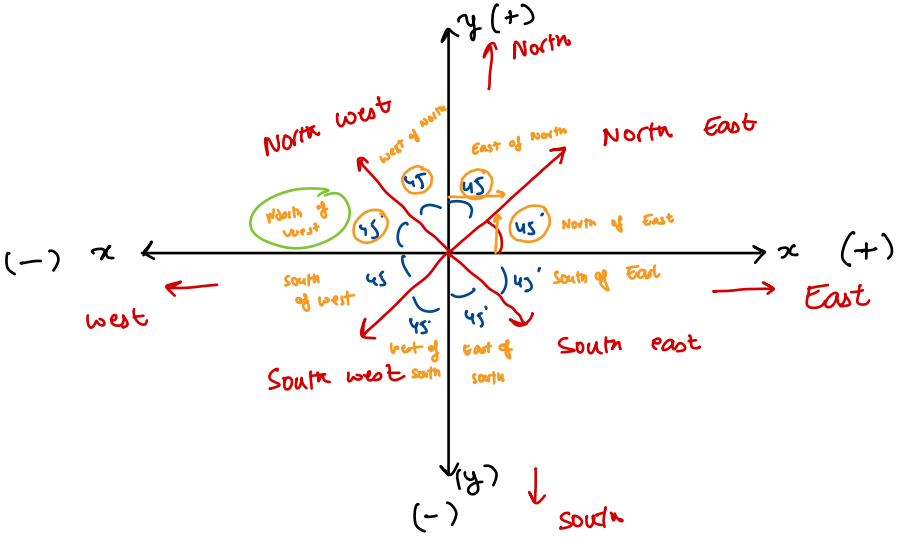
Scalars & Vectors

Quantity : anything that you can measure ; time, length, speed, force

→ Scalar : magnitude only eg time

→ Vector : magnitude + direction eg Force



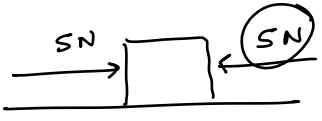
Vector Addition

(1)

$5 + 5 = 10N$

East

(2)

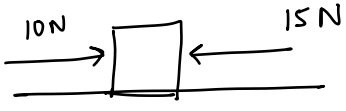


$5 + (-5) = 0N$

not moving

Rest

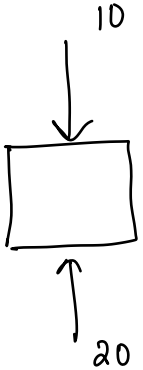
(3)



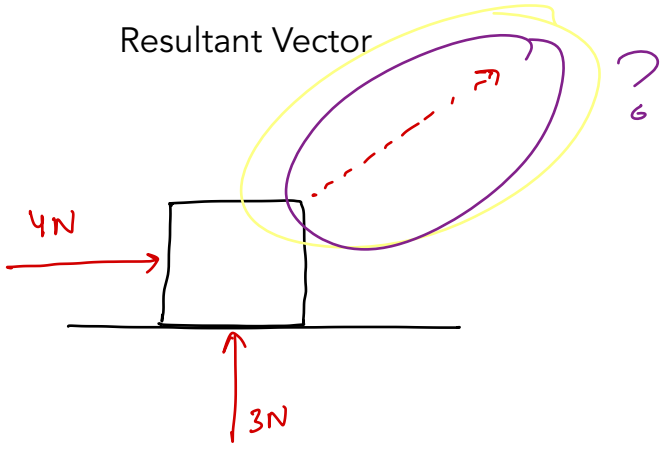
5N to the left

$-5N$

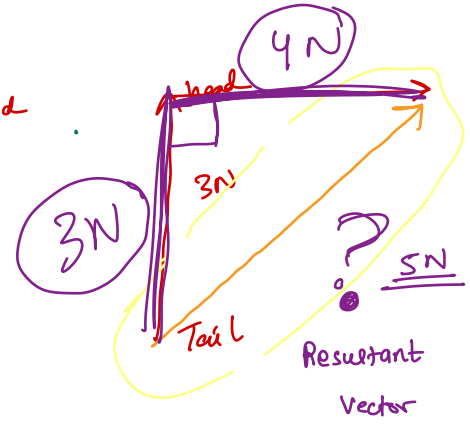
(4)



$+10N$



① head to tail method

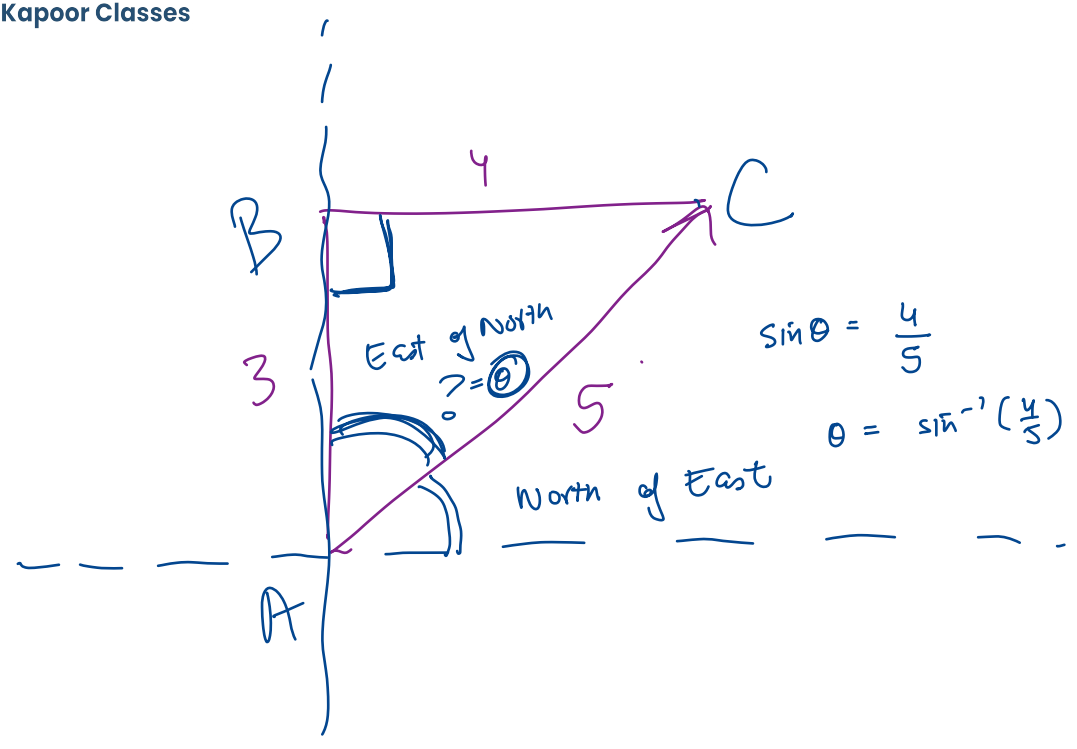


4N
tail
head

→ move vectors anywhere parallel

→ tail of first to the head of second

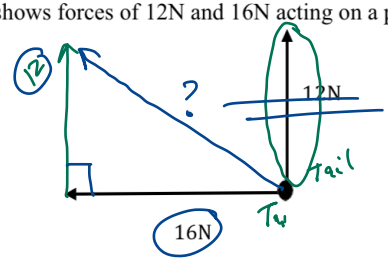
$$\sqrt{3^2 + 4^2} = 5N$$



$\sin\theta = \frac{4}{5}$

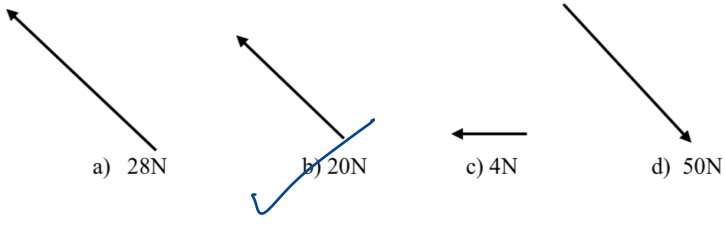
$\theta = \sin^{-1}\left(\frac{4}{5}\right)$

The following diagram shows forces of 12N and 16N acting on a particle, P in directions north and due west respectively.



$\sqrt{16^2 + 12^2} = 20$

Which of the following BEST represents the resultant force?

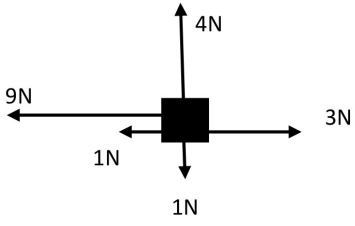


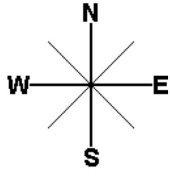
a) 28N

b) 20N

c) 4N

d) 50N

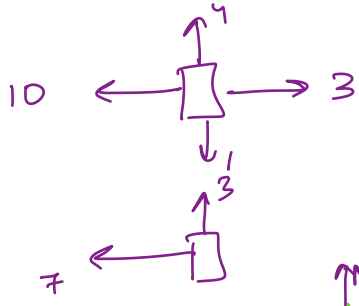


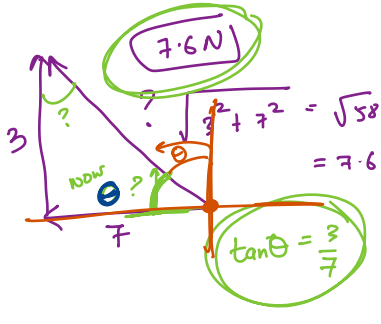


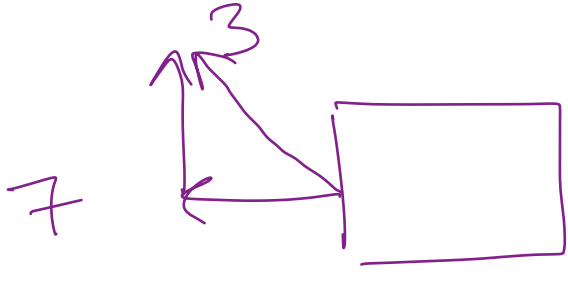
2. The direction of the resultant vector is towards

a) North-east b) South-east c) North-west d) South-west

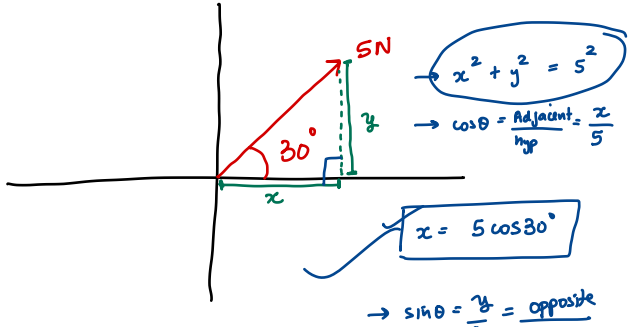
✓Calculate the Resultant Magnitude and Resultant Direction.







Resolving Into components



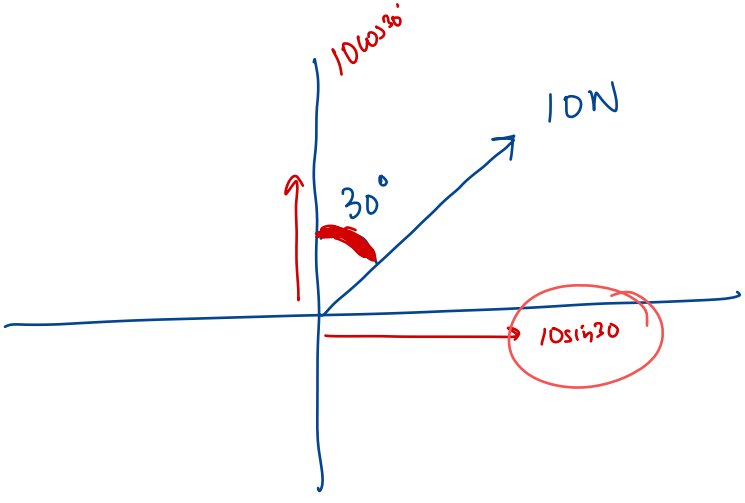
$$(5\cos 30°)^2 + (5\sin 30°)^2 = 5^2$$

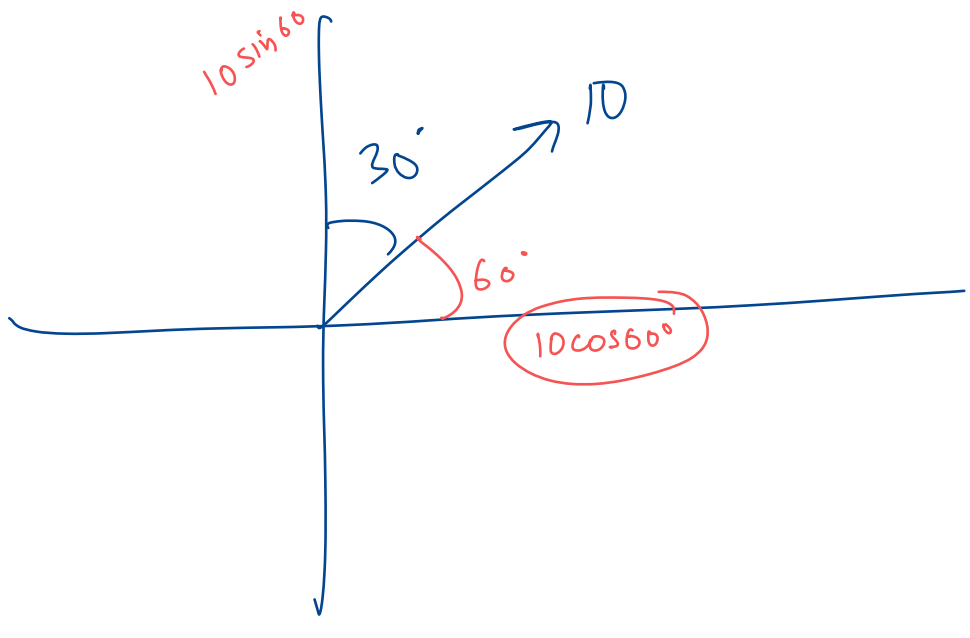
$$25\cos^2 30 + 25\sin^2 30 = 25$$

$$25(\cos^2 30 + \sin^2 30) = 25$$

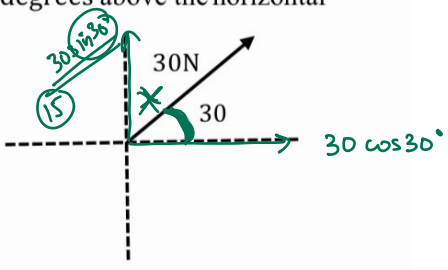
$$\Downarrow$$

$$1$$


10cos30°
10N
30°
10sin30


10 sin60°
10
30°
60°
10cos60°

A force of 30 N acts at an angle of 30 degrees above the horizontal

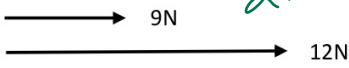


The vertical and horizontal components of this force are respectively

a) 26N and 15N
b) 20N and 12N
c) 15N and 26N
d) 10N and 10N

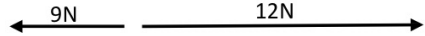
Find the vector sum of the following

21N East

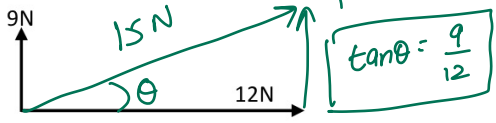


A

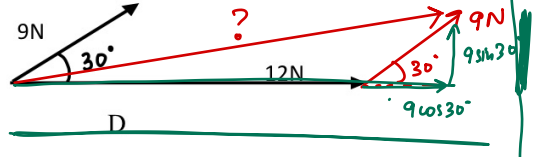
3N East



B



C



D

Show your work for part C and D and solve for both Vector Sum and Direction.

$$(12 + 9\cos 30^\circ)^2 + (9\sin 30^\circ)^2 = (?)^2$$