

Starter

Factorise the following...

a) $x^2 + 12x + 27$

b) $y^2 - 7x - 30$

c) $b^2 - 64$

Completing the Square

Today we are learning...

How to factorise expressions by completing the square.

I will know if I have been successful if...

I can identify the value needed inside the brackets.

I can identify the value needed outside the brackets.

I can check my answer by expanding the brackets.



Expanding Brackets

$$\begin{aligned} 1) (x + 4)^2 &= (x + 4)(x + 4) = x^2 + 4x + 4x + 16 \\ &= x^2 + 8x + 16 \end{aligned}$$

$$2) (y - 7)^2 =$$

$$3) (m + 5)^2 =$$

Example 1

1) Factorise the following expression...

$$x^2 + 6x + 21 = (\quad)(\quad)$$

Completed Square Form

This is what completed square form should look like.

$$(x + a)^2 + b$$

Remember a and b are just numbers!

Example 1

1) Factorise the following expression...

$$x^2 + 6x + 21 =$$

Example 2 & 3

2) $x^2 + 8x - 10 =$

3) $b^2 - 6b + 14 =$

Practice

1) (a) $x^2 + 4x + 3$

(b) $x^2 + 8x - 13$

(c) $x^2 + 6x + 5$

(d) $x^2 - 4x + 5$

(e) $x^2 - 8x + 9$

(f) $x^2 - 2x - 5$

2) Challenge...

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

(b) $x^2 - 7x + 12$

(c) $x^2 - 3x - 5$

(d) $2x^2 - 16x + 24$

(e) $3x^2 + 6x - 15$

(f) $2x^2 + 6x + 5$

Summary

$$x^2 + 10x + 13$$

$$b^2 - 12b + 40$$

$$p^2 - 8p - 2$$

Completing the Square (Continued)

Today we are learning...

How to factorise expressions by completing the square.

I will know if I have been successful if...

I can identify the value needed inside the brackets.

I can identify the value needed outside the brackets.

I can check my answer by expanding the brackets.



Completed Square Form

This is what completed square form should look like.

$$(x + a)^2 + b$$

Remember a and b are just numbers!

Example 1

1) Factorise and put into completed square form the expression...

$$\begin{aligned}x^2 + 10x + 16 &= (x + a)^2 + b \\&= (x + 5)^2 + b \\&= (x + 5)(x + 5) + b \\&= x^2 + 5x + 5x + 25 + b \\&= x^2 + 10x + 25 + b \\&= (x + 5)^2 - 9 \quad b = -9\end{aligned}$$

Example 2

2) Factorise and put into completed square form the expression....

$$\begin{aligned} b^2 - 8b - 13 &= \\ x^2 - 8x - 13 &= (x+a)^2 + b \\ &= (x-4)^2 + b \\ &= (x-4)(x-4) + b \\ &= x^2 - 4x - 4x + 16 + b \\ &= x^2 - 8x + \underbrace{16 + b}_{-13} \\ &= (x-4)^2 - 29 \quad b = -29 \end{aligned}$$

Completing the Square (Continued)

Today we are learning...

How to factorise expressions by completing the square.

I will know if I have been successful if...

I can identify the value needed inside the brackets.

I can identify the value needed outside the brackets.

I can check my answer by expanding the brackets.



Summary...

Types of Factorising

Two Brackets $(x + a)(x + b)$

Completing the Square $(x + a)^2 + b$

Difference of Two squares $(x - a)(x + a)$

Two Brackets

1) $x^2 + 10x + 24$

Completing the Square

2) $x^2 + 9x + 23$

Difference of Two Squares

3) $4x^2 - 64$

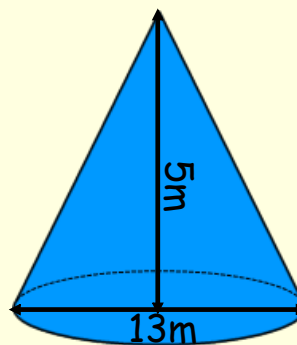
Starter

1) Factorise the following expressions:

a) $4x^2 - 64 =$

b) $x^2 + 13x + 40 =$

2) Find the volume of a cone with height 5m and diameter 13m.



Area of a Sector

Today we are learning...

How to find the area of a sector.

I will know if I have been successful if...

I can recall the formula for the area of a circle.

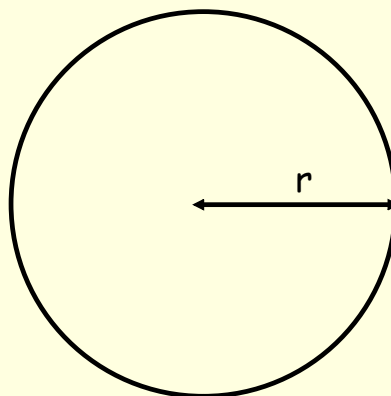
I know the formula for the area of a sector.

I can solve problems related to this.



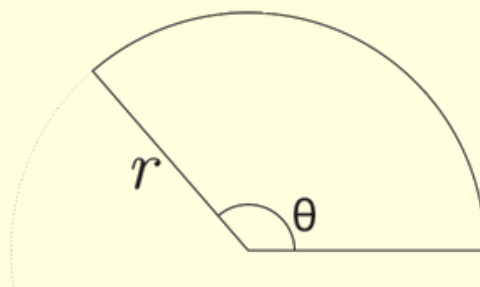
Area of a Circle

$$A = \pi r^2$$



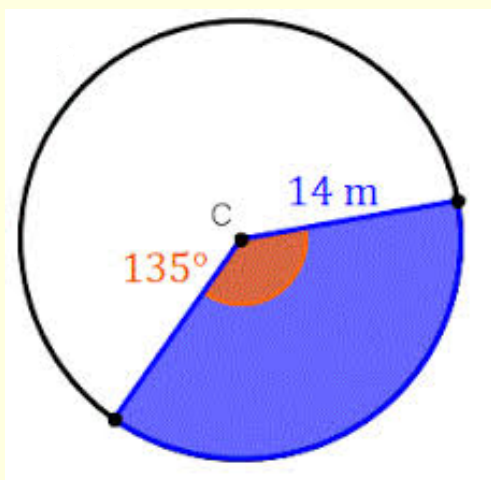
Area of a Sector

$$A = \pi r^2 \times \frac{\theta}{360}$$



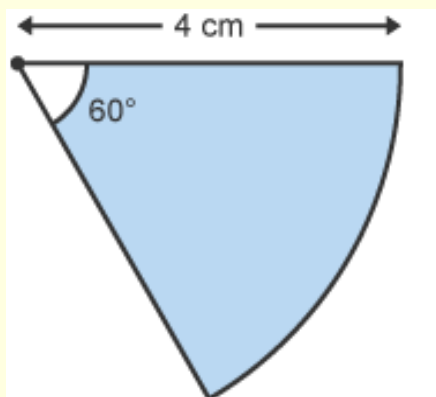
Example 1

Calculate the area of the minor sector.



Example 2

Calculate the area of the minor sector.



The Answers

Exercise 13·2 page 127

- 39·25 cm²
- a 26·17 cm² b 42·39 cm²
- a 274·75 cm² b 52·33 cm²
- a 43·96 cm² b 802·44 cm²
c 83·41 cm² d 54·51 cm²
e 128·22 cm² f 69·32 cm²
- 163·54 cm²

Exercise 13·3 page 128

- a (i) 55·8 cm (ii) 1116·44 cm²
b (i) 12·95 mm (ii) 35·62 mm²
- 1395·56 cm²
- 157 cm²
- 24·42 cm
- a 115·13 m b 105·54 m
- 22·9 m
- a 29·34 cm b 53·22 cm²
- a 113·04 cm² b 72 cm² c 41·04 cm²
- 182·18