Trigonometry MCQs for Entry Test - Exercise 9.2

Introduction

This document contains 20 multiple-choice questions based on Exercise 9.2 of the trigonometry chapter, designed for entry test preparation. Each question tests concepts such as signs of trigonometric functions, quadrant identification, finding trigonometric ratios, and evaluating expressions. Solutions with detailed explanations are provided at the end.

Multiple-Choice Questions

1. **What is the sign of** $\tan 205°$**?**

   A) Positive

   B) Negative

   C) Zero

   D) Undefined

2. **Evaluate** $\sin(-230°)$**.**

   A) $\sin 230°$

   B) $-\sin 230°$

   C) $\cos 230°$

   D) $-\cos 230°$

3. **In which quadrant does an angle lie if** $\sec\theta > 0$ **and** $\tan\theta < 0$**?**

   A) I

   B) II

   C) III

   D) IV

4. **If** $\sin\theta = \frac{3}{5}$ **in Quadrant I, what is** $\sec\theta$**?**

   A) $\frac{5}{3}$

   B) $\frac{5}{4}$

   C) $\frac{4}{5}$

   D) $\frac{3}{4}$

5. **If $\cos\theta = -\frac{5}{13}$ in Quadrant III, what is $\tan\theta$?**

   A) $\frac{12}{5}$
   B) $-\frac{12}{5}$
   C) $\frac{5}{12}$
   D) $-\frac{5}{12}$

6. **If $\tan\theta = -2$ in Quadrant II, what is $\csc\theta$?**

   A) $\sqrt{5}$
   B) $-\sqrt{5}$
   C) $\frac{\sqrt{5}}{2}$
   D) $-\frac{\sqrt{5}}{2}$

7. **If $\cot\theta = \frac{4}{3}$ in Quadrant III, what is $\cos\theta$?**

   A) $-\frac{3}{5}$
   B) $-\frac{4}{5}$
   C) $\frac{3}{5}$
   D) $\frac{4}{5}$

8. **If $\csc\theta = -2$ and θ is not in Quadrant III, what is $\sec\theta$?**

   A) $\frac{2\sqrt{3}}{3}$
   B) $-\frac{2\sqrt{3}}{3}$
   C) $\sqrt{3}$
   D) $-\sqrt{3}$

9. **What is the sign of $\csc 340°$?**

   A) Positive
   B) Negative
   C) Zero
   D) Undefined

10. **Evaluate $\cot(-150°)$.**

    A) $\cot 150°$
    B) $-\cot 150°$
    C) $\tan 150°$
    D) $-\tan 150°$

11. **In which quadrant does an angle lie if $\sin\theta > 0$ and $\cot\theta < 0$?**

    A) I
    B) II

C) III

D) IV

12. **If** $\sec\theta = \frac{13}{12}$ **in Quadrant I, what is** $\sin\theta$**?**

A) $\frac{5}{13}$

B) $\frac{12}{13}$

C) $\frac{5}{12}$

D) $\frac{12}{5}$

13. **If** $\sin\theta = -\frac{8}{17}$ **in Quadrant IV, what is** $\cot\theta$**?**

A) $\frac{15}{8}$

B) $-\frac{15}{8}$

C) $\frac{8}{15}$

D) $-\frac{8}{15}$

14. **If** $\cos\theta = \frac{1}{3}$ **in Quadrant IV, what is** $\csc\theta$**?**

A) $\frac{3}{2\sqrt{2}}$

B) $-\frac{3}{2\sqrt{2}}$

C) $\frac{2\sqrt{2}}{3}$

D) $-\frac{2\sqrt{2}}{3}$

15. **If** $\tan\theta = \frac{\sqrt{3}}{2}$ **and** θ **is not in Quadrant III, what is** $\frac{\csc^2\theta - \sec^2\theta}{\csc^2\theta + \sec^2\theta}$**?**

A) $\frac{1}{7}$

B) $\frac{5}{7}$

C) $\frac{7}{11}$

D) $\frac{11}{13}$

16. **If** $\cot\theta = 3$ **in Quadrant I, what is** $\frac{2\sin\theta + 3\cos\theta}{\cos\theta - \sin\theta}$**?**

A) $\frac{7}{2}$

B) $\frac{9}{2}$

C) $\frac{11}{2}$

D) $\frac{13}{2}$

17. **If** $\csc\theta = \frac{m^2+1}{2m}$ **and** $0 < \theta < \frac{\pi}{2}$**, what is** $\cos\theta$**?**

A) $\frac{m^2-1}{m^2+1}$

B) $\frac{2m}{m^2+1}$

C) $\frac{m^2+1}{2m}$

D) $\frac{1-m^2}{m^2+1}$

18. **If $\sec\theta = -\frac{2}{\sqrt{3}}$ in Quadrant III, what is $\sin\theta$?**

    A) $-\frac{1}{2}$

    B) $\frac{1}{2}$

    C) $-\frac{\frac{3}{2}}$

    - $\frac{\sqrt{3}}{2}$

19. **In which quadrant does an angle lie if $\cos\theta < 0$ and $\csc\theta < 0$?**

    A) I

    B) II

    C) III

    D) IV

20. **If $\sin\theta = \frac{1}{\sqrt{5}}$ in Quadrant I, what is $\frac{\sin^2\theta+\cos^2\theta}{\tan^2\theta+1}$?**

    $\frac{1}{2}$

    $\frac{3}{4}$

    $\frac{5}{6}$

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Solutions and Explanations

1. **Solution to Question 1:**

   - 205° is in Quadrant III (180° to 270°).
   - In QIII, tan is positive.

   Answer: A) Positive

2. **Solution to Question 2:**

   - $\sin(-\theta) = -\sin\theta$
   - So, $\sin(-230°) = -\sin 230°$.

   Answer: B) $-\sin 230°$

3. **Solution to Question 3:**

   - $\sec\theta > 0$ implies $\cos\theta > 0$ (QI or QIV).
   - $\tan\theta < 0$ in QII or QIV.
   - Intersection: QIV.

   Answer: D) IV

4. **Solution to Question 4:**

- $\sin\theta = \frac{3}{5}$ in QI.
- $\cos\theta = \sqrt{1-\sin^2\theta} = \sqrt{1-\frac{9}{25}} = \frac{4}{5}$ (positive in QI).
- $\sec\theta = \frac{1}{\cos\theta} = \frac{5}{4}$.

Answer: B) $\frac{5}{4}$

5. **Solution to Question 5:**

- $\cos\theta = -\frac{5}{13}$ in QIII.
- $\sin\theta = \pm\sqrt{1-\cos\theta^2\theta} = \sqrt{1-\frac{25}{169}} = \sqrt{\frac{144}{169}} = \frac{12}{13}$ (negative in QIII).
- $\sin\theta = -\frac{12}{13}$.
- $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{-\frac{12}{13}}{-\frac{5}{13}} = \frac{12}{5}$.

Answer: A) $\frac{12}{5}$

6. **Solution to Question 6:**

- $\tan\theta = -2$ in QII.
- $\sec^2\theta = 1+\tan^2\theta = 1+4 = 5 \Rightarrow \sec\theta = -\sqrt{5}$ (negative in QII).
- $\cos\theta = \frac{1}{\sec\theta} = -\frac{1}{\sqrt{5}}$.
- $\sin^2\theta = 1-\cos^2\theta = 1-\frac{1}{5} = \frac{4}{5} \Rightarrow \sin\theta = \frac{2}{\sqrt{5}}$ (positive in QII).
- $\csc\theta = \frac{1}{\sin\theta} = \frac{\sqrt{5}}{2}$.

Answer: $\frac{\sqrt{5}}{2}$

7. **Solution to Question 7:**

- $\cot\theta = \frac{4}{3}$ in QIII.
- $\tan\theta = \frac{3}{4}$.
- $\sec^2\theta = 1+\tan^2\theta = 1+\frac{9}{16} = \frac{25}{16} \Rightarrow \sec\theta = -\frac{5}{4}$ (negative in QIII).
- $\cos\theta = \frac{1}{\sec\theta} = -\frac{4}{5}$.

Answer: B) $-\frac{4}{5}$

8. **Solution to Question 8:**

- $\csc\theta = -2 \Rightarrow \sin\theta = -\frac{1}{2}$, not in QIII, so QIV.
- $\cos^2\theta = 1-\sin^2\theta = 1-\frac{1}{4} = \frac{3}{4} \Rightarrow \cos\theta = \frac{\sqrt{3}}{2}$ (positive in QIV).
- $\sec\theta = \frac{1}{\cos\theta} = \frac{2}{\sqrt{3}}$.

Answer: A) $\frac{2\sqrt{3}}{3}$

9. **Solution to Question 9:**

- 340° is in QIV (270° to 360°).

- In QIV, csc is negative.

Answer: B) Negative

10. **Solution to Question 10:**

- $\cot(-\theta) = -\cot\theta$.
- So, $\cot(-150^\circ) = -\cot 150^\circ$.

Answer: B) $-\cot 150^\circ$

11. **Solution to Question 11:**

- $\sin\theta > 0$ in QI or QII.
- $\cot\theta < 0$ in QII or QIV.
- Intersection: QII.

Answer: B) II

12. **Solution to Question 12:**

- $\sec\theta = \frac{13}{12}$ in QI.
- $\cos\theta = \frac{12}{13}$.
- $\sin\theta = \sqrt{1-\cos^2\theta} = \sqrt{1-\frac{144}{169}} = \frac{5}{13}$ (positive in QI).

Answer: A) $\frac{5}{13}$

13. **Solution to Question 13:**

- $\sin\theta = -\frac{8}{17}$ in QIV.
- $\cos^2\theta = 1-\sin^2\theta = 1-\frac{64}{289} = \frac{225}{289} \Rightarrow \cos\theta = \frac{15}{17}$ (positive in QIV).
- $\cot\theta = \frac{\cos\theta}{\sin\theta} = \frac{\frac{15}{17}}{-\frac{8}{17}} = -\frac{15}{8}$.

Answer: B) $-\frac{15}{8}$

14. **Solution to Question 14:**

- $\cos\theta = \frac{1}{3}$ in QIV.
- $\sin^2\theta = 1-\cos^2\theta = 1-\frac{1}{9} = \frac{8}{9} \Rightarrow \sin\theta = -\frac{2\sqrt{2}}{3}$ (negative in QIV).
- $\csc\theta = \frac{1}{\sin\theta} = -\frac{3}{2\sqrt{2}}$.

Answer: B) $-\frac{3}{2\sqrt{2}}$

15. **Solution to Question 15:**

- $\tan\theta = \frac{\sqrt{3}}{2}$, not in QIII, so QI (since tan is positive).
- $\sec^2\theta = 1+\tan^2\theta = 1+\frac{3}{4} = \frac{7}{4} \Rightarrow \sec\theta = \frac{\sqrt{7}}{2}$.
- $\cot\theta = \frac{2}{\sqrt{3}} \Rightarrow \csc^2\theta = 1+\cot^2\theta = 1+\frac{4}{3} = \frac{7}{3}$.

- $\frac{\csc^2\theta-\sec^2\theta}{\csc^2\theta+\sec^2\theta} = \frac{\frac{7}{3}-\frac{7}{4}}{\frac{7}{3}+\frac{7}{4}} = \frac{\frac{28-21}{12}}{\frac{28+21}{12}} = \frac{\frac{7}{12}}{\frac{49}{12}} = \frac{7}{49} = \frac{1}{7}$.

Answer: A) $\frac{1}{7}$

16. **Solution to Question 16:**

- $\cot\theta = 3$ in QI.
- $\tan\theta = \frac{1}{3}$.
- $\csc^2\theta = 1+\cot^2\theta = 1+9 = 10 \Rightarrow \csc\theta = \sqrt{10} \Rightarrow \sin\theta = \frac{1}{\sqrt{10}}$.
- $\cos^2\theta = 1-\sin^2\theta = 1-\frac{1}{10} = \frac{9}{10} \Rightarrow \cos\theta = \frac{3}{\sqrt{10}}$.
- $\frac{2\sin\theta+3\cos\theta}{\cos\theta-\sin\theta} = \frac{2\cdot\frac{1}{\sqrt{10}}+3\cdot\frac{3}{\sqrt{10}}}{\frac{3}{\sqrt{10}}-\frac{1}{\sqrt{10}}} = \frac{\frac{2+9}{\sqrt{10}}}{\frac{2}{\sqrt{10}}} = \frac{11}{2}$.

Answer: C) $\frac{11}{2}$

17. **Solution to Question 17:**

- $\csc\theta = \frac{m^2+1}{2m}$, $0<\theta<\frac{\pi}{2}$ (QI).
- $\sin\theta = \frac{2m}{m^2+1}$.
- $\cos\theta = \sqrt{1-\sin^2\theta} = \sqrt{1-\frac{4m^2}{(m^2+1)^2}} = \sqrt{\frac{(m^2+1)^2-4m^2}{(m^2+1)^2}} = \frac{m^2-1}{m^2+1}$.

Answer: A) $\frac{m^2-1}{m^2+1}$

18. **Solution to Question 18:**

- $\sec\theta = -\frac{2}{\sqrt{3}}$ in QIII.
- $\cos\theta = -\frac{\sqrt{3}}{2}$.
- $\sin^2\theta = 1-\cos^2\theta = 1-\frac{3}{4} = \frac{1}{4} \Rightarrow \sin\theta = -\frac{1}{2}$ (negative in QIII).

Answer: A) $-\frac{1}{2}$

19. **Solution to Question 19:**

- $\cos\theta < 0$ in QII or QIII.
- $\csc\theta < 0$ in QIII or QIV.
- Intersection: QIII.

Answer: C) III

20. **Solution to Question 20:**

- $\sin\theta = \frac{1}{\sqrt{5}}$ in QI.
- $\cos^2\theta = 1-\sin^2\theta = 1-\frac{1}{5} = \frac{4}{5} \Rightarrow \cos\theta = \frac{2}{\sqrt{5}}$.
- $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{1}{\sqrt{5}}}{\frac{2}{\sqrt{5}}} = \frac{1}{2}$.
- $\sin^2\theta+\cos^2\theta = 1$, $\tan^2\theta+1 = \frac{1}{4}+1 = \frac{5}{4}$.

- $\frac{\sin^2\theta+\cos^2\theta}{\tan^2\theta+1} = \frac{1}{\frac{5}{4}} = \frac{4}{5}$.

Answer: None match exactly; likely intended $\frac{4}{5}$, but options suggest error. Closest: D) 1 (assuming identity simplification).