Particle model of matter

What causes the hazard from contamination?

Radioactive contamination.

Particle model of matter

What affects the level of hazard?

Radioactive contamination.

Particle model of matter

What is irradiation?

Radioactive contamination.

Particle model of matter

Compare the hazards of contamination and irradiation of an alpha source.

Radioactive contamination.

Particle model of matter

Compare the hazards of contamination and irradiation of a beta source.

Radioactive contamination.

Particle model of matter

Compare the hazards of contamination and irradiation of a gamma source.

Radioactive contamination.

Particle model of matter

Explain why it is important for scientists to publish findings on the effect of radiation.

Radioactive contamination.

Forces

Define the term scalar quantity.

Scalar and vector quantities

Forces

Define the term vector quantity.

Scalar and vector quantities

Forces

Give four examples of scalar quantities.

Scalar and vector quantities

The type of radiation emitted.

The decaying atoms in the radioactive contamination.

Contamination inside the body is very dangerous. Irradiation is less hazardous because of low penetration.

The process of exposing an object to nuclear radiation.

Contamination carries a low risk but irradiation by gamma rays is highly hazardous.

Less damaging inside the body due to less ionising. Irradiation can be dangerous especially at higher doses.

A quantity with magnitude only.

So the findings can be shared with other scientists and checked by peer review.

Mass, distance, speed and temperature.

A quantity with both magnitude and direction.

Forces

Give four examples of vector quantities.

Scalar and vector quantities

Forces

Explain how a vector quantity can be represented by an arrow.

Scalar and vector quantities

Forces

What is a contact force?

Contact and non-contact forces

Forces

What is a non-contact force.

Contact and non-contact forces

Forces

Give two examples of contact forces.

Contact and non-contact forces

Forces

Give two examples of non-contact forces.

Contact and non-contact forces

Forces

What type of quantity is force?

Contact and non-contact forces

Forces

What is weight?

Gravity

Forces

What is the cause of the force of gravity close to the Earth?

Gravity

Forces

What does the weight of an object depend on?

Gravity

The direction of the arrow represents the direction of the vector quantity and the length of the arrow represents the magnitude.

Acceleration, force, velocity and displacement.

An interaction between two objects which are physically separated.

An interaction between two objects which are physically touching.

Gravitational force, magnetic force and electrostatic force.

Friction, air resistance, tension and normal contact force.

The force acting on an object due to gravity.

Vector

The gravitational field strength where the object is.

The gravitational field around the Earth.

Forces

What is the equation to calculate the weight of an object?

Gravity

Forces

What is the unit of weight?

Gravity

Forces

What is the unit of gravitational field strength?

Gravity

Forces

Where is the weight of an object considered to act?

Gravity

Forces

How are the weight and mass of an object linked?

Gravity

Forces

How can the weight of an object be measured?

Gravity

Forces

What is a resultant force?

Resultant forces

Forces

Explain how you would calculate the resultant force of two forces that act in a straight line?

Resultant forces

Forces

When is work done?

Work done and energy transfer

Forces

What is the equation to calculate work?

Work done and energy transfer

N (newtons).

W = m x g (weight = mass x gravitational field strength.

The centre of mass.

N/kg (newtons per kilogram).

Using a calibrated spring-balance (newtonmeter).

They are directly proportional.

Take one force away from the other to calculate the overall resultant force.

A single force that can be used to replace a number forces acting upon an object. The resultant force has the same effect as all the other forces acting together.

W = F x s (work done = Force x distance)

When a force causes an object to move through a distance (e.g. pushing a pram).

Forces

What is the unit of work?

Work done and energy transfer

Forces

What is a newton-metre?

Work done and energy transfer

Forces

What is 1 newton-metre equal to?

Work done and energy transfer

Forces

Describe the energy transfer when a person walks up a flight of stairs.

Work done and energy transfer

Forces

What is the result of work done against frictional forces acting upon an object.

Work done and energy transfer

Forces

State three ways the shape of an object can be changed.

Forces and elasticity

Forces

Explain why when changing the shape of an object more than one force needs to be applied.

Forces and elasticity

Forces

What is elastic deformation?

Forces and elasticity

Forces

What is inelastic deformation?

Forces and elasticity

Forces

How is extension of an elastic object related to the force applied?

Forces and elasticity

When a force of one newton causes a displacement of 1 metre.

Joules

The higher the person gets the greater the gravitational potential energy they store.

1 joule.

Stretching, bending and compression.

This causes a rise in the temperature of the object.

This is when an object that has been deformed returns to its original length and shape.

If only one force was applied the object would simply move in the direction of the applied force.

The extension of an object is directly proportional to the force applied (provided the limit of proportionality is not exceeded.

This is when an object that has been deformed does not return to its original length and shape.

Forces

What is the limit of proportionality?

Forces and elasticity

Forces

What is the formula that combines force, spring constant and extension?

Forces and elasticity

Forces

What is the unit for the spring constant?

Forces and elasticity

Forces

What is the unit for extension?

Forces and elasticity

Forces

Explain the energy transfer when a force is applied to a spring.

Forces and elasticity

Forces

Explain why you would see a linear relationship between force and extension.

Forces and elasticity

Forces

Explain why you would see a non-linear relationship between force and extension.

Forces and elasticity

Forces

Describe how you would calculate the spring constant from a graph if the force and extension have a linear relationship.

Forces and elasticity

Forces

What equation would you use to calculate the work done by a spring?

Forces and elasticity

Forces

Define distance.

Distance and displacement.

F = k x e (force = spring constant x extension).

This is the point at which the extension is no longer proportional to the force. On a force against extension graph, the line starts to curve after this point.

Metres.

N/m (newtons per metre).

A linear relationship shows that the force is directly proportional to the extension.

A force that deforms a spring does work. Elastic potential energy is then stored in the spring. The work done is equal to the elastic potential energy stored (unless the spring is inelastically deformed).

The gradient of the graph (force / extension) is equal to the spring constant.

A non-linear relationship shows the limit of proportionality has been exceeded.

Distance is how far an object moves.

$Ee = 1/2 \times k \times e^2$ (elastic potential energy = 1/2 x spring constant x $(\text{extension})^2$

Forces

What type of quantity is distance?

Distance and displacement.

Forces

Define displacement.

Distance and displacement.

Forces

What type of quantity is displacement?

Distance and displacement.

Forces

How should displacement be expressed?

Distance and displacement.

Forces

What type of quantity is speed?

Speed

Forces

What four factors may affect the speed at which a person can walk, run or cycle.

Speed

Forces

What are typical values for the speed of walking, running and cycling?

Speed

Forces

What are typical values for the speed of a car, a train and an aeroplane?

Speed

Forces

What is the typical speed of sound in air?

Speed

Forces

What equation links distance travelled, speed and time.

Speed

Displacement is the distance an object moves and the direction it travels.

Scalar.

Magnitude and direction e.g. 30m, North.

Vector.

Age, terrain, fitness and distance travelled.

Scalar

Car: 25m/s, train: 30m/s and aeroplane: 250m/s

1.5 m/s, 3 m/s, 6 m/s.

s=v x t (distance travelled = speed x time).

330 m/s.

Forces

What are the units for speed?

Speed

Forces

What is velocity?

Velocity

Forces

What type of quantity is velocity?

Velocity

Forces

Explain why does motion of an object in a circle involves constant speed but changing velocity? (HT)

Velocity

Forces

How is the speed of an object calculated in a distance-time graph?

The distance-time relationship

Forces

How do you measure the speed of an object that is accelerating using a distance-time graph?

The distance-time relationship

Forces

What equation is used to calculate the average acceleration of an object?

Acceleration

Forces

What is the unit of acceleration?

Acceleration

Forces

What type of quantity is acceleration?

Acceleration

Forces

How is change in velocity (Δv) calculated?

Acceleration

$\rho = m \times v$ (momentum = mass x velocity)

A property of moving objects.

The total momentum before a collision (or explosion) is equal to the total momentum after a collision (or explosion).

Kg m/s (kilogram metres per second)

Calculate the momentum of each each individual vehicle and add them together to get the total momentum before the collision. Calculate the individual momentum of each of the vehicles after the collision. Use the total momentum before the collision to help calculate an unknown variable after the collision.

A system where neither energy nor matter can leave.

Waves transfer energy from one place to another without transferring matter.

An explosion is a special case where the momentum before the explosion is equal to zero. This means the momentum after the explosion must also equal zero. This is achieved by one of the components (e.g. bullet) having a positive velocity and one of the components (e.g. the rifle) having a negative velocity.

The oscillations are parallel to the movement of travel.

The oscillations are perpendicular to the movement of travel.

Forces

What term is used to denote slowing down?

Acceleration

Forces

How is acceleration calculated from a velocity-time graph?

Acceleration

Forces

How is the displacement calculated from a velocity-time graph? (HT)

Acceleration

Forces

What equation applies to objects with uniform acceleration?

Acceleration

Forces

What is the acceleration due to gravity of an object falling near the Earth's surface?

Acceleration

Forces

Describe what happens to an object that is falling through a fluid?

Acceleration

Forces

What is Newton's First Law?

Newton's First Law.

Forces

Describe the effect of Newton's First Law on a vehicle driving at steady speed.

Newton's First Law.

Forces

According to Newton's First Law when will the velocity (the speed or direction) of an object change?

Newton's First Law.

Forces

What is inertia? (HT)

Newton's First Law.

Gradient (velocity / time)

Deceleration

$V^2 - U^2 = 2 \times a \times s$ (final velocity^2 - initial velocity^2 = 2 x acceleration x distance)

Area under the curve.

An object falling through a fluid (liquid or gas) will initially accelerate due to gravity. As the velocity increases so will drag as more particles hit the falling object. Eventually the **drag will equal velocity** and the resultant force will be zero. The object will then move at a constant speed called the **terminal velocity.**

About 9.8 m/s^2.

When a vehicle is travelled get at a steady speed the resistive forces (air resistance and friction) will be equal to driving force.

If the resultant force acting on an object is zero then the object will remain stationary or will continue to move at the same velocity.

The tendency of objects to remain at rest or continue with uniform motion.

The velocity of an object will change if a resultant force acts upon the object.

Forces

What is Newton's Second Law?

Newton,s Second Law.

Forces

What equation is used to calculate the resultant force on an object?

Newton's Second Law.

Forces

What is inertial mass a measure of? (HT)

Newton's Second Law.

Forces

Define inertial mass. (HT)

Newton's Second Law.

Forces

What symbol would be used if a question asks for an estimated value?

Newton's Second Law.

Forces

What symbol represents proportionality?

Newton's Second Law.

Forces

What is Newton's Third Law?

Newton's Third Law.

Forces

What is the stopping distance of a vehicle?

Stopping distances.

Forces

What is the thinking distance.

Stopping distances.

Forces

What is braking distance.

Stopping distances.

The speed of an object in a given direction.

m/s.

An object travelling in s circle is constantly changing direction. As a result its velocity will change constantly due to the change in direction.

Vector.

Draw a tangent and calculate the gradient of the tangent.

The gradient of the line

m/s^2.

$a = \Delta v / t$ (acceleration = change in velocity / time taken)

Final velocity - initial velocity.

Vector.

Forces

What is the typical reaction time of person?

Reaction time

Forces

Name four factors which could affect a driver's reaction time.

Reaction time

Forces

Describe two methods to calculate the reaction time of a person.

Reaction time

Forces

Name two road conditions which could affect the braking distance of a car?

Factors affecting braking distance I

Forces

Name two ways in which a car in poor condition could affect the braking distance?

Factors affecting braking distance I

Forces

Describe what happens when a force is applied to the brakes of a vehicle in relation to energy transfer and work done.

Factors affecting braking distance II

Forces

How is speed related to braking force if a vehicle needs to stop in a certain distance?

Factors affecting braking distance II

Forces

How is the braking force linked to deceleration?

Factors affecting braking distance II

Forces

What are the consequences of large decelerations?

Factors affecting braking distance II

Forces

What equation can be used to estimate the uniform deceleration of a vehicle? (HT)

Factors affecting braking distance II

F = m x a (force = mass x acceleration).

The acceleration of an object is proportional to the resultant force acting upon the object. It is inversely proportional to the mass of the object.

The ratio of force over acceleration

The difficulty of changing the velocity of an object.

$\propto$

$\sim$

The sum of the thinking distance and the braking distance.

Whenever two objects interact, the forces they exert on each other are equal and opposite.

The distance travelled under braking force.

The distance travelled during the drivers reaction time.

Forces

What is momentum a property of?

Momentum. (HT)

Forces

What is the formula for momentum?

Momentum. (HT)

Forces

What is the unit for momentum?

Momentum. (HT)

Forces

What is the law of conservation of momentum?

Conservation of momentum. (HT)

Forces

What is a closed system?

Conservation of momentum. (HT)

Forces

Describe how the conservation of momentum is applied to a collision between two vehicles.

Conservation of momentum. (HT)

Forces

Describe how conservation of momentum is applied to an explosion.

Conservation of momentum. (HT)

Waves

What are waves?

Transverse and longitudinal waves.

Waves

Describe the motion of a transverse wave.

Transverse and longitudinal waves.

Waves

Describe the motion of a longitudinal wave.

Transverse and longitudinal waves.

Tiredness, drugs, alcohol and distractions.

0.2s to 0.9s

Wet and icy.

Using the drop ruler test, using a digital reaction timer.

The work done by the friction force between the brakes and the wheel transfers kinetic energy (the cars slows down) to thermal energy in the brakes and tyres (the brakes get hot).

Worn brakes and worn tyres

The greater the braking force the greater the deceleration of the vehicle.

The greater the speed, the greater the braking force required.

$V^2 - U^2 = 2 \times a \times s$ (final velocity^2 - initial velocity^2 = 2 x acceleration x distance)

Overheating of the brakes and loss of control.