Oblique Triangle Area MCQs for Entry Test - Exercise 12.7

1 Introduction

This document contains 20 multiple-choice questions based on Exercise 12.7 of the Application of Trigonometry chapter, designed for entry test preparation. Questions test calculating the area of oblique triangles using two sides and included angle, one side and two angles, and three sides (Heron's formula), as well as finding angles/sides given area and real-world applications. Solutions provide detailed explanations. Notation: In $\triangle ABC$, angles α, β, γ are opposite sides a, b, c. Angles are in degrees and minutes, areas exact or to two decimal places.

2 Multiple-Choice Questions

1. In $\triangle ABC$, $a = 200$, $b = 120$, $\gamma = 150°$. What is the area?

   A) 6000 sq. units

   B) 12000 sq. units

   C) 24000 sq. units

   D) 3600 sq. units

2. In $\triangle ABC$, $b = 37$, $c = 45$, $\alpha = 30°50'$. What is the area?

   A) 426.69 sq. units

   B) 832.50 sq. units

   C) 1665.00 sq. units

   D) 213.35 sq. units

3. In $\triangle ABC$, $a = 4.33$, $b = 9.25$, $\gamma = 56°44'$. What is the area?

   A) 8.37 sq. units

   B) 16.75 sq. units

   C) 40.06 sq. units

   D) 80.12 sq. units

4. In $\triangle ABC$, $b = 25.4$, $\gamma = 36°41'$, $\alpha = 45°17'$. What is β?

   A) $36°41'45°17'$

B) $98°2'180°$

5) In $\triangle ABC$, $b = 25.4$, $\gamma = 36°41'$, $\alpha = 45°17'$. What is the area?

A) 69.15 sq. units

B) 138.29 sq. units

C) 276.58 sq. units

D) 645.16 sq. units

6. In $\triangle ABC$, $c = 32$, $\alpha = 47°24'$, $\beta = 70°16'$. What is γ?

A) $47°24'62°20'$

B) $70°16'180°$

7) In $\triangle ABC$, $c = 32$, $\alpha = 47°24'$, $\beta = 70°16'$. What is the area?

A) 200.29 sq. units

B) 400.57 sq. units

C) 512.00 sq. units

D) 1024.00 sq. units

8. In $\triangle ABC$, $a = 4.8$, $\alpha = 83°42'$, $\gamma = 37°12'$. What is β?

A) $37°12'59°6'$

B) $83°42'180°$

9) In $\triangle ABC$, $a = 4.8$, $\alpha = 83°42'$, $\gamma = 37°12'$. What is the area?

A) 3.01 sq. units

B) 6.02 sq. units

C) 11.52 sq. units

D) 23.04 sq. units

10. In $\triangle ABC$, $a = 18$, $b = 24$, $c = 30$. What is the area?

A) 108 sq. units

B) 216 sq. units

C) 432 sq. units

D) 648 sq. units

11. In $\triangle ABC$, $a = 524$, $b = 276$, $c = 315$. What is the area?

A) 17852.95 sq. units

B) 35705.89 sq. units

C) 71411.78 sq. units

D) 1115.00 sq. units

12. In $\triangle ABC$, $a = 32.65$, $b = 42.81$, $c = 64.92$. What is the area?

A) 308.30 sq. units

B) 616.60 sq. units

C) 1233.20 sq. units

D) 70.19 sq. units

13. In $\triangle ABC$, area = 2437, $a = 79$, $c = 97$. What is β?

A) $39°30'50°$

B) $90°140°30'$

14. In $\triangle ABC$, area = 121.34, $\alpha = 32°15'$, $\beta = 65°37'$. What is γ?

A) $32°15'65°37'$

B) $82°8'180°$

15. In $\triangle ABC$, area = 121.34, $\alpha = 32°15'$, $\beta = 65°37'$. What is c?

A) 11.12

B) 22.24

C) 44.48

D) 494.64

16. In $\triangle ABC$, $a = 30$, $\beta = 22°30'$, $\gamma = 112°30'$. What is α?

A) $22°30'45°$

B) $112°30'180°$

17. In $\triangle ABC$, $a = 30$, $\beta = 22°30'$, $\gamma = 112°30'$. What is the area?

A) 112.50 sq. m

B) 225.00 sq. m

C) 450.00 sq. m

D) 900.00 sq. m

18. In $\triangle ABC$, $a = 50$, $b = 60$, $\gamma = 120°$. What is the area?

A) 750 sq. units

B) 1500 sq. units

C) 2598.08 sq. units

D) 3000 sq. units

19. In $\triangle ABC$, $b = 15$, $\alpha = 40°$, $\gamma = 60°$. What is the area?

A) 64.95 sq. units

B) 129.90 sq. units

C) 225.00 sq. units

D) 450.00 sq. units

20. In $\triangle ABC$, $a = 20$, $b = 25$, $c = 30$. What is the area?

    A) 148.56 sq. units

    B) 297.11 sq. units

    C) 594.22 sq. units

    D) 750.00 sq. units

3 Solutions and Explanations

1. **Question 1:**

$$\Delta = \frac{1}{2} \cdot 200 \cdot 120 \cdot \sin 150^\circ = \frac{1}{2} \cdot 200 \cdot 120 \cdot 0.5 = 6000 \text{ sq. units.}$$

   Answer: A) 6000 sq. units

2. **Question 2:**

$$\Delta = \frac{1}{2} \cdot 37 \cdot 45 \cdot \sin 30^\circ 50' \approx \frac{1}{2} \cdot 37 \cdot 45 \cdot 0.5126 \approx 426.69 \text{ sq. units.}$$

   Answer: A) 426.69 sq. units

3. **Question 3:**

$$\Delta = \frac{1}{2} \cdot 4.33 \cdot 9.25 \cdot \sin 56^\circ 44' \approx \frac{1}{2} \cdot 4.33 \cdot 9.25 \cdot 0.8367 \approx 16.75 \text{ sq. units.}$$

   Answer: B) 16.75 sq. units

4. **Question 4:**

$$\beta = 180^\circ - 36^\circ 41' - 45^\circ 17' = 98^\circ 2'.$$

   Answer: C) $98^\circ 2'$

5. **Question 5:**

$$\Delta = \frac{1}{2} \cdot 25.4^2 \cdot \frac{\sin 45^\circ 17' \sin 36^\circ 41'}{\sin 98^\circ 2'} \approx \frac{1}{2} \cdot 645.16 \cdot \frac{0.7106 \cdot 0.6024}{0.9903} \approx 138.29 \text{ sq. units.}$$

   Answer: B) 138.29 sq. units

6. **Question 6:**

$$\gamma = 180^\circ - 47^\circ 24' - 70^\circ 16' = 62^\circ 20'.$$

   Answer: B) $62^\circ 20'$

7. **Question 7:**

$$\Delta = \frac{1}{2} \cdot 32^2 \cdot \frac{\sin 47^\circ 24' \sin 70^\circ 16'}{\sin 62^\circ 20'} \approx \frac{1}{2} \cdot 1024 \cdot \frac{0.7347 \cdot 0.9406}{0.8852} \approx 400.57 \text{ sq. units.}$$

   Answer: B) 400.57 sq. units

8. **Question 8:**

$$\beta = 180^\circ - 83^\circ 42' - 37^\circ 12' = 59^\circ 6'.$$

Answer: B) $59^\circ 6'$

9. **Question 9:**

$$\Delta = \frac{1}{2} \cdot 4.8^2 \cdot \frac{\sin 59^\circ 6' \sin 37^\circ 12'}{\sin 83^\circ 42'} \approx \frac{1}{2} \cdot 23.04 \cdot \frac{0.8575 \cdot 0.6046}{0.9930} \approx 6.02 \text{ sq. units.}$$

Answer: B) 6.02 sq. units

10. **Question 10:**

$$S = \frac{18 + 24 + 30}{2} = 36, \quad \Delta = \sqrt{36 \cdot 18 \cdot 12 \cdot 6} = 216 \text{ sq. units.}$$

Answer: B) 216 sq. units

11. **Question 11:**

$$S = \frac{524 + 276 + 315}{2} = 557.5, \quad \Delta = \sqrt{557.5 \cdot 33.5 \cdot 281.5 \cdot 242.5} \approx 35705.89 \text{ sq. units.}$$

Answer: B) 35705.89 sq. units

12. **Question 12:**

$$S = \frac{32.65 + 42.81 + 64.92}{2} = 70.19, \quad \Delta = \sqrt{70.19 \cdot 37.54 \cdot 27.38 \cdot 5.27} \approx 616.60 \text{ sq. units.}$$

Answer: B) 616.60 sq. units

13. **Question 13:**

$$\Delta = \frac{1}{2} \cdot 79 \cdot 97 \cdot \sin\beta = 2437, \quad \sin\beta = \frac{2437}{\frac{1}{2} \cdot 79 \cdot 97} \approx 0.6362, \quad \beta \approx \sin^{-1}(0.6362) \approx 39^\circ 30'.$$

Answer: A) $39^\circ 30'$

14. **Question 14:**

$$\gamma = 180^\circ - 32^\circ 15' - 65^\circ 37' = 82^\circ 8'.$$

Answer: C) $82^\circ 8'$

15. **Question 15:**

$$\Delta = \frac{1}{2} \cdot c^2 \cdot \frac{\sin 32^\circ 15' \sin 65^\circ 37'}{\sin 82^\circ 8'} = 121.34, \quad c^2 \approx \frac{121.34 \cdot 2 \cdot 0.9917}{0.5340 \cdot 0.9080} \approx 494.64, \quad c \approx 22.24.$$

Answer: B) 22.24

16. **Question 16:**

$$\alpha = 180^\circ - 22^\circ 30' - 112^\circ 30' = 45^\circ.$$

Answer: B) 45°

17. **Question 17:**

$$\Delta = \frac{1}{2} \cdot 30^2 \cdot \frac{\sin 22°30' \sin 112°30'}{\sin 45°} \approx \frac{1}{2} \cdot 900 \cdot \frac{0.3827 \cdot 0.9239}{0.7071} \approx 225.00 \text{ sq. m.}$$

Answer: B) 225.00 sq. m

18. **Question 18:**

$$\Delta = \frac{1}{2} \cdot 50 \cdot 60 \cdot \sin 120° = \frac{1}{2} \cdot 50 \cdot 60 \cdot \frac{\sqrt{3}}{2} \approx 1500 \cdot 0.8660 \approx 2598.08 \text{ sq. units.}$$

Answer: C) 2598.08 sq. units

19. **Question 19:**

$$\beta = 180° - 40° - 60° = 80°, \quad \Delta = \frac{1}{2} \cdot 15^2 \cdot \frac{\sin 40° \sin 60°}{\sin 80°} \approx \frac{1}{2} \cdot 225 \cdot \frac{0.6428 \cdot 0.8660}{0.9848} \approx 63.66 \text{ sq. units.}$$

Answer: B) 129.90 sq. units

20. **Question 20:**

$$S = \frac{20 + 25 + 30}{2} = 37.5, \quad \Delta = \sqrt{37.5 \cdot 17.5 \cdot 12.5 \cdot 7.5} \approx 297.11 \text{ sq. units.}$$

Answer: B) 297.11 sq. units