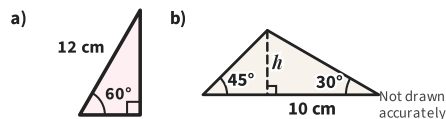


1 Exact trig values

- a) Without a calculator, find the exact perimeter of triangle a).
b) Find the exact height h in its simplest form.



$$a) 12 + 6 + 6\sqrt{3} = 18 + 6\sqrt{3} \text{ cm}$$

$$b) h + h\sqrt{3} = 10, \\ h = 10 \div (1 + \sqrt{3}) = 5(\sqrt{3} - 1) \text{ cm}$$

2 Exact trig values

Do not use a calculator.

- a) Show that $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ = \sin 30^\circ$.
b) A regular hexagon has sides of 4 cm. Find its exact area.

$$a) \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} - \frac{1}{2} \times \frac{1}{2} = \frac{3}{4} - \frac{1}{4} = \frac{1}{2} = \sin 30^\circ$$

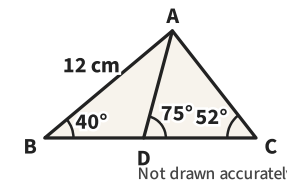
$$b) \text{ six equilateral triangles}$$

$$6 \times \frac{1}{2} \times 4 \times 4 \times \frac{\sqrt{3}}{2} = 24\sqrt{3} \text{ cm}^2$$

3 Sine rule: finding a side

D is on BC. Give each answer to 2 decimal places.

- a) Find the length AD.
b) Find the length AC.



$$a) \text{ angle } ADB = 105^\circ, \text{ angle } BAD = 35^\circ$$

$$AD = \frac{12 \sin 40^\circ}{\sin 105^\circ} = 7.99 \text{ cm}$$

$$b) AC = \frac{7.986 \sin 75^\circ}{\sin 52^\circ} = 9.79 \text{ cm}$$

4 Sine rule: finding an angle

Triangle PQR has PQ = 10 cm, QR = 7 cm and angle QPR = 38° .

- a) Find the two possible sizes of angle PRQ, to 1 decimal place.
b) Explain why QR = 12 cm would give only one triangle.

$$a) \sin R = 10 \sin 38^\circ \div 7 = 0.8795 \\ R = 61.6^\circ \text{ or } 180 - 61.6 = 118.4^\circ$$

$$b) 12 > 10, \text{ so } R < 38^\circ: R \text{ cannot be obtuse}$$

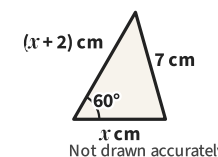
Pythagoras' theorem and trigonometry 2

revision mat answers

5 The cosine rule

Give each answer to 2 decimal places.

- a) Find x .
b) The hands of a clock are 6 cm and 9 cm long. How far apart are their tips at half past four?



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

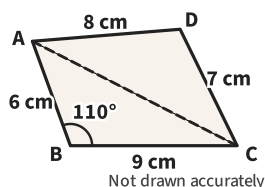
$$x^2 + 2x - 45 = 0, x = -1 + \sqrt{46} = 5.78$$

$$b) 45^\circ \text{ apart: } \sqrt{(117 - 108 \cos 45^\circ)} = 6.37 \text{ cm}$$

6 The cosine rule

Give each answer to 1 decimal place.

- a) Find the length of the diagonal AC.
b) Find the angle ADC.

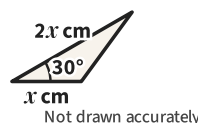


$$a) AC^2 = 6^2 + 9^2 - 108 \cos 110^\circ, AC = 12.41 \text{ cm}$$

$$b) \cos D = \frac{7^2 + 8^2 - 12.41^2}{2 \times 7 \times 8}, D = 111.4^\circ$$

7 Area of a triangle: $\frac{1}{2}ab \sin C$

- a) The area of this triangle is 18 cm^2 . Find x .
b) A triangle has sides of 8 cm and 7 cm and an area of 20 cm^2 . Find the two possible angles between those sides, to 1 decimal place.

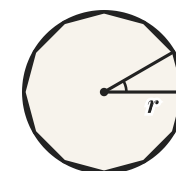


$$a) \frac{1}{2} \times x \times 2x \times \frac{1}{2} = 18, x^2 = 36, x = 6$$

$$b) \sin C = \frac{20}{28}, C = 45.6^\circ \text{ or } 134.4^\circ$$

8 Area of a triangle: $\frac{1}{2}ab \sin C$

- a) A regular 12 sided polygon fits exactly in a circle of radius r . Show that its area is $3r^2$.
b) An equilateral triangle has an area of 100 cm^2 . Find the length of its sides to 1 decimal place.



$$a) 12 \text{ triangles, angle } 360 \div 12 = 30^\circ \\ 12 \times \frac{1}{2} \times r \times r \times \sin 30^\circ = 3r^2$$

$$b) \frac{1}{2}s^2 \sin 60^\circ = 100, s = 15.2 \text{ cm}$$