Students will be able to:

1. Define Sine, Cosine and Tangent in terms of the opposite, adjacent and hypotenuse of a triangle.
2. Use the above trig functions to find angles and right triangle side lengths.
3. Define a vector in a sentence.
4. Describe a vector’s two main features.
5. Define a scalar in a sentence.
6. Give examples of vectors and scalars.
7. Be able to identify if two vectors are equal.
8. Graphically show the result of multiplying a vector by a positive scalar.
9. Graphically show the result of multiplying a vector by a negative scalar.
10. Graphically add vectors.
11. Graphically subtract vectors.
12. Graphically add, subtract and multiply vectors by a scalar in one equation.
13. Given a graphical representation of a vector equation, come up with the formula.
14. Calculate the magnitude of any vector’s horizontal and vertical components.
15. Draw a vector’s horizontal and vertical components.
16. Use trig to calculate a vector’s direction.
17. Calculate a vector’s direction as a degree measurement combined with compass directions.
18. Calculate a vector’s magnitude using trig or Pythagorean theorem.
19. Add and subtract vectors by their components.
For the vectors below, calculate the vector’s magnitude, and direction.
For each vector drawn below on a coordinate axis, label the shown $\theta$ with its proper compass headings, e.g. N of W, S, S of E, etc.
For each vector drawn below, calculate its magnitude and direction. NOTE: For the vector’s direction, there will be two possible correct answers for each problem. The two answers are complimentary to each other.
VECTORS - GRAPHICAL MEANS

FIND THE RESULTANTS, \( R \):

\[
\begin{align*}
A + B &= R_1, & B + C &= R_2, & E + D &= R_3, & A - B &= R_4, & B - D &= R_5, & E - C &= R_6, \\
A + B + D &= R_7, & E + A + C &= R_8, & A + (-B) &= R_9, & -B + C + (-D) &= R_{10}, \\
E - A + C - D &= R_{11}.
\end{align*}
\]
Adding by Vector Components

1. 8 m/s at 55°, 10 m/s at 40°

2. 15 m/s at 25°, 8 m/s at 10°

3. 3 N at 40°, 7 N at 44°

4. 8 m at 33°, 10 m at 33°
Adding by Vector Components

5

15 m/s
35°
8 m/s

6

6 N
72°
3 N

7

8 m/s²
15°
9 m/s²

8

10 m/s
5 m/s
13 m/s
4 m/s
FIND THE RESULTANT’S LENGTH AND ACUTE ANGLE WITH THE HORIZONTAL FOR EACH \( R_i \):

\( A + B = R_1, \quad B + C = R_2, \quad E + D = R_3, \quad A - B = R_4, \quad B - D = R_5, \quad E - C = R_6, \quad A + B + D = R_7, \quad E + A + C = R_8, \quad A + (-B) = R_9, \quad -B + C + (-D) = R_{10}, \quad E - A + C - D = R_{11}, \)

<table>
<thead>
<tr>
<th>Vector</th>
<th>Magnitude</th>
<th>Direction OR</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R_1 )</td>
<td>( 2 \sqrt{17} = 8.25 )</td>
<td>18.43° N of E</td>
<td>71.57° E of N</td>
</tr>
<tr>
<td>( R_2 )</td>
<td>( 2 \sqrt{13} = 7.21 )</td>
<td>56.31° N of W</td>
<td>33.69° W of N</td>
</tr>
<tr>
<td>( R_3 )</td>
<td>( \sqrt{5} = 2.24 )</td>
<td>63.43° S of W</td>
<td>26.57° W of S</td>
</tr>
<tr>
<td>( R_4 )</td>
<td>( 2 \sqrt{41} = 12.81 )</td>
<td>38.66° W of S</td>
<td>51.34° S of W</td>
</tr>
<tr>
<td>( R_5 )</td>
<td>17</td>
<td>28.07° N of E</td>
<td>61.93° E of N</td>
</tr>
<tr>
<td>( R_6 )</td>
<td>11</td>
<td>Due East</td>
<td>----</td>
</tr>
<tr>
<td>( R_7 )</td>
<td>1</td>
<td>Due West</td>
<td>----</td>
</tr>
<tr>
<td>( R_8 )</td>
<td>17</td>
<td>14.04° E of S</td>
<td>75.96° S of E</td>
</tr>
<tr>
<td>( R_9 )</td>
<td>( 2 \sqrt{41} = 12.81 )</td>
<td>38.66° W of S</td>
<td>51.34° S of W</td>
</tr>
<tr>
<td>( R_{10} )</td>
<td>( 2 \sqrt{13} = 7.21 )</td>
<td>56.31° W of S</td>
<td>33.69° S of W</td>
</tr>
</tbody>
</table>
VECTORS WORKSHEETS
Find the missing variable

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q
Find the angle $\theta$
VECTORS WORKSHEETS

Find the missing variable
For the vectors below, calculate the vector’s magnitude, and direction.

\[
\vec{A} + \vec{B} = \vec{R}_1
\]
\[
\vec{A} + 4\vec{C} = \vec{R}_2
\]
\[
\vec{A} + 2\vec{B} + \frac{1}{2}\vec{C} = \vec{R}_3
\]
\[
\vec{A} - \vec{C} = \vec{R}_4
\]
\[
\vec{B} - \vec{A} = \vec{R}_5
\]
\[
2\vec{C} - \vec{B} = \vec{R}_6
\]
\[
2\vec{C} - \vec{A} - \vec{B} = \vec{R}_7
\]

For the vectors below, calculate the vector’s magnitude, and direction.

\[
\text{mag} = 5.00
\]
\[
\theta = \text{DUE SOUTH}
\]
\[
\text{mag} = 9.90
\]
\[
\theta = 45 \text{ N of E}
\]
\[
\text{mag} = 8.49
\]
\[
\theta = 45 \text{ S of E}
\]
\[
\text{mag} = 7.07
\]
\[
\theta = 45 \text{ N of E}
\]
\[
\text{mag} = 7.28
\]
\[
\theta = 15.95 \text{ E of S}
\]
\[
\theta = 74.05 \text{ S of E}
\]
\[
\text{mag} = 10.00
\]
\[
\theta = 53.13 \text{ N of E}
\]
\[
\theta = 36.87 \text{ E of N}
\]
ANSWERS

VECTORS WORKSHEETS

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