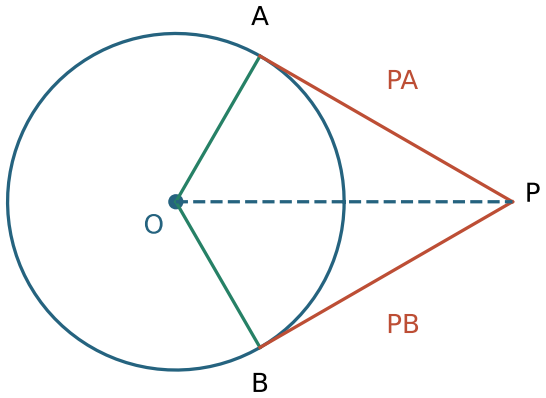
Exercise walk-through

4.2.2
Solid Views

AQA · GCSE · Mathematics

Figure: Congruence, similarity and circles (4)

Shared OP and equal radii → RHS → PA = PB



- Equal radii, shared OP and right angles give congruent triangles (RHS), so PA = PB
- Match each part of the diagram to the text.

Perimeter, area and volume

- Triangle: $\frac{1}{2} \times b \times h$, where h is the **perpendicular height** .
- Parallelogram: $b \times h$.
- Trapezium: $\frac{1}{2}(a+b)h$, where a and b are the parallel sides.
- Circle: $A = \pi r^2$, and the **circumference** is $C = 2\pi r = \pi d$.

$$\text{arc length} = \frac{\theta}{360} \times 2\pi r \qquad \text{sector area} = \frac{\theta}{360} \times \pi r^2$$

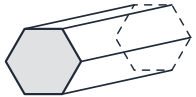
Pythagoras and trigonometry

- **Pythagoras' theorem.** In a right-angled triangle, $a^2 + b^2 = c^2$, where c is the **hypotenuse**, the longest side, opposite the right angle.
- A ladder whose foot is 3 m from a wall and whose top is 4 m up the wall is $\sqrt{9+16} = 5$ m long.
- **Trigonometric ratios.** Label the sides from the angle θ: opposite, **adjacent** (next to the angle) and **hypotenuse**.
- **Worked example 12.** In a right-angled triangle the hypotenuse is 23.7 cm and x is the side **adjacent** to an angle of $52°$.

$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \qquad \cos\theta = \frac{\text{adj}}{\text{hyp}} \qquad \tan\theta = \frac{\text{opp}}{\text{adj}}$$

Exercises 2.1·2.2

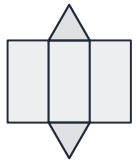
2.1 Write down the number of faces, edges and vertices of the hexagonal prism. [2]



2.2 Name the solid that each net makes. [2]



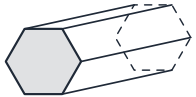
A



B

Exercises 2.1·2.2

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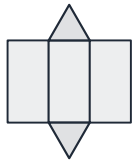
2.1

- **8** faces and **12** vertices
- **18** edges

2.2 Name the solid that each net makes. [2]



A



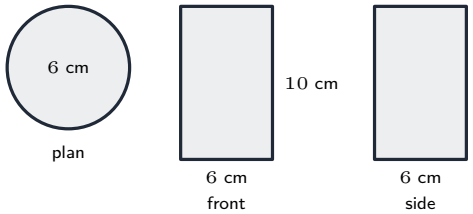
B

2.2

- A: **square-based pyramid**
- B: **triangular prism**

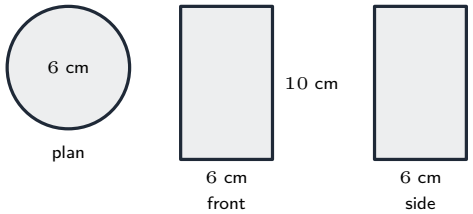
Exercise 3.1

3.1 The plan, front elevation and side elevation of a solid are shown. Name the solid. Work out its volume. [3]



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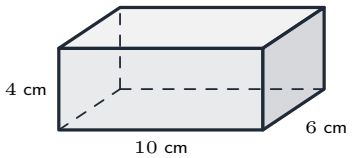
3.1

- **cylinder**
- $\pi \times 3^2 \times 10$
- **282.7** cm^3

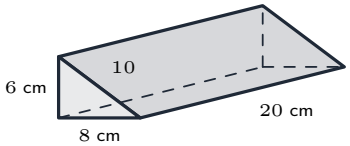
Exercise 3.2 (a)

3.2 A company makes gift boxes. Box A is a cuboid 10 cm by 6 cm by 4 cm. Box B is a triangular prism.

(a) Write down the number of faces, edges and vertices of box A. Show that they fit $F + V - E = 2$. [2]



box A

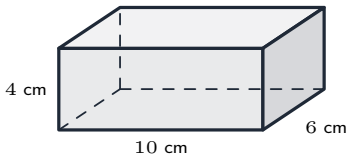


box B

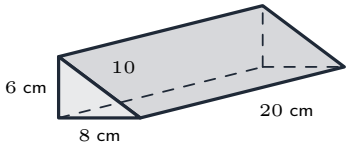
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(a) Write down the number of faces, edges and vertices of box A. Show that they fit $F + V - E = 2$. [2]



box A



box B

(a) 6 faces, 12 edges, 8 vertices; $6 + 8 - 12 = 2$

Exercise 3.2 (b)

3.2 A company makes gift boxes. Box A is a cuboid 10 cm by 6 cm by 4 cm. Box B is a triangular prism.

(b) Work out the area of the net of box A. [3]

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(b) Work out the area of the net of box A. [3]

(b) $2(10 \times 6 + 10 \times 4 + 6 \times 4) = 2 \times 124 = \mathbf{248}$ cm^2

Exercise 3.2 (c)

3.2 A company makes gift boxes. Box A is a cuboid 10 cm by 6 cm by 4 cm. Box B is a triangular prism.

(c) Nets are cut from a sheet of card 30 cm by 20 cm. Use areas to find the greatest number of nets of box A that could come from one sheet. What percentage of the card is left over? [4]

Exercise 3.2 (c)

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(c) card 600 cm^2; $600 \div 248 = 2.4$, so **2** nets; $\frac{600-496}{600} \times 100 = \mathbf{17.3}\%$

Exercise 3.2 (d)

3.2 A company makes gift boxes. Box A is a cuboid 10 cm by 6 cm by 4 cm. Box B is a triangular prism.

(d) Box B has a right-angled triangle cross-section with sides 6 cm, 8 cm and 10 cm. It is 20 cm long. Write down its number of faces and vertices. Work out its volume and its surface area. [5]

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(d) 5 faces, 6 vertices; $\frac{1}{2} \times 6 \times 8 \times 20 = \mathbf{480}$ cm^3; $2 \times 24 + (6 + 8 + 10) \times 20 = \mathbf{528}$ cm^2