# Pythagoras and Trigonometry - Practice paper 2

16 questions | 44 marks | 55 minutes

Apply right-triangle geometry to diagrams, lengths, angles and contextual decisions.

Equivalent correct methods earn the corresponding marks.

**1.** Triangle $PQR$ is right-angled at $R$. Which side is the hypotenuse? [1 mark]

$PQ$ is opposite right angle $R$.

**Answer:** $PQ$

**2.** Find the hypotenuse with legs 9 cm and 40 cm. [2 marks]

$c = \sqrt{81 + 1600} = 41$ cm.

**Answer:** 41 cm

**3.** Hypotenuse $= 25$ m and one leg $= 7$ m. Find the other leg. [2 marks]

$x = \sqrt{625 - 49} = 24$ m.

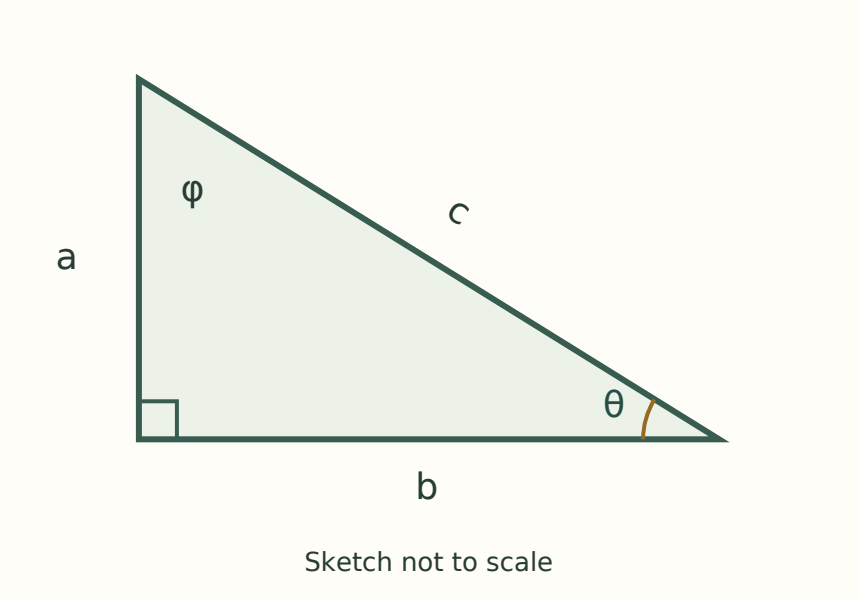
**Answer:** 24 m

**4.** Find the hypotenuse with legs 12 m and 13 m, exactly and to two decimal places. [3 marks]

$c = \sqrt{144 + 169} = \sqrt{313} \approx 17.69$ m.

**Answer:** $\sqrt{313}$ m; 17.69 m

**5.** Use upper angle $\phi$ instead of $\theta$. Name opposite and adjacent. [2 marks]




Sketch not to scale

$b$ lies across from $\phi$; $a$ touches $\phi$ and is not hypotenuse.

**Answer:** Opposite $b$; adjacent $a$

**6.** Enlarge a 5-12-13 triangle by 2.5. Find the three new side lengths and say whether the angles change. [3 marks]

Multiply every length by 2.5.

A uniform enlargement preserves angles.

**Answer:** 12.5, 30, 32.5; angles unchanged

**7.** You know adjacent and hypotenuse and need the acute angle. Which inverse function? [2 marks]

$\theta = \cos^{-1}\left(\frac{a}{h}\right)$.

**Answer:** Inverse cosine

**8.** Explain why $\sin\theta = 1.2$ cannot describe an acute angle in a right triangle. [2 marks]

For an acute angle $0 < \sin\theta < 1$.

**Answer:** Opposite cannot exceed hypotenuse.

**9.** Find adjacent when $h = 22$ m and $\theta = 41^\circ$. Give two decimal places. [3 marks]

$a = 22\cos 41^\circ$.

**Answer:** 16.60 m

**10.** Find adjacent when $o = 12$ cm and $\theta = 32^\circ$. Give two decimal places. [3 marks]

$\tan 32^\circ = \frac{12}{a}$.

$a = \frac{12}{\tan 32^\circ}$.

**Answer:** 19.20 cm

**11.** Find hypotenuse when $a = 7$ cm and $\theta = 54^\circ$. Give two decimal places. [3 marks]

$h = \frac{7}{\cos 54^\circ}$.

**Answer:** 11.91 cm

**12.** Find the acute angle opposite a 9 cm side when hypotenuse $= 15$ cm. Give two decimal places. [3 marks]

$\theta = \sin^{-1}(\frac{9}{15})$.

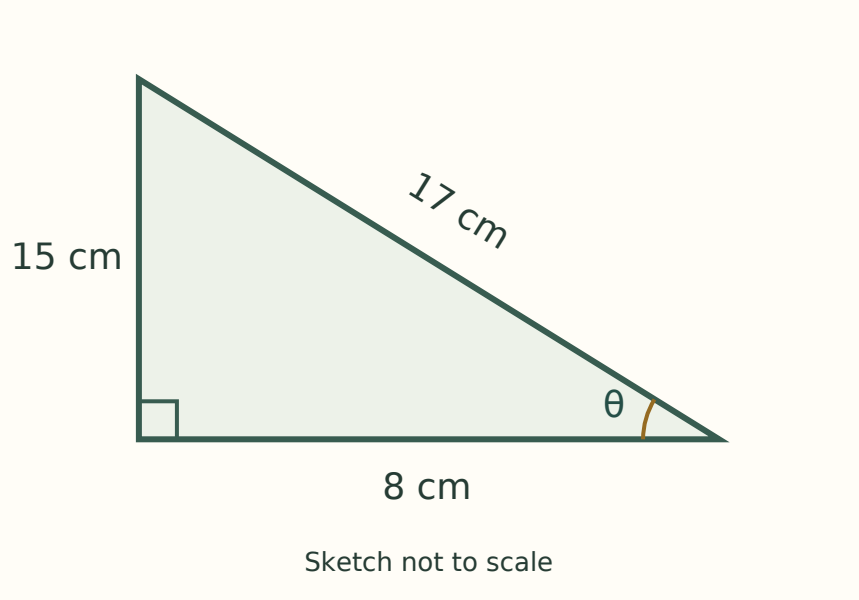
**Answer:** $36.87^\circ$

**13.** Find the angle with opposite 14 m and adjacent 20 m. Give two decimal places. [3 marks]

$\theta = \tan^{-1}(\frac{14}{20})$.

**Answer:** $34.99^\circ$

**14.** Find $\theta$ in the diagram to one decimal place. [3 marks]




Sketch not to scale

$\theta = \sin^{-1}\left(\frac{15}{17}\right) \approx 61.9275^\circ$.

**Answer:** $61.9^\circ$

**15.** A ramp rises 0.8 m over a horizontal run of 6 m. Answer each part. [5 marks]

**(a)** Find the sloping length to two decimal places. [2 marks]

$L = \sqrt{36.64}$.

**Answer:** 6.05 m

**(b)** Find the angle to horizontal to two decimal places. [3 marks]

$\theta = \tan^{-1}\left(\frac{0.8}{6}\right)$.

**Answer:** $7.59^\circ$

**16.** A student says doubling all sides doubles the acute angles. Use side ratios to explain why this is false. [4 marks]

For example, $\frac{o}{a} = \frac{3}{4}$ becomes $\frac{6}{8} = \frac{3}{4}$.

The same ratios give the same acute angles.

**Answer:** Angles stay unchanged.