Right Triangles MCQs for Entry Test - Exercise 12.2

1 Introduction

This document contains 20 multiple-choice questions based on Exercise 12.2 of the Application of Trigonometry chapter, designed for entry test preparation. Each question tests skills in solving right triangles, including finding unknown angles (in degrees and minutes) and sides using trigonometric ratios, angle sum, and the Pythagorean theorem. Solutions with detailed explanations are provided. Notation: In $\triangle ABC$, $\angle C = \gamma = 90°$, $\angle A = \alpha$, $\angle B = \beta$, with sides $a = BC$, $b = AC$, $c = AB$ (hypotenuse). Sides are exact or rounded to two decimal places.

2 Multiple-Choice Questions

1. In $\triangle ABC$, $\gamma = 90°$, $\alpha = 45°$, $a = 4$. What is β?

   A) 30°

   B) 45°

   C) 60°

   D) 90°

2. In $\triangle ABC$, $\gamma = 90°$, $\alpha = 45°$, $a = 4$. What is c (hypotenuse)?

   A) 4

   B) $4\sqrt{2}$

   C) $2\sqrt{2}$

   D) 8

3. In $\triangle ABC$, $\gamma = 90°$, $\alpha = 60°$, $b = 12$. What is β?

   A) 30°

   B) 45°

   C) 60°

   D) 90°

4. In $\triangle ABC$, $\gamma = 90°$, $\alpha = 60°$, $b = 12$. What is a?

   A) 6

   B) $6\sqrt{3}$

C) 12

D) $12\sqrt{3}$

5. In $\triangle ABC$, $\gamma = 90°$, $a = 5$, $c = 10$. What is α?

    A) 30°

    B) 45°

    C) 60°

    D) 90°

6. In $\triangle ABC$, $\gamma = 90°$, $a = 5$, $c = 10$. What is b?

    A) 5

    B) $5\sqrt{3}$

    C) $5\sqrt{2}$

    D) 8.66

7. In $\triangle ABC$, $\gamma = 90°$, $\beta = 40°$, $b = 8$. What is α?

    A) 30°

    B) 45°

    C) 50°

    D) 60°

8. In $\triangle ABC$, $\gamma = 90°$, $\beta = 40°$, $b = 8$. What is a?

    A) 6.43

    B) 8.39

    C) 9.53

    D) 12.45

9. In $\triangle ABC$, $\gamma = 90°$, $\beta = 56°$, $c = 15$. What is a?

    A) 8.39

    B) 12.44

    C) 15.00

    D) 18.66

10. In $\triangle ABC$, $\gamma = 90°$, $\alpha = 45°$, $b = 8$. What is c?

    A) 8

    B) $8\sqrt{2}$

    C) $4\sqrt{2}$

    D) 16

11. In $\triangle ABC$, $\gamma = 90°$, $\alpha = 37°20'$, $a = 243$. What is β?

A) $45°40'$

B) $52°40'$

C) $60°20'$

D) $90°$

12. In $\triangle ABC$, $\gamma = 90°$, $\alpha = 37°20'$, $a = 243$. What is c?

   A) 243

   B) 318.04

   C) 400.00

   D) 500.00

13. In $\triangle ABC$, $\gamma = 90°$, $\alpha = 62°40'$, $b = 796$. What is β?

   A) $27°20'$

   B) $30°40'$

   C) $45°0'$

   D) $60°20'$

14. In $\triangle ABC$, $\gamma = 90°$, $\alpha = 62°40'$, $b = 796$. What is a?

   A) 796

   B) 1540.00

   C) 1733.55

   D) 2000.00

15. In $\triangle ABC$, $\gamma = 90°$, $a = 3.28$, $b = 5.74$. What is α?

   A) $29°44'$

   B) $45°0'$

   C) $60°16'$

   D) $90°$

16. In $\triangle ABC$, $\gamma = 90°$, $a = 3.28$, $b = 5.74$. What is c?

   A) 3.28

   B) 5.74

   C) 6.61

   D) 9.02

17. In $\triangle ABC$, $\gamma = 90°$, $b = 68.4$, $c = 96.2$. What is α?

   A) $30°0'$

   B) $44°40'$

   C) $45°20'$

D) $60°0'$

18. In $\triangle ABC$, $\gamma = 90°$, $b = 68.4$, $c = 96.2$. What is a?

   A) 67.60

   B) 68.40

   C) 96.20

   D) 164.60

19. In $\triangle ABC$, $\gamma = 90°$, $a = 5429$, $c = 6294$. What is β?

   A) $30°24'$

   B) $59°36'$

   C) $60°0'$

   D) $90°$

20. In $\triangle ABC$, $\gamma = 90°$, $\beta = 50°10'$, $c = 0.832$. What is a?

   A) 0.5329

   B) 0.6939

   C) 0.8320

   D) 1.0000

3 Solutions and Explanations

1. **Question 1:**
$$\alpha + \beta = 90° \implies 45° + \beta = 90° \implies \beta = 45°.$$

   Answer: B) $45°$

2. **Question 2:**
$$\sin 45° = \frac{a}{c} = \frac{4}{c} \implies \frac{\sqrt{2}}{2} = \frac{4}{c} \implies c = 4\sqrt{2}.$$
   Answer: B) $4\sqrt{2}$

3. **Question 3:**
$$\alpha + \beta = 90° \implies 60° + \beta = 90° \implies \beta = 30°.$$

   Answer: A) $30°$

4. **Question 4:**

$$\sin 60° = \frac{a}{b} = \frac{a}{12} \implies \frac{\sqrt{3}}{2} = \frac{a}{12} \implies a = 12 \cdot \frac{\sqrt{3}}{2} = 6\sqrt{3}.$$

   Answer: B) $6\sqrt{3}$

5. **Question 5:**

$$\sin\alpha = \frac{a}{c} = \frac{5}{10} = 0.5 \implies \alpha = \sin^{-1}(0.5) = 30°.$$

Answer: A) 30°

6. **Question 6:**

$$a^2 + b^2 = c^2 \implies 5^2 + b^2 = 10^2 \implies 25 + b^2 = 100 \implies b^2 = 75 \implies b = \sqrt{75} = 5\sqrt{3}.$$

Answer: B) $5\sqrt{3}$

7. **Question 7:**

$$\alpha + \beta = 90° \implies \alpha + 40° = 90° \implies \alpha = 50°.$$

Answer: C) 50°

8. **Question 8:**

$$\tan 40° = \frac{b}{a} = \frac{8}{a} \implies a = \frac{8}{\tan 40°} \approx \frac{8}{0.8391} \approx 9.53.$$

Answer: C) 9.53

9. **Question 9:**

$$\sin 56° = \frac{a}{c} = \frac{a}{15} \implies a = 15 \cdot \sin 56° \approx 15 \cdot 0.8290 \approx 12.44.$$

Answer: B) 12.44

10. **Question 10:**

$$\cos 45° = \frac{b}{c} = \frac{8}{c} \implies \frac{\sqrt{2}}{2} = \frac{8}{c} \implies c = 8 \cdot \frac{2}{\sqrt{2}} = 8\sqrt{2}.$$

Answer: B) $8\sqrt{2}$

11. **Question 11:**

$$\alpha + \beta = 90° \implies 37°20' + \beta = 90° \implies \beta = 52°40'.$$

Answer: B) 52°40′

12. **Question 12:**

$$\sin 37°20' = \frac{a}{c} = \frac{243}{c} \implies c = \frac{243}{\sin 37°20'} \approx \frac{243}{0.6075} \approx 400.00.$$

Answer: C) 400.00

13. **Question 13:**

$$\alpha + \beta = 90° \implies 62°40' + \beta = 90° \implies \beta = 27°20'.$$

Answer: A) 27°20′

14. **Question 14:**

$$\tan 62°40' = \frac{a}{b} = \frac{a}{796} \implies a = 796 \cdot \tan 62°40' \approx 796 \cdot 1.9336 \approx 1540.00.$$

Answer: B) 1540.00

15. **Question 15:**

$$\tan \alpha = \frac{a}{b} = \frac{3.28}{5.74} \approx 0.5714 \implies \alpha = \tan^{-1}(0.5714) \approx 29°44'.$$

Answer: A) 29°44'

16. **Question 16:**

$$\sin 29°44' = \frac{a}{c} = \frac{3.28}{c} \implies c = \frac{3.28}{\sin 29°44'} \approx \frac{3.28}{0.4962} \approx 6.61.$$

Answer: C) 6.61

17. **Question 17:**

$$\cos \alpha = \frac{b}{c} = \frac{68.4}{96.2} \approx 0.7102 \implies \alpha = \cos^{-1}(0.7102) \approx 44°40'.$$

Answer: B) 44°40'

18. **Question 18:**

$$\sin 44°40' = \frac{a}{c} = \frac{a}{96.2} \implies a = 96.2 \cdot \sin 44°40' \approx 96.2 \cdot 0.7027 \approx 67.60.$$

Answer: A) 67.60

19. **Question 19:**

$$\sin \alpha = \frac{a}{c} = \frac{5429}{6294} \approx 0.8624 \implies \alpha = \sin^{-1}(0.8624) \approx 59°36' \implies \beta = 90° - 59°36' = 30°24'.$$

Answer: A) 30°24'

20. **Question 20:**

$$\sin 39°50' = \frac{a}{c} = \frac{a}{0.832} \implies a = 0.832 \cdot \sin 39°50' \approx 0.832 \cdot 0.6405 \approx 0.5329.$$

Answer: A) 0.5329