

## Right Triangles and Trigonometry: math test solutions, Grade 10 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

### 1 Pythagorean theorem

/ 4 pts

- (a)  $c^2 = 400 + 441 = 841$ , so  $c = 29$ . (2 pts)
- (b)  $a^2 = 289 - 225 = 64$ , so  $a = 8$ . (1 pt)
- (c)  $11^2 + 60^2 = 121 + 3600 = 3721 = 61^2$ : yes, it is a right triangle. (1 pt)

### 2 Special right triangles

/ 3 pts

- (a) Leg =  $\frac{20}{\sqrt{2}} = 10\sqrt{2} \approx 14.14$  in. (1 pt)
- (b) Short leg  $x = 9$  cm and hypotenuse  $2x = 18$  cm. (2 pts)

### 3 Geometric mean

/ 3 pts

$$h = \sqrt{5 \cdot 20} = 10. \text{ (1 pt)}$$

$$\text{Hypotenuse} = 5 + 20 = 25. \text{ (0.5 pt)}$$

$$\text{Legs: } \sqrt{5 \cdot 25} = 5\sqrt{5} \approx 11.18 \text{ (0.75 pt) and } \sqrt{20 \cdot 25} = 10\sqrt{5} \approx 22.36 \text{ (0.75 pt).}$$

### 4 Trigonometric ratios

/ 4 pts

$$(a) AB^2 = 576 + 100 = 676, \text{ so } AB = 26. \text{ (1 pt)}$$

$$(b) \sin A = \frac{10}{26} = \frac{5}{13}, \cos A = \frac{24}{26} = \frac{12}{13}, \tan A = \frac{10}{24} = \frac{5}{12}. \text{ (1 pt)}$$

$$(c) A = \tan^{-1}\left(\frac{5}{12}\right) \approx 22.6^\circ \text{ (1 pt) and } B = 90^\circ - 22.6^\circ = 67.4^\circ. \text{ (1 pt)}$$

### 5 The balloon

/ 3 pts

$$(a) 150 \tan 34^\circ \approx 101.2 \text{ ft above eye level, so the height is about } 101.2 + 6 = 107.2 \text{ ft. (2 pts)}$$

$$(b) 34^\circ, \text{ by alternate interior angles. (1 pt)}$$

### 6 Law of Sines and Law of Cosines

/ 3 pts

$$(a) q = \frac{9 \sin 84^\circ}{\sin 38^\circ} \approx 14.54. \text{ (2 pts)}$$

$$(b) c^2 = 36 + 100 - 2(6)(10) \cos 60^\circ = 136 - 60 = 76, \text{ so } c \approx 8.72. \text{ (1 pt)}$$



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