P5 Quick Revision Questions

H = Higher tier only

SS = Separate science only

- Define force

Answer 1

- A push or a pull that is applied by one object on another

Give two examples of contact and non-contact forces

Answer 2

- Contact – friction, air resistance, tension or normal contact force

- Non-contact – gravitational force, electrostatic force or magnetic force

- Define a scalar and a vector quantity

Answer 3   .... of 50

Scalar quantities have magnitude only

Vector quantities have magnitude and direction

Give the equation for speed and the units

Answer 4

Speed (km/h or m/s) = distance (km or m)/time (h or s)

Question 5   …. of 50

- How would you find the speed at a particular point on a distance-time graph?

Answer 5

- Draw a tangent to the line and measure the gradient of the tangent

- If an object is dropped, why does its speed increase as it falls?

It accelerates because it is pulled towards the centre of the earth due to the force of gravity

Question 7

- Define acceleration

Answer 7

Acceleration = change in velocity/time taken

- A car accelerates from 10 m/s to 30 m/s in 8s. What is the acceleration?

Answer 8

- Acceleration = change in velocity/time taken
- = (30m/s – 10m/s)/8s
- = 2.5 m/s^2

- What does a negative velocity show?

A change in direction

- A motor cycle travelling at 20 m/s takes 5s to stop. What is its average acceleration?

Answer 10

- Acceleration = change in velocity/time taken
  - = (20 m/s)/(5 s)
    - = 4m/s^2

- Give the 4 symbols used to describe motion

- s = displacement (m)

- u = initial velocity (m/s)

- v = final velocity (m/s)

- a = acceleration (m/s^2)

- Give the equation for uniform motion

Answer 12

$$v^2 = u^2 + 2as$$

- A train approaches a red signal at 10m/s. The signal turns green and the train accelerates. Once it has travelled another 1000m it is now travelling at 20 m/s

$$v^2 = u^2 + 2as$$

$$a = (v^2 - u^2)/2s$$

$$a = (20^2 - 10^2)/(2 \times 1000)$$

$$= 300/2000$$

$$= 0.15 \text{ m/s}^2$$

- If the object is slowing down, will v be bigger or smaller than u?

Answer 14

v will be smaller than u

- Define mass

Answer 15

The amount of substance that is present in an object (kg)

- Define weight

The force acting on that mass, if it is in a gravitational field (N)

- Give the equation for weight

Weight (N) = mass (kg) x gravitational field (N/kg)

- Calculate the weight on Earth of a 5.0kg mass. Assume g = 9.8 N/kg or 9.8 m/s^2 (units are equivalent)

Answer 18

W = mg

= 5.0kg x 9.8 N/kg

= 49N

- What is the point called where the weight of an object can be considered to act?

The object's centre of mass

- Give Newton's first law

Answer 20

- If the resultant force acting on an object is zero it will –

- If stationary, remain stationary

- If moving, keep moving at a steady speed in a straight line

- Define resultant force

- The force applied by one source subtracted from that applied by the other source to find the combined force

- What does a free-body diagram show?

- It shows the magnitude and direction of the forces acting on an object

- How can you determine the magnitude and direction of a resultant force?

Answer 23

- Draw a scale diagram

- Give the equation that links force, mass and acceleration

- F = ma
- F = resultant force (N)
- m = mass (kg)
- a = acceleration (m/s^2)

- A car of mass 1200kg has a resultant forward force acting on it of 4200N. Calculate its acceleration

- F = ma
- a = F/m
- a = 4200/1200
- a = 3.5 m/s^2

- Define inertial mass and give the equation

Answer 26

- Inertial mass is a measure of how difficult it is to change the velocity of an object
  - Inertial mass = force/acceleration

- Give one way the relationship between force, mass and acceleration can be determined

Answer 27

- Light gates with a:
  - Data logger or
  - Ticker-timer

- Define Newton's third law

- Whenever too objects interact, the forces they exert on each other are equal and opposite

- If two vehicles experiencing the same braking force decelerate, will they decelerate by the same amount?

- Yes if their masses are the same
  - No if the masses are different

- Give the equation for momentum

Answer 30

- Momentum (kg m/s) = mass (kg) x velocity (m/s)

  - p = mv

- Calculate the momentum of a car with a mass of 1000kg travelling at 20 m/s

- Momentum = mass x velocity
  - = 1000 x 20
  - 20000 kg m/s

- What do crumple zones do?

- Increase the time between first impact and the car stopping

- Define stopping distance

- Stopping distance = thinking distance + breaking distance

- Give two factors that will affect thinking distance

Answer 34 .... of 50

- Tired
- Alcohol or drugs
- Distracted or lack of concentration

- Give two factors that will affect braking distance

Answer 35

- Road is wet or icy
- Car has poor brakes or bald tyres
- Speed of the car is greater

- Define pivot

- The point the moment acts around

- What equation is used to calculate the size of a moment

- Moment = force x perpendicular distance from the pivot to the line of action of the force

- A force of 5 N is applied 1.5m from a pivot. Calculate the moment of force about the pivot

- Moment = force x perpendicular distance from the pivot to the line of action of the force

  - Moment = 5N x 1.5m

    - Moment = 7.5 Nm

- What are gears used for

- The transmitting of the rotational effect of a force from one part of a machine to another

- Give the equation for pressure

- Pressure (p) = force normal to a surface/area of that surface

- Which collisions contribute to atmospheric pressure?

- Collisions between air molecules and molecules with a surface e.g. on skin

- What is the technical term for a spring returning back to its original length when forces are removed

Answer 42

- Elastic deformation

Question 43

- Define extension/compression of a spring

Answer 43

- How much its length changes when the forces are applied

- Define the limit of proportionality

- A straight line up to a point on a force applied vs extension

- Give the equation for elastic potential energy

- $E_e = \frac{1}{2}ke^2$

- Calculate the elastic potential energy stored by a spring that has been stretched by 2cm. The spring constant is 30 N/m

Answer 46

- $E_e = \frac{1}{2}ke^2$
- $E_e = \frac{1}{2} \times 30 \times 0.02^2$
- $= 0.006$ J

- A spring has a constant of 10 N/m. Determine its extension once 0.2J of work is done stretching it. Assume the limit of proportionality is not exceeded.

- $E_e = \frac{1}{2}ke^2$
- $0.2 = \frac{1}{2} \times 10 \times e^2$
- $e^2 = 0.2/(1/2 \times 10)$
- $e^2 = 0.1$
- $= 0.32m$

- What apparatus should be used to measure the force applied to the spring?

Answer 48

- Load the springs with weight

- Explain g-force

- A way of comparing forces by measuring the acceleration they produce

- Can humans tolerate g forces greater horizontally or vertically?

Answer 50

- Horizontally
- 2g+ is dangerous