Name:

Exam Style Questions

Completing the Square

Corbettmαths

Ensure you have: Pencil, pen, ruler, protractor, pair of compasses and eraser

You may use tracing paper if needed

Guidance

1. Read each question carefully before you begin answering it.
2. Don't spend too long on one question.
3. Attempt every question.
4. Check your answers seem right.
5. Always show your workings

Revision for this topic

www.corbettmaths.com/contents

Video 10

1. Write $x^2 + 8x + 6$ in the form $(x + a)^2 + b$, where a and b are constants.

$$(x+4)^2 - 16 + 6$$

$$(x+4)^2 - 10$$

....
(3)

2. Write $x^2 + 12x - 1$ in the form $(x + a)^2 + b$, where a and b are constants.

$$(x+6)^2 - 36 - 1$$

$$(x+6)^2 - 37$$

....
(3)

3. $x^2 - 6x - 3 \equiv (x - a)^2 - b$, where a and b are constants

(a) Find the values of a and b.

$$\left(x - 3\right)^2 - 9 - 3$$

$$\left(x - 3\right)^2 - 12$$

a = ...3... and b = ...12...

(3)

(b) Hence solve $x^2 - 6x - 3 = 0$

$$\left(x - 3\right)^2 - 12 = 0$$

$$\left(x - 3\right)^2 = 12$$

$$x - 3 = \pm\sqrt{12}$$

$$x = 3 \pm \sqrt{12}$$

$$x = 3 + \sqrt{12}$$
$$\text{or } x = 3 - \sqrt{12}$$

or $x = 3 \pm 2\sqrt{3}$

$$x = 3 + 2\sqrt{3}$$
$$\text{or } x = 3 - 2\sqrt{3}$$

x = ... or x = ...

(3)

4. Using completing the square, solve $x^2 - 6x + 2 = 0$

$$(x-3)^2 - 9 + 2 = 0$$

$$(x-3)^2 - 7 = 0$$

$$(x-3)^2 = 7$$

$$x - 3 = \pm\sqrt{7}$$

$$x = 3 \pm \sqrt{7}$$

$$x = 3 + \sqrt{7} \quad \text{or} \quad x = 3 - \sqrt{7}$$

x = ... or x = ...

(5)

5. Georgina rewrites the expression $x^2 + px + q$ by completing the square.
   He correctly obtains $(x - 5)^2 + 31$

   Work out the values of p and q.

   $$(x-5)^2 + 31$$
   $$(x-5)(x-5) + 31$$
   $$x^2 - 10x + 25 + 31$$
   $$x^2 - 10x + 56$$

   p = ...-10... and q = ...56...

   (3)

6. Write $x^2 - 3x + 7$ in the form $(x + a)^2 + b$

   $$\left(x - \frac{3}{2}\right)^2 - \frac{9}{4} + 7$$
   $$\left(x - \frac{3}{2}\right)^2 - \frac{9}{4} + \frac{28}{4}$$
   $$\left(x - \frac{3}{2}\right)^2 + \frac{19}{4}$$

   ....
   (3)
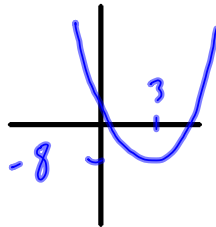
7. Express $3x^2 + 18x - 1$ in the form $a(x + b)^2 + c$

$$3\left(x^2 + 6x - \tfrac{1}{3}\right)$$

$$3\left[(x+3)^2 - 9 - \tfrac{1}{3}\right]$$

$$3\left[(x+3)^2 - \tfrac{27}{3} - \tfrac{1}{3}\right]$$

$$3\left[(x+3)^2 - \tfrac{28}{3}\right]$$

$$3(x+3)^2 - 28$$

....
(3)

8. Use completing the square to find the minimum point of the curve $y = x^2 - 6x + 1$

$$y = (x-3)^2 - 9 + 1$$

$$y = (x-3)^2 - 8$$

$(3, -8)$
....
(4)

9.   Use completing the square to find the minimum point of the curve $y = x^2 + 4x + 7$

$$y = (x+2)^2 - 4 + 7$$

$$y = (x+2)^2 + 3$$

$$(-2, 3)$$

(4)