1MA1 Higher themed papers: Complete the square

Write your name here

Surname | Other names

Centre Number | Candidate Number

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Mathematics

Complete the square

Paper Reference
1MA1

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – there may be more space than you need.
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is **32**. There are **9** questions.
- Questions have been arranged in an ascending order of mean difficulty, as found by all students in the June 2017–November 2019 examinations.
- The marks for **each** question are shown in brackets
  – use this as a guide as to how much time to spend on each question.

Advice

- 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.

1MA1 Higher themed papers: Complete the square

1 Given that $x^2 - 6x + 1 = (x - a)^2 - b$ for all values of x,

(i) find the value of a and the value of b.

$a =$ .....

$b =$ .....

(2)

(ii) Hence write down the coordinates of the turning point on the graph of $y = x^2 - 6x + 1$

(..... , ...)

(1)

(Total for Question 1 is 3 marks)

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2 Write $x^2 + 2x - 8$ in the form $(x + m)^2 + n$
where m and n are integers.

.....

(Total for Question 2 is 2 marks)

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3 Sketch the graph of

$$y = 2x^2 - 8x - 5$$

showing the coordinates of the turning point and the exact coordinates of any intercepts with the coordinate axes.

(Total for Question 3 is 5 marks)

4 By completing the square, find the coordinates of the turning point of the curve with equation $y = x^2 + 10x + 18$

You must show all your working.

(..... , ...)

(Total for Question 4 is 3 marks)

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5 $(x - 8)(x + 4) = (x - a)^2 + b$ for all values of x.

Find the value of a and the value of b.

$a =$ .....

$b =$ .....

(Total for Question 5 is 4 marks)

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6 (*a*) Write $2x^2 + 16x + 35$ in the form $a(x + b)^2 + c$ where a, b, and c are integers.

.....

(3)

(*b*) Hence, or otherwise, write down the coordinates of the turning point of the graph of $y = 2x^2 + 16x + 35$

.....

(1)

(Total for Question 6 is 4 marks)

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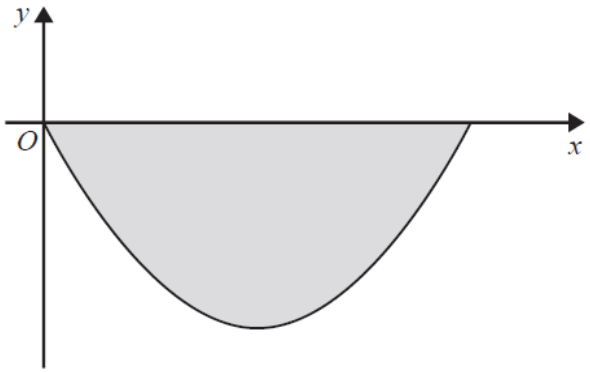
7 Here is a sketch of a vertical cross section through the centre of a bowl.



The cross section is the shaded region between the curve and the x-axis.

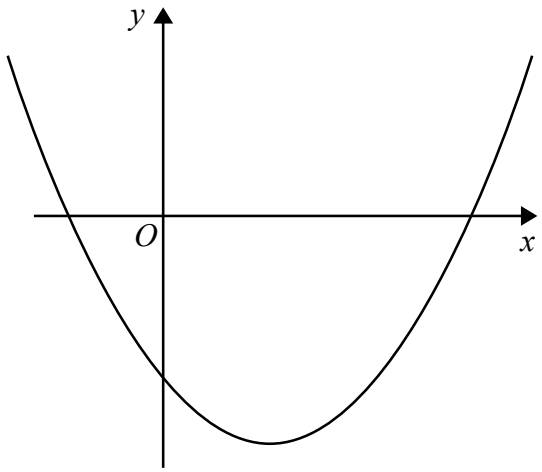
The curve has equation $y = \frac{x^2}{10} - 3x$ where x and y are both measured in centimetres.

Find the depth of the bowl.

..... cm

(Total for Question 7 is 4 marks)

8 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.

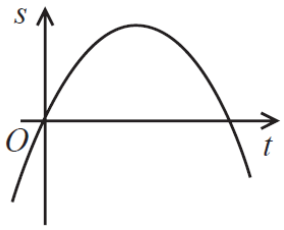
(..... , ...)

(Total for Question 8 is 4 marks)

9 A particle P is moving in a straight line.
O is a fixed point on the straight line.
The distance, s metres, of P from O at time t seconds is given by

$$s = 80t - 5t^2$$

Use algebra to find the greatest distance of P from O when $0 \leqslant t \leqslant 16$



.....metres

(Total for Question 9 is 4 marks)

TOTAL MARKS FOR PAPER: 32