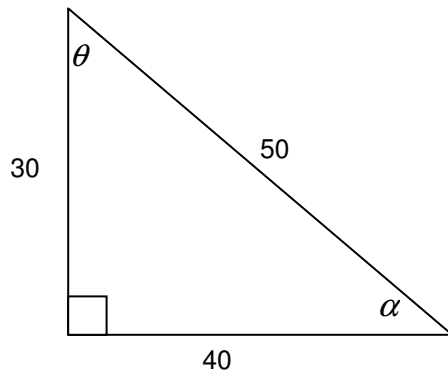


Physics is very heavily dependent on math. Therefore, it is very important to become reacquainted with some basic math concepts.

Trigonometry

$\sin \theta = \frac{opp}{hyp}$, $\cos \theta = \frac{adj}{hyp}$, $\tan \theta = \frac{opp}{adj}$ or remember **sohcahtoa**.



$$\sin \theta = \frac{40}{50}$$

$$\sin \alpha = \frac{30}{50}$$

$$\cos \theta = \frac{30}{50}$$

$$\cos \alpha = \frac{40}{50}$$

$$\tan \theta = \frac{40}{30}$$

$$\tan \alpha = \frac{30}{40}$$

Sine Law and Cosine Law

Sine Law

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine Law

$$c^2 = a^2 + b^2 - 2ab \cos(C) \text{ or}$$

$$a^2 = c^2 + b^2 - 2cb \cos(A) \text{ or}$$

$$b^2 = a^2 + c^2 - 2ac \cos(B)$$

Proportioning

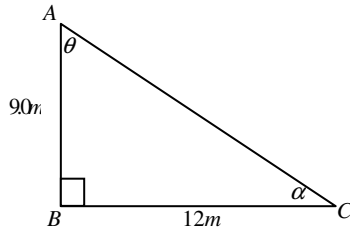
One very useful tool in physics is proportioning. The advantage of proportioning is that one needs very little information to solve a question.

Example: If the gravitational attraction between two bodies was 4N, what would happen to the force if the mass of one body was tripled and the distance between them cut in half?

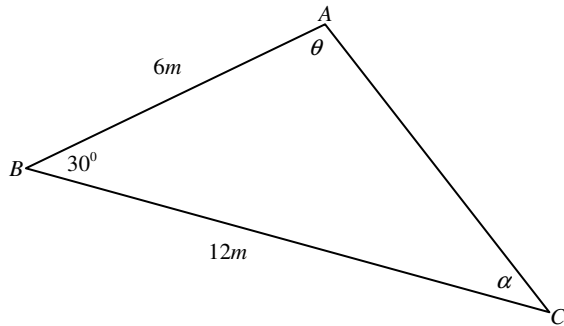
<u>Proportion 1</u>	<u>Proportion 2</u>
$F_{g_1} = \frac{Gm_a m_b}{r^2}$ <p>where $F_{g_1} = 4N$</p>	$F_{g_2} = \frac{G3m_a m_b}{(\frac{1}{2}r)^2}$ $F_{g_2} = \frac{3Gm_a m_b}{\frac{1}{4}r^2}$ $F_{g_2} = \frac{4}{1} \cdot \frac{3Gm_a m_b}{r^2}$ $F_{g_2} = 12 \frac{Gm_a m_b}{r^2}$
	$F_{g_2} = 12F_{g_1}$ $F_{g_2} = 12 \times 4N$ $= 48N$ <p>\therefore the force is 48N</p>

Questions:

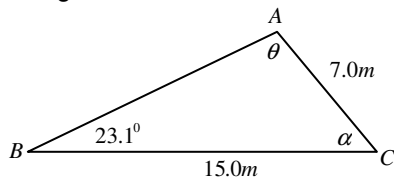
- Find the two unknown angles and the length of the unknown side using trigonometric ratios only.



- Find all the unknown sides of the following triangle.

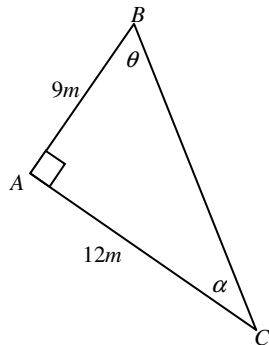


- Find all the unknown sides of the following triangle.

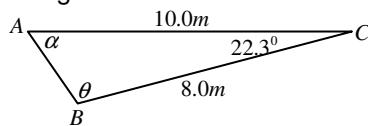


Homework:

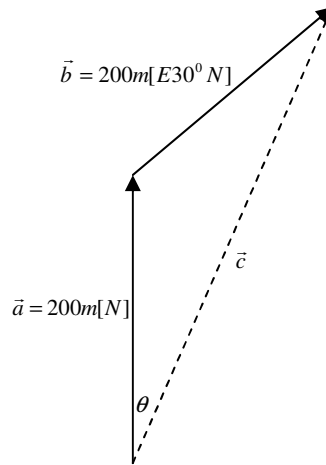
- Find the two unknown angles and the length of the unknown side using trigonometric ratios only.



- Find all the unknown sides of the following triangle.

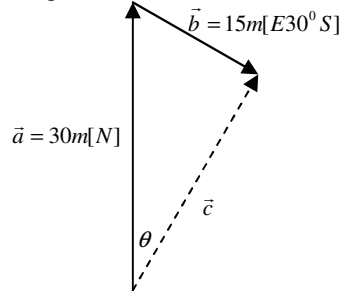


- Find the displacement represented in the diagram below.



- The volume of a cylinder is defined by the formula $V = \pi r^2 h$. If initially have a cylinder with a volume of $10m^3$, find the volume of the cylinder:
 - if the height doubles
 - if the height is cut in half
 - if the radius is doubled
 - if the radius is cut in half
 - if the radius is doubled and the height is cut in half

- Find the displacement represented in the diagram below.



- The volume of a cone is defined by the formula $V = \frac{1}{3} \pi r^2 h$. If initially have a cone with a volume of $9m^3$, find the volume of the cone:
 - if the height is reduced to a third
 - if the radius is doubled
 - if the radius is reduced to a third
 - if the radius is tripled and the height is reduced to a fourth.