Practice Quiz 1 (Vectors)

Name_______________________________

1) Vector \( \vec{A} \) has a magnitude of 16.0 m and is pointing eastward. It is rotated 110.0° clockwise. The component of this vector along west is
   A) 15.0 m.
   B) 5.47 m.
   C) 18.7 m.
   D) 12.4 m.
   Answer: B

2) When vectors \( \vec{A} \) and \( \vec{B} \) are added together they form vector \( \vec{C} \) and these vectors satisfy the relationship \( A^2 + B^2 = C^2 \). Which statement is true for these vectors?
   A) Vectors \( \vec{A} \) and \( \vec{B} \) must be parallel.
   B) Vectors \( \vec{A} \) and \( \vec{B} \) must be anti-parallel.
   C) Vectors \( \vec{A} \) and \( \vec{B} \) must have the same magnitudes.
   D) Vectors \( \vec{A} \) and \( \vec{B} \) must be perpendicular.
   Answer: D

3) A displacement vector is 34.0 m in length and is directed 60.0° east of north. What are the components of this vector?

<table>
<thead>
<tr>
<th>choice</th>
<th>Northward component</th>
<th>Eastward component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29.4 m</td>
<td>17.0 m</td>
</tr>
<tr>
<td>2</td>
<td>18.2 m</td>
<td>28.1 m</td>
</tr>
<tr>
<td>3</td>
<td>22.4 m</td>
<td>11.5 m</td>
</tr>
<tr>
<td>4</td>
<td>17.0 m</td>
<td>29.4 m</td>
</tr>
</tbody>
</table>

4) The magnitudes of the four vectors shown in Figure above are given as follows: \( A = 14.0 \) m; \( B = 12.0 \) m; \( C = 10.0 \) m and \( D = 6.0 \) m. The components of the vector sum of these four vectors are

<table>
<thead>
<tr>
<th>choice</th>
<th>( x)-component</th>
<th>( y)-component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.5 m</td>
<td>6.0 m</td>
</tr>
<tr>
<td>2</td>
<td>13.5 m</td>
<td>20.0 m</td>
</tr>
<tr>
<td>3</td>
<td>3.5 m</td>
<td>18.0 m</td>
</tr>
<tr>
<td>4</td>
<td>-2.9 m</td>
<td>-18.0 m</td>
</tr>
</tbody>
</table>

A) Choice 1
B) Choice 2
C) Choice 3
D) Choice 4
Answer: C

5) The components of vectors \( \vec{M} \) and \( \vec{N} \) are as follows: \( \vec{M} \) (1, -1) and \( \vec{N} \) (2, 4). The components of the resultant vector \( \vec{M} - \vec{N} \) are given by
A) (-1, -5).
B) (3, 3).
C) (1, -5).
D) (0, 4).
Answer: A

6) Refer to Figure above. The components of the vector sum are given by

<table>
<thead>
<tr>
<th>choice</th>
<th>x-component</th>
<th>y-component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.73 cm</td>
<td>2.20 cm</td>
</tr>
<tr>
<td>2</td>
<td>-3.73 cm</td>
<td>2.20 cm</td>
</tr>
<tr>
<td>3</td>
<td>-2.27 cm</td>
<td>0 cm</td>
</tr>
<tr>
<td>4</td>
<td>2.27 cm</td>
<td>0 cm</td>
</tr>
</tbody>
</table>

A) Choice 1
B) Choice 2
C) Choice 3
D) Choice 4
Answer: B

7) A plane has an airspeed of 142 m/s. A 30.0 m/s wind is blowing southward at the same time as the plane is flying. What must be the direction of the plane in order to move due east relative to the ground?
A) 78.1° north of east
B) 11.9° north of east
C) 77.8° north of east
D) 12.2° north of east
Answer: B
8) Refer to Figure above. Vector \( \vec{S} \) as expressed in terms of vectors \( \vec{M} \) and \( \vec{N} \) is given by
   A) \( \vec{M} + \vec{N} \).
   B) \( \vec{M} - \vec{N} \)
   C) \( \vec{M} \).
   D) None of the other choices is correct.
   Answer: B

9) Three vectors have equal magnitudes and make 120° with each other. We can say that
   A) the magnitude of the resultant is three times the magnitude of the component vectors.
   B) the magnitude of the resultant is more than three times the magnitude of each component vector.
   C) the resultant is zero.
   D) the magnitude of the resultant is equal to the magnitude of the component vectors.
   Answer: C

10) Vector \( \vec{B} \) is obtained by rotating vector \( \vec{A} \) counterclockwise by 270°. The components of \( \vec{B} \) will
   A) have the same signs as those of \( \vec{A} \).
   B) have opposite signs as those of \( \vec{A} \).
   C) The \( x \)-components will have opposite signs but the \( y \)-components will not.
   D) It depends on the quadrant where \( \vec{A} \) is.
   Answer: D

11) A vector \( \vec{A} \) has components \( A_x < 0 \), and \( A_y > 0 \), the angle that this vector makes with the positive \( x \)-axis must be in the range
   A) 0° to 90°.
   B) 90° to 180°.
   C) 180° to 270°.
   D) 270° to 360°.
   Answer: B

12) Two vectors \( \vec{A} \) and \( \vec{B} \) are added together giving vector \( \vec{C} \). The magnitude of \( C \) is such that
   \[ C = \sqrt{A^2 + B^2} \]
   If the magnitudes of both vectors \( \vec{A} \) and \( \vec{B} \) are doubled, the magnitude of vector \( \vec{C} \) will
   A) increase by a factor of 4.
   B) increase by a factor of 2.
   C) increase by a factor of \( \sqrt{2} \).
   D) not change.
   Answer: B