Multiple Choice

1. Find the remaining sides of a $45^\circ - 45^\circ - 90^\circ$ triangle if the longest side is 12.
   a. $6\sqrt{2}, 6\sqrt{3}$
   b. $7\sqrt{3}, 7\sqrt{3}$
   c. $2\sqrt{2}, 2\sqrt{2}$
   d. $5\sqrt{3}, 5\sqrt{3}$
   e. $9\sqrt{2}, 9\sqrt{2}$

2. Indicate if the angle $100^\circ$ is acute or obtuse. Then give the complement and the supplement of the angle.
   a. obtuse; complement: $-10^\circ$ supplement: $-100^\circ$
   b. acute; complement: $-10^\circ$ supplement: $80^\circ$
   c. obtuse; complement: $80^\circ$ supplement: $-10^\circ$
   d. acute; complement: $-10^\circ$ supplement: $-100^\circ$
   e. obtuse; complement: $-10^\circ$ supplement: $80^\circ$

3. Find the distance between the points:
   $(-2, -4), (-10, 7)$
   a. $\sqrt{223}$
   b. $\sqrt{185}$
   c. $\sqrt{89}$
   d. $\sqrt{149}$
   e. $\sqrt{113}$
4. In the diagram below, angle \( \theta \) is in standard position. Find \( \sin \theta \), \( \cos \theta \) and \( \tan \theta \).

![Diagram with angle \( \theta \) in standard position with points labeled 1, 2, 3, 4, and 5.]

a. \( \sin \theta = \frac{\sqrt{89}}{8} \), \( \cos \theta = \frac{\sqrt{89}}{5} \), \( \tan \theta = \frac{8}{5} \)

b. \( \sin \theta = \frac{3\sqrt{89}}{89} \), \( \cos \theta = \frac{5\sqrt{89}}{89} \), \( \tan \theta = \frac{8}{5} \)

c. \( \sin \theta = \frac{\sqrt{89}}{5} \), \( \cos \theta = \frac{\sqrt{89}}{8} \), \( \tan \theta = \frac{8}{5} \)

d. \( \sin \theta = \frac{5\sqrt{89}}{89} \), \( \cos \theta = \frac{8\sqrt{89}}{89} \), \( \tan \theta = \frac{5}{8} \)

e. \( \sin \theta = \frac{3\sqrt{89}}{89} \), \( \cos \theta = \frac{5\sqrt{89}}{89} \), \( \tan \theta = \frac{5}{8} \)

5. Find \( y \) if the point (8, \( y \)) is on the terminal side of \( \theta \) and \( \cos \theta = \frac{8}{17} \).

a. \( y = \pm 24 \)

b. \( y = 11 \)

c. \( y = 17 \)

d. \( y = \pm 13 \)

e. \( y = \pm 15 \)
6. Find the remaining trigonometric functions of \( \theta \) if \( \cot \theta = \frac{m}{n} \) where \( m \) and \( n \) are both positive. Assume that \( \theta \) is between \( 0^\circ \) and \( 180^\circ \).

   a. \( \sin \theta = \frac{m}{\sqrt{n^2 + m^2}} \), \( \cos \theta = \frac{n}{\sqrt{n^2 + m^2}} \), \( \tan \theta = \frac{n}{m} \)

   \[ \csc \theta = \frac{\sqrt{n^2 + m^2}}{n}, \sec \theta = \frac{\sqrt{n^2 + m^2}}{m} \]

   b. \( \sin \theta = \frac{m}{\sqrt{n^2 + m^2}} \), \( \cos \theta = \frac{n}{\sqrt{n^2 + m^2}} \), \( \tan \theta = \frac{m}{n} \)

   \[ \csc \theta = \frac{\sqrt{n^2 + m^2}}{m}, \sec \theta = \frac{\sqrt{n^2 + m^2}}{n} \]

   c. \( \sin \theta = \frac{n}{\sqrt{n^2 + m^2}} \), \( \cos \theta = \frac{m}{\sqrt{n^2 + m^2}} \), \( \tan \theta = \frac{n}{m} \)

   \[ \csc \theta = \frac{\sqrt{n^2 + m^2}}{m}, \sec \theta = \frac{\sqrt{n^2 + m^2}}{n} \]

   d. \( \sin \theta = \frac{n}{\sqrt{n^2 + m^2}} \), \( \cos \theta = \frac{m}{\sqrt{n^2 + m^2}} \), \( \tan \theta = \frac{n}{m} \)

   \[ \csc \theta = \frac{\sqrt{n^2 + m^2}}{n}, \sec \theta = \frac{\sqrt{n^2 + m^2}}{m} \]

   e. \( \sin \theta = \frac{m}{\sqrt{n^2 + m^2}} \), \( \cos \theta = \frac{n}{\sqrt{n^2 + m^2}} \), \( \tan \theta = \frac{n}{m} \)

   \[ \csc \theta = \frac{\sqrt{n^2 + m^2}}{m}, \sec \theta = \frac{\sqrt{n^2 + m^2}}{n} \]
7. Give the reciprocal of the given number.

\[
\frac{-10}{11}
\]

a. \(\frac{11}{-10}\)
b. \(\frac{11}{21}\)
c. \(\frac{-13}{10}\)
d. \(\frac{-11}{10}\)
e. \(\frac{13}{10}\)

8. Write the following in terms of \(\sin \theta\) only.

\(\sec \theta\)

a. \(\frac{\sin \theta}{1 - \sin \theta}\)
b. \(\frac{1}{\sin \theta}\)
c. \(\frac{\sin \theta}{\pm \sqrt{1 - \sin^2 \theta}}\)
d. \(\frac{1}{\pm \sqrt{1 - \sin^2 \theta}}\)
e. \(\pm \sqrt{1 - \sin^2 \theta}\)


\((\sin \theta - \cos \theta)^2\)

a. \(\sin^2 \theta - \cos^2 \theta\)
b. \(1\)
c. \(1 + 2 \sin \theta \cos \theta\)
d. \(1 - 2 \sin \theta \cos \theta\)
e. \(\sin^2 \theta - \cos \theta\)
10. Write the following in terms of $\sin \theta$ and $\cos \theta$ and then simplify if possible.

\[
\csc \theta \cot \theta
\]

a. \[\frac{\sin \theta \cos \theta}{\cos \theta}\]

b. \[\frac{\cos \theta}{\sin^2 \theta}\]

c. \[\frac{\sin^2 \theta}{\cos \theta}\]

d. \[\frac{\sin \theta}{\cos^2 \theta}\]

e. \[\frac{1}{\sin \theta \cos \theta}\]

11. Suppose \(\triangle ABC\) is a right triangle with \(\angle C = 90^\circ\).

If \(a = 6\) and \(c = 10\), find \(b\).

12. Solve for \(x\).

\[
\sqrt{65} = x + 3
\]

13. Find the distance between the points:

\( (0, 4), (3, 0) \)
14. Use the diagram to help you name an angle between $0^\circ$ and $360^\circ$ that is coterminal with the angle $-330^\circ$

15. Suppose the angle formed by the line $y = 3x$ and the positive $x$-axis is $\theta$. Find the tangent of $\theta$. 

$\tan \theta = \_\_\_\_\_$
Short Answer

16. Find the remaining side of a $45^\circ - 45^\circ - 90^\circ$ triangle if the shorter sides are each $\frac{3}{5}$.

17. Find the distance between the points:

$(-1, -4), (-9, 7)$

18. Find $x$ so the distance between $(x, 3)$ and $(4, 7)$ is $2\sqrt{5}$.

$x = \underline{\phantom{0}}$

19. Use a ratio identity to find $\tan \theta$ if

$\sin \theta = \frac{8}{\sqrt{65}}$ and $\cos \theta = \frac{1}{\sqrt{65}}$.

20. For this problem, recall that $\sin^2 \theta$ means $(\sin \theta)^2$.

If $\sin \theta = \frac{1}{\sqrt{7}}$, find $\sin^2 \theta$.

Simplify the answer. Do not convert to decimal form.

21. Simplify the expression $\sqrt{16 - 4x^2}$ as much as possible after substituting $2 \sin \theta$ for $x$.

22. Simplify the expression $\sqrt{x^2 + 1}$ as much as possible after substituting $\tan \theta$ for $x$.

23. Multiply.

$(\sin \theta + \cos \theta)^2$
24. Write the following in terms of $\sin \theta$ and $\cos \theta$ and then simplify if possible.

$\sec \theta - \tan \theta \sin \theta$

25. Write the following in terms of $\sin \theta$ and $\cos \theta$ and then simplify if possible.

$\sec \theta \tan \theta \csc \theta$
Answer Section

MULTIPLE CHOICE

1. A
2. E
3. B
4. D
5. E
6. D
7. D
8. D
9. D
10. B

NUMERIC RESPONSE

11. 8
12. 4
13. 5
14. 30
15. 3

SHORT ANSWER

16. \(\frac{3 \cdot \sqrt{2}}{5}\)
17. \(\sqrt{185}\)
18. 6, 2
19. \(\tan(\theta) = 8\)
20. \(\frac{1}{7}\)
21. \(4 \cdot |\cos(\theta)|\)
22. \(|\sec(\theta)|\)
23. \(1 + 2 \cdot \sin(\theta) \cdot \cos(\theta)\)
24. \(\cos(\theta)\)
25. \(\frac{1}{\cos^2(\theta)}\)