Precision and practical applications

6 questions | 15 marks

Equivalent correct methods earn the corresponding marks.

1. A right triangle has hypotenuse 14.2 cm and leg 8.1 cm. Find its other leg to 0.1 cm. [3 marks]

$x = \sqrt{14.2^2 - 8.1^2}$.

Retain the square-root result until rounding.

Answer: 11.7 cm

2. A student uses $\tan 37^\circ \approx 0.75$ for a height with horizontal distance 20 m. Compare their height with $20\tan 37^\circ$, both to 0.1 m. [3 marks]

Rounded-ratio height $= 20(0.75) = 15.0$ m.

Full-ratio height $= 20\tan 37^\circ = 15.071\ldots$ m.

Answer: 15.0 m versus 15.1 m.

3. A calculation gives $\sin A = 1.08$ for a triangle. What should you conclude? [2 marks]

A sine value must lie between -1 and 1.

Check the supplied lengths and opposite-pair substitution.

Answer: The data, model or calculation is inconsistent; no real angle has that sine.

4. A map shows horizontal separation 80 m and a line of sight rises 25 m. Should 80 m be used as the hypotenuse? Explain. [2 marks]

The sloping line of sight is the hypotenuse.

Its length is $\sqrt{80^2 + 25^2}$ m.

Answer: No; it is the horizontal leg.

5. Sides 12 cm and 17 cm include 52°. State an appropriate method for the third side and write its formula. [3 marks]

$c = \sqrt{12^2 + 17^2 - 2(12)(17)\cos 52^\circ}$.

The known angle is included between the known sides.

Answer: Cosine rule.

6. A survey estimates a tower height assuming level ground. Why should the final report state that assumption? [2 marks]

The right-triangle model used a horizontal base.

A conclusion is valid only under the assumptions used to form it.

Answer: Sloping ground changes the vertical difference and can change the inferred height.