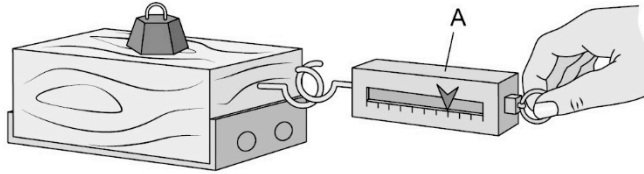


Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

- 1 a Bilal investigates the effect of the mass of an object on the force needed to move it. He uses the apparatus shown in the diagram.



- i Name apparatus A.

\_\_\_\_\_ (1)

- ii Name the force that will slow down the movement of the block.

\_\_\_\_\_ (1)

- iii Name the variable Bilal should change in the investigation.

\_\_\_\_\_ (1)

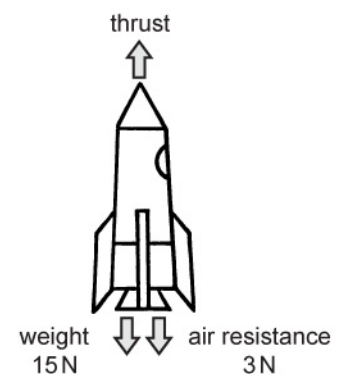
- iv Name *one* variable that Bilal must control in the investigation to make the test fair.

\_\_\_\_\_ (1)

- b This diagram shows the forces acting on a toy rocket. The rocket is travelling upwards at a constant speed.

The air resistance and weight forces are balanced by the thrust force.

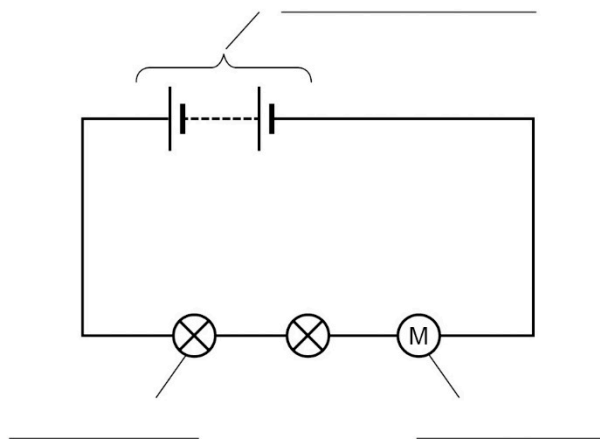
Calculate the size of the thrust force.



thrust = \_\_\_\_\_ N (1)

(Total for Question 1 = 5 marks)

- 2 a** This diagram shows an electric circuit.



- i** Label the components in the circuit. (2)

- ii** Tracy removes one of the bulbs from the circuit and connects the ends of the wire together.

Explain what will happen to the brightness of the remaining bulb.

Use words from the box to complete the sentence correctly.

brighter	current	resistance	positive
negative	unchanged	dimmer	

The remaining bulb will be \_\_\_\_\_ because the \_\_\_\_\_ has decreased and so the \_\_\_\_\_ will increase.

(2)

- b** The resistance of a component in a circuit can be calculated from the potential difference (voltage) and the current.

$$\text{resistance } (\Omega) = \frac{\text{potential difference across the component (V)}}{\text{current through the component (A)}}$$

The potential difference across the motor is 6 V and the current is 0.5 A.

Calculate the resistance of the motor.

resistance = \_\_\_\_\_  $\Omega$

(2)

(Total for Question 2 = 6 marks)

**3** The Solar System includes asteroids and comets as well as planets and moons.

**a** What is an asteroid?

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(1)

**b** An astronaut has a mass of 95 kg.

Weight is calculated using the equation:

weight (N) = mass (kg) × gravitational field strength (N/kg)

On Earth the gravitational field strength is 10 N/kg.

**i** Calculate the weight of the astronaut on Earth.

weight = \_\_\_\_\_ N  
(2)

**ii** The astronaut travels into space.

Explain how the weight of the astronaut changes as she travels away from Earth.

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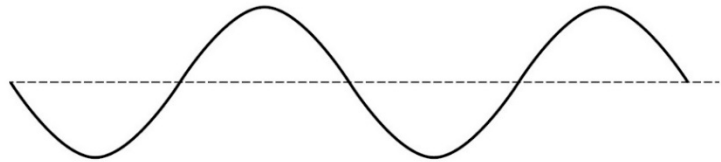
(2)

**c** The gravitational field strength is less on the Moon than on the Earth. Explain why this means that the astronaut can jump higher on the Moon than she can when she is on the Earth.

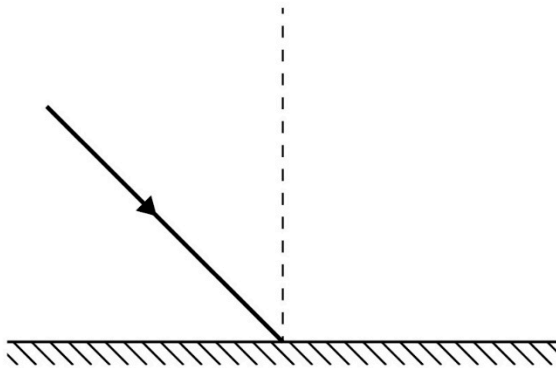
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(2)

(Total for Question 3 = 7 marks)

**4** Light travels as a wave.**a** This diagram represents a light wave.**i** Label the amplitude on the diagram above.

(1)

**ii** Complete the diagram below to show what happens to a light ray hitting a smooth surface.

(1)

**b** Draw three lines to match the keywords to their definitions.

transparent

an object that allows light to pass through

opaque

an object that emits light

luminous

an object that absorbs or reflects light rays

an object that scatters light rays

(2)

**c** White light can be split into a spectrum of colours using a prism.**i** What term do scientists use to describe the bending of light as it passes from one material to another? Tick *one* box.☐ A reflection☐ B refraction☐ C frequency☐ D filtering

(1)

- ii Draw a diagram in the space below to show how white light can be split into a spectrum of colours.

(3)

(Total for Question 4 = 8 marks)

- 5 a All fuels store energy. Food is a type of fuel.

This table shows the energy stored by two foods.

Food type	Energy stored per 100 g (kJ)
wheat cereal	1500
chocolate	2200

- i What name do we use for the energy stored in fuel or foods? Tick *one* box.

- ☐ A kinetic energy
- ☐ B chemical energy
- ☐ C thermal energy
- ☐ D elastic potential energy

(1)

- ii Calculate the total energy in a 30 g serving of wheat cereal.

energy = \_\_\_\_\_ kJ

(2)

- b Petrol used in car engines stores 47 300 kJ of energy in every kilogram of fuel. Biodiesel, a type of biofuel, stores 38 000 kJ in every kilogram of fuel.

Give *one* advantage and *one* disadvantage of using biofuel as a fuel in car engines.

Advantage \_\_\_\_\_

Disadvantage \_\_\_\_\_

(2)

(Total for Question 5 = 5 marks)

- 6 Henna puts an ice cube made with coloured water into a beaker of colourless water.

After a few minutes she can see the coloured water moving in the directions shown in the diagram.

- a i Ice is solid water. It floats on liquid water. Explain why this is unusual compared with other materials.

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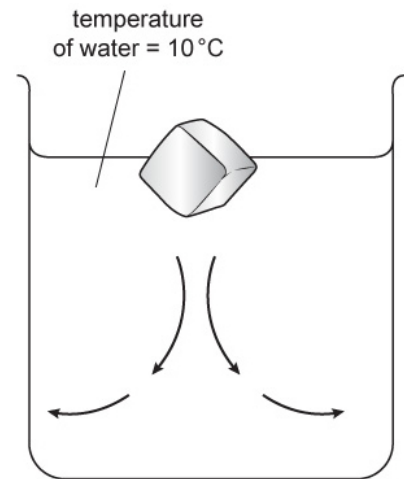
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(2)

- ii Which statement best explains the direction of energy transfer taking place in the investigation? Tick *one* box.

- ☐ A Energy is transferred from the ice cube to the water because the water is warmer.
- ☐ B Energy is transferred from the water to the ice cube because the water is warmer.
- ☐ C Energy is transferred from the ice cube to the water because the ice cube is warmer.
- ☐ D Energy is transferred from the water to the ice cube because the ice cube is warmer.

(1)

- b The coloured water follows the path shown in the diagram, because water becomes more dense when it gets colder. Explain why this is so in terms of particles.

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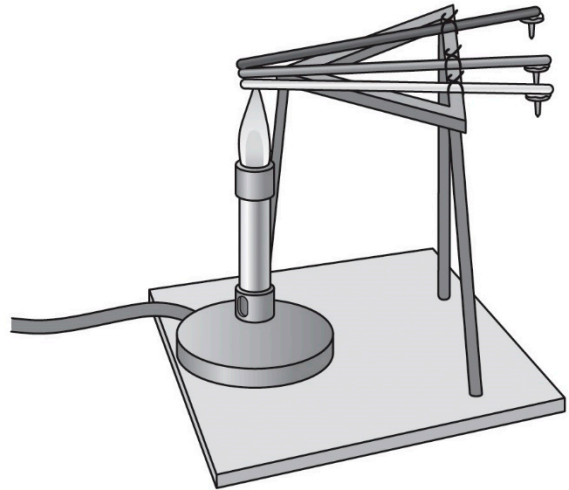
(2)

(Total for Question 6 = 5 marks)

- 7 In an investigation, a group of students use the apparatus shown in the diagram.

They use wax to stick a drawing pin to one end of each of three rods. The rods are made of different materials.

They heat the other ends of the rods using a Bunsen burner and measure the time taken for the pins to fall off.



- a State why the pins fall off the ends of the rods.

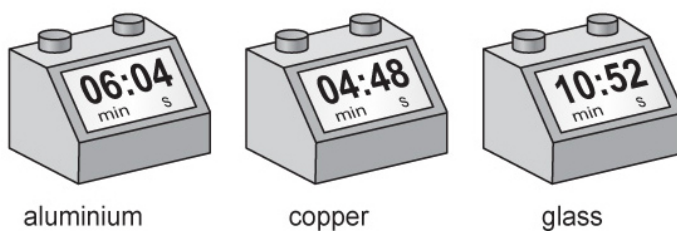
(1)

- b How is the energy transferred along the rods? Tick *one* box.

- ☐ A convection
- ☐ B conduction
- ☐ C radiation
- ☐ D reflection

(1)

- c The students use three stop clocks to record the time each pin takes to fall off its rod, as shown in the diagram.



Complete the results table.

Material	Time for pin to fall off (seconds)

(2)

- d** Write a conclusion for this investigation.

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(1)

- e** Give *one* advantage of heating all the rods at once.

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(1)

(Total for Question 7 = 6 marks)

- 8** Peter investigates static electricity using rods made from two different materials, as shown in the diagram.

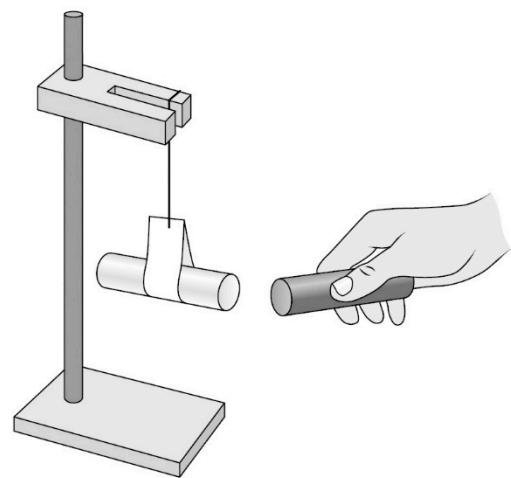
- a** Describe the kinds of materials that can be given a charge of static electricity.

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(1)



- b** The two rods in the diagram have opposite charges to each other.  
Describe what will happen when the two rods are close to each other.

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(1)

- c** Peter charges the rods by rubbing them with a cloth.

Explain how the charge on the cloth compares with the charge on the rod that has just been rubbed.

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(2)

(Total for Question 8 = 4 marks)



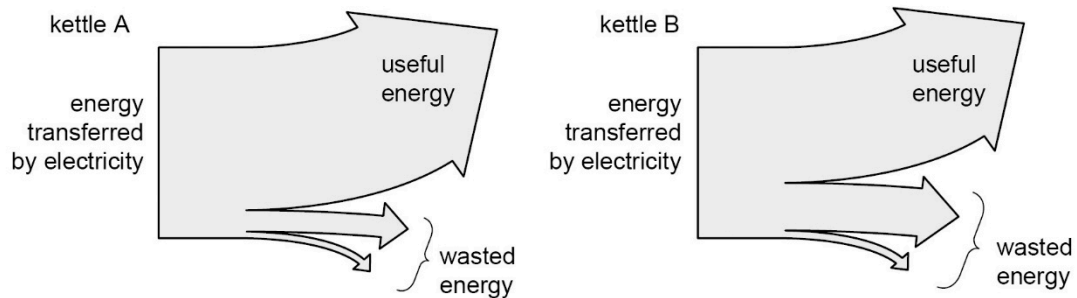
- 9 A kettle uses electricity to heat water. Energy is transferred usefully to be stored in the hot water inside the kettle.

a Describe the main way that wasted energy is stored when the water in the kettle is being heated.

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(1)

- b The Sankey diagrams below show the energy transfers in two kettles. The widths of the arrows represent the amounts of energy transferred in different ways.



State why kettle A is more efficient.

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(1)

- c Cups for hot drinks can be made from different materials.

Nikhil has three cups made from different materials. The three cups are all the same size and shape.

Nikhil is investigating which material is the best insulator.

Write a plan for this investigation.

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(2)

- d Describe *two* things Nikhil must do to make sure the investigation is a fair test.

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(2)

(Total for Question 9 = 6 marks)

- 10** Ultrasound produces an echo when it hits a surface.

Sonar uses ultrasound to locate shoals of fish.

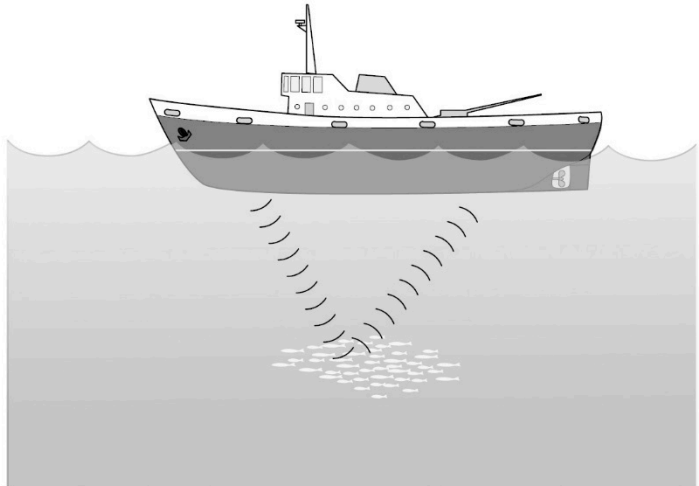
The boat in the diagram to the right sends out an ultrasound signal and times how long it takes to detect the echo.

A ship records a time of 2 seconds for the echo to be received.

The speed of sound in water is 1500 m/s.

Calculate the depth of the fish using the following equation.

$$\text{depth(m)} = \frac{\text{speed(m/s)} \times \text{time(s)}}{2}$$



depth = \_\_\_\_\_ m

(2)

(Total for Question 10 = 2 marks)

- 11** An energy spokesperson makes the following statement.

*We can invest in renewable energy resources such as wind and solar, but until we can store large amounts of energy we will still need to maintain fossil fuel or nuclear power stations.*

Explain why governments are investing in renewable energy resources, and why we still need non-renewable resources as well.

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(6)

(Total for Question 11 = 6 marks)

TOTAL FOR TEST = 60 MARKS