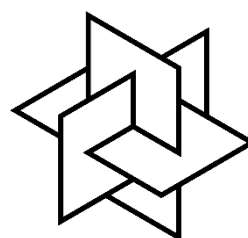


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CE AT 13+

SCIENCE



ISEB

Independent Schools
Examinations Board

CORE PHYSICS

Specimen Paper

Date

Time allowed: 40 minutes

Instructions

Answer **all** the questions.

Information

You may use a calculator.

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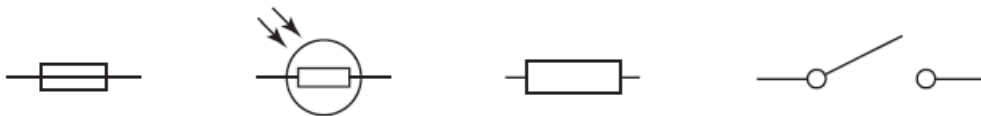
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1. Underline the word or phrase which best completes the following:

(a) The unit of force is the

kilogram newton newton metre pascal

(b) The circuit symbol for a switch is



(c) A note with a pitch lower than middle C has a smaller

amplitude frequency speed wavelength

(d) The planet in our solar system next closest to the Sun after Earth is

Jupiter Mars Mercury Venus

(e) A wave which cannot travel between the Sun and the Earth is

infra-red light sound ultra violet

(f) We can see the Moon at night because

it emits light

it reflects the Sun

light from our eyes reaches the Moon and reflects back to our eye

astronauts on the Apollo missions left a reflector on the Moon

(g) A metal block is resting on a table

It is turned so that a face with half the area now rests on the table.

The pressure of the block on the table is now

four times as much

half as much

the same

twice as much

[7]

2. The space probe Rosetta was launched on 2 March 2004 to meet up with a comet. It reached the comet on 6 August 2014, so it had been travelling for about 3 800 days.

(a) Show that this time is about 91 000 hours.

..... [1]

The probe travelled about 6 400 million (6 400 000 000) km to reach the comet.

(b) (i) State the equation that links speed, distance and time.

..... [1]

(ii) Calculate its average speed in km/hr.

.....km/hr [2]

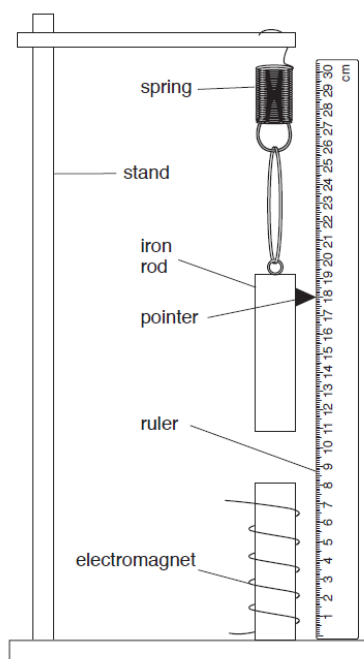
As the probe approached the comet, it had to be slowed down using rocket motors.

(c) Suggest why rocket motors, instead of a parachute, had to be used to slow it down.

.....
..... [2]

3. Matthew decides to build a device to measure current.

The diagram below shows the apparatus he uses.



The electromagnet is connected into the circuit where he wants to measure the current. When a current flows in the electromagnet, the iron is pulled downwards

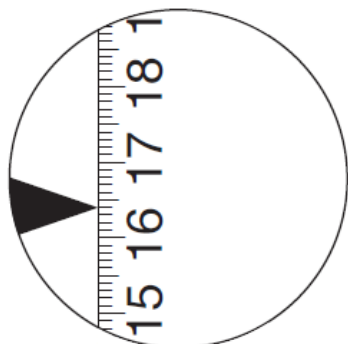
(a) Explain why the iron is pulled downwards when a current flows in the electromagnet.

.....

..... [2]

With **no** current flowing, the pointer is at 18.0 cm on the ruler.

With the electromagnet connected in a circuit and a current flowing, the position of the pointer is as shown below.



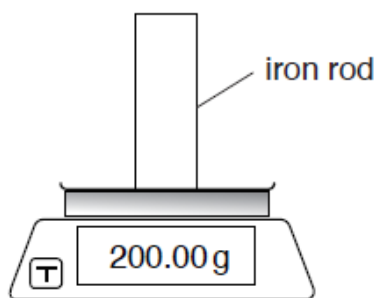
(b) Write down the new position of the pointer.

..... cm [1]

(c) Show that the extension of the spring caused by the current is 1.6 cm.

..... [2]

The mass of the iron rod is measured by putting it on a balance as shown below.



(d) Write down the mass of the iron rod in kg.

..... kg [1]

On Earth, gravity exerts a force of 10 N on 1 kg.

(e) Calculate the weight of the iron rod and give the correct unit.

weight unit [2]

When first hung on the spring, with no current flowing, the iron rod extends the spring by 3.2 cm.

(f) Calculate the force exerted by the electromagnet on the iron rod when the current flows.

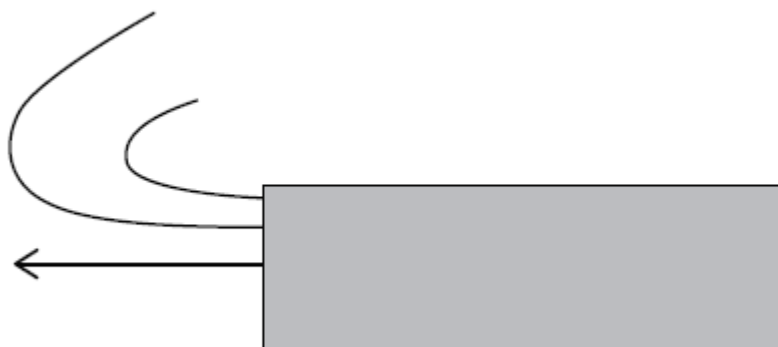
.....
..... [2]

When Matthew doubles the current, he finds that the iron rod is pulled down more than twice as far.

(g) Explain why this happens.

.....
.....
..... [3]

4. The diagram below shows part of the magnetic field around a bar magnet.



- (a) Use the letters **N** and **S** to show the location of the north and south poles of the magnet on the diagram.

[1]

- (b) Complete the two curved field lines on the diagram.
Include an arrow on each field line to indicate its direction.

[2]

- (c) Describe how you could carry out a test to find out whether another metal bar of similar size to the bar magnet is a bar magnet or not.

.....

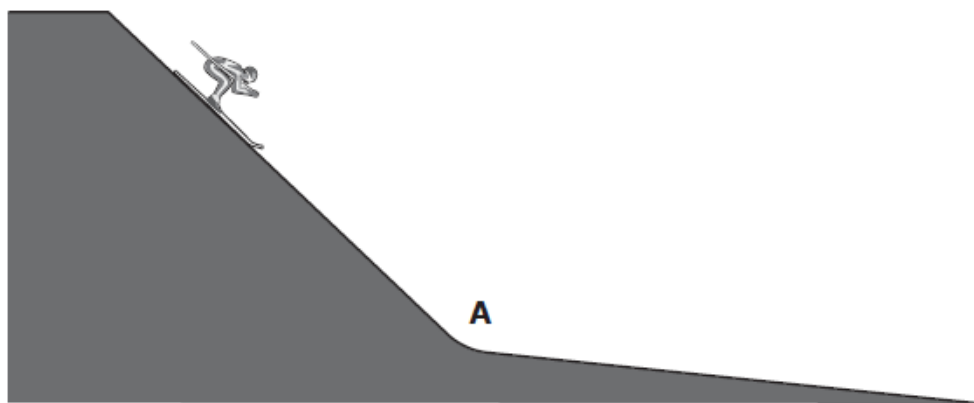
.....

.....

.....

[3]

5. The diagram below shows a skier on a ski slope.



- (a) Complete the following sentence:

As the skier gets faster skiing down the slope, energy store is transferred to energy store.

[2]

After she reaches point **A** she gradually slows down to a stop.

- (b) Explain what has happened to her energy when she has stopped.

.....

.....

[2]

6. The table below gives data for some of the planets in our solar system.

name of planet	time to rotate once, in hours	mean distance from the Sun, in millions of km	mean density, in kg/m ³
Jupiter	9.9	778.6	1326
Mars	24.6	227.9	3933
Mercury	1 407.6	57.9	5427
Venus	-5832.5	108.2	5243

- (a) State which of the four planets has the shortest day.

..... [1]

The average surface temperature of Jupiter is -110 °C.

- (b) Use data from the table to explain why Jupiter is the coldest of the planets listed.

.....
..... [2]

One of the planets in the table is often referred to as a 'gas giant'.

- (c) Use data from the table to explain which of the planets listed is a gas giant.

.....
..... [2]

7. 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]

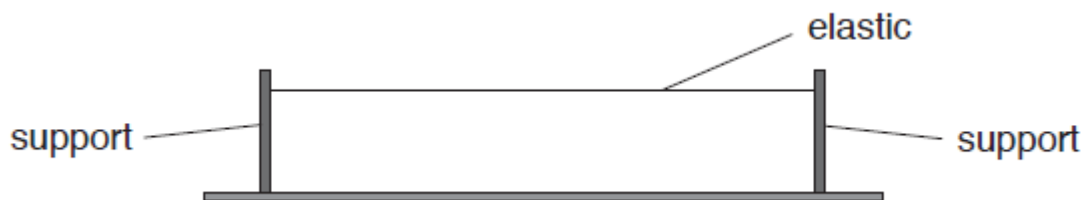
Humans have visited the Moon and we have sent unmanned probes to the furthest reaches of our solar system.

Space exploration is very expensive and uses valuable resources.

(d) Suggest and explain the advantages and disadvantages of these projects.

.....
.....
.....
.....
..... [4]

8. A piece of elastic is stretched between two supports as shown below.



The piece of elastic is plucked and a sound is heard.

- (a) Explain why a sound is heard when the elastic is plucked.

.....

..... [2]

The supports are moved further apart, stretching the elastic more.

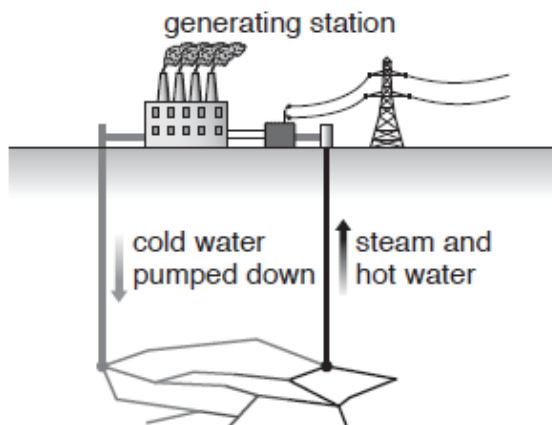
- (b) Complete the following sentence, using any of the words in the box below.
The words may be used once, more than once or not at all.

higher	lower	stretches	the same	vibrates
---------------	--------------	------------------	-----------------	-----------------

The sound is now in pitch because the elastic
now at frequency.

[3]

9. The diagram below shows a way of taking thermal energy from beneath the surface of the Earth.



Cold water is pumped through hot, dry rocks below the surface of the Earth and is turned into steam.

- (a) Name the renewable energy resource.

..... [1]

The steam turns turbines.

- (b) Write in the boxes below the energy change that takes place in this process.



[2]

- (c) State one advantage of using this type of renewable energy resource rather than fossil fuels to generate electricity.

..... [1]

- (d) Give one other example of a renewable energy resource.

..... [1]

(Total marks: 60)