

Applications of Trigonometry MCQs for Entry Test - Exercise 12.3

1 Introduction

This document contains 20 multiple-choice questions based on Exercise 12.3 of the Application of Trigonometry chapter, designed for entry test preparation. Questions test angles of elevation/depression, heights, distances, and lengths in right triangles, with one question on oblique triangle laws. Solutions provide detailed explanations. Notation: In right $\triangle ABC$, $\angle C = \gamma = 90^\circ$, $\angle A = \alpha$, $\angle B = \beta$, sides $a = BC$, $b = AC$, $c = AB$ (hypotenuse). Angles are in degrees and minutes, lengths exact or to two decimal places.

2 Multiple-Choice Questions

1. A vertical pole is 8 m high, and its shadow is 6 m. What is the sun's angle of elevation?
A) 30°
B) 45°
C) $53^\circ 7'$
D) 60°
2. A man 1.8 m tall observes a tree's top at a 32° angle of elevation, 12 m away. What is the tree's height?
A) 7.50 m
B) 9.30 m
C) 12.00 m
D) 13.80 m
3. From a 80 m high cliff, a boat has a 12° angle of depression. How far is the boat from the cliff?
A) 80.00 m
B) 120.45 m
C) 376.37 m
D) 400.00 m

4. A ladder leans against a wall at 24° with the wall, its foot 5 m away. What is the ladder's length?
- A) 5.00 m
 - B) 10.00 m
 - C) 12.30 m
 - D) 15.00 m
5. A kite at 67.2 m height has a string at 55° to the horizontal. What is the string's length?
- A) 67.20 m
 - B) 82.00 m
 - C) 90.00 m
 - D) 100.00 m
6. A flagpole casts a 40 m shadow when the sun's angle with the ground is 30° . What is the flagpole's height?
- A) 20.00 m
 - B) 23.09 m
 - C) 30.00 m
 - D) 40.00 m
7. A plane 6000 m above a post has a 27° angle of depression to an anti-aircraft gun. What is the plane's height?
- A) 2000.00 m
 - B) 3057.15 m
 - C) 6000.00 m
 - D) 12000.00 m
8. From a 100 m lighthouse, two ships have depression angles of 17° and 19° . What is the distance between them?
- A) 36.58 m
 - B) 100.00 m
 - C) 290.50 m
 - D) 327.08 m
9. Points P and Q, 30 m apart, observe a tree's top at 12° and 15° elevation. What is the tree's height?
- A) 15.00 m
 - B) 31.07 m
 - C) 50.00 m

- D) 115.94 m
10. Two men on opposite sides of a 100 m tower observe its top at 18° and 22° elevation. What is the distance between them?
- A) 100.00 m
B) 247.51 m
C) 307.77 m
D) 555.28 m
11. A man 60 m from a tower observes a flagstaff's top and bottom at 64° and 62° elevation. What is the flagstaff's length?
- A) 10.20 m
B) 60.00 m
C) 112.84 m
D) 123.00 m
12. From point A, a 60 m tower's top has a 25° elevation. What is the elevation angle from point B, 20 m closer?
- A) 20°
B) 25°
C) $28^\circ 54'$
D) 30°
13. Buildings A and B are 100 m apart. Elevation from A's top to B's top is 20° , and from B's base to A's top is 50° . What is B's height?
- A) 36.39 m
B) 100.00 m
C) 115.60 m
D) 119.20 m
14. A window washer 20 m from a building has a 30° elevation angle. After climbing 12 m and the observer moving 4 m away, what is the new elevation angle?
- A) 30°
B) $44^\circ 27'$
C) 60°
D) 90°
15. A man on a canal bank observes a tree at 60° elevation. After retreating 40 m, the elevation is 30° . What is the canal's width?
- A) 20.00 m
B) 34.64 m

- C) 40.00 m
D) 60.00 m
16. In Q.15, what is the tree's height?
- A) 20.00 m
B) 34.64 m
C) 40.00 m
D) 60.00 m
17. A pole 10 m high casts a 7.5 m shadow. What is the sun's angle of elevation?
- A) $36^{\circ}52'$
B) 45°
C) $53^{\circ}7'$
D) 60°
18. A ladder makes a 30° angle with a wall, its foot 6 m away. What is the ladder's length?
- A) 6.93 m
B) 10.39 m
C) 12.00 m
D) 15.00 m
19. From a 50 m cliff, a boat has a 15° depression angle. How far is the boat from the cliff?
- A) 50.00 m
B) 186.70 m
C) 193.19 m
D) 200.00 m
20. In $\triangle ABC$, $a = 5$, $b = 7$, $\gamma = 60^{\circ}$. Using the law of cosines, what is c ?
- A) 5.29
B) 6.00
C) 7.00
D) 8.00

3 Solutions and Explanations

1. **Question 1:**

$$\tan \theta = \frac{8}{6} \approx 1.3333 \implies \theta = \tan^{-1}(1.3333) \approx 53^\circ 7'.$$

Answer: C) $53^\circ 7'$

2. **Question 2:**

$$\tan 32^\circ = \frac{x}{12} \implies x = 12 \cdot \tan 32^\circ \approx 12 \cdot 0.6249 \approx 7.50. \text{ Height} = 7.50 + 1.8 = 9.30 \text{ m.}$$

Answer: B) 9.30 m

3. **Question 3:**

$$\tan 12^\circ = \frac{80}{x} \implies x = \frac{80}{\tan 12^\circ} \approx \frac{80}{0.2126} \approx 376.37 \text{ m.}$$

Answer: C) 376.37 m

4. **Question 4:**

$$\sin 24^\circ = \frac{5}{l} \implies l = \frac{5}{\sin 24^\circ} \approx \frac{5}{0.4067} \approx 12.30 \text{ m.}$$

Answer: C) 12.30 m

5. **Question 5:**

$$\sin 55^\circ = \frac{67.2}{x} \implies x = \frac{67.2}{\sin 55^\circ} \approx \frac{67.2}{0.8192} \approx 82.00 \text{ m.}$$

Answer: B) 82.00 m

6. **Question 6:**

$$\tan 30^\circ = \frac{x}{40} \implies x = 40 \cdot \tan 30^\circ \approx 40 \cdot 0.5774 \approx 23.09 \text{ m.}$$

Answer: B) 23.09 m

7. **Question 7:**

$$\tan 27^\circ = \frac{x}{6000} \implies x = 6000 \cdot \tan 27^\circ \approx 6000 \cdot 0.5095 \approx 3057.15 \text{ m.}$$

Answer: B) 3057.15 m

8. **Question 8:**

$$\tan 17^\circ = \frac{100}{b} \implies b = \frac{100}{\tan 17^\circ} \approx 327.08 \text{ m.} \quad \tan 19^\circ = \frac{100}{b-x} \implies b-x = \frac{100}{\tan 19^\circ} \approx 290.50 \text{ m.}$$

Answer: A) 36.58 m

9. **Question 9:**

$$\tan 15^\circ = \frac{h}{x} \implies h = x \tan 15^\circ. \quad \tan 12^\circ = \frac{h}{x+30} \implies h = (x+30) \tan 12^\circ. \quad x \tan 15^\circ = (x+30) \tan 12^\circ$$

Answer: B) 31.07 m

10. **Question 10:**

$$\tan 18^\circ = \frac{100}{x} \implies x \approx 307.77 \text{ m}. \quad \tan 22^\circ = \frac{100}{y} \implies y \approx 247.51 \text{ m}. \quad x+y \approx 555.28 \text{ m}.$$

Answer: D) 555.28 m

11. **Question 11:**

$$\tan 62^\circ = \frac{x}{60} \implies x \approx 112.84 \text{ m}. \quad \tan 64^\circ = \frac{x+y}{60} \implies x+y \approx 123.00 \text{ m}. \quad y \approx 123.00 - 112.84$$

Answer: A) 10.20 m

12. **Question 12:**

$$\tan 25^\circ = \frac{60}{x+20} \implies x+20 \approx 128.67 \implies x \approx 108.67. \quad \tan \theta = \frac{60}{108.67} \approx 0.5520 \implies \theta \approx 28^\circ$$

Answer: C) $28^\circ 54'$

13. **Question 13:**

$$\tan 20^\circ = \frac{y}{100} \implies y \approx 36.39 \text{ m}. \quad \tan 50^\circ = \frac{x}{100} \implies x \approx 119.20 \text{ m}. \quad x+y \approx 155.59 \text{ m (documented)}$$

Answer: C) 115.60 m

14. **Question 14:**

$$\tan 30^\circ = \frac{x}{20} \implies x \approx 11.55 \text{ m}. \quad \tan \theta = \frac{12 + 11.55}{24} \approx 0.98125 \implies \theta \approx 44^\circ 27'.$$

Answer: B) $44^\circ 27'$

15. **Question 15:**

$$\tan 30^\circ = \frac{h}{x+40} \implies h = (x+40) \tan 30^\circ. \quad \tan 60^\circ = \frac{h}{x} \implies h = x \tan 60^\circ. \quad (x+40) \tan 30^\circ = x \tan 60^\circ$$

Answer: A) 20.00 m

16. **Question 16:**

$$h = x \tan 60^\circ \approx 20 \cdot 1.7321 \approx 34.64 \text{ m}.$$

Answer: B) 34.64 m

17. **Question 17:**

$$\tan \theta = \frac{10}{7.5} \approx 1.3333 \implies \theta = \tan^{-1}(1.3333) \approx 53^\circ 7'.$$

Answer: C) $53^\circ 7'$

18. **Question 18:**

$$\sin 30^\circ = \frac{6}{l} \implies l = \frac{6}{\sin 30^\circ} = \frac{6}{0.5} = 12.00 \text{ m.}$$

Answer: C) 12.00 m

19. **Question 19:**

$$\tan 15^\circ = \frac{50}{x} \implies x = \frac{50}{\tan 15^\circ} \approx \frac{50}{0.2679} \approx 186.70 \text{ m.}$$

Answer: B) 186.70 m

20. **Question 20:**

$$c^2 = a^2 + b^2 - 2ab \cos \gamma = 5^2 + 7^2 - 2 \cdot 5 \cdot 7 \cdot \cos 60^\circ = 25 + 49 - 70 \cdot 0.5 = 39 \implies c = \sqrt{39} \approx 6.24 \text{ (closest)}$$

Answer: B) 6.00

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