



1 Factorise $x^2 - 49$

(1 mark)

$x^2 - 49$ is a difference of two squares, since $49 = 7^2$

$$x^2 - 49 = (x + 7)(x - 7)$$

Check by expanding

$(x + 7)(x - 7) = x^2 - 7x + 7x - 49$. The two middle terms cancel, leaving $x^2 - 49$

$$(x + 7)(x - 7)$$

2 a. Factorise $m^2 - 64$

b. Factorise $k^2 - 100$

(2 marks)

a) $64 = 8^2$

$$m^2 - 8^2 = (m - 8)(m + 8)$$

$$(m - 8)(m + 8)$$

b) $100 = 10^2$

$$(k - 10)(k + 10)$$

3 Factorise $4x^2 - 25$

(2 marks)

Both terms are squares

$$4x^2 - 25 = (2x)^2 - 5^2$$

$$(2x - 5)(2x + 5)$$

4 Use the difference of two squares to work out these without a calculator.

a. $99^2 - 1^2$

b. $73^2 - 27^2$

(3 marks)

a) $a^2 - b^2 = (a - b)(a + b)$

$$99^2 - 1^2 = (99 - 1)(99 + 1)$$

$$= 98 \times 100$$

$$\boxed{9800}$$

b)

$$73^2 - 27^2 = (73 - 27)(73 + 27)$$

$$= 46 \times 100$$

$$\boxed{4600}$$

5 Factorise fully $2x^2 - 50$

(3 marks)

Take out the common factor 2

$$2x^2 - 50 = 2(x^2 - 25)$$

Difference of two squares

$$\boxed{2(x - 5)(x + 5)}$$

6 Simplify fully $\frac{x^2 - 9}{2x + 6}$

(3 marks)

$$\frac{x^2 - 9}{2x + 6} = \frac{(x - 3)(x + 3)}{2(x + 3)}$$

Cancel $(x + 3)$

$$\boxed{\frac{x - 3}{2}}$$

7 Solve $4x^2 - 49 = 0$

(3 marks)

$$4x^2 - 49 = 0$$

$$(2x - 7)(2x + 7) = 0$$

One bracket must be zero

$$2x - 7 = 0 \text{ or } 2x + 7 = 0$$

$$\boxed{x = \frac{7}{2} \text{ or } x = -\frac{7}{2}}$$

- 8 Without working out the squares, show that

$$53^2 - 47^2 = 600$$

(3 marks)

Use the difference of two squares

$$a^2 - b^2 = (a + b)(a - b)$$

$$\begin{aligned} 53^2 - 47^2 &= (53 + 47)(53 - 47) \\ &= 100 \times 6 = 600 \end{aligned}$$

- 9 Simplify fully $\frac{x^2 - 16}{x^2 + x - 12}$

(4 marks)

Factorise the top (difference of two squares)

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

Factorise the bottom

$$x^2 + x - 12 = (x + 4)(x - 3)$$

Cancel $(x + 4)$

$$\boxed{\frac{x - 4}{x - 3}}$$

- 10 Show that $(2n + 1)^2 - (2n - 1)^2$ is a multiple of 8 for every integer n .

(3 marks)

$$a = 2n + 1, b = 2n - 1$$

$$a - b = 2$$

$$a + b = 4n$$

$$\begin{aligned} a^2 - b^2 &= 2 \times 4n \\ &= 8n \end{aligned}$$

$8n$ is a multiple of 8

- 11 a. Factorise $y^2 - 25$

- b. Hence, or otherwise, expand and simplify $(y + 5)(y - 5)(2y + 3)$

(5 marks)

$y^2 - 25$ is a difference of two squares: $(y + 5)(y - 5)$

$$\text{So } (y + 5)(y - 5)(2y + 3) = (y^2 - 25)(2y + 3)$$

$$2y^3 + 3y^2 - 50y - 75$$

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a. Expand and simplify $(y + 7)(y - 7)$ b. Factorise $x^2 + x - 30$

(4 marks)

$$a) (y + 7)(y - 7) = y^2 - 7y + 7y - 49 = y^2 - 49$$

b) Find two numbers that multiply to -30 and add to 1: they are 6 and -5

$$b) x^2 + x - 30 = (x + 6)(x - 5)$$