AQA P5a Forces - the basics
Triple Physics

Required Practical for this topic:
Hooke's Law

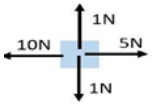
Gravity, mass and weight	mass	How much matter something is made of	Measured in kilograms (kg)
	weight	The force acting on an object due to gravity	Measured in newtons (N)
	gravitational field strength	How much weight is experienced per kilogram of mass	On Earth, this is 9.8 N/kg
Weight = mass x gravitational field strength (W = m x g)			

Units and definitions	unit	For example: newton (N), kilogram (kg), metre (m)	
	kilo	For example: kilonewton (kN), kilogram (kg)	1000 or $1x10^3$
	mega	For example: meganewton (MN)	1,000,000 or $1x10^6$
	velocity	Speed in a given direction	m/s
	distance	How far	m
	displacement	Distance in a given direction	e.g. 5 metres east
centre of mass = the single point through which the weight of an object acts			

Scalars and vectors	scalar	A quantity that only has magnitude (size), e.g. mass, time, temperature, energy, speed	Arrows can be used to show vectors: Length of the arrow = size of the vector Direction of the arrow = direction of the vector 
	vector	A quantity that has magnitude and direction, e.g. force, velocity, momentum	

Work done and energy transfer	work done	When work is done, energy is transferred. Work done = force x distance (W = Fs)
1 joule of work is done when 1 newton of force moves an object 1 metre in the direction of the force (1 J = 1 N/m)		
If the force is at right angles to the direction of movement then no work is done		
If work is done against friction then the thermal energy store of the object will increase		

Forces	A force can be a push or a pull	Examples are stretch, squash and turn
	Contact forces are exerted between two objects when they touch	E.g. friction, air resistance and tension
	Non-contact forces are exerted between two objects without touching	E.g. gravity, magnetism, electrostatic forces
Resultant force = the single force which has the same effect as all the forces on an object		
	Two forces acting in the same direction…	…are added together
	Two forces acting in opposite directions…	…are taken away

A free body diagram shows the magnitude and direction of all the forces on an object	
The object in the diagram would experience a force of 5N to the left.	
You can split a force into two component forces acting at right angles to each other.	This is called resolving forces. The combined forces have the same effect.

Forces and elasticity	Forces can…	…accelerate or deform an object.
	elastic deformation	An object has been stretched but can return to its original length
	inelastic deformation	An object is stretched and can't return to its original length
	extension =	Current length – original length
	Hooke's law	The extension is directly proportional to the force stretching an object
	limit of proportionality	The point at which a force-extension graph stops being a straight line and Hooke's law stops being true
	elastic potential energy	Energy stored in a stretched spring
	work done on a spring	Increases the elastic potential energy store and thermal energy store of the spring
Hooke's law: force (*N*) = spring constant (*N/m*) x extension (*m*) (F = k x e)		
elastic potential energy (*J*) = ½ x spring constant (*N/m*) x extension^2 (m^2) (E = ½ ke^2)		