

Physics 112

* Math 10 → Review

Physics 112

1) Kinematics

2) Dynamics

3) Work, energy, momentum ; impulse

4) Waves

Same type of material as was completed in gr. 10 Science

Kinematics

- Scalar vs Vector
- Vector addition and subtraction

- Word problems involving motion

Terms

Scalar
Quantity

Vector
Quantity

Scalar - magnitude only
- numerical value only
- 12 m , 30 m/s , 200 J

Vector - described by both magnitude and direction
- 12 m East , 15 m/s up , 30 N Left

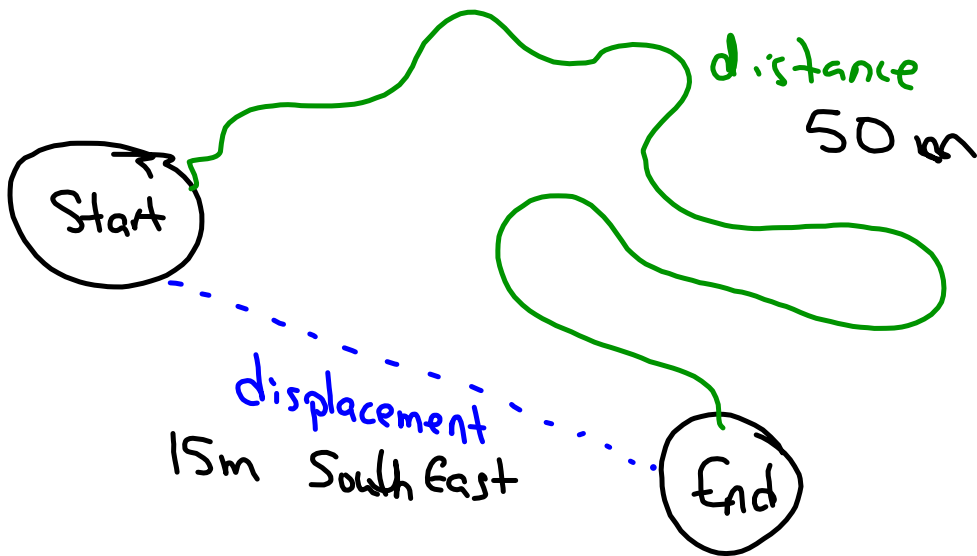
ExamplesScalar

distance
time
speed
mass
temperature
distance
energy
work

Vector

displacement
acceleration
velocity
momentum
force
weight

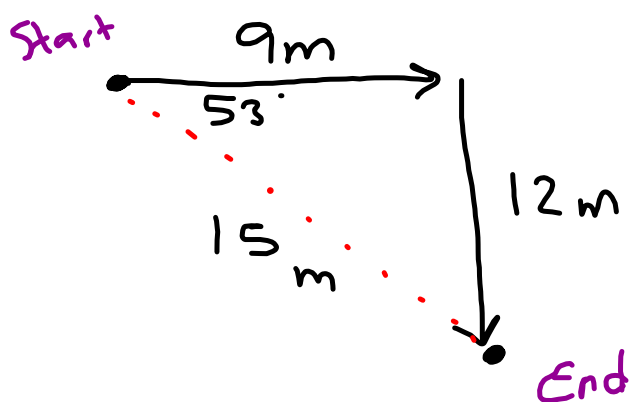
We will look at distance and displacement



Displacement \rightarrow Change in position.

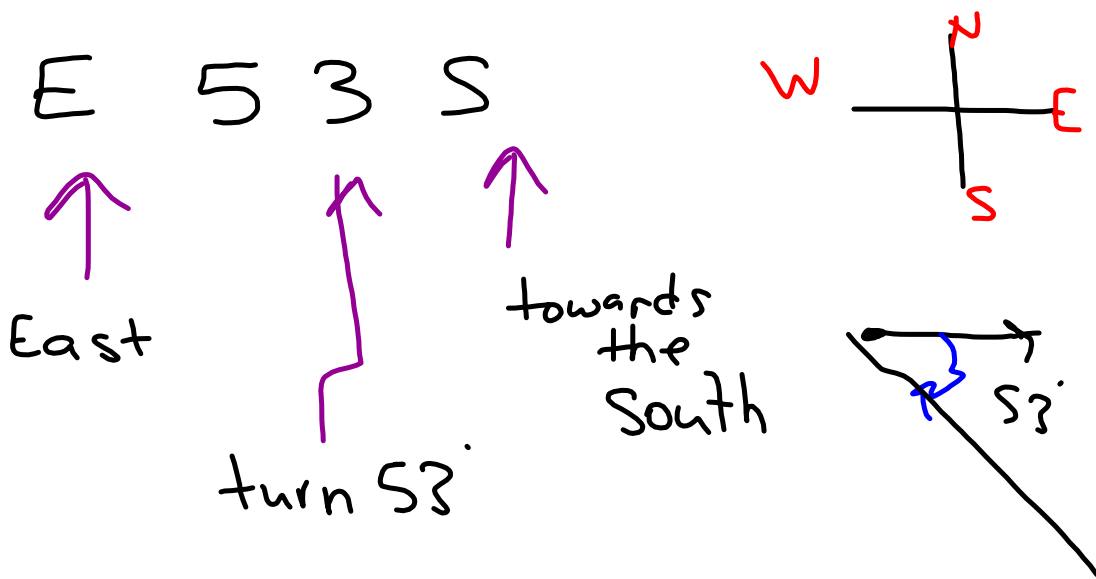
\Rightarrow measured from your starting position to your end position

Distance \rightarrow Total amount the object has moved. This depends on the whole path traveled, not just the starting and ending points.



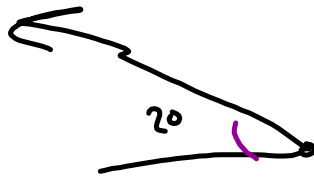
Distance = 21 m

Displacement
= 15 m
E 53 S



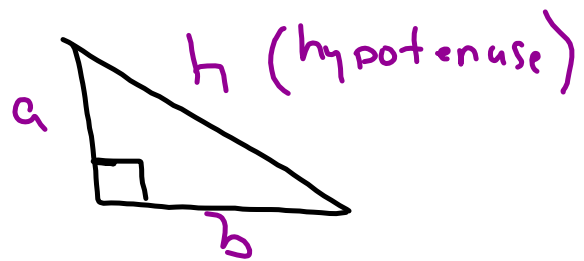
W 20 N

- Go west and turn 20° to the North

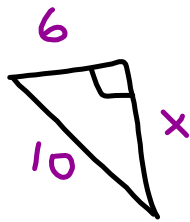


• Pythagorean theorem

$$h^2 = a^2 + b^2$$



Example:



$$\begin{aligned}h^2 &= a^2 + b^2 \\10^2 &= x^2 + 6^2 \\100 &= x^2 + 36 \\100 - 36 &= x^2 \\64 &= x^2\end{aligned}$$

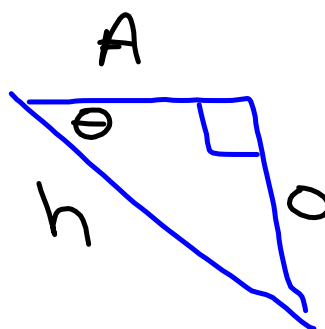
$$\boxed{8 = x}$$

• Trig Ratios

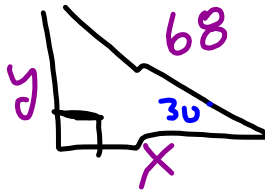
$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$



Example:



x

y

$$\cos \theta = \frac{A}{H}$$

$$\cos 30 = \frac{x}{68}$$

$$68 \cos 30 = x$$

$$68(0.866) = x$$

$$58.9 = x$$

$$\sin \theta = \frac{O}{H}$$

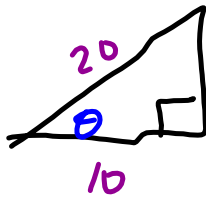
$$\sin 30 = \frac{y}{68}$$

$$68(\sin 30) = y$$

$$68(0.5) = y$$

$$34 = y$$

Example :



$$\cos \theta = \frac{A}{H}$$

$$\cos \theta = \frac{10}{20}$$

$$\cos \theta = 0.5$$

$$\theta = 60^\circ$$

Rearrange Formulas

$$1) \quad d = ut \quad (t)$$

$$\frac{d}{v} = \frac{ut}{v}$$

$$\frac{d}{v} = t$$

$$2) \quad h^2 = a^2 + b^2 \quad [a]$$

$$h^2 - b^2 = a^2 + b^2 - b^2$$

$$h^2 - b^2 = a^2$$

$$\sqrt{h^2 - b^2} = a$$

$$3) \quad a = \frac{v_2 - v_1}{t} \quad [v_2]$$

$$a \times t = \frac{v_2 - v_1}{t} \times t$$

$$at = v_2 - v_1$$

$$at + v_1 = v_2 - v_1 + v_1$$

$$at + v_1 = v_2$$

$$4) \quad v_2^2 = v_1^2 + 2ad \quad [a]$$

$$v_2^2 - v_1^2 = v_1^2 + 2ad - v_1^2$$

$$v_2^2 - v_1^2 = 2ad$$

$$\frac{v_2^2 - v_1^2}{2d} = \frac{2ad}{2d}$$

$$\frac{v_2^2 - v_1^2}{2d} = a$$

$$5) \quad n = \frac{c}{v} \quad [v]$$

$$n \times v = \frac{c}{v} \times v$$

$$nv = c$$

$$\frac{nv}{n} = \frac{c}{n}$$

$$v = \frac{c}{n}$$

