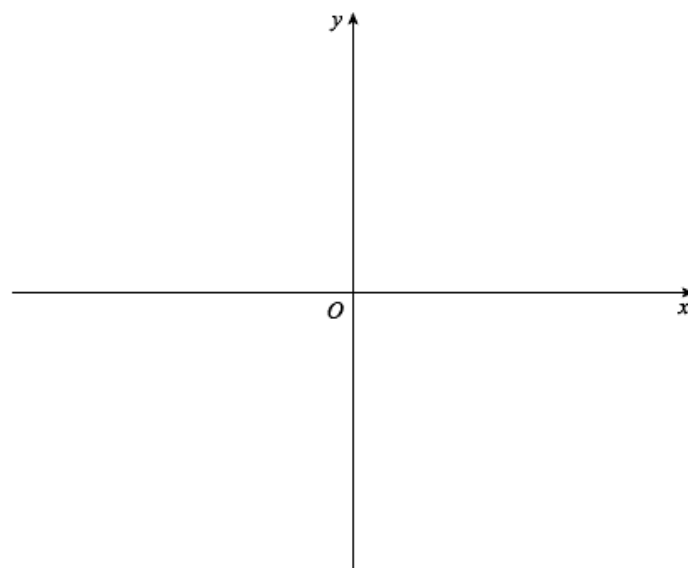
(a) Work out the equation of the line of symmetry of the graph of $y = x^2 + 7x - 18$

.....
(3)

(b) On the axes below, sketch the graph of $y = x^2 + 7x - 18$

State any points of intersection with the coordinate axes.

You do not need to work out the coordinates of any stationary points.

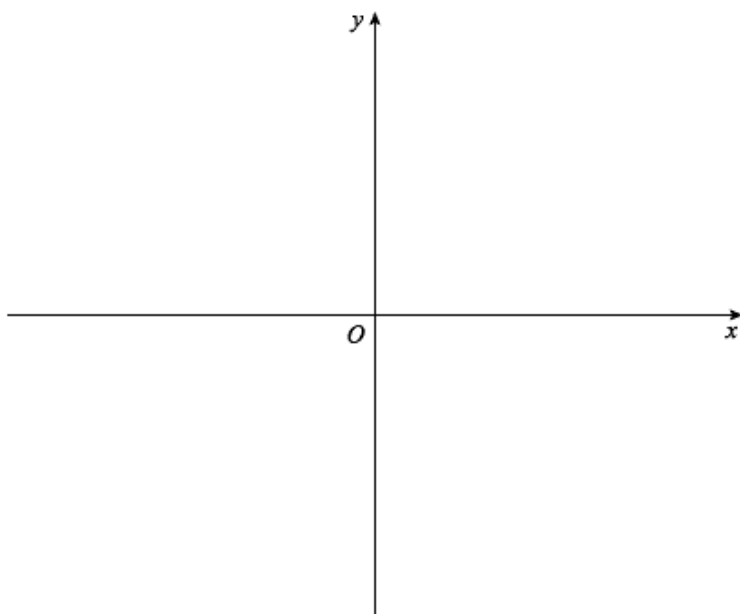


(3)

A parabola has equation

$$y = x^2 - 8x + 19$$

Sketch the graph of this function, showing clearly the turning point and the point of intersection with the y -axis.

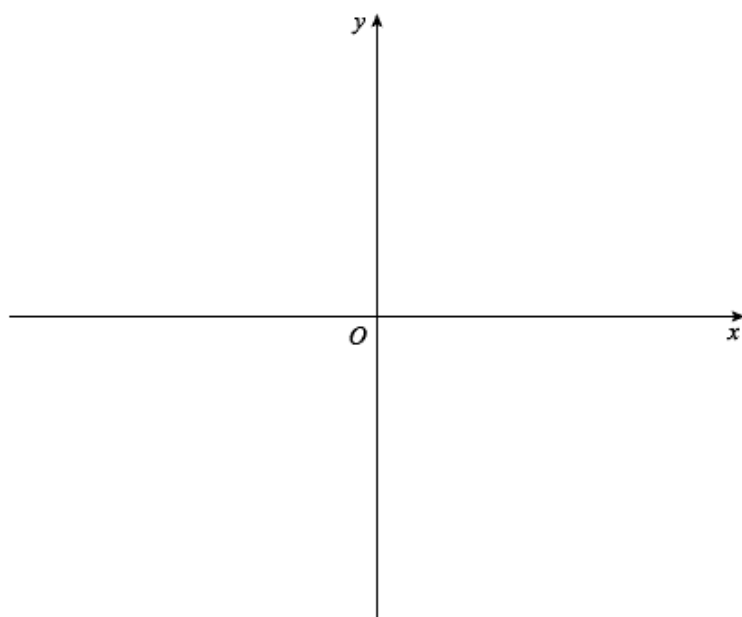


(3 marks)

Q18.

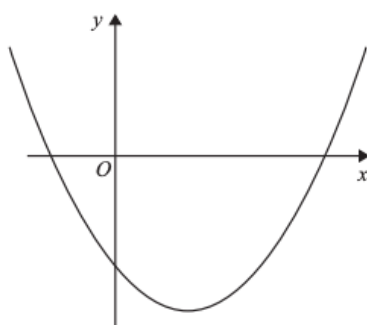
AtoZrevision.com

Sketch the graph of $y = x^2 - 6x + 11$.
Show clearly the coordinates of any turning points.



(3 marks)

Here is a sketch of a curve.



The equation of the curve is $y = x^2 + ax + b$ where a and b are integers.

The points $(0, -5)$ and $(5, 0)$ lie on the curve.

Find the coordinates of the turning point of the curve.

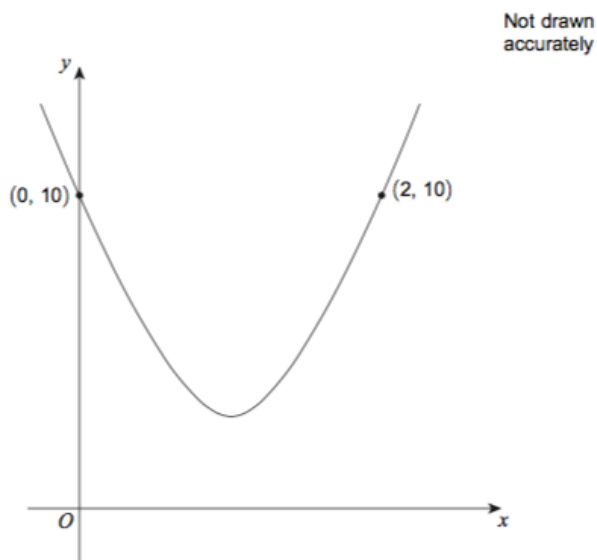
(4 marks)

Q20.

AtoZrevision.com

The sketch shows the quadratic curve $y = 4(x - a)^2 + b$

The curve passes through (0,10) and (2,10)



Work out the value of a .

.....
(2 marks)

Q21.

AtoZrevision.com

A curve has the equation $y = 2x^2 - 8x - 5$.

Find the coordinates of the turning point of the curve.

.....
(3 marks)

The line L is the line of symmetry of the curve with equation $y = 3x^2 - 12x + 7$

Write down an equation of L .

Q23.

AtoZrevision.com

Find the equation of the line of symmetry of the curve $y = 7 + 6x - x^2$.

.....
(4 marks)

Q24.

AtoZrevision.com

Find the equation of the line of symmetry of the curve $y = 9 + 18x - 3x^2$

.....
(4 marks)