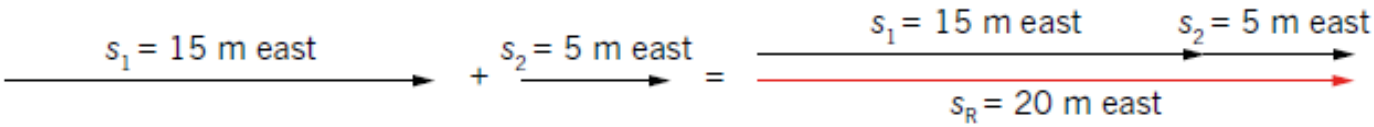
Physics with Synno – Motion-2 – Lesson 2

M.1.2.1 Addition of Vectors

If we have two vectors a and b, to add them we put the vectors head to tail and the result of the addition is the vector drawn from the starting point to the finishing point.

One-Dimension



Eg. Determine the resultant force on a box that is acted upon by the following forces: 16N Up, 22 N Down, 4 N Up, 17 N Down

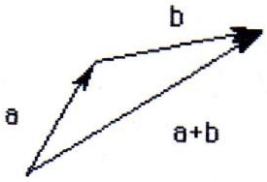
Take Up as +ve

16 – 22 + 4 – 17 = -19

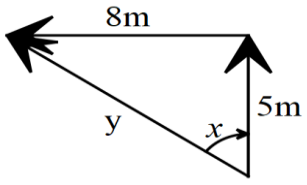
Resultant force is 19 N Down

Two-Dimensions

We will use Pythagoras and Trigonometry (SOH CAH TOA) to help with the calculation.



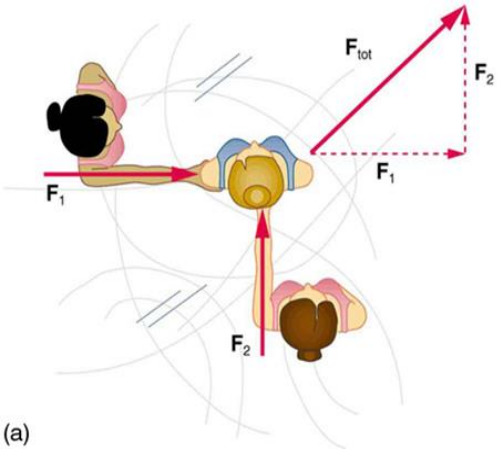
Example Add the vectors 5 m North and 8 m West



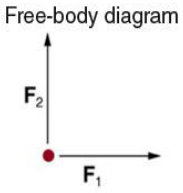
$y^2 = 8^2 + 5^2$
$y^2 = 64 + 25$
$y = \sqrt{89}$
$y = 9.43m$
$x = \tan^{-1}\left(\frac{8}{5}\right)$
$x = 58°$

Vector sum is 9.43m N 58° W

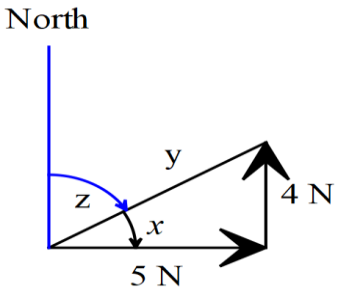
Example A skater is pushed by two others. As shown in the diagram below.
If $\mathbf{F}_1$ is 5 N East and $\mathbf{F}_2$ ia 4N North, what is the resultant force on the skater.



(a)



(b)



$y^2 = 4^2 + 5^2$
$y^2 = 16 + 25$
$y = \sqrt{41}$
$y = 6.4\ N$
$x = \tan^{-1}\left(\frac{4}{5}\right)$
$x = 38.7°$
$z = 90 - 38.7 = 51.3$

Vector sum is 6.4 N, N 51.3º E

Problem Set #2: Text Page 271 All Questions