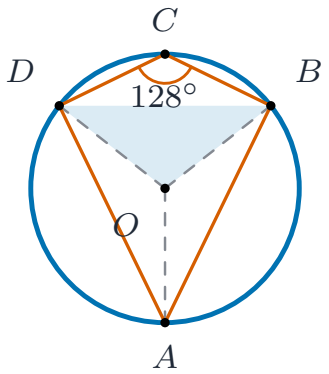
Exercise walk-through

4.2
Trig Basic

Pearson Edexcel · International GCSE · Mathematics A

Figure: Circle geometry with reasons (2)



cyclic quad: $\angle BAD = 52°$
centre $= 2\times$ rim: $\angle BOD = 104°$
$OB = OD$ (radii): isosceles
$\angle OBD = \frac{180-104}{2} = 38°$

every numerical step names its reason

- Worked example 2: a circle centre O with **cyclic quadrilateral** ABCD, angle BCD = 128°, and the chain BAD = 52°, BOD = 104°, OBD = 38°.
- Match each part of the diagram to the text.

Pythagoras and trigonometry in 2D

- $\tan 62° = \frac{h}{50}$, so $h = 50 \tan 62° = 94.0$ m (3 s.f.).
- The **sine rule** , $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$, works when you know a side and its opposite angle.
- The **cosine rule** , $a^2 = b^2 + c^2 - 2bc\cos A$, works when you know two sides and the angle between them, or all three sides.

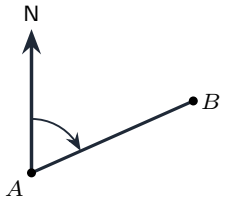
$$\sin\theta = \frac{\text{opp}}{\text{hyp}}, \quad \cos\theta = \frac{\text{adj}}{\text{hyp}}, \quad \tan\theta = \frac{\text{opp}}{\text{adj}}$$

Pythagoras and trigonometry in 2D (2)

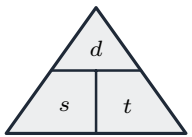
- The area of a triangle is $\frac{1}{2}ab\sin C$. It also works backwards: if the area is 15, $a = 6$ and $b = 10$, then $30\sin C = 15$, so $\sin C = 0.5$ and $C = 30°$ (or $150°$ if the angle is obtuse).
- $BC = a$ is opposite A, and $AC = b$ is opposite B. By the **sine rule**, $$\frac{b}{\sin 65°} = \frac{8}{\sin 40°}.$$
- $b = \dfrac{8\sin 65°}{\sin 40°} = 11.3$ cm (3 s.f.).

Exercises 2.1·2.2

2.1 A ship sails from P on a bearing of 040° to Q. Write down the bearing of P from Q. [2]

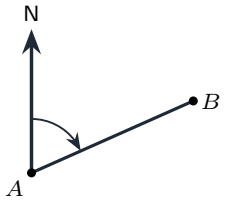


2.2 A car covers 234 km in 2 hours 36 minutes. Find its average speed in km/h. [3]



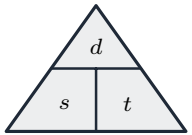
Exercises 2.1·2.2

2.1 A ship sails from P on a bearing of 040° to Q. Write down the bearing of P from Q. [2]



2.1 $040 + 180 = 220°$.

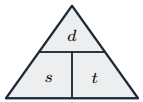
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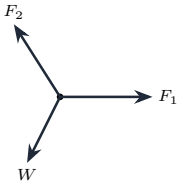
2.2 2 h 36 min $= 2.6$ h; $234 \div 2.6 = 90$ km/h.

Exercise 2.3

2.3 A metal block of mass 96 g has volume 12 cm^3. Find its density in g/cm^3. [2]



2.4 A force of 50 N acts on an area of 2.5 m^2. Find the pressure in N/m^2. [2]



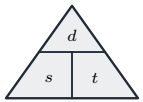
2.5 Write 7:40 p.m. in 24-hour clock time. [1]



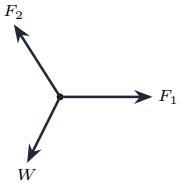
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2.3 $96 \div 12 = 8$ g/cm^3.

2.4 $50 \div 2.5 = 20$ N/m^2.

Full solution on next slide

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Full solution 2.3

2.3 $96 \div 12 = 8$ g/cm^3.

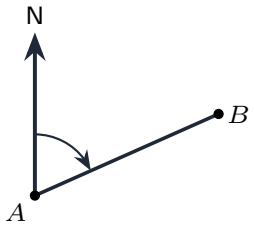
2.4 $50 \div 2.5 = 20$ N/m^2.

2.5 19:40.

Exercise 3.1

3.1 *(Original.)* A, B and C are ports. The bearing of B from A is 048°, and the bearing of C from B is 138°.

(a) Write down the bearing of A from B. (b) Hence show that angle $ABC = 90°$. [3]

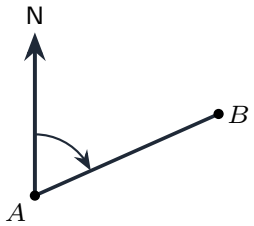


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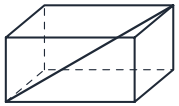


3.1 (a) Back-bearing: $048 + 180 = 228°$. (b) At B, the direction to A bears 228° and the direction to C bears 138°; the angle between them is $228 - 138 = 90°$. ✓

Exercise 3.2

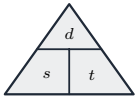
3.2 *(Original.)* A cuboid of gold is 4 cm by 2 cm by 1.5 cm and has mass 231 g.

(a) Find its volume. (b) Find its density in g/cm^3. (c) A second cube of the same gold has edge 3 cm; find its mass. [5]



3.3 *(Original.)* A train leaves at 19 42 and arrives at 01 18 the next day.

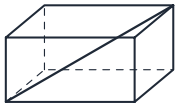
(a) Find the journey time in hours and minutes. (b) The distance is 420 km. Find the average speed in km/h. [4]



Exercise 3.2

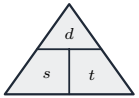
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3.2 (a) $4 \times 2 \times 1.5 = 12$ cm^3. (b) $231 \div 12 = 19.25$ g/cm^3. (c) Cube volume 27 cm^3; mass $= 27 \times 19.25 = 519.75$ g.

3.3 (a) From 19:42 to 01:18 is 5 h 36 min. (b) 5.6 h; $420 \div 5.6 = 75$ km/h.

Full solution on next slide

Full solution 3.2

3.2 (a) $4 \times 2 \times 1.5 = 12$ cm^3. (b) $231 \div 12 = 19.25$ g/cm^3. (c) Cube volume 27 cm^3; mass $= 27 \times 19.25 = 519.75$ g.

3.3 (a) From 19:42 to 01:18 is 5 h 36 min. (b) 5.6 h; $420 \div 5.6 = 75$ km/h.

Local review guidance: the compound-measure triangle written before substitution; correct units on every answer; bearing sketches with north lines. This is authored classroom guidance.