

## 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)			
<b>Mathematics</b> <b>Complete the square</b>			
			Paper Reference <b>1MA1</b>
<b>You must have:</b> 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  $\pi$  button, take the value of  $\pi$  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  $b$ .

$a = \dots\dots\dots$

$b = \dots\dots\dots$   
**(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)**

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- 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)**

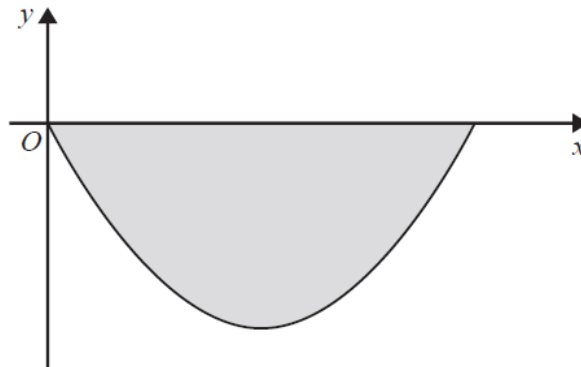
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7

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.

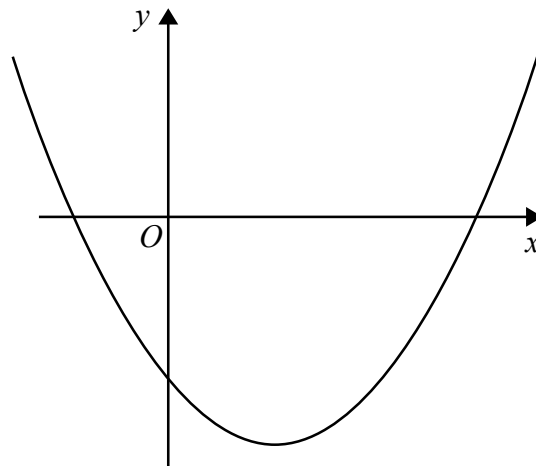
..... cm

**(Total for Question 7 is 4 marks)**

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**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)**

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**9**

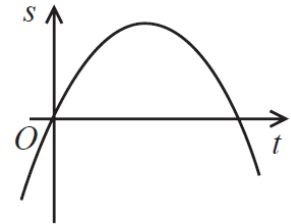
A particle  $P$  is moving in a straight line.

$O$  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  $0 \leq t \leq 16$



.....metres

**(Total for Question 9 is 4 marks)**

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**TOTAL MARKS FOR PAPER: 32**