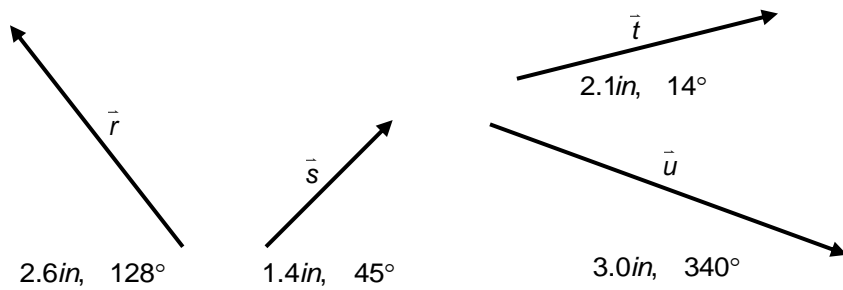


Complete the following problems, neatly, on a separate sheet of paper.



Find the horizontal and vertical components of each vector above.

- \vec{r}
- \vec{s}
- \vec{t}
- \vec{u}

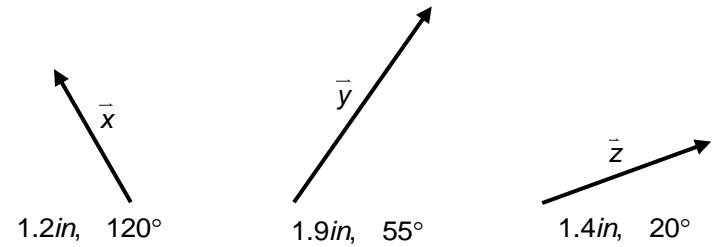
Use the horizontal and vertical components to find the magnitude and direction of each resultant.

- $\vec{r} + \vec{s}$
- $\vec{s} + \vec{u}$
- $\vec{u} - \vec{r}$
- $3\vec{u} - 2\vec{s}$
- $\vec{r} + 3\vec{s} - 2\vec{u}$

SAT/ACT Practice: Three times the least of three consecutive odd integers is three greater than two times the greatest. Find the greatest of the three integers.

Complete the following problems, neatly, on a separate sheet of paper.

- Is the sum of two vectors commutative? Justify your answer.
- Is \overline{RS} the same as \overline{SR} ? Explain.



Find the horizontal and vertical components of each vector above.

- \vec{x}
- \vec{y}
- \vec{z}
- The difference of a vector twice as long as \vec{z} and a vector one-third the magnitude of \vec{x} .

A plane is flying due west at a velocity of 100 meters per second. The wind is blowing out of the north (to the south) at 5 meters per second.

- Draw a labeled diagram of the situation.
- What is the magnitude and direction of the plane's resultant velocity?

Belkis is pulling a toy by exerting a force of 1.5 newtons on a string attached to the toy.

- The string makes an angle of 52° with the floor. Find the vertical and horizontal components of the force.
- If Belkis raises the string so that it makes a 78° angle with the floor, what are the magnitudes of the horizontal and vertical components of the force?

For each problem, make a sketch to show the given vectors and the resultant vector. Then solve the problem. Round magnitudes to the nearest hundredth and directions to the nearest tenth. DO NOT ROUND UNTIL THE FINAL ANSWER!

- Find the magnitude and direction of the resultant of a 425-newton force along the x-axis and a 390-newton force perpendicular to it.
- Find the magnitude and direction of the resultant of a 105-newton force along the x-axis and a 110-newton force at an angle of 50° to the first force.
- Two soccer players kick the ball at the same time. One player's foot exerts a force of 70N west and the other's foot exerts a force of 30 N south. Find the magnitude and direction of the resultant force on the ball.
- A hiker leaves camp and walks 13 km due north. The hiker then walks 15 km northeast (exactly midway between north and east). Find the hiker's direction and displacement from her starting point.
- An airplane flies due west at 240 km/h. At the same time, the wind blows it due south at 70 km/h. Find the plane's resultant velocity and direction.
- A pilot flies a plane east for 200 km, then 60° south of east for 80 km. Find the plane's distance and direction from the starting point.
- Find the magnitude and direction of the resultant of two forces of 250 pounds and 45 pounds at angles of 25° and 160° with the x-axis, respectively.
- An airplane flies at 150 km/h and heads 30° south of east. A 40 km/h wind blows it in the direction 30° west of south. What is the plane's resultant velocity and bearing?

Answers: (1) $r = 576.82\text{N}$, $\Theta = 42.5^\circ$ (2) $r = 194.87\text{N}$, $\Theta = 25.6^\circ$ (3) $r = 76.16\text{N}$, $\Theta = 23.2^\circ$ south of west
 (4) $r = 25.88\text{ km}$, $\Theta = 24.2^\circ$ east of north (5) $r = 250\text{ km/h}$, $\Theta = 16.3^\circ$ south of west (6) $r = 249.80\text{ km}$, $\Theta = 16.1^\circ$ south of east (7) $r = 220.49\text{ lb}$, $\Theta = 33.3^\circ$ (8) $r = 155.24\text{ km/h}$, $\Theta = 134.9^\circ$ (east of north)

- Draw vector \vec{a} with magnitude 2.4 cm and direction 35° and find the magnitude of the horizontal and vertical components of \vec{a} .
- Given A(-3, 7) and B(-4, 9) find:
 - an ordered pair for \overline{AB}
 - the magnitude of \overline{AB}
 - the direction of \overline{AB}
- Given $\vec{v} = \langle 3, -1 \rangle$ and $\vec{w} = \langle 0, 4 \rangle$:
 - Find $\vec{u} = 2\vec{v} + \vec{w}$
 - Find $|\vec{u}|$
 - True or False? $|\vec{u}| = 2|\vec{v}| + |\vec{w}|$
- Write each of the following vectors in the form $a\mathbf{i} + b\mathbf{j}$
 - The vector joining the origin to P(2, -3)
 - The vector joining P1(2, 3) to P2(4, 2)
 - The vector joining P2(4, 2) to P1(2, 3)
 - The vector having magnitude 6 and direction 120°
- Given $\vec{v} = \langle 4, -1, 0 \rangle$ and $\vec{w} = \langle -2, 1, 3 \rangle$, find:
 - $|\vec{w}|$
 - The sum of \vec{v} and \vec{w}
 - The dot product of \vec{v} and \vec{w}
 - The cross product of \vec{v} and \vec{w}
- Determine if the vectors $\langle 4, 1, -6 \rangle$ and $\langle 8, -2, 5 \rangle$ are perpendicular.
- Find a vector perpendicular to the plane containing the points (1, 2, 3), (-4, 2, -1) and (5, -3, 0).

8. An airplane flies due west at 260 km/hr. At the same time, the wind blows it 10° east of south at 75 km/hr. Find the plane's resultant velocity and direction.

Three vertices of a parallelogram are located at $A(1,2,3)$, $B(2,-1,5)$ and $C(4,1,3)$. Find the area of the parallelogram