1. Simplify the following expression by first substituting values from the table of exact values and then simplifying the resulting expression.

\[ 8 \cos 60^\circ \]

### Table of Exact Values

<table>
<thead>
<tr>
<th>x</th>
<th>( \sin x )</th>
<th>( \cos x )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>30°</td>
<td>( \frac{1}{2} )</td>
<td>( \frac{\sqrt{3}}{2} )</td>
</tr>
<tr>
<td>45°</td>
<td>( \frac{1}{\sqrt{2}} )</td>
<td>( \frac{1}{\sqrt{2}} )</td>
</tr>
<tr>
<td>60°</td>
<td>( \frac{\sqrt{3}}{2} )</td>
<td>( \frac{1}{2} )</td>
</tr>
<tr>
<td>90°</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

2. Change the following to decimal degrees. If rounding is necessary, round to the nearest tenth of a degree.

\[ 71^\circ 12' \]

\[ \phantom{0000}^\circ \]

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

\[ \cot 40^\circ \]

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

\[ \sec 42.2^\circ \]
5. Refer to right triangle $ABC$ with $C = 90^\circ$.

If $b = 9.1$ mm and $c = 12$ mm, find $B$.

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

$B = \boxed{\phantom{0000}}^\circ$

6. Use the information given in the diagram to find $A$ to the nearest degree.

$A = \boxed{\phantom{0000}}^\circ$

7. Solve the following problem. Be sure to make a diagram of the situation with all the given information labeled.

An equilateral triangle (one with all sides the same length) has an altitude of 4.4 inches. Find the length of the sides. Apply the rules regarding the use of significant digits when determining your answer.

Length of sides = $\boxed{\phantom{0000}}$ in.
8. Solve the following problem. Be sure to make a diagram of the situation with all the given information labeled.

A person standing on top of a 13-foot high sand pile wishes to estimate the width of the pile. He visually locates two rocks on the ground below at the base of the sand pile. The rocks are on opposite sides of the sand pile, and he and the two rocks are in line with one another. If the angles of depression from the top of the sand pile to each of the rocks are $19^\circ$ and $25^\circ$, how far apart are the rocks?

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

Distance between rocks = _________ ft

9. Solve the following problem. Be sure to make a diagram of the situation with all the given information labeled.

A tree on one side of a river is due west of a rock on the other side of the river. From a stake 21 yards north of the rock, the bearing of the tree is $S \, 18.5^\circ \, W$. How far is it from the rock to the tree?

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

Distance between rock and tree = _________ yd

10. A helicopter makes a forced landing at sea. The last radio signal received at station C gives the bearing of the helicopter from C as N $57.1^\circ$ E at an altitude of 423 feet. An observer at C sights the helicopter and gives $\angle DCB$ as $12.1^\circ$. How far will a rescue boat at A have to travel to reach any survivors at B (see the figure)? Apply the rules regarding the use of significant digits when determining your answer.

Distance rescue boat travels = _________ ft
11. The magnitude of the horizontal and vertical vector components $V_x$ and $V_y$ of vector $V$ are given. Find the magnitude of $V$. Apply the rules regarding the use of significant digits when determining your answers.

$$|V_x| = 38.0, |V_y| = 29.0$$

$$|V| = \underline{\text{_______}}$$

12. Danny and Stacey have gone from the swing to the slide at the park. The slide is inclined at an angle of $46.0^\circ$. Danny weighs 47.0 pounds. He is sitting in a cardboard box with a piece of wax paper on the bottom. Stacey is at the top of the slide holding on to the cardboard box. Find the magnitude of the force Stacey must pull with, in order to keep Danny from sliding down the slide. (We are assuming that the wax paper makes the slide into a frictionless surface, so that the only force keeping Danny from sliding is the force with which Stacey pulls.) Apply the rules regarding the use of significant digits when determining your answer.

$$\underline{\text{_______}} \text{ lb}$$

13. Mark pulls Allison and Mattie in a wagon by exerting a force of 20 pounds on the handle at an angle of $39^\circ$ with the horizontal. How much work is done by Mark in pulling the wagon 330 feet? Apply the rules regarding the use of significant digits when determining your answer.

$$\underline{\text{_______}} \text{ ft} \cdot \text{lb}$$
Short Answer

14. Find the exact value of $\sec 30^\circ$.

15. Find the exact value of $\cot 60^\circ$.

16. Use a calculator to complete the following table. (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>
<thead>
<tr>
<th>$x$</th>
<th>$\sin x$</th>
<th>$\csc x$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0^\circ$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$30^\circ$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$45^\circ$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$60^\circ$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$90^\circ$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. Use a calculator to find a value of $\theta$ between $0^\circ$ and $90^\circ$ that satisfies the statement below. Write your answer in degrees and minutes rounded to the nearest minute.

$\cos \theta = 0.5492$

$\theta = ____^\circ ____'$

18. Use a calculator to find a value of $\theta$ between $0^\circ$ and $90^\circ$ that satisfies the statement below. Write your answer in degrees and minutes rounded to the nearest minute.

$csc \theta = 7.5834$

$\theta = ____^\circ ____'$

19. 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.

$\sin 22^\circ = ____$, $\cos 68^\circ = ____$
20. Refer to right triangle $ABC$ with $C = 90^\circ$. Solve for all the missing parts using the given information.

$A = 29^\circ, c = 21\text{ m}$

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

$B = \ldots^\circ$

$a = \ldots\text{ m}$

$b = \ldots\text{ m}$

21. 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 $A = 32^\circ, \angle BDC = 49^\circ, \text{ and } AB = 52$, find $h$, then $x$.

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

$h = \ldots$, $x = \ldots$

22. Solve the following problems. Be sure to make a diagram of the situation with all the given information labeled.

The diagonal of a rectangle is 352 millimeters, while the longer side is 284 millimeters.

Find the shorter side of the rectangle. Apply the rules regarding the use of significant digits when determining your answer. $\ldots\text{ mm}$

Find the smaller of the two angles the diagonal makes with the sides. Apply the rules regarding the use of significant digits when determining your answer. $\ldots^\circ$

Find the larger of the two angles the diagonal makes with the sides. Apply the rules regarding the use of significant digits when determining your answer. $\ldots^\circ$
23. Solve the following problem. Be sure to make a diagram of the situation with all the given information labeled.

A man wandering in the desert walks 2.7 miles in the direction S 27° W. He then turns 90° and walks 3.7 miles in the direction N 63° W. At that time, how far is he from his starting point?

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

Distance from starting point = __________ mi

What is the man's bearing from his starting point?

__________  __________  __________

24. A bullet is fired into the air with an initial velocity of 2,000 feet per second at an angle of 30° from the horizontal. Find the horizontal and vertical vector components of the velocity. Apply the rules regarding the use of significant digits when determining your answers.

\[|V_x| = \text{__________ ft/sec}\]

\[|V_y| = \text{__________ ft/sec}\]

25. A ship travels 185 kilometers on a bearing of S 49° E.

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

How far east has it traveled?

__________ km

How far south has it traveled?

__________ km
Answer Section

NUMERIC RESPONSE

1. 4
2. 71.2
3. 1.1918
4. 1.3499
5. 49
6. 56
7. 5.1
8. 66
9. 7.0
10. 1,660
11. 47.8
12. 33.8
13. 5,100

SHORT ANSWER

14. \( \frac{2}{\sqrt{3}} \)
15. \( \frac{1}{\sqrt{3}} \)
16. 0.0000; undefined; 0.5000; 2.0000; 0.7071; 1.4142; 0.8660; 1.1547; 1.0000; 1
17. 56; 41
18. 7; 35
19. 0.3746; 0.3746
20. 61; 10; 18
21. 28; 24
22. 208; 36.2; 53.8
23. 4.6; S; 81; W
24. 1,700; 1,000
25. 140; 120