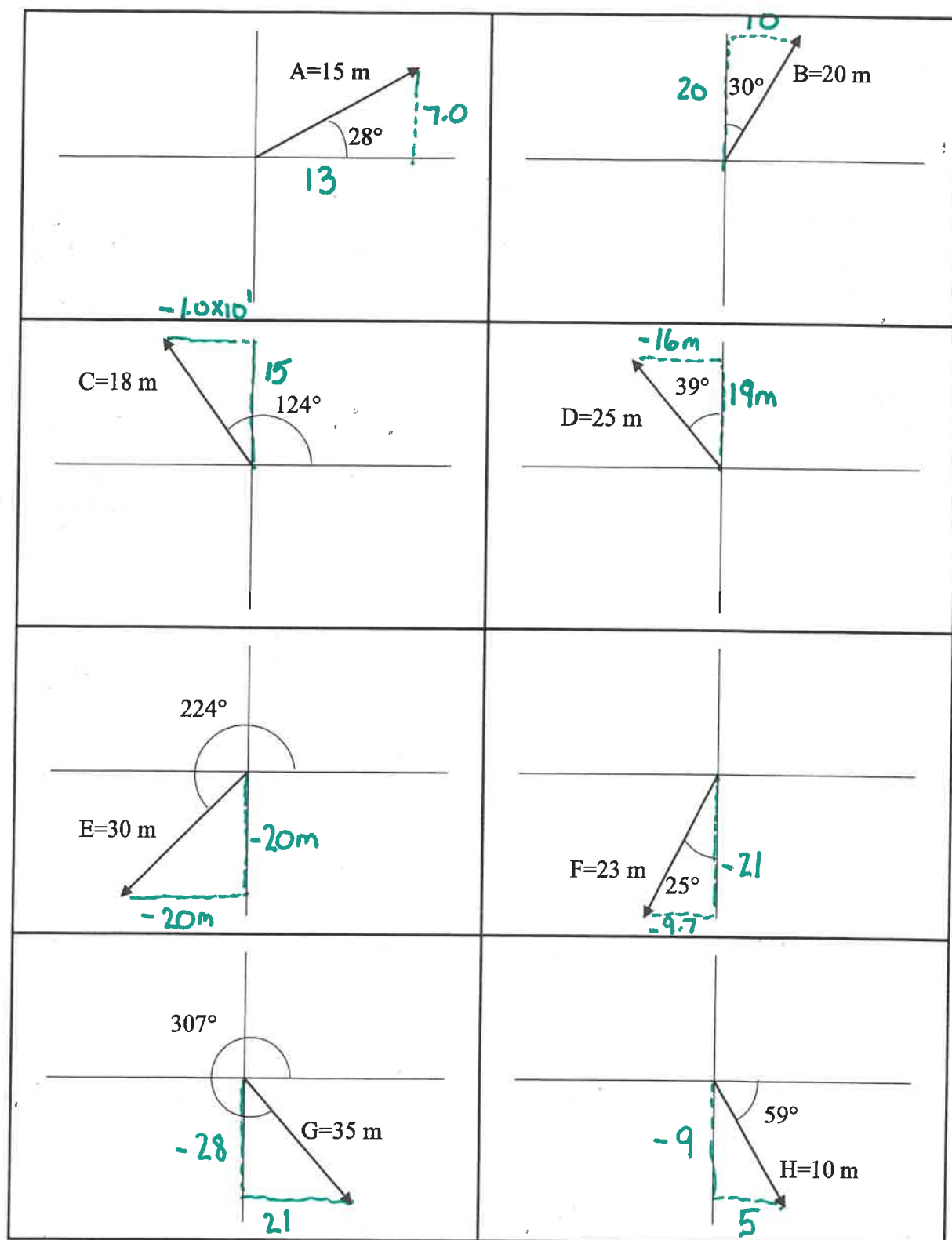


Vector Components



Find the components of the vectors.

Solutions to Physics I C Vector Components Worksheet

Vector Components Worksheet

1. Using dotted lines, draw the horizontal and vertical components for each vector shown below. Show only one pair of the components.

40 m, 40° from horizontal	9 lb, 20° from horizontal	20 km 15° from vertical
15 m/s, 50° from vertical	45 N, 70° from vertical	15 ft, 80° from horizontal
6 mi, 0° from vertical	50 m/s^2, 0° from horizontal	100 m/s, 30° from horizontal

2. Using the angles given on the diagrams in problem #1 above, calculate the values of the horizontal (x) and vertical (y) components for each diagram you did above, showing your work in the box for each below.

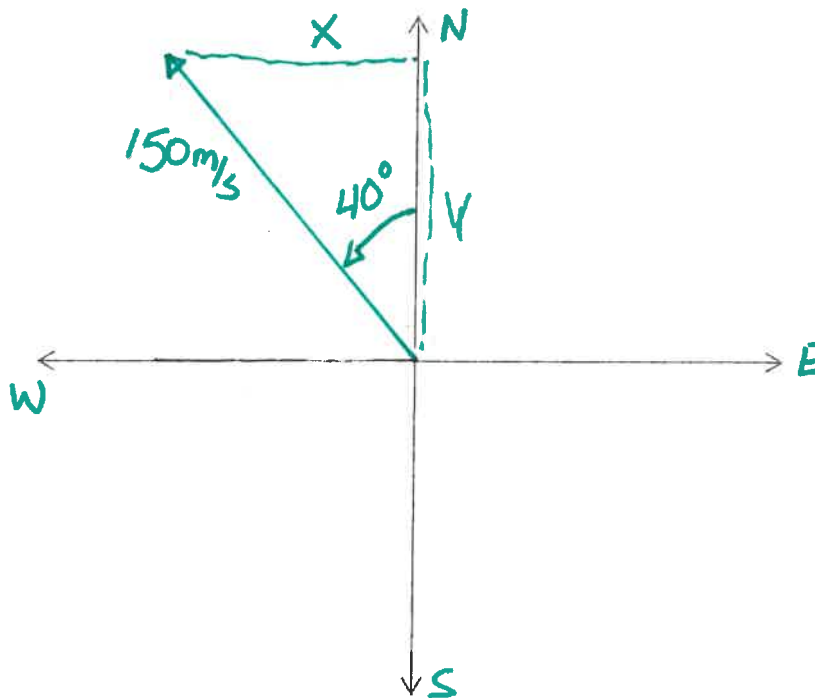
Note: Be sure your calculator is in "DEGREE" mode before doing your calculations.

$X = -30 \text{ m}$ $Y = 30 \text{ m}$	$X = 8 \text{ lb}$ $Y = 3 \text{ lb}$	$X = -5 \text{ km}$ $Y = -20 \text{ km}$
$X = 10 \text{ m/s}$ $Y = -10 \text{ m/s}$	$X = -40 \text{ N}$ $Y = -20 \text{ N}$	$X = 3 \text{ ft}$ $Y = 10 \text{ ft}$
$X = 0 \text{ mi}$ $Y = -6 \text{ mi}$	$X = 50 \text{ m/s}^2$ $Y = 0 \text{ m/s}^2$	$X = 90 \text{ m/s}$ $Y = -50 \text{ m/s}$

A plane heads at an angle of 40° West of North at a speed of 150 m/s .

a. Draw the vector representing the plane's flight and show the westward and northward components of its velocity.

b. Calculate the westward and northward components of the plane's velocity.



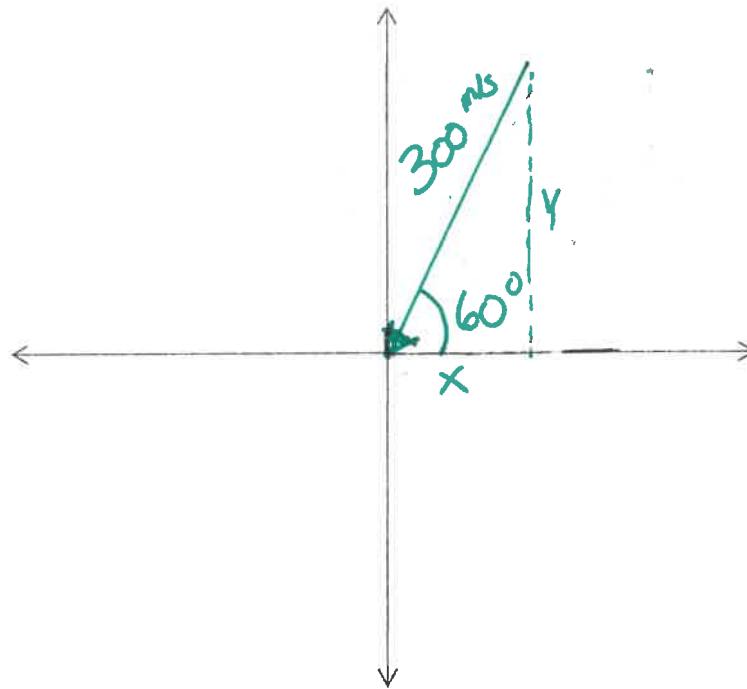
$$\begin{aligned} X &= 150 \text{ m/s} \times \sin 40^\circ \\ &= 100 \text{ m/s } \underline{\text{west}} \end{aligned}$$

$$\begin{aligned} Y &= 150 \text{ m/s} \times \cos 40^\circ \\ &= 100 \text{ m/s } \text{North} \end{aligned}$$

A rocket hits the ground at an angle of 60° from the horizontal at a speed of 300 m/s.

a. Draw the vector representing the rocket's impact and show the westward and eastward components of its velocity.

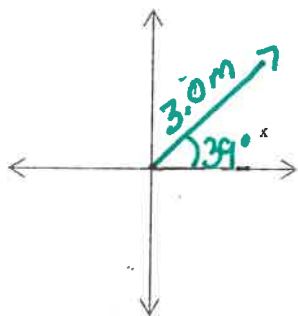
b. Calculate the horizontal and vertical components of the rocket's impact velocity.



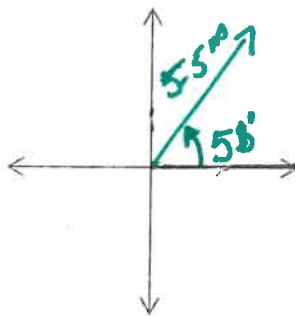
$$y = 300 \sin 60^\circ = 300 \text{ m/s down. } (-y)$$
$$x = 300 \cos 60^\circ = 200 \text{ m/s } (-\text{horizontal})$$

(-x)

A squirrel runs out into the street in front of your car. The squirrel runs at an angle of 39° for 3.0 m, turns around and runs 5.5 m at an angle of 51° . a. Draw the individual vectors. b. Calculate the resultant vector.



Vector A



Vector B

$$A_x = 2.3\text{ m}$$

$$A_y = 1.9\text{ m}$$

$$B_x = 3.5\text{ m}$$

$$B_y = 4.3\text{ m}$$

$$R_x = 5.8\text{ m}$$

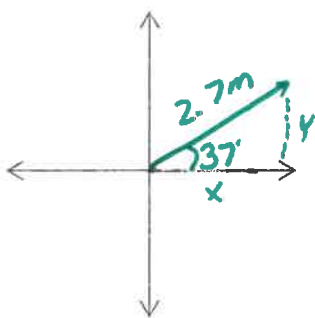
$$R_y = 6.2\text{ m}$$

$$R = 8.5\text{ m}$$

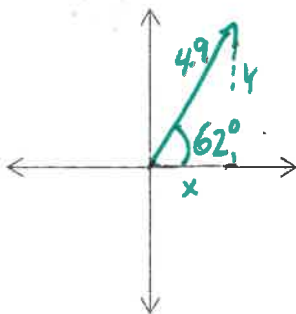
$$\theta = 47^\circ$$

A dodge ball player is trying to avoid getting hit by the opposing team. The player runs 2.7 m at an angle 37° . They then run 4.9 m at an angle of 62° . Then then runs 1.7 m at an angle of 13° .

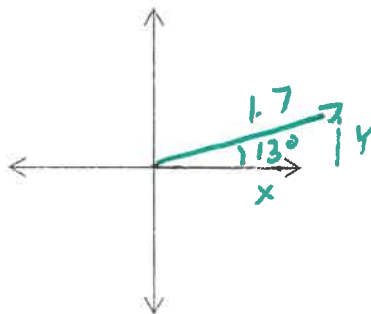
a. Draw the x and y components of the individual vectors on the diagram below.



Vector A



Vector B



Vector C

$$A_x = 2.2m$$

$$A_y = 1.6m$$

$$B_x = 2.3m$$

$$B_y = 4.3m$$

$$C_x = 1.7m$$

$$C_y = 0.38m$$

$$R_x = 6.1m$$

$$R_y = 6.3m$$

$$R = 8.8m$$

$$\theta = 46^\circ$$