AQA Forces – Knowledge Organiser

Keywords

Force	Make objects move or change shape. Measured in Newtons (N)
Vector	Quantities with both magnitude [size] and direction such as momentum
Scalar	Quantities with only magnitude
Speed	A scalar quantity – How something covers a set distance ***[speed = distance ÷ time]***
Velocity	A vector quantity – speed in a given direction
Acceleration	How quickly something speeds up. ***(change in speed ÷ time taken)*** **[m/s/s]**
Distance	A scalar quantity that measures how much ground an object covers when moved
Displacement	A vector quantity that measures how far out of place an object is from A to B
Weight	A **force** caused by gravity. Measured in **N**ewtons ***[weight = mass x gravity]***
Mass	The amount of matter an object has. Measured in **g** or **kg**
Resultant Force	The overall, single force. This is zero if objects are stationary or at constant speed
Terminal Velocity	The maximum speed objects reach when falling. When weight = resistive forces
Joule	Force of 1 Newton displaces an object of 1 metre (1 Joule = 1 Newton-metre)
Hookes Law	Extension of an elastic object is directly proportional to the force ***[F = ke]***
Stopping Distance	The amount of time it takes to stop. Thinking distance + braking distance. (in m)
Momentum *(HT)*	Vector quantity that is a property of moving objects ***[momentum = mass x velocity]*** (kg m/s) also written as *p = mv*

Contact Forces	Non-Contact Forces
Friction	Gravitational Forces
Air Resistance	Electrostatic Forces
Tension	Magnetic Forces
Reaction Forces	Nuclear Forces

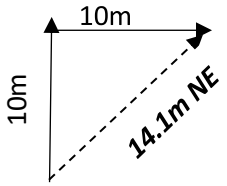
Scalar Quantity	Vector Quantity
Mass	Force
Speed	Acceleration
Distance	Displacement
Time	Velocity

Equations

Energy Transfer (work)	Work (J or N/m) = Force (N) x Distance (m)
Weight	Weight (N) = mass (kg) x g
Hookes law	Force (N) = spring constant (N/m) x extension (m)
Elastic Potential Energy	Elastic potential energy = ½ x spring constant x (extension)^2
PHYSICS ONLY Turning Force	Moment of a force(Nm) = force (N) x distance (m)
PHYSICS ONLY Pressure	Pressure (Pa) = Force (N) ÷ Area (m^2)
PHYSICS ONLY (HT) Liquid Column Pressure	Pressure(Pa) = column height (m) x density (kg/m^3) x g (N/kg)
Speed	Speed (m/s) = distance (m) ÷ time (s) [v = s ÷ t]
Newtons 2nd Law	Resultant Force (N) = mass (kg) x acceleration (m/s^2)
HT ONLY Momentum	Momentum (kg m/s) = mass (kg) x velocity (m/s)
Acceleration	Acceleration (m/s/s or m/s^2) = change in velocity ÷ time taken
Uniform Acceleration	$V^2 - U^2 = 2as$; $V = u + at$; $V^2 = U^2 + 2as$; $S = ut + ½at^2$

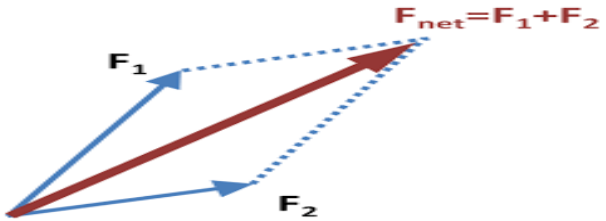
U = initial velocity V = final velocity t = time
a = acceleration s = displacement
u, v, a, s = vector quantities t = scalar quantity

Forces and Vectors



Measure displacement / resultant force with a ruler or by

$F = \sqrt{a^2 + b^2}$



Newtons Laws

First law	Resultant force is zero if stationary or travelling at constant speed. Objects will travel in a straight line unless a force acts on it. (**HT**- resisting that change)
Second Law	F=ma – acceleration is proportional to force & inversely proportional to mass
Third Law	When objects interact their forces are equal and opposite

Common Speeds
walking 1.5 m/s, running 3 m/s, cycling 6 m/s

PHYSICS & HT ONLY Force as rate of change of momentum: Force = change in momentum ÷ time taken for the change

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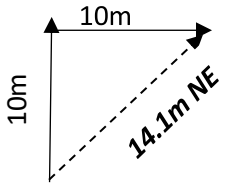

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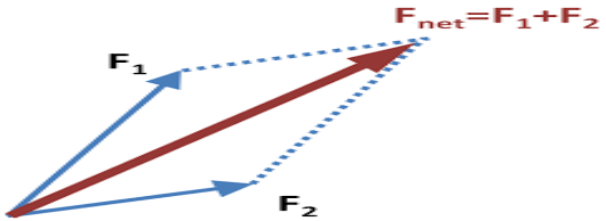

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