# Oblique Triangles MCQs for Entry Test - Exercise 12.5

## 1 Introduction

This document contains 20 multiple-choice questions based on Exercise 12.5 of the Application of Trigonometry chapter, designed for entry test preparation. Questions test solving oblique triangles using the Law of Cosines, Law of Tangents, and Law of Sines, covering cases with two sides and an included angle, two sides and an opposite angle, side ratios, and resultant forces. Solutions provide detailed explanations. Notation: In $\triangle ABC$, angles $\alpha, \beta, \gamma$ are opposite sides $a, b, c$. Angles are in degrees and minutes, sides exact or to two decimal places.

## 2 Multiple-Choice Questions

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1. In $\triangle ABC$, $b = 59$, $c = 34$, $\alpha = 52°$. What is $a$?

   A) 34.00

   B) 59.00

   C) 78.76

   D) 95.00

2. In $\triangle ABC$, $b = 59$, $c = 34$, $\alpha = 52°$. What is $\beta$?

   A) $52°$

   B) $56°7'$

   C) $71°53'$

   D) $80°$

3. In $\triangle ABC$, $b = 59$, $c = 34$, $\alpha = 52°$. What is $\gamma$?

   A) $52°$

   B) $56°7'$

   C) $71°53'$

   D) $80°$

4. In $\triangle ABC$, $b = 12.5$, $c = 23$, $\alpha = 38°20'$. What is $a$?

   A) 12.50

   B) 15.30

C) 23.00

D) 30.00

5. In $\triangle ABC$, $b = 12.5$, $c = 23$, $\alpha = 38°20'$. What is $\beta$?

   A) $30°26'$

   B) $38°20'$

   C) $111°14'$

   D) $120°$

6. In $\triangle ABC$, $a = \sqrt{3} - 1$, $b = \sqrt{3} + 1$, $\gamma = 60°$. What is $c$?

   A) 0.73

   B) $\sqrt{3}$

   C) $\sqrt{6}$

   D) 2.73

7. In $\triangle ABC$, $a = \sqrt{3} - 1$, $b = \sqrt{3} + 1$, $\gamma = 60°$. What is $\alpha$?

   A) $15°$

   B) $60°$

   C) $105°$

   D) $120°$

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8. In $\triangle ABC$, $a = 3$, $c = 6$, $\beta = 36°20'$. What is $b$?

   A) 3.00

   B) 4.00

   C) 6.00

   D) 9.00

9. In $\triangle ABC$, $a = 3$, $c = 6$, $\beta = 36°20'$. What is $\gamma$?

   A) $26°23'$

   B) $36°20'$

   C) $117°17'$

   D) $147°$

10. In $\triangle ABC$, $a = 7$, $b = 3$, $\gamma = 38°13'$. What is $c$?

    A) 3.00

    B) 5.00

    C) 7.00

    D) 10.00

11. In $\triangle ABC$, $a = 7$, $b = 3$, $\gamma = 38°13'$. What is $\alpha$?

A) $21°47'$

B) $38°13'$

C) $120°$

D) $141°47'$

12. In $\triangle ABC$, $a = 36.21$, $b = 42.09$, $\gamma = 44°29'$. What is $\alpha$?

A) $44°29'$

B) $57°22'$

C) $78°10'$

D) $135°31'$

13. In $\triangle ABC$, $a = 36.21$, $b = 42.09$, $\gamma = 44°29'$. What is $c$?

A) 30.13

B) 36.21

C) 42.09

D) 50.00

14. In $\triangle ABC$, $a = 93$, $c = 101$, $\beta = 80°$. What is $\gamma$?

A) $47°11'$

B) $52°49'$

C) $80°$

D) $100°$

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15. In $\triangle ABC$, $a = 93$, $c = 101$, $\beta = 80°$. What is $b$?

A) 93.00

B) 101.00

C) 125.00

D) 150.00

16. In $\triangle ABC$, $b = 14.8$, $c = 16.1$, $\alpha = 42°45'$. What is $\gamma$?

A) $42°45'$

B) $62°29'$

C) $74°45'$

D) $137°15'$

17. In $\triangle ABC$, $b = 14.8$, $c = 16.1$, $\alpha = 42°45'$. What is $a$?

A) 11.33

B) 14.80

C) 16.10

D) 20.00

18. In $\triangle ABC$, $a = 319$, $b = 168$, $\gamma = 110°22'$. What is $\alpha$?

    A) $22°39'$

    B) $46°58'$

    C) $69°38'$

    D) $110°22'$

19. In $\triangle ABC$, $b = 61$, $c = 32$, $\alpha = 59°30'$. What is $\beta$?

    A) $31°38'$

    B) $59°30'$

    C) $88°51'$

    D) $120°30'$

20. Two forces of 40 N and 30 N are inclined at $147°25'$. What is the resultant force?

    A) 30.00 N

    B) 40.00 N

    C) 67.25 N

    D) 70.00 N

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# 3 Solutions and Explanations

1. **Question 1:**

   $a^2 = b^2+c^2-2bc\cos\alpha = 59^2+34^2-2\cdot59\cdot34\cdot\cos 52° \approx 3481+1156-2466.6 \approx 6204, \quad a \approx 78.76.$

   Answer: C) 78.76

2. **Question 2:**

   $$\cos\beta = \frac{a^2+c^2-b^2}{2ac} \approx \frac{78.76^2+34^2-59^2}{2\cdot 78.76\cdot 34} \approx 0.3146, \quad \beta \approx \cos^{-1}(0.3146) \approx 71°53'.$$

   Answer: C) $71°53'$

3. **Question 3:**

   $$\gamma = 180° - \alpha - \beta = 180° - 52° - 71°53' \approx 56°7'.$$

   Answer: B) $56°7'$

4. **Question 4:**

   $a^2 = 12.5^2+23^2-2\cdot12.5\cdot23\cdot\cos 38°20' \approx 156.25+529-451.04 \approx 234.21, \quad a \approx 15.30.$

   Answer: B) 15.30

5. **Question 5:**

$$\cos\beta = \frac{a^2+c^2-b^2}{2ac} \approx \frac{15.3^2+23^2-12.5^2}{2\cdot 15.3\cdot 23} \approx 0.8660, \quad \beta \approx \cos^{-1}(0.8660) \approx 30°26'.$$

Answer: A) $30°26'$

6. **Question 6:**

$$a = \sqrt{3}-1 \approx 0.7320, \quad b = \sqrt{3}+1 \approx 2.7320, \quad c^2 = 0.7320^2+2.7320^2-2\cdot 0.7320\cdot 2.7320\cdot\cos 60° \approx 6,$$

Answer: C) $\sqrt{6}$

7. **Question 7:**

$$\cos\alpha = \frac{b^2+c^2-a^2}{2bc} \approx \frac{2.7320^2+(\sqrt{6})^2-0.7320^2}{2\cdot 2.7320\cdot\sqrt{6}} \approx 0.9660, \quad \alpha \approx \cos^{-1}(0.9660) \approx 15°.$$

Answer: A) $15°$

8. **Question 8:**

$$b^2 = 3^2+6^2-2\cdot 3\cdot 6\cdot\cos 36°20' \approx 9+36-29 \approx 16, \quad b \approx 4.00.$$

Answer: B) 4.00

9. **Question 9:**

$$\gamma = 180° - 26°23' - 36°20' \approx 117°17'.$$

Answer: C) $117°17'$

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10. **Question 10:**

$$c^2 = 7^2+3^2-2\cdot 7\cdot 3\cdot\cos 38°13' \approx 49+9-33 \approx 25, \quad c \approx 5.00.$$

Answer: B) 5.00

11. **Question 11:**

$$\cos\alpha = \frac{3^2+5^2-7^2}{2\cdot 3\cdot 5} \approx \frac{9+25-49}{30} = -0.5, \quad \alpha \approx \cos^{-1}(-0.5) = 120°.$$

Answer: C) $120°$

12. **Question 12:**

$$\alpha+\beta = 180°-44°29' = 135°31', \quad \frac{42.09-36.21}{42.09+36.21} \approx \frac{0.0750}{2.4443}, \quad \beta-\alpha \approx 20°48', \quad 2\beta \approx 156°19', \quad \beta \approx$$

Answer: B) $57°22'$

13. **Question 13:**

$$c = \frac{42.09}{\sin 78°10'}\cdot\sin 44°29' \approx 42.09\cdot\frac{0.6950}{0.9785} \approx 30.13.$$

Answer: A) 30.13

14. **Question 14:**

$$\alpha+\gamma=100^\circ,\quad \frac{101-93}{101+93}\approx\frac{0.04124}{1.1918},\quad \gamma-\alpha\approx 5^\circ 37',\quad \gamma\approx 52^\circ 49'.$$

Answer: B) $52^\circ 49'$

15. **Question 15:**

$$b=\frac{93}{\sin 47^\circ 11'}\cdot\sin 80^\circ\approx 93\cdot\frac{0.9848}{0.7317}\approx 125.00.$$

Answer: C) 125.00

16. **Question 16:**

$$\beta+\gamma=137^\circ 15',\quad \frac{16.1-14.8}{16.1+14.8}\approx\frac{0.0420}{2.555},\quad \gamma-\beta\approx 12^\circ 16',\quad \gamma\approx 74^\circ 45'.$$

Answer: C) $74^\circ 45'$

17. **Question 17:**

$$a=\frac{14.8}{\sin 62^\circ 29'}\cdot\sin 42^\circ 45'\approx 14.8\cdot\frac{0.6763}{0.8860}\approx 11.33.$$

Answer: A) 11.33

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18. **Question 18:**

$$\alpha+\beta=69^\circ 38',\quad \frac{319-168}{319+168}\approx\frac{0.3101}{0.695},\quad \alpha-\beta\approx 24^\circ 20',\quad \alpha\approx 46^\circ 58'.$$

Answer: B) $46^\circ 58'$

19. **Question 19:**

$$\beta+\gamma=120^\circ 30',\quad \frac{61-32}{61+32}\approx\frac{0.3118}{1.7496},\quad \beta-\gamma\approx 57^\circ 14',\quad \beta\approx 88^\circ 51'.$$

Answer: C) $88^\circ 51'$

20. **Question 20:**

$$b^2=30^2+40^2-2\cdot 30\cdot 40\cdot\cos 147^\circ 25'\approx 900+1600+2022.26\approx 4522.26,\quad b\approx 67.25.$$

Answer: C) 67.25 N