Write your name here

Surname	Other names

Scholarship Paper 2025

Subject: Physics

Time: 1 Hour

You must have: Pen, Pencil, Calculator	**Total Marks**

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name.
- Answer the questions in the answer sheets provided**.**
  - *there may be more space than you need.*

Information

- The total mark for this paper is **60**
- The marks for **each** question are shown in brackets
  - *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

1.

Underline the option which best completes each of the following.

(a) An example of a non-renewable energy resource is

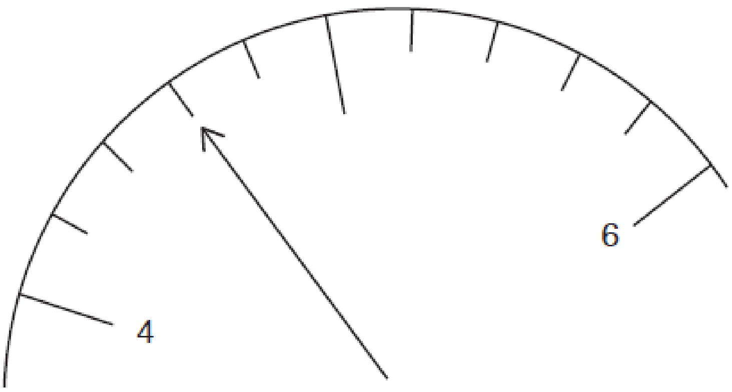
biomass **nuclear** **solar** **wind**

(b) The instrument used to measure electric current is

an ammeter **an ampmeter**

a resistor **a voltmeter**

(c)



The reading shown on the pointer on the scale above is

4.3 **4.6** **5.2** **6.7**

(d) A stone has a density of $3\,g/cm^3$ and a mass of 30 g. Its volume is

$10\,cm^3$ **$27\,cm^3$** **$33\,cm^3$** **$90\,cm^3$**

(e) Light beams travel

as a single colour **at the same speed in every medium**

at an infinite speed **in a straight line**

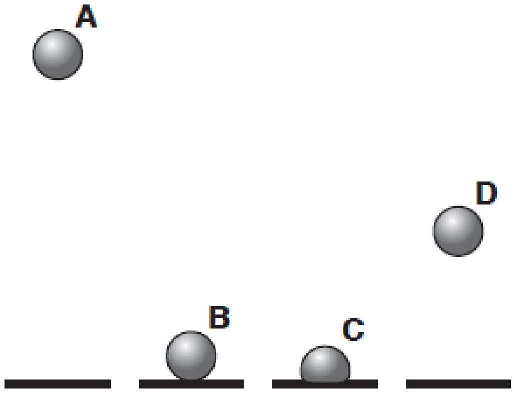
(f) In order of increasing distance from the Sun, the planets in the solar system are in the order of Mercury, Venus, Earth, Mars.

The next planet from the Sun is

Io **Jupiter** **Saturn** **Titan**

(6)

2.
Mary drops a squash ball onto a hard floor so that it bounces.



In the diagrams above, **A** shows the ball being released, **B** shows it landing on the floor, **C** shows it squashed on the floor and **D** shows it at the top of its first bounce.

(a) Complete the sentence below.

As the ball falls from **A** to **B**,..

energy is transferred into kinetic energy. (1)

The ball has 0.2 J of energy at **A**.

(b) (i) Explain why it will have about 0.2 J of kinetic energy at **B**.

....

.... (1)

(ii) Explain why it will have slightly less than 0.2 J of kinetic energy at **B**.

....

.... (2)

(c) Name the form of energy which the ball has at **C**.

.... (1)

(d) Explain why the ball has much less than 0.2 J of energy at **D**.

....

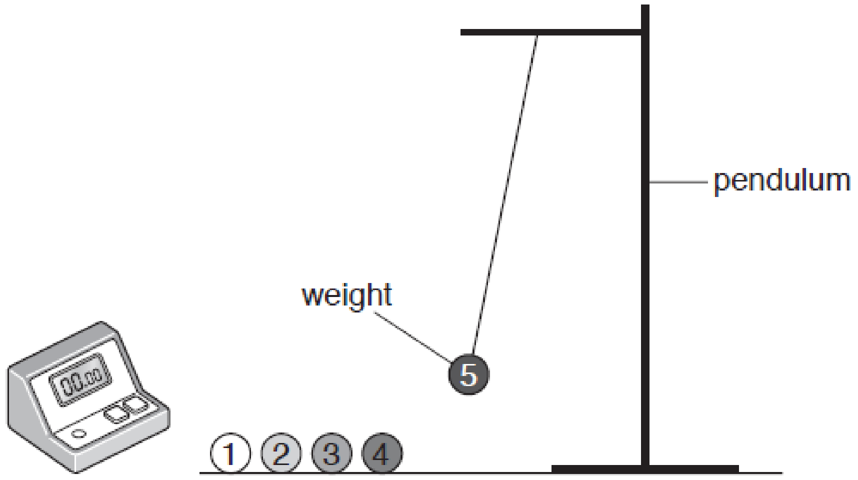
.... (2)

3.

William said, 'I think that a pendulum with a heavy weight will swing faster than one with a light weight.'

His teacher said, 'That's a prediction; you should test it'.

William was given the apparatus shown in the diagram below.



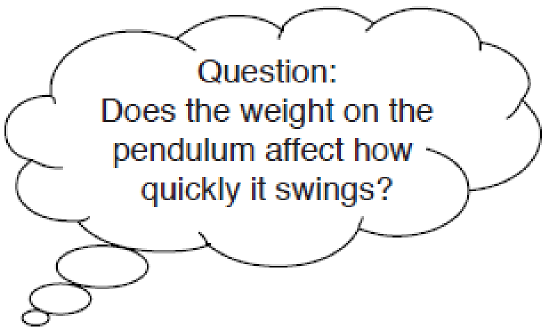
His teacher told him that he should plan his investigation carefully and make sure it was a fair test.

(a) What do you understand by the term *fair test*?

....

.... (2)

(b) Complete the planning document below to ensure that the investigation is fair.



What I will change

....

....

What I will measure

....

....

What I will keep the same	What I will keep the same	What I will keep the same
....	....	....
....	....	....

(5)

William's teacher suggested that he should repeat his experiment and then calculate the average of his results.

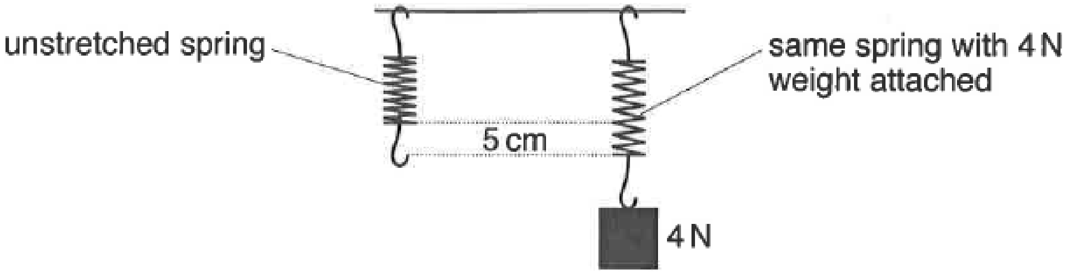
(c) Why is this a good idea?

....

.... (1)

4.

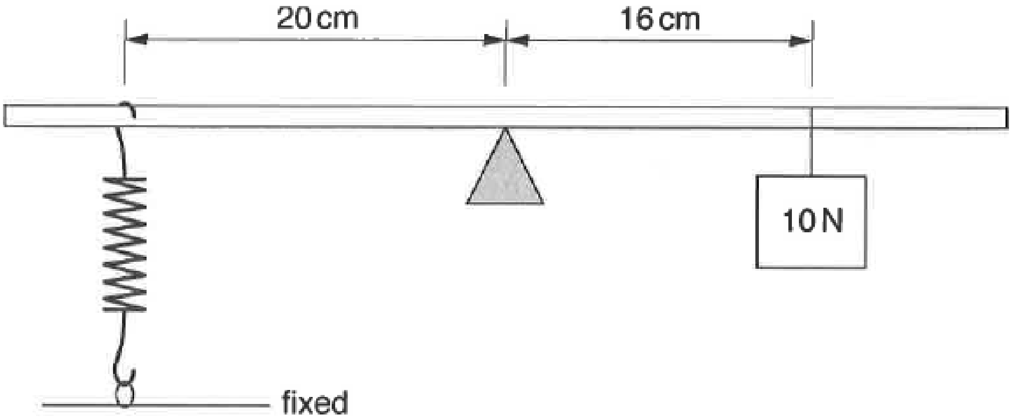
The diagram shows a spring being extended by 5 cm when a weight of 4 N is attached to it.



(a) State the size of the tension in the spring after the 4 N weight is attached.

.... (1)

The same spring is used to balance a lever as shown in the diagram below.



(b) Show that the clockwise moment on the lever is 160 N cm.

....

.... (1)

(c) Calculate the force which the spring needs to exert on the lever in order to balance it.

....

.... (2)

(d) Calculate the extension of the spring when it is exerting this force.

....

.... (2)

5.

Many artificial satellites orbit the Earth.

One use of an artificial satellite is to carry a telescope to look at distant stars and galaxies.

(a) Name the force which keeps a satellite in orbit round the Earth.

.... (1)

(b) Give **two** other uses for artificial satellites.

1: ....

....

2: ....

.... (2)

Some artificial satellites orbit the Earth in 24 hours while the Moon, our only natural satellite, takes about 28 days to orbit the Earth.

(c) (i) Which must be further from the Earth, the artificial satellites or the Moon?

.... (1)

(ii) Explain your answer.

....

.... (1)

Humans have visited the Moon and we have sent unmanned probes to the furthest reaches of our solar system.

Space exploration is very expensive and uses valuable resources.

(d) Discuss the advantages and disadvantages to society of these projects and whether you think they are worthwhile.

(One mark will be awarded for use of correct spelling, punctuation and grammar.)

....

....

....

....

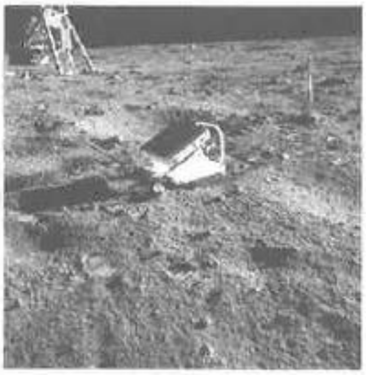
....

.... (4)

6.

In 1969, astronauts left a reflector on the surface of the Moon.

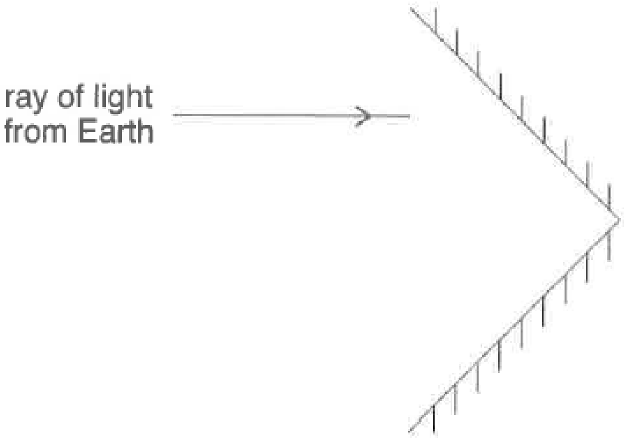
The reflector is made from two mirrors at 90° to each other.



Scientists on Earth aim light from a laser at the reflector.

This light reflects back to them.

The diagram below shows two of the mirrors in the reflector.



a) Complete the diagram to show the path of the ray of light. [2]

b) State the equation which links speed, distance and time.

.... [1]

The speed of light in a vacuum is 300 000 km/s.

The average time for a ray of light to travel to the Moon and back is 2.6 s.

c) Show that the Moon is approximately 400 000 km from the Earth.

....

....

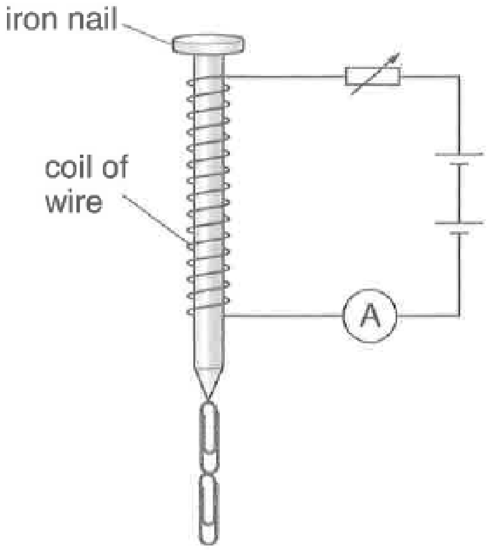
.... [3]

7.

A pupil constructs an electromagnet and uses it to lift paperclips.

She varies the current and counts how many paperclips can be lifted.

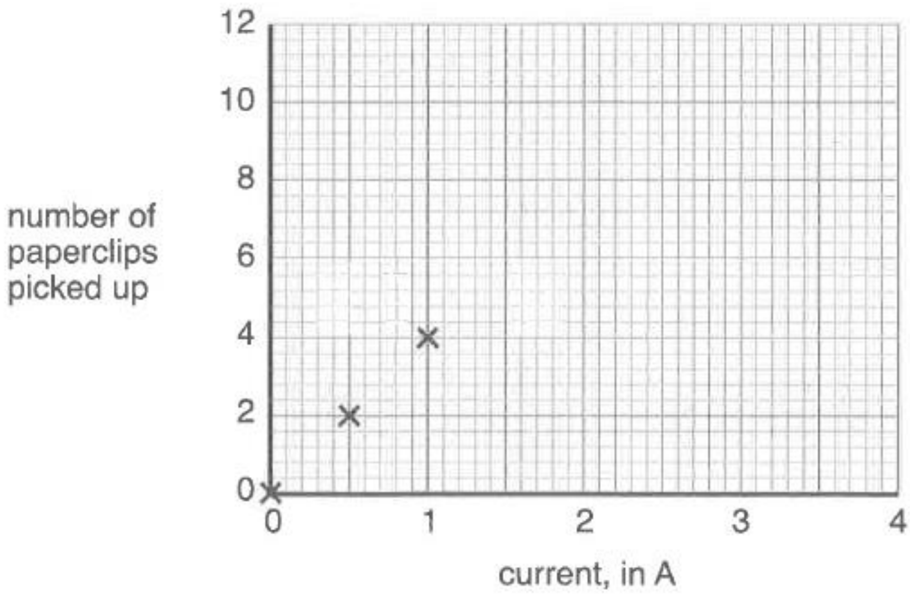
Her results are shown in the table below.



current, in A	number of paper-clips picked up
0	0
0.5	2
1.0	4
1.5	6
2.0	8
2.5	9
3.0	10
3.5	10

(a) Complete the graph below.

(The first three points have been plotted for you.) (2)



(b) Add a suitable line of best fit. (1)

(c) Describe the relationship between current and number of paperclips lifted.

....

....

....

.... (2)

(d) (i) Use your graph to determine the number of paperclips which would be lifted by a current of 1.8 A.

.... (1)

(ii) Show clearly on your graph how you obtained your answer. (1)

The pupil finds that with a current of 0.2 A no paperclips can be lifted by the electromagnet.

(e) Explain carefully whether this means that there is no force exerted by the electromagnet on the paperclips when a current of 0.2 A flows.

....

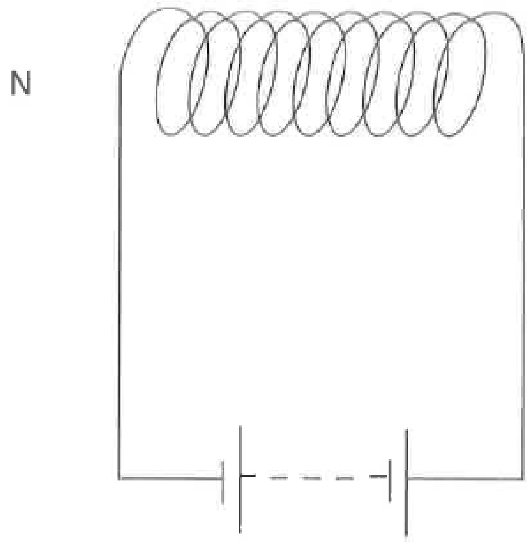
....

.... (3)

The diagram below shows a coil of wire connected to a battery.

(The north-seeking pole has been labelled for you.)

(f) Add at least 4 lines to show the shape and direction of the magnetic field around the coil.



(2)

8.
Alex wants to calculate the pressure he exerts on the floor when he stands on one foot.

a) Describe how Alex could measure the area of the floor in contact with one of his feet.

....

....

....

....

.... [3]

Alex records these measurements:

weight = 550 N

The area of the floor in contact with one foot = $220\,cm^2$

b) i) State the equation which links pressure, force and area.

.... [1]

ii) Calculate the pressure that Alex's foot exerts on the floor and include the correct unit.

Show your working.

pressure: .... unit: .... [3]