Multiple Choice

1. Find $\tan A$ in the right triangle below.

   ![Right Triangle](image)

   a. $\tan(A) = \frac{1}{\sqrt{3}}$
   b. $\tan(A) = \frac{1}{2}$
   c. $\tan(A) = \frac{2}{3}$
   d. $\tan(A) = \frac{\sqrt{3}}{2}$
   e. $\tan(A) = \frac{1}{3}$

2. Find $\tan B$ in the right triangle below.

   ![Right Triangle](image)

   a. $\tan(B) = \frac{13}{12}$
   b. $\tan(B) = \frac{12}{13}$
   c. $\tan(B) = \frac{5}{13}$
   d. $\tan(B) = \frac{5}{12}$
   e. $\tan(B) = \frac{13}{5}$
3. Find the exact value for \( \csc 60^\circ \).
   a. 0
   b. \( \frac{2}{\sqrt{3}} \)
   c. \( \frac{2}{\sqrt{3}} \)
   d. \( \frac{2}{\sqrt{3}} \)
   e. \( \frac{5}{\sqrt{3}} \)

4. There is a right triangle \( ABC \) with \( C = 90^\circ \), \( b = 8.98 \), and \( c = 9.72 \). Use a calculator to find \( \cos A \). Round your answer to the nearest hundredth.
   a. 0.93
   b. 0.36
   c. 0.38
   d. 0.37
   e. 0.92

5. Suppose each edge of the cube shown in the figure is 2 inches long. Find the sine and cosine of the angle formed by diagonals \( AH \) and \( AF \).

\[ \sin \theta = \frac{\sqrt{3}}{2}, \cos \theta = \frac{1}{2} \]
\[ \sin \theta = \frac{\sqrt{2}}{\sqrt{3}}, \cos \theta = \frac{1}{\sqrt{3}} \]
\[ \sin \theta = \frac{\sqrt{2}}{2}, \cos \theta = \frac{\sqrt{2}}{2} \]
\[ \sin \theta = \frac{1}{\sqrt{3}}, \cos \theta = \frac{\sqrt{2}}{\sqrt{3}} \]
\[ \sin \theta = \frac{1}{2}, \cos \theta = \frac{\sqrt{3}}{2} \]
6. Use a calculator to complete the table of sin and csc values and determine which of the tables below displays the correct values. (Be sure your calculator is in degree mode.) Round all answers to four digits past the decimal point. If you have a graphing calculator with table-building capabilities, use it to construct the tables.

<table>
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<tr>
<th>x</th>
<th>sin</th>
<th>csc</th>
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<th>csc</th>
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</table>

7. To further justify the Cofunction Theorem, use your calculator to find a value for each pair of trigonometric functions below. In each case, the trigonometric functions are cofunctions of one another, and the angles are complementary angles. Round your answers to four places past the decimal point.

\[ \sin 25°, \cos 65° \]

a. \[ \sin 25° = 0.4226, \cos 65° = 0.4226 \]
b. \[ \sin 25° = 0.4226, \cos 65° = -0.9063 \]
c. \[ \sin 25° = -0.4226, \cos 65° = 0.9063 \]
d. \[ \sin 25° = 0.4176, \cos 65° = 0.9063 \]
e. \[ \sin 25° = 0.4156, \cos 65° = 0.8993 \]
8. Calculate the tangent values for each value of $x$ indicated in the sets of tables shown below. Determine which set of tables displays the correct values. Round all answers to the nearest tenth.

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<th>$x$</th>
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<table>
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</table>
9. Refer to right triangle $ABC$ with $C = 90^\circ$.

If $A = 44^\circ$ and $c = 90$ cm, find $b$.

Round the answer to the nearest whole number.

a. 65 cm  
b. 69 cm  
c. 67 cm  
d. 64 cm  
e. 68 cm

10. Refer to right triangle $ABC$ with $C = 90^\circ$. Solve for all the missing parts using the given information.

$A = 23^\circ$, $c = 29$ m

Round each answer to the nearest whole number.

a. $B = 67^\circ$, $a = 11$ m, $b = 26$ m  
b. $B = 67^\circ$, $a = 13$ m, $b = 29$ m  
c. $B = 67^\circ$, $a = 11$ m, $b = 27$ m  
d. $B = 67^\circ$, $a = 12$ m, $b = 26$ m  
e. $B = 67^\circ$, $a = 12$ m, $b = 27$ m

11. Refer to right triangle $ABC$ with $C = 90^\circ$. Solve for all the missing parts using the given information.

$a = 36$ ft, $b = 89$ ft

Round each answer to the nearest whole number if necessary.

a. $A = 21^\circ$, $B = 69^\circ$, $c = 97$ ft  
b. $A = 24^\circ$, $B = 66^\circ$, $c = 94$ ft  
c. $A = 21^\circ$, $B = 69^\circ$, $c = 96$ ft  
d. $A = 22^\circ$, $B = 68^\circ$, $c = 97$ ft  
e. $A = 22^\circ$, $B = 68^\circ$, $c = 96$ ft
12. The figure shows two right triangles drawn at 90° to each other.

If ∠ABD = 55°, ∠C = 48°, and BC = 46, find x and then find h.

Round each answer to the nearest whole number.

a. x = 51, h = 73
b. x = 55, h = 69
c. x = 51, h = 71
d. x = 49, h = 73
e. x = 49, h = 71
13. Draw a vector representing the velocity.

90 mph due south

a.

b.

c.

d.

e.
14. Vector $\mathbf{V}$ with magnitude $|\mathbf{V}|$ forms an angle with the positive $x$-axis. Give the magnitude of the horizontal and vertical vector components of $\mathbf{V}$, namely $V_x$ and $V_y$, respectively.

$$|\mathbf{V}| = 13.4, \ \theta = 24.3^\circ$$

a. $|V_x| = -9.61, \ |V_y| = 1.31$

b. $|V_x| = 7.91, \ |V_y| = -3.81$

c. $|V_x| = 12.21, \ |V_y| = 5.51$

d. $|V_x| = 12.21, \ |V_y| = -3.81$

e. $|V_x| = -7.91, \ |V_y| = -5.51$

15. A plane travels 175 miles on a bearing of $N \ 10^\circ \ E$ and then changes its course to $N \ 48^\circ \ E$ and travels another 120 miles. Find the total distance traveled north and the total distance traveled east.

a. plane travels 237 miles to the north and 120 miles to the east

b. plane travels 253 miles to the north and 120 miles to the east

c. plane travels 253 miles to the north and 98 miles to the east

d. plane travels 237 miles to the north and 98 miles to the east

e. plane travels 248 miles to the north and 128 miles to the east

**Numeric Response**

16. Use a calculator to find the following. Round your answer to four places past the decimal point.

$$\sin 20^\circ 20'$$

17. Find $\theta$ if $\theta$ is between $0^\circ$ and $90^\circ$. Round your answer to the nearest tenth of a degree.

$$\sin \theta = 0.7292$$

$$\theta = \ \boxed{46.3^\circ}$$
18. Refer to right triangle $ABC$ with $C = 90^\circ$.

![Diagram of right triangle ABC]

If $A = 43^\circ$ and $c = 80$ cm, find $b$.

Apply the rules regarding the use of significant digits when determining your answer.

$$b = \underline{\phantom{000}} \text{ cm}$$

19. In the figure below, a person standing at point $A$ notices that the angle of elevation to the top of the antenna is $46^\circ \ 30'$'. A second person standing 35.0 feet farther from the antenna than the person at $A$ finds the angle of elevation to the top of the antenna to be $43^\circ \ 18'$. How far is the person at $A$ from the base of the antenna? Apply the rules regarding the use of significant digits when determining your answers.

![Image of antenna]

Distance = \underline{\phantom{0}} \text{ ft}
20. Solve the following problem. Be sure to make a diagram of the situation with all the given information labeled.

A ship is anchored off a long straight shoreline that runs north and south. From two observation points 16 miles apart on shore, the bearings of the ship are N 28° E and S 50° E. What is the shortest distance from the ship to the shore? Apply the rules regarding the use of significant digits when determining your answer.

________ mi

Short Answer

21. Refer to right triangle $ABC$ with $C = 90^\circ$. Solve for all the missing parts using the given information.

$B = 18^\circ, c = 4.5\text{ ft}$

Apply the rules regarding the use of significant digits when determining your answer.

$A = \underline{\hspace{1cm}}^\circ$

$a = \underline{\hspace{1cm}} \text{ ft}$

$b = \underline{\hspace{1cm}} \text{ ft}$

22. Refer to right triangle $ABC$ with $C = 90^\circ$. Solve for all the missing parts using the given information.

$B = 52^\circ 30', \ b = 715 \text{ mm}$

Apply the rules regarding the use of significant digits when determining your answer.

$A = \underline{\hspace{1cm}}^\circ \underline{\hspace{1cm}}'$

$a = \underline{\hspace{1cm}} \text{ mm}$

$c = \underline{\hspace{1cm}} \text{ mm}$
23. In the figure, the distance from \( A \) to \( D \) is \( y \), the distance from \( D \) to \( C \) is \( x \), and the distance from \( C \) to \( B \) is \( h \).

If \( A = 32^\circ \), \( \angle BDC = 47^\circ \), and \( AB = 52 \), find \( h \), then \( x \).

Apply the rules regarding the use of significant digits when determining your answer.

\[ h = \underline{\phantom{000}} \]

\[ x = \underline{\phantom{000}} \]

24. Vector \( \mathbf{V} \) with magnitude \( |\mathbf{V}| \) forms an angle with the positive \( x \)-axis. Give the magnitude of the horizontal and vertical vector components of \( \mathbf{V} \), namely \( \mathbf{V}_x \) and \( \mathbf{V}_y \), respectively. Apply the rules regarding the use of significant digits when determining your answer.

\[ |\mathbf{V}| = 13.8, \quad \theta = 24.9^\circ \]

\[ \mathbf{V}_x = \underline{\phantom{000}} \]

\[ \mathbf{V}_y = \underline{\phantom{000}} \]

25. A plane travels 125 miles on a bearing of \( \text{N} 18^\circ \text{ E} \) and then changes its course to \( \text{N} 56^\circ \text{ E} \) and travels another 120 miles. Find the total distance traveled north and the total distance traveled east.

Apply the rules regarding the use of significant digits when determining your answers.

Find the total distance traveled north.

\[ \underline{\phantom{000}} \text{ mi} \]

Find the total distance traveled east.

\[ \underline{\phantom{000}} \text{ mi} \]
Answer Section

MULTIPLE CHOICE

1. A
2. D
3. B
4. E
5. D
6. C
7. A
8. D
9. A
10. C
11. E
12. A
13. B
14. C
15. B

NUMERIC RESPONSE

16. 0.3475
17. 46.8
18. 59
19. 296
20. 5.9

SHORT ANSWER

21. 72; 4.3; 1.4
22. 37; 30; 549; 901
23. 28; 26
24. 12.5; 5.81
25. 190; 140