Mechanics 1.1 AS 90940 Mechanics

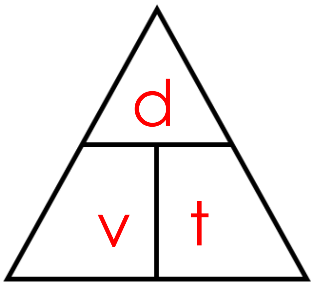
ANSWERS Formula revision Part 1

Success Criteria: We know we have achieved this when we can:

- Construct a Formula equation for Motion, Force and Pressure
- Be able to give the names and units used in each Formula
- Be able to solve a simple question using each Formula

Remember to answer questions:
1. Write down formula
2. Rearrange formula if needed
3. Show working
4. Give answer with units

1. Calculating **speed (velocity)** - Fill in triangle and give names and units for each Letter



Letter	Name	Units
v	Velocity / speed	**$m\ s^{-1}$**
d	distance	m
t	time	s

$v = \Delta d / \Delta t$

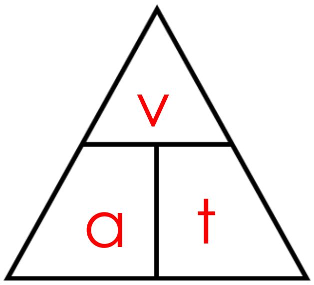
Sample Question: A cyclist rides at a speed of **20 ms^{-1}** for **30 seconds**. Calculate the **distance** she travels.

d = v x t

d = 20 ms^{-1} x 30 s

d = 600 m

2. Calculating **acceleration** - Fill in triangle and give names and units for each Letter



Letter	Name	Units
a	acceleration	ms^{-2}
v	velocity	ms^{-1}
t	time	s

$a = \Delta v / \Delta t$

Sample Question: A car accelerates from **5 ms^{-1}** and reaches a speed of **20 ms^{-1}**

If the car takes **12 s** to reach this speed, calculate the **acceleration** of the car.

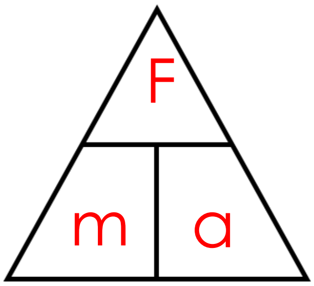
$a = \Delta v / \Delta t$

$\Delta v = 20\ ms^{-1} - 5\ ms^{-1} = 15\ ms^{-1}$

$a = 15\ ms^{-1} / 12\ s$

$a = 1.25\ ms^{-2}$

3. Calculating **Force (general)** - Fill in triangle and give names and units for each Letter



Letter	Name	Units
F	Force	N
m	mass	kg
a	acceleration	ms^{-2}

$F_{net} = ma$

<u>Sample Question:</u> A car broke down and needs to be pushed. Three people pushed the car with a force of **450 N.** Friction can be ignored. If the car with the driver inside it had a mass of **900 kg**, calculate the car's **acceleration.**

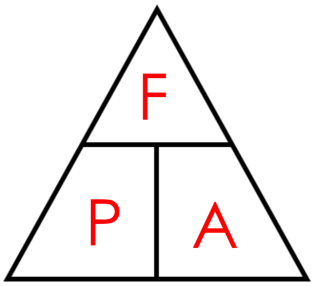
a = F / m

a = 450 N / 900 kg

a = 0.5 ms^{-2}

Remember to convert mass to weight:
F (weight) = Mass x Gravity
Acceleration due to gravity = $10ms^{-2}$

4. Calculating **pressure** - Fill in triangle and give names and units for each Letter



Letter	Name	Units
P	Pressure	Nm^{-2} or Pa
F	Force	N
A	Area	m^2

P= F / A

<u>Sample Question:</u> A **70 kg** snowboarder stands uses a snowboard which has a mass of **2.5 kg.** The snowboard has a surface area in contact with the snow of **0.60 m^2.** Calculate the pressure on the snow.

P = F / A

Mass = 70 kg + 2.5 kg = 72.5 kg

F_{weight} = 72.5 x 10 = 725 N

P = 725 N / 0.60 m^2

P = 1208.3 Nm^2

Remember:

To convert cm^2 to m^2

Divide by 10,000