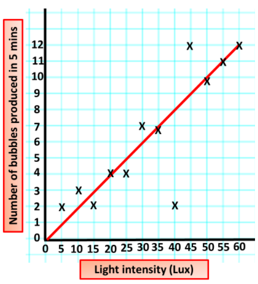
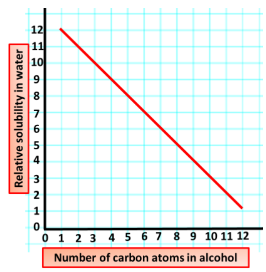
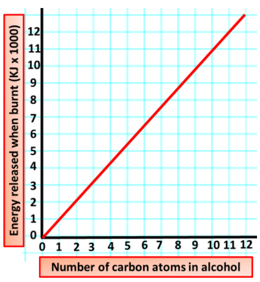
Photosynthesis



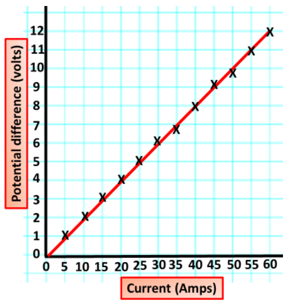
Solubility of alcohols



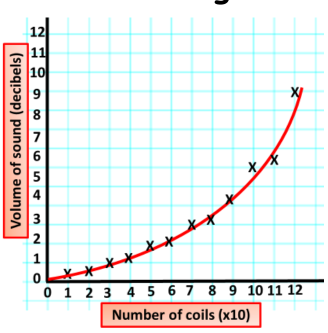
Energy in alcohols



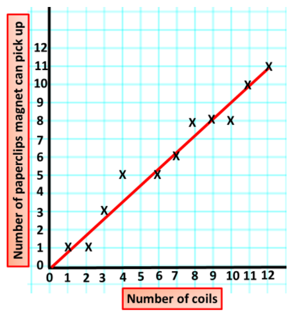
Resistance in a wire



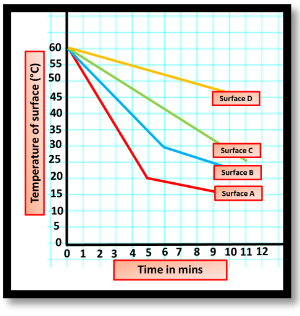
Electromagnet strength in a speaker



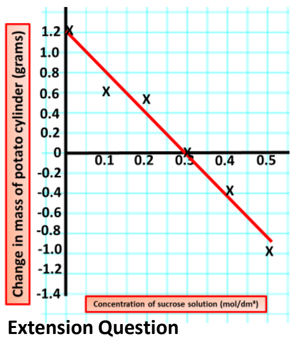
Electromagnet strength



Infrared Radiation (surface A)

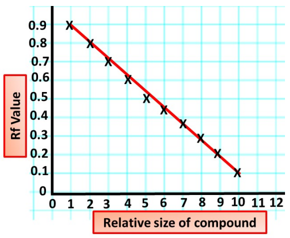


Osmosis

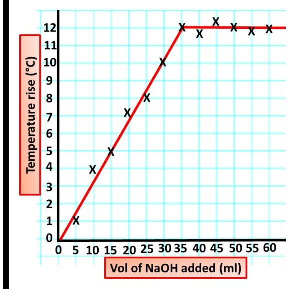


Extension Question
Identify the sucrose concentration of the potato

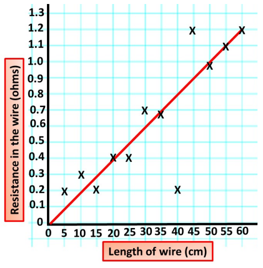
Chromatography



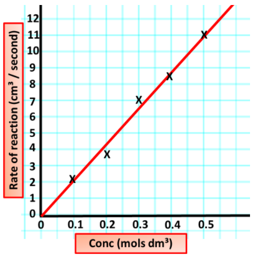
Temperature change



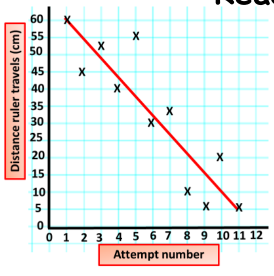
Resistance



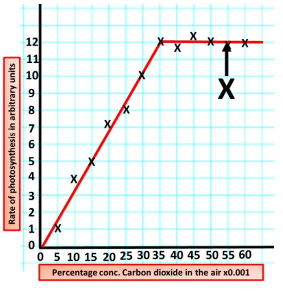
Rate of reaction



Reaction Time

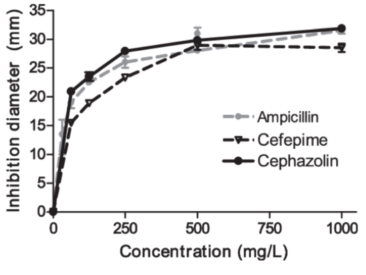


Photosynthesis

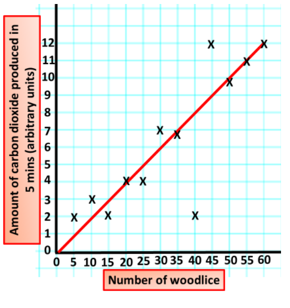


Extension Question
Why is this trend seen

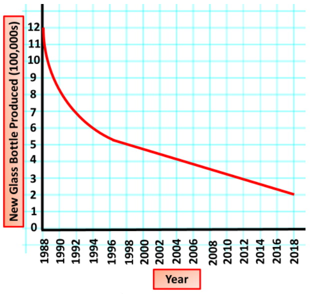
Effect of Antibiotic Concentration



Respiration

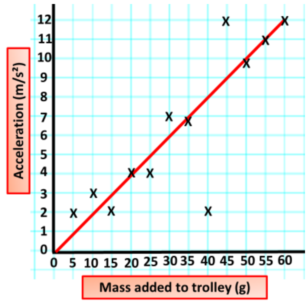


Recycling

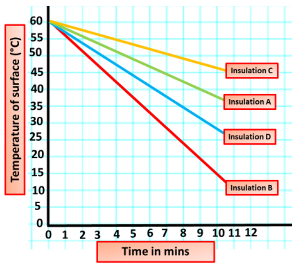


Extension Question
suggest a reason for this trend

Acceleration

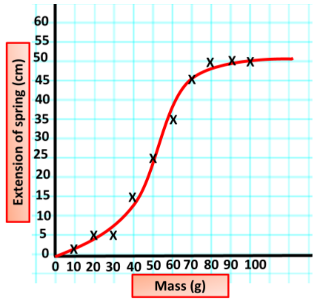


Insulation

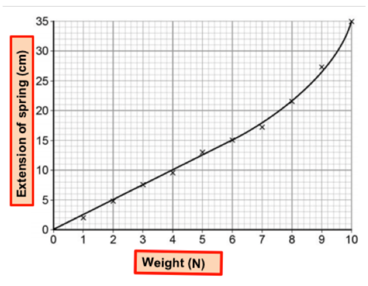


Extension Question
What do the results on this graph show about C?

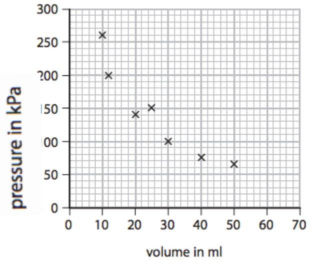
Rubber band Extension



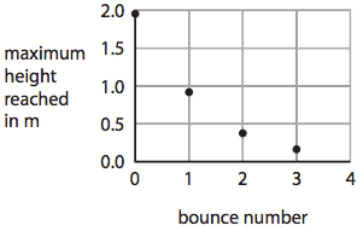
Rubber band Extension



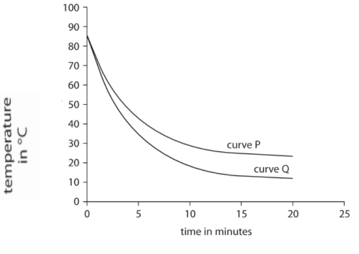
Pressure



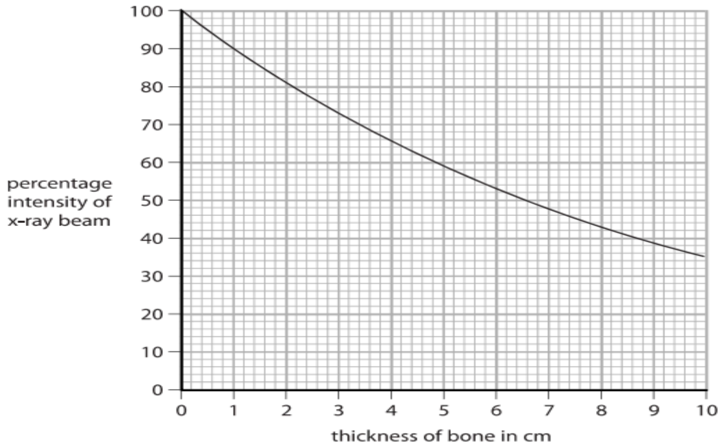
Bounce



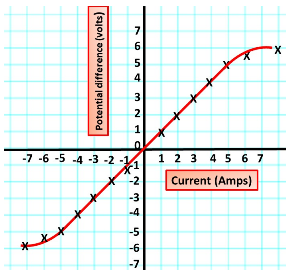
Temperature



Xray

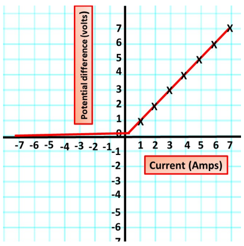


Filament lamp

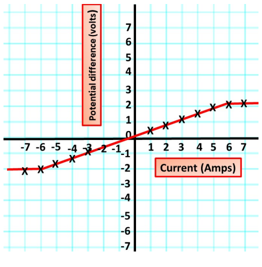


Extension Question
Explain shape

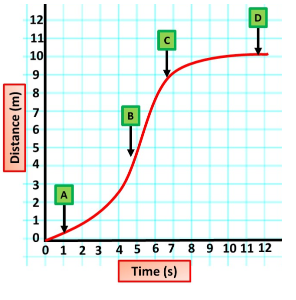
Diode



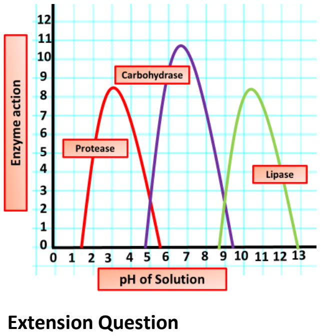
Filament lamp



Speed

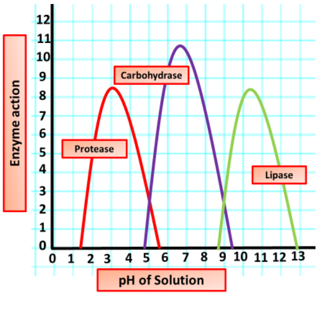


Enzymes (Carbohydrase)



Extension Question
Explain why lipase activity decreases

Enzymes (Protease)



Q1.

(ii) Figure 6 shows the student's results.

mass of metal block	0.92 kg
power of heater	50 W
starting temperature	20 °C
finishing temperature	54 °C
time	300 s

Figure 6

Use the data in Figure 6 to calculate a value for the specific heat capacity of the metal.

Use the equation

$$\text{specific heat capacity} = \frac{\text{power} \times \text{time}}{\text{mass} \times \text{temperature rise}}$$

(3)

specific heat capacity = ... J/kg °C

Q3.

A cyclist is riding a bicycle at a steady velocity of 12 m/s.

The cyclist and bicycle have a total mass of 68 kg.

The cyclist starts to cycle again.

The cyclist does 1600 J of useful work to travel 28 m.

Calculate the average force the cyclist exerts.

(3)

average force = ... N

Q4.

There is a piece of music called "The Flight of the Bumble Bee."

This takes 4 minutes to play.

During this time, a bee flies 1608 m.

Calculate the average speed of the bee.

(3)

speed .... m/s

Q5.

The student calculates the volume of the block as 13 cm^3.

She finds that the mass of the block is 100 g.

Calculate the density of the block.

Use the equation

(2)

density = ... g/cm^3

Q6.

Figure 2 shows an energy transfer diagram for a steam engine.

The diagram shows the amounts of energy transferred each second by the steam engine.

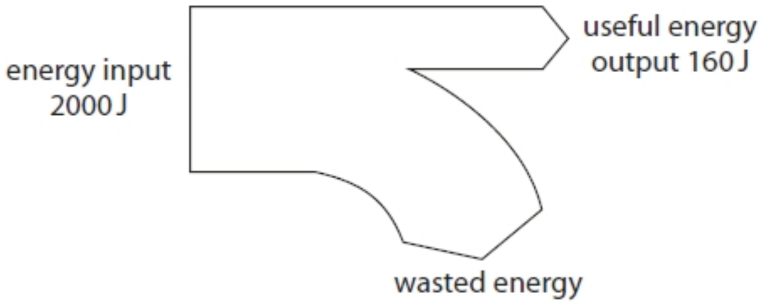


Figure 2

(i) Calculate the amount of wasted energy.

(1)

wasted energy = ... J

(ii) Calculate the efficiency of the steam engine.

Use the equation

(2)

efficiency = ...

Q7.

Shot-put is an Olympic event.
The shot is a heavy ball.
An athlete throws the shot as far as possible.
A sports scientist analyses an athlete's throw to help improve performance.
In one throw, the shot continues to rise by another 1.3 m after it leaves the athlete's hand.
The mass of the shot is 7.26 kg.

(i) Calculate the amount of gravitational potential energy gained by the shot.

(2)

gravitational potential energy gained = ... J

Q10.

A ball has a mass of 0.046 kg.

(i) Calculate the change in gravitational potential energy when the ball is lifted through a vertical height of 2.05 m.

(2)

change in gravitational potential energy = ... J

(ii) The ball is released.
Calculate the kinetic energy of the ball when the speed of the ball is 3.5 m/s.

(3)

kinetic energy of the ball = ... J

Q11.

A student investigates the motion of a trolley along a horizontal runway using the apparatus in Figure 2.

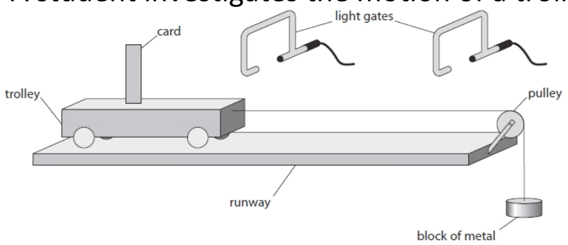


Figure 2

A trolley is attached to a string passing over a pulley.
A block of metal hangs on the end of the string.
Each light gate measures the time it takes for the card to pass through the gate.
When the trolley is released, it moves along the track.
A computer measures the time it takes for the card to pass between each light gate.

(i) The card took 0.080 s to pass through the first light gate.
The width of the card is 5 cm.
Calculate the average speed, in m/s, of the trolley through the first light gate.

(2)

average speed = ... m/s

Another trolley passes through the first light gate at a velocity of 0.72 m/s.
This trolley passes through the second light gate at a velocity of 1.1 m/s.
The time it takes for the card on the trolley to travel between the two light gates is 0.53 s.

(iii) Calculate the acceleration of the trolley between the two light gates.

(2)

acceleration = ... m/s^2

Q12.

An earthquake causes a sea wave.
This sea wave travels 26 400 m in two minutes.
Calculate the speed of the wave.
Use the equation

(3)

speed = ... m/s

Q13.

Another cyclist travels 1200 m in a time of 80 s.
Calculate the average speed of the cyclist.

(2)

average speed = ... m / s

Q14.

Figure 13 shows a drone.

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Figure 13

A different drone has a mass of 4.5 kg.
This drone rises from the ground to a height of 20 m.

(i) Calculate the change in gravitational potential energy when the drone rises through a height of 20 m.
The gravitational field strength g = 10 N/kg.

(2)

change in gravitational potential energy = ... J

(ii) State the amount of useful work done by the blades as the drone rises through 20 m.

(1)

useful work done = ... J

(iii) It takes 4 s for the drone to rise through 20 m.
Calculate the useful power developed by the blades in this time of 4 s.

(2)

useful power developed = ... W

Q15.

(ii) The mass of the piece of copper is 0.058 kg.
The volume of the piece of copper is 6.5×10^{-6} m^3.
Calculate the density of copper.

(2)

density of copper = ... kg/m^3

Q16.

An aircraft waits at the start of a runway.
The aircraft accelerates from a speed of 0 m/s to a speed of 80 m/s.
The acceleration of the aircraft is 4 m/s^2.
Calculate the distance, *x*, travelled by the aircraft while it is accelerating.
Use the equation

$$x = \frac{v^2 - u^2}{2a}$$

(2)

x = ... m

Q17.

(i) Figure 6 shows an electric kettle.

Figure 6

The kettle contains 1.5 kg of water.
The kettle is switched on.
Calculate the energy needed to raise the temperature of the water by 50 °C.
Specific heat capacity of water = 4200 J/kg °C
Use the equation

$$\Delta Q = m \times c \times \Delta\vartheta$$

(2)

energy needed = ... J

(ii) The amount of energy, E, needed to bring the water to boiling point is 670 000 J.
The kettle has a power of 3500 W.
Calculate the time, *t*, it takes to bring the water to boiling point.

(3)

time to bring the water to boiling point = ... s

Q18.

A model train has a mass of 8.0 kg.
It travels at a speed of 1.5 m/s.
Calculate the kinetic energy of the model train.

(3)

kinetic energy = ... J

Q19.

A wire in a circuit carries a current of 0.9 A.
Calculate the quantity of charge that flows through the wire in 50 s.
State the unit of charge with your answer.

(3)

quantity of charge = ... unit ....

Q20.

A wave has a frequency of 15 Hz.
Its wavelength is 125 m.
Calculate the speed of the wave.
State the unit.

(3)

speed = ... unit ....

Q21.

A different water wave has a wavelength of 0.25 m and a frequency of 1.5 Hz.
Calculate the wave speed.

(2)

wave speed = ... m/s

Q23.

(i) A car is moving at 90 km/h when the driver has to stop.
Calculate the thinking time of the driver.
Using the equation:

time = distance ÷ average speed

(2)

thinking time = ... s

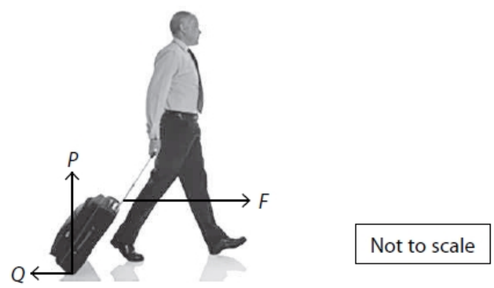
(ii) A car has a mass of 1300 kg.
Calculate the kinetic energy of the car when it is travelling at 20 m/s.

(2)

kinetic energy .... J

Q24.

A man pulls a suitcase with a horizontal force, *F*, as shown in Figure 10.
Two other forces acting on the suitcase are labelled *P* and *Q*.



(a) The man pulls the suitcase for 80 m along a horizontal path.
The mass of the man and the suitcase is 85 kg.
The man does 1200 J of work on the suitcase as he pulls the suitcase along.
He walks with an average velocity of 1.5 m/ s.

(i) Calculate the kinetic energy of the man and the suitcase.

(2)

kinetic energy = ... J

(ii) Calculate the horizontal force, *F*, that the man exerts on the suitcase.

(2)

force = ... N

Q25.

The volume of 380 g of ice is 410 cm^3.
Calculate the density of the ice in g/cm^3.

(2)

density = ... g/cm^3

Q26.

Another student decides to melt some ice.
The student melts 380 g of ice at 0 °C.
The specific latent heat of fusion of ice is 3.34×10^5 J/kg.
Calculate the thermal energy needed to melt the ice.

(2)

thermal energy needed = ... J

Q27.

A cyclist is riding a bicycle at a steady velocity of 12 m/s.
The cyclist and bicycle have a total mass of 68 kg.
Calculate the kinetic energy of the cyclist and bicycle.

(2)

kinetic energy = ... J

Q28.

A lamp is connected to a potential difference of 0.24 V.
The current in the lamp is 0.12 A.
(i) Calculate the power of the lamp.

(2)

power of the lamp = ... W

(ii) The potential difference is changed to 0.30 V.
The current in the lamp is now 0.13 A.
The lamp is switched on for 35 s.
Calculate the energy that is transferred in this time.

(2)

energy transferred = ... J

(iii) The current in the lamp stays at 0.13 A.
Calculate the charge that flows through the lamp in 35 s.

(2)

charge = ... C

Q29.

The electromagnetic spectrum is continuous.
Different regions of the spectrum have different properties.
An electromagnetic wave has a frequency of 7×10^9 Hz.
The speed of the wave is 3×10^8 m/s.
Calculate the wavelength of the wave.

(3)

wavelength = ...m

Q30.

He is investigating to see if the padding stops the egg from breaking.
The weight of the egg is 0.6 N.
Calculate the work done on the egg to lift it up by 20 m. State the unit.

(3)

Work done = ...J

Q31.

Light and sound waves are produced at the same time by an explosion on Earth.

(i) The sound of the explosion is heard 1920 metres away 6.0 seconds after the explosion has happened. Calculate the speed of sound in air.

(2)

speed = ... m/s

Q32.

A battery sends a current through a metal wire.

The current in a wire is 3.7 A.

Calculate the charge that flows into the wire in 13 s.

(2)

Q33.

The students use a telescope to view the Moon.

Light from the Moon takes 1.3 s to reach the students.

The speed of light is 300 000 km/s.

Calculate the distance to the Moon.

(2)

distance = speed × time

distance = ... m

Q35.

The photograph shows a man dropping an egg inside a padded box from a height.

(b) The weight of the egg is 0.6 N.

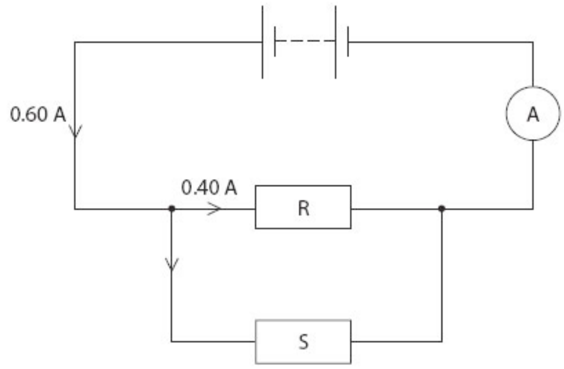
Calculate the work done on the egg to lift it up by 20 m. State the unit.

(3)

Work done = ... unit ....

Q36.

The diagram shows an electric circuit with two resistors, R and S.



(i) R has a resistance of 11 ohms.
Calculate the potential difference across R.

(2)

potential difference = ... V

Q37.

(ii) The resistance of the heater is 15 Ω.
The current in the heater is 0.56 A.
Calculate the potential difference (voltage) across the heater.

(2)

potential difference = ... V

(iii) The technician changes the value of the variable resistor.
She measures the new voltage across the heater and the new current in it.
Here are her results:

voltage = 6.0 V current = 0.40 A.

Calculate the amount of electrical energy transferred in 30 s by the heater.

(2)

energy transferred = ... J

Q38.

A torch has a battery and a bulb.
The current in its circuit is 0.08 A.
Calculate the amount of charge passing a point in this circuit in 2 minutes.

(3)

charge = ... coulombs

Q39.

(ii) In one second an engine has a total energy input of 7500 J.
In one second 3200 J is transferred to the surroundings as wasted energy.
Calculate the useful energy transferred by the engine.

(1)

useful energy transferred = ...

(iii) Calculate the efficiency of this engine.

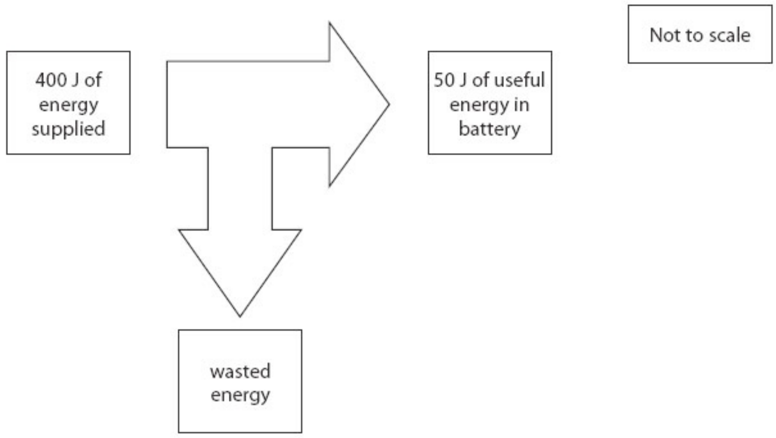
(2)

efficiency of the engine = ...

Q40.

A student uses a solar powered battery charger to charge some batteries.

The diagram shows how much energy is usefully transferred by the battery charger.



(i) Calculate the amount of wasted energy.

(1)

Wasted energy transferred = ...

(ii) Calculate the efficiency of the battery charger.

(2)

efficiency = ...

Q41.

The blades of the fan are turned by an electric motor.

In one second, the motor gets 200 J of electrical energy from the mains supply.
Only 180 J of this energy is used to turn the blades of the fan.
The rest of the energy is wasted.
(i) Calculate how much of the 200 J of energy is wasted.

(1)

wasted energy = ... J

(iii) Calculate the efficiency of the motor.

(2)

efficiency = ...

Q42.

(b) (i) A car engine produces an average driving force of 1200 N.
The car travels 8.0 m.
Calculate the work done by the force over this distance.

(2)

work done = ... J

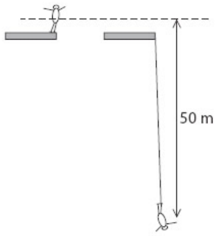
(ii) The car has a mass of 1400 kg and travels at a velocity of 25 m/s.
Calculate the kinetic energy of the car.

(3)

kinetic energy = ... J

Q43.

A 60 kg student weighs 600 N.
He does a bungee jump.



The bungee cord becomes straight and starts to stretch when he has fallen 50 m.
(i) Calculate the change in gravitational potential energy as the student falls 50 m.
Give the unit.

(3)

Gravitational potential energy = ... unit ....

(ii) The battery charger supplies a steady current of 2.5 A to the battery.
Calculate the charge flowing to the battery in 8 minutes.

(2)

charge = ... C

Q45.

(ii) A cyclist travels down a slope.
The top of the slope is 20 m vertically above the bottom of the slope.
The cyclist has a mass of 75 kg.
Calculate the change in gravitational potential energy of the cyclist between the top and the bottom of the slope.
The gravitational field strength, g, is 10 N/kg.

(3)

change in gravitational potential energy = ... J

Q46.

Figure 7 shows a skier going down a hill.

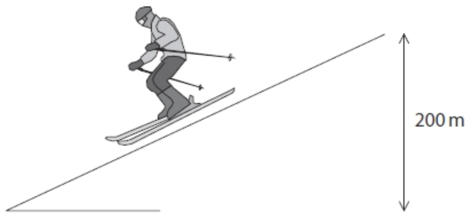


Figure 7

She descends through a vertical height of 200 m.

The skier's mass is 65 kg.

(i) Calculate the change in gravitational potential energy.

Take the gravitational field strength, *g*, as 10 N / kg.

(2)

change in gravitational potential energy = ... J

(ii) At the bottom of the slope her speed was 36 m/s.

Calculate her kinetic energy at the bottom of the slope.

(3)

kinetic energy = ... J

Q47.

(b) A javelin has a mass of 0.8 kg. In one throw, the javelin left the athlete's hand at a velocity of 25 m/s.

(i) Calculate the kinetic energy of the javelin as it left the athlete's hand. State the unit.

(3)

kinetic energy = ... unit ....

(ii) State the amount of work done by the athlete on the javelin to get it to a velocity of 25 m/s.

(1)

work done = ...

Q49.

The students produce a different wave.

This wave has a frequency of 1.7 Hz and a wavelength of 8.0 cm.

Calculate the speed of this wave.

(2)

....

Q50.

(ii) A van accelerates from a velocity of 2 m / s to a velocity of 20 m / s in 12 s.

Calculate the acceleration of the van.

(2)

acceleration = ... m / s^2

Q51.

(ii) The current in resistor X is 0.041 A.

The voltage across resistor X is 2.1 V.

Show that the resistance of resistor X must be about 50 ohms.

(2)

(iii) Calculate the power in resistor X when the voltage across X is 2.1 V and the current in resistor X is 0.041 A.

(2)

power = ... W

(iv) Calculate the overall resistance of the 22 ohm resistor and resistor X.

(2)

overall resistance = ... Ω

(v) The current in the circuit is 0.041 A.

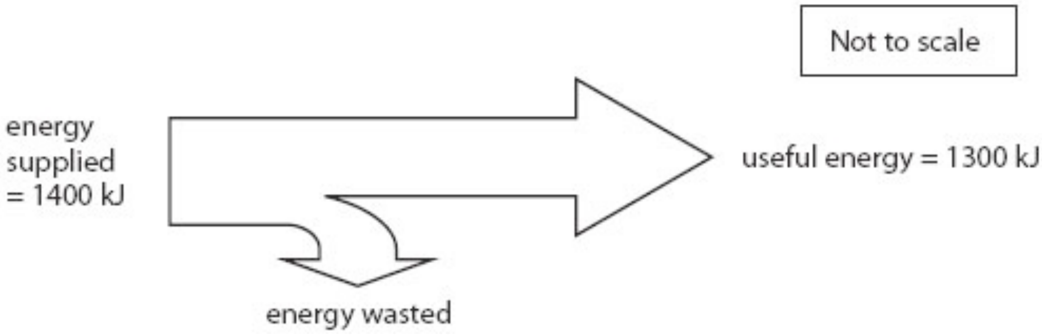
The voltage across the battery is 3.0 V.
Calculate the energy transferred in 2 minutes.

(2)

energy = ... J

Q52.

The diagram represents the energy transfer in one second in the generator.



(i) Calculate the amount of energy wasted in one second in the generator.

(1)

wasted energy = ... J

(ii) Calculate the efficiency of the generator.

(2)

efficiency = ...

Q53.

An electric kettle is connected to a mains voltage of 230 V.
The current in the kettle is 12 A.

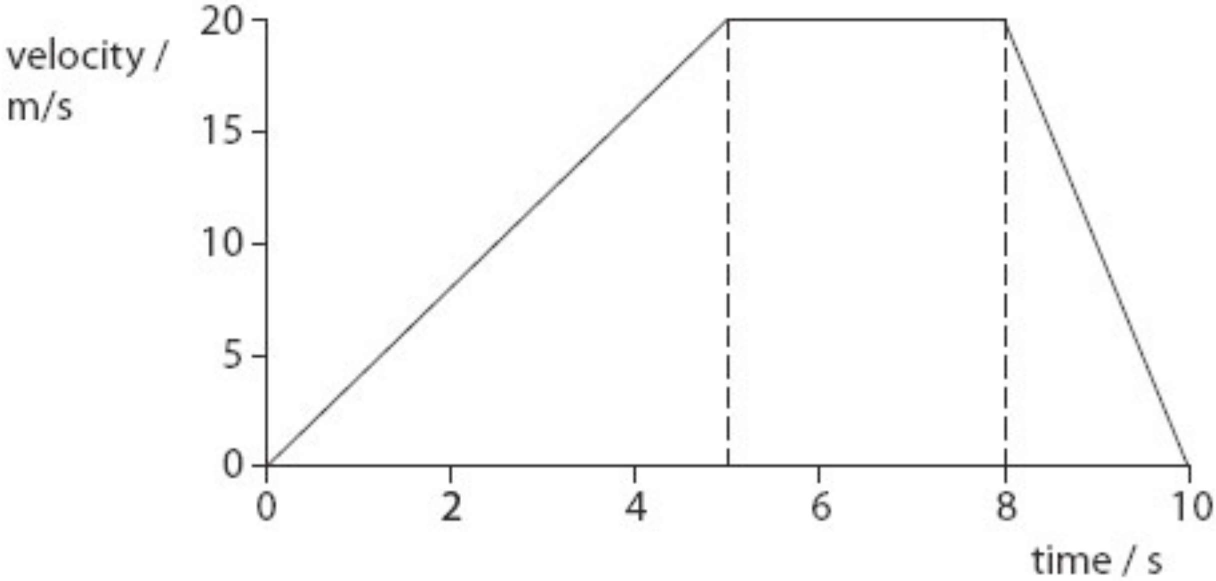
Calculate the power of the kettle.

(2)

Power = ...W

Q55.

The graph shows how the velocity of a small car changes with time.



(i) Use the graph to estimate the velocity of the car at three seconds.

(1)

....

(ii) Calculate the acceleration of the car when it is speeding up.

(2)

acceleration = ...m/s^2

Q1.

A car is travelling along a level road when the driver applies the brakes to stop it.
The work done to stop the car is 510 000 J.
The car has a mass of 1400 kg.

(i) State the value of the kinetic energy of the car when the brakes were first applied.

(1)

kinetic energy = ... J

(ii) Calculate the velocity of the car when the brakes were first applied.

(3)

velocity = ... m/s

(iii) The brakes applied an average force of 15 000 N.
Calculate the distance it takes for the brakes to stop the car.

(2)

distance = ... m

Q2.

The lamp is designed to be used in a car with a 12 V battery.

(i) When it is connected to the 12 V battery, there is a current of 800 mA in the lamp.
Calculate the power of the lamp.

(2)

power = ... W

Q3.

A motorcyclist is climbing a hill at a constant speed of 13 m/s.
Calculate the time it takes for the motorcyclist to travel 29 m.

(2)

time = ... s

Q4.

A relief organisation drops food parcels by parachute from a helicopter.

The helicopter is hovering at a constant height above the ground.
It drops a food parcel.
The parcel falls for a few seconds before the parachute starts to open.
Calculate the velocity of the food parcel after falling for 1.2 s.
Ignore any air resistance acting on the food parcel.
Acceleration due to gravity, g = 10 m/s^2.

(3)

velocity = ... m/s

Q5.

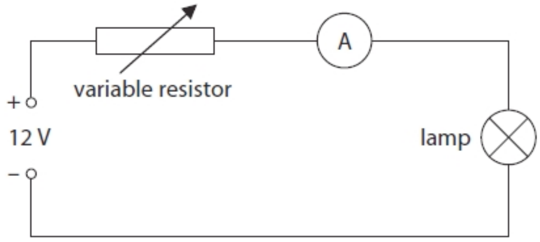
A LED lamp has a power rating of 3 W.
The voltage across the lamp is 12 V.
Calculate the current in the lamp.

(3)

current in the lamp =.. A

Q6.

A student uses this circuit to investigate how the current in a filament lamp varies with the potential difference (voltage) across the lamp.



When the variable resistor is at the half-way position, the ammeter reads 0.37 A and the voltmeter reads 4.0 V.

Show that the resistance of the filament in the lamp is about 11 Ω.

(2)

………

Q7.

Some students carry out investigations with an electric motor.

The students use the electric motor to lift a weight.

The current in the motor is 0.5 A.

The potential difference (voltage) across the motor is 6 V.

Calculate the input power to the motor.

State the unit.

(3)

input power = ... unit = ...

Q8.

A car is travelling along a level road.

(ii) The car now accelerates in a straight line.

Its average acceleration is 12 m/s^2.

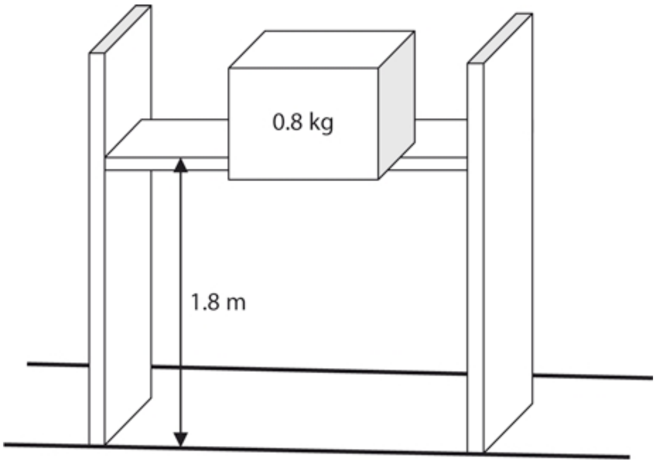
Calculate the increase in velocity of the car in 4.0 s.

(3)

....

Q9.

A box with a mass of 0.8 kg is lifted from the floor and placed on a shelf.
The shelf is 1.8 m above the floor.



(i) The box has gained gravitational potential energy.
Calculate the gain in gravitational potential energy.
Gravitational field strength = 10 N/kg

(2)

gain in gravitational potential energy = ... J

(ii) The box falls off the shelf.
State the kinetic energy of the box just before it hits the floor.

(1)

Kinetic energy = ... J

(iii) Just before the box hits the floor it has a momentum of 4.8 kg m/s.
Calculate the velocity of the box just before it hits the floor.

(3)

velocity = ... m/s

Q10.

(iii) The device is used as a light meter.
It has a 9 V battery.
Calculate the current when the resistance of the LDR is 600 Ω

(3)

current = ... A

Q11.

(iii) The average speed of a P-wave in the mantle is 12 km/s.

A P-wave travels vertically down from the surface and reflects from the core–mantle boundary back to the surface.

It travels a total distance of 5800 km.

Calculate the total time of travel for the wave.

(3)

time = ... s

Q12.

Some students investigate the electrical resistance of different components using this circuit.

(ii) One of the components being investigated is a 12 ohm resistor.

When it is in the circuit, the ammeter reading is 0.50 A.

Calculate the voltmeter reading.

(2)

....

Q13.

A man monitors how much money he spends on electricity.

He uses a device which calculates the cost of electrical energy used.

He connects his 2.9 kW electric kettle to the 230 V mains supply.

(i) Calculate the current in the kettle element.

(3)

current = ... A

Q14.

The electromagnetic spectrum is continuous.

(b) An electromagnetic wave has a frequency of 7×10^9 Hz.

The speed of the wave is 3×10^8 m/s.

Calculate the wavelength of the wave.

(3)

wavelength = ... m

Q15.

(b) Some microwaves have a frequency of 1.5×10^{10} Hz.

They travel at a speed of 3.0×10^{8} m/s.

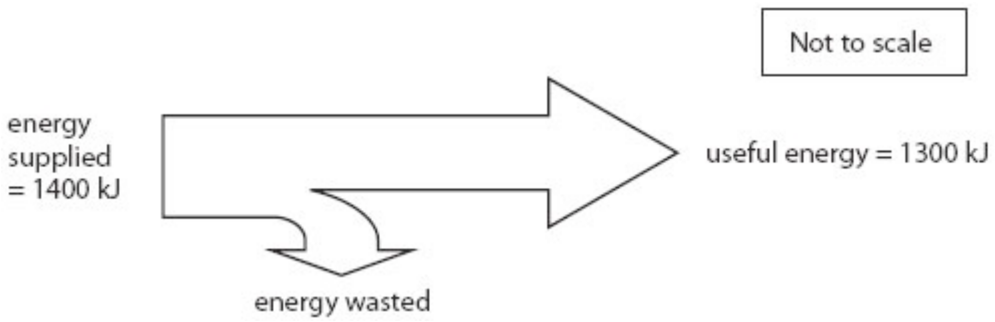
Calculate their wavelength.

(3)

wavelength =....................... m

Q16.

(b) The diagram represents the energy transfer in one second in the generator.



(i) Calculate the amount of energy wasted in one second in the generator.

(1)

....

(ii) Calculate the efficiency of the generator.

(2)

....

Q17.

Andrew skis down a hill.

(b) Andrew returns to the top of the hill and starts again.

(i) His mass is 67 kg.

Show that his momentum is about 2000 kg m/s when his velocity is 31 m/s.

(2)

....

(ii) He falls over when his momentum is 2000 kg m/s.
After he falls over, he slows down by sliding across the snow.
It takes 2.3 s for his momentum to reduce to zero.
Calculate the average force on Andrew as he slows down.

(2)

....

Q18.

(iii) The first motor has a power rating of 20 W.
The motor is used for 15 s.
Calculate the energy supplied to the motor.

(2)

energy supplied to the motor =.. J

(iv) In the second motor, the useful output power was 18 W when the input power was 24 W.
Calculate the efficiency of this motor.

(2)

efficiency =..

Q19.

A technician is testing a filament lamp from a car.
He connects the lamp to a test circuit with a 1.5 V d.c. power supply.
(ii) The circuit shows the lamp and the power supply.

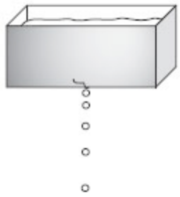
(iii) The current is 0.18 A.
Calculate the resistance of the filament in the lamp.

(3)

resistance = ... Ω

Q21.

A water tank drips water.



(b) The mass of one water drop is 0.000 08 kg.
Calculate its weight.
(gravitational field strength is 10 N/kg)

(2)

weight = ... N

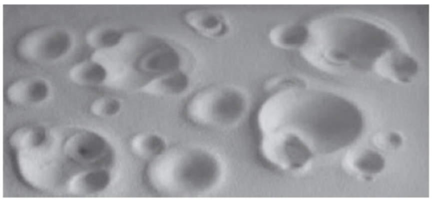
(c) The water drop falls to the ground, 13 m below, in 1.7 s.
Calculate the average speed of the drop while it is falling.

(2)

average speed = ... m/s

Q22.

Some students investigate a model of the craters produced by meteorite impacts.
They drop balls into a tray filled with sand.
They use six balls with different masses.
They drop each ball from the same height.
This photograph shows the sand after several balls have hit it.



(c) When one ball hits the sand, it has a velocity of 6.2 m/s.
It has a momentum of 0.46 kg m/s.
(i) Calculate the mass of the ball.

(3)

mass of ball = ... kg

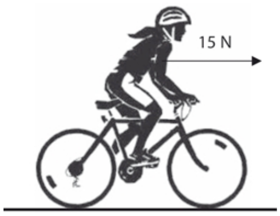
(ii) The ball takes 0.17 s to come to rest after it hits the sand.
Calculate the average impact force.

(2)

average impact force = ... N

Q23.

The cyclist in this picture is travelling at a constant velocity.
Her muscles produce a driving force of 15 N.



The cyclist accelerates at 1.4 m/s^2.
The mass of the cyclist and bicycle is 60 kg.

(i) Calculate the resultant force.

(2)

resultant force = ... N

(ii) The cyclist accelerates for 8 s.
Calculate the increase in velocity during this time.

(3)

increase in velocity = ... m/s

Q24.

(iii) The average speed of a P-wave in the mantle is 12 km/s.
A P-wave travels vertically down from the surface and reflects from the core–mantle boundary back to the surface.
It travels a total distance of 5800 km.
Calculate the total time of travel for the wave.

(3)

time = ... s

Q25.

A child is stationary on a swing.

(a) The child is given a push by his brother to start him swinging.
His brother applies a steady force of 84 N over a distance of 0.25 m.

(i) Calculate the work done by this force.

(2)

Work done = ... J

(ii) State how much energy is transferred by this force.

(1)

Energy transfered = ... J

(iii) After several more pushes, the child has a kinetic energy of 71 J.
The mass of the child is 27 kg.
Show that the velocity of the child at this point is about 2.3 m/s.

(2)

....

Q26.

A student uses an electric kettle.

It works from the 230 V mains supply.

(b) The power of the kettle when it is heating water is 1.8 kW.
The mains voltage is 230 V.

(i) Calculate the current in the kettle.

(3)

current = ... A

(ii) The kettle is switched on for 2 minutes.
Calculate the total amount of energy transferred by the kettle in this time.

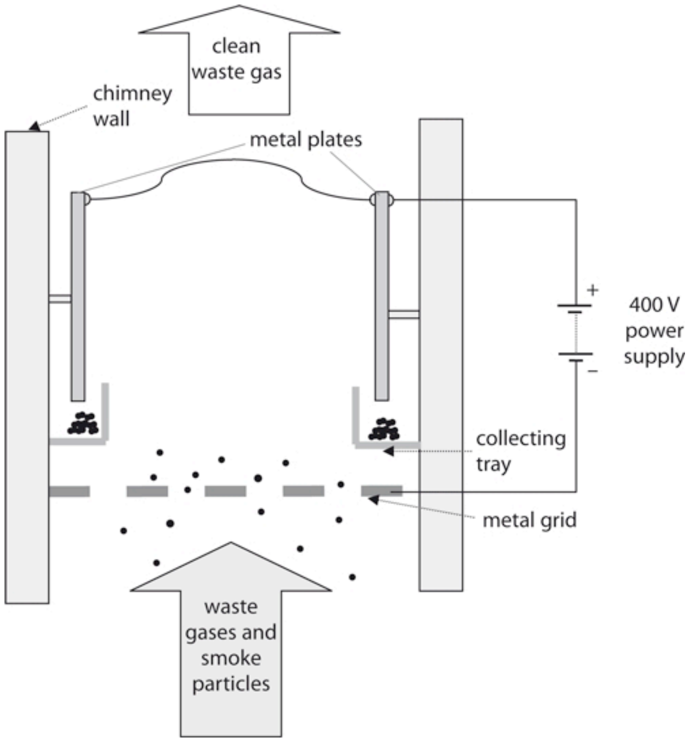
(2)

energy transferred = ... J

Q27.

Waste gases contain smoke particles.

The diagram shows how smoke particles can be removed from waste gases as they rise through a chimney.



(c) There is a current of 1.4 A between the grid and the plates.

(i) Calculate the charge transferred by this current in two minutes. State the unit.

(3)

charge = ... unit ....

(ii) The potential difference between the grid and the plate is 400 V.

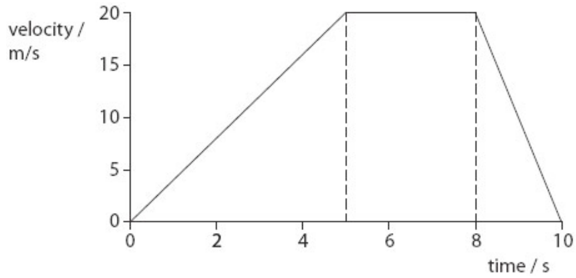
Calculate the electrical energy transferred in two minutes.

(2)

energy transferred = ... joules

Q28.

The graph shows how the velocity of a small car changes with time.



(i) Use the graph to estimate the velocity of the car at three seconds.

(1)

....

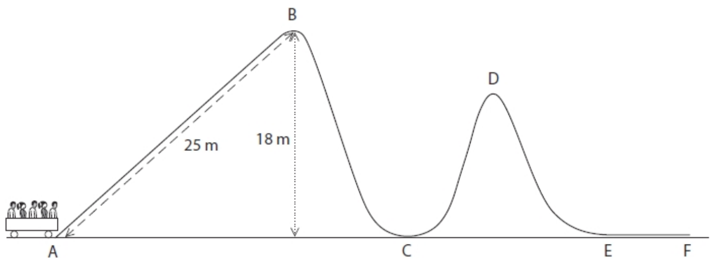
(ii) Calculate the acceleration of the car when it is speeding up.

(2)

acceleration = ...m/s^2

Q29.

The diagram shows a car and passengers at the start of a roller coaster ride at an amusement park.



(a) An electric motor pulls the car from A to B at a steady speed.
The total mass of the car and passengers is 9500 kg.
Calculate the amount of work done on the car and passengers.
[Gravitational field strength, g = 10 N/kg]

(2)

work done = ... J

(b) The car is released at B and continues down the track.
State the maximum possible kinetic energy of the car and passengers at C.

(1)

maximum KE = ... J

(d) When the car and passengers reach E, they have a total momentum of 150 000 kg m/s.

The total mass of the car and passengers is 9500kg.
Calculate the velocity of the car and passengers at E.

(3)

velocity = ... m/s