

Daily Practice _____ 18.4.2018

Q1. Multiply out and simplify $(x - 1)(2x + 3)$

$$2x^2 + 3x - 2x - 3$$

$$\underline{2x^2 + x - 3}$$

Q2. Factorise $4x^2 - y^2$

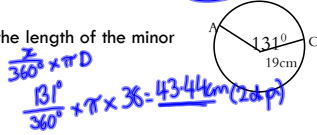
$$(2x + y)(2x - y)$$

Today we will be learning to complete the square.

Q3. Simplify fully $\frac{2x+3}{2x^2+x-3}$

$$= \frac{2x+3}{(2x+3)(x-1)} = \underline{\underline{\frac{1}{x-1}}}$$

Q4. Calculate the length of the minor arc AC



Squaring out brackets

Before we learn to complete the square, we first need to practise squaring out brackets.

Multiply out and simplify the following:

$$(x-1)(x-4) \quad (x+3)^2 \quad (2x+4)^2 \quad (5-x)^2$$

$$x^2 - x - 4x + 4 \quad x^2 + 6x + 9 \quad 4x^2 + 16x + 16 \quad 25 - 10x + x^2$$

$$x^2 - 5x + 4 \quad x^2 + 6x + 9 \quad 4x^2 + 16x + 16 \quad 25 - 10x + x^2$$

Completing the Square

Completing the square means writing a quadratic/trinomial expression in the form $(x + p)^2 + q$

Writing it in this form is useful for when we are working with parabolas or solving quadratic equations.

Completing the Square

Examples: Write these expressions in the form $(x + p)^2 + q$

1) $x^2 + 6x + 10$

$$(x+3)^2 + 1$$

half of the coefficient of the x-term

$$x^2 + 6x + 9$$

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

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

3) $x^2 - 14x + 10$

$$(x-7)^2 - 39$$

$$x^2 - 14x + 49$$

4) $x^2 - 18x + 3$

$$(x-9)^2 - 78$$

$$x^2 - 18x + 81$$

Daily Practice _____ 19.4.2018

Q1. Multiply out and simplify $(2x - 1)^2 = 4x^2 - 4x + 1$

Q2. Factorise $x^2 - 7x + 12 = (x-3)(x-4)$

Q3. Calculate the area of a quarter circle with radius 5cm

$$A = \frac{1}{4} \times \pi \times 5^2 = 19.63 \text{ cm}^2 \text{ (2dp)}$$

Q4. Calculate the capacity of a cylinder with diameter of base 20cm and height 48cm

$$V = 10^2 \times \pi \times 48$$

$$V = 15079.64 \text{ cm}^3 = 15.1 \text{ Litres (3sf)}$$

Today we will be continuing to learn how to complete the square.

Completing the Square

Write the following quadratics in the form $(x + a)^2 + b$

- | | |
|---------------------|-----------------------|
| (a) $x^2 + 4x + 3$ | (g) $x^2 - 12x - 15$ |
| (b) $x^2 + 8x - 13$ | (h) $x^2 + 22x - 4$ |
| (c) $x^2 + 6x + 5$ | (i) $x^2 + 3x - 5$ |
| (d) $x^2 - 4x + 5$ | (j) $x^2 - 11x + 12$ |
| (e) $x^2 - 8x + 9$ | (k) $m^2 - 100m + 14$ |
| (f) $x^2 - 2x - 5$ | (l) $k^2 - 20k + 3$ |
| | (m) $n^2 - 15n + 7.5$ |

Completing the Square

Write the following quadratics in the form $(x + a)^2 + b$

- | | |
|------------------------------------|--|
| (a) $x^2 + 4x + 3 = (x+2)^2 - 1$ | (g) $x^2 - 12x - 15 = (x-6)^2 - 51$ |
| (b) $x^2 + 8x - 13 = (x+4)^2 - 29$ | (h) $x^2 + 22x - 4 = (x+11)^2 - 125$ |
| (c) $x^2 + 6x + 5 = (x+3)^2 - 4$ | (i) $x^2 + 3x - 5 = (x + \frac{3}{2})^2 - \frac{29}{4}$ |
| (d) $x^2 - 4x + 5 = (x-2)^2 + 1$ | (j) $x^2 - 11x + 2 = (x - \frac{11}{2})^2 - \frac{121}{4} + 2$ |
| (e) $x^2 - 8x + 9 = (x-4)^2 - 7$ | |
| (f) $x^2 - 2x - 5 = (x-1)^2 - 6$ | |

Completing the Square

Completing the square when the coefficient of x^2 is -1

- * First factorise by taking out -1.
- * Then complete as normal.
- * Then multiply back in the -1.

Examples

(a) $-x^2 + 6x - 5$

$$-1[x^2 - 6x + 5]$$

$$-1[(x-3)^2 - 4]$$

$$= -(x-3)^2 + 4$$

$$\underline{\underline{4 - (x-3)^2}}$$

(b) $-x^2 - 8x + 2$

$$-1[x^2 + 8x - 2]$$

$$-1[(x+4)^2 - 18]$$

$$= -(x+4)^2 + 18$$

(c) $-x^2 - 18x - 9$

$$- [x^2 + 18x + 9]$$

$$- [(x+9)^2 - 72]$$

$$\underline{\underline{-(x+9)^2 + 72}}$$