OXFORD
INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

INTERNATIONAL GCSE

Physics

Paper 2

Thursday 7 June 2018 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a ruler
- a scientific calculator
- the Physics Equations Sheet (enclosed).

Instructions
- Use black ink or black ball-point pen.
- Fill in the box at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information
- The maximum mark for this paper is 90.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

Do not write outside the box

0 1 Solar panels produce electricity from sunlight.

Figure 1

0 1 . 1 Sunlight is a renewable energy resource.

What is meant by renewable energy resource?

[1 mark]

0 1 . 2 Using electricity from solar panels means less electricity is generated by burning fuels such as coal.

Explain why this is less harmful to the environment.

[2 marks]

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0 1 . 3 The efficiency of the solar panels is low.

What is another disadvantage of solar panels?

Tick **one** box.

[1 mark]

Make lots of noise ☐

Need to be replaced often ☐

Only produce power during the day ☐

Produce atmospheric pollution ☐

Question 1 continues on the next page

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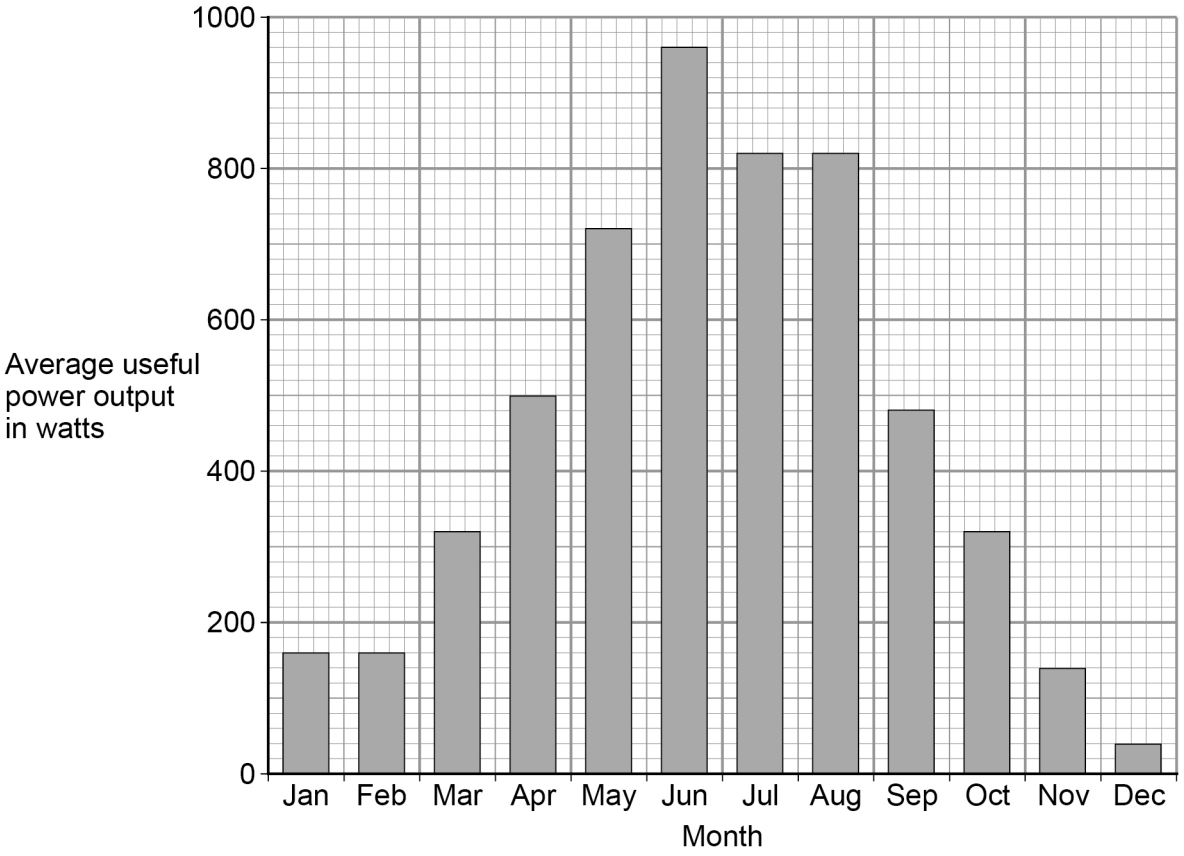
0 1 . 4 **Figure 2** shows the average useful power output from the solar panels each month.

Figure 2



For how many months was the average useful power output less than 350 W?

Tick **one** box.

[1 mark]

1 ☐

4 ☐

6 ☐

8 ☐

Do not write outside the box

0 1 . 5 The average power input to the solar panels in June was 8000 W.

The average useful power output from the solar panels was 960 W.

Calculate the efficiency of the solar panels.

Use the Physics Equations Sheet.

[2 marks]

Efficiency = _____

7

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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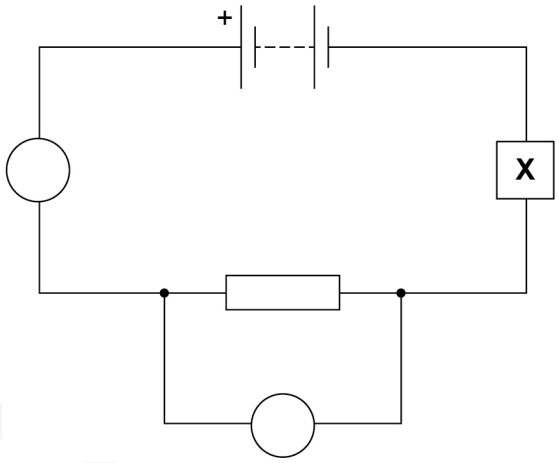
0 2 A student investigated how the potential difference (p.d.) across a resistor varied with current.

Figure 3



0 2 . 1 Complete the circuit symbols for the meters the student used to measure the p.d. and current.

[1 mark]

0 2 . 2 Component **X** can be used to change the current in the circuit.

Which of the following would be most suitable to use as component **X**?

Tick **one** box.

[1 mark]

- Fuse ☐
- LDR ☐
- Thermistor ☐
- Variable resistor ☐

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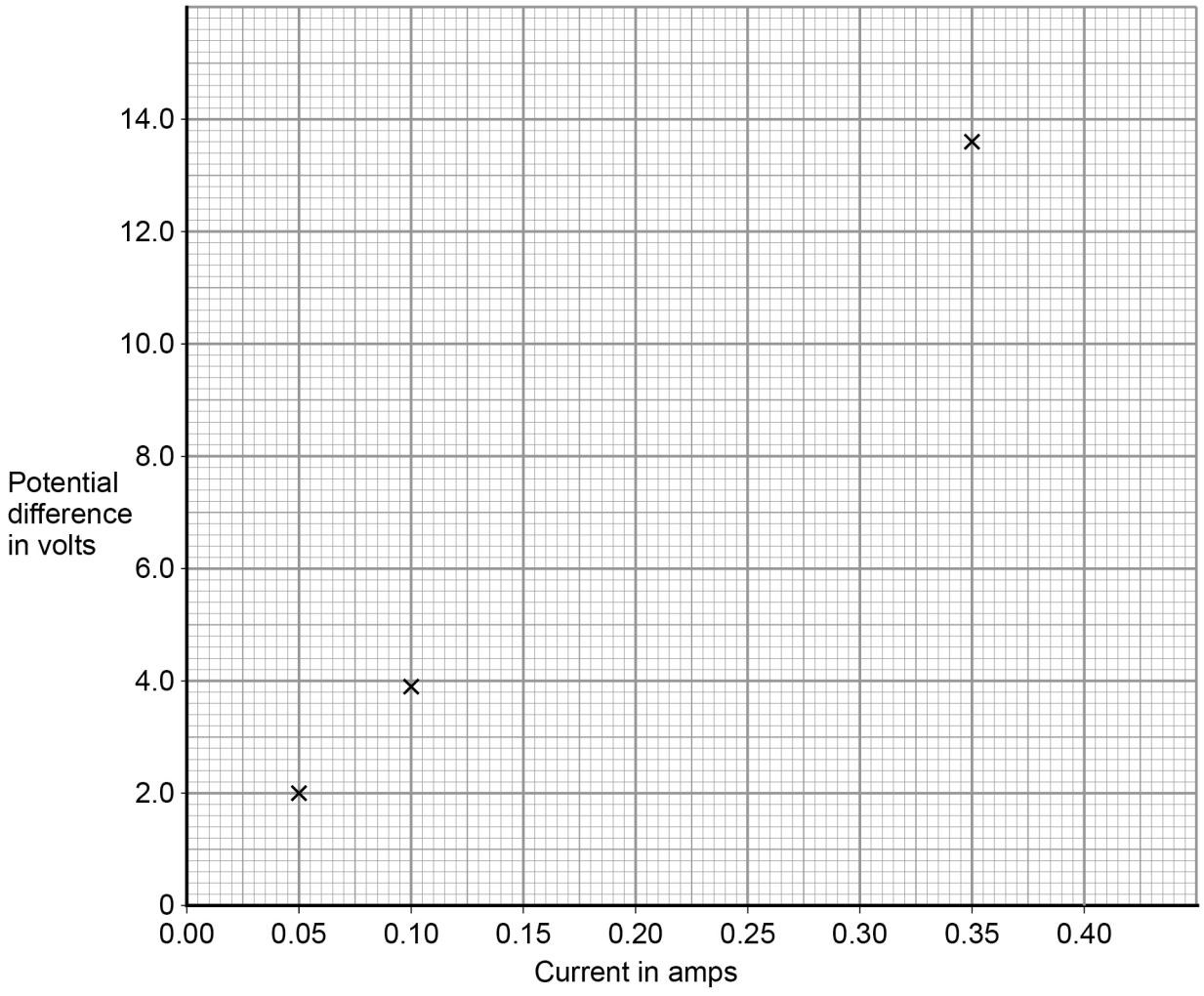
Table 1 shows the student's results.

Table 1

Current in amps	Potential difference in volts
0.05	2.0
0.10	3.9
0.15	6.1
0.20	7.8
0.25	10.1
0.30	12.0
0.35	13.6

Figure 4



0 2 . 3 Complete **Figure 4** using results from **Table 1**. Three of the points have been plotted for you.

[2 marks]

0 2 . 4 Draw a line of best fit.

[1 mark]

Do not write outside the box

0 2 . 5 Determine the resistance of the resistor when the p.d. across it is 5.0 V.

Give the unit.

Use the Physics Equations Sheet.

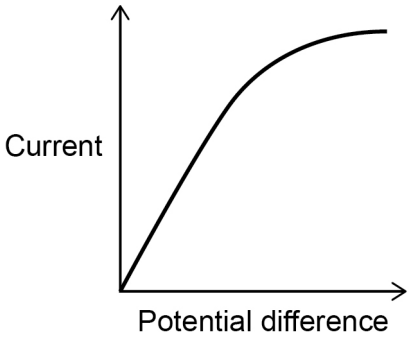
[4 marks]

Resistance = _____ Unit _____

0 2 . 6 The student replaced the resistor with a different component and repeated the investigation.

A sketch graph of the results is shown in **Figure 5**.

Figure 5



Explain why the current and p.d. for this component vary as shown in **Figure 5**.

[4 marks]

13

Turn over ►

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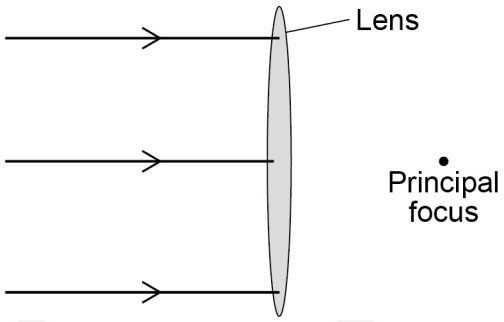
0 3 **Figure 6** shows three parallel rays of light entering a convex (converging) lens.

Figure 6



0 3 . 1 Complete **Figure 6** to show how the rays of light are brought to a focus.

[1 mark]

0 3 . 2 Complete the sentence. Choose an answer from the box.

[1 mark]

focal length	**focal point**	**lens power**	**object distance**

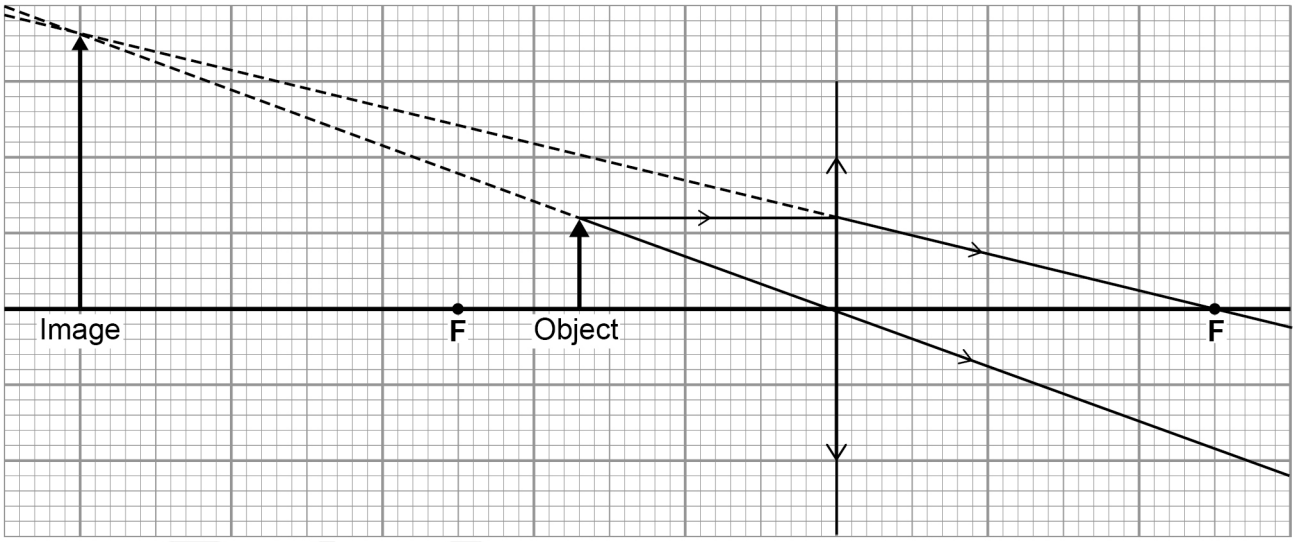
The distance from the centre of the lens to the principal focus is

called the _____ .

Do not write outside the box

Figure 7 shows a ray diagram for a convex lens.

Figure 7



0 3 . 3 The image in **Figure 7** is magnified.

Give **two** other words that describe the nature of the image.

[2 marks]

0 3 . 4 Calculate the magnification produced by the lens in **Figure 7**.

Use the Physics Equations Sheet.

[2 marks]

Magnification = _____

Turn over ►

Do not write outside the box

Convex lenses are used to correct long sight.

0 3 . 5 Explain what is meant by long sight.

[2 marks]

0 3 . 6 Complete the sentence. Choose an answer from the box.

[1 mark]

25 mm	**25 cm**	**250 cm**	**25 m**

For a normal eye, the near point is approximately _____ from the eye.

Do not write outside the box

0 3 . 7 A student is outside looking up at the dark night sky.

He then looks down to read a text message on a brightly lit phone.

Figure 8

Explain the changes that take place in the student's eye so he can see the text message clearly.

[4 marks]

13

Turn over for the next question

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0 4 **Figure 9** shows a racing car and driver.

Figure 9

0 4 . 1 The car is moving at 80 m/s. The mass of the car is 750 kg.

Calculate the kinetic energy of the car.

Use the Physics Equations Sheet.

[2 marks]

Kinetic energy = _____ J

Do not write outside the box

0 4 . 2 The brakes were applied. The average braking force was 15 kN.

The car travelled 60 m while braking.

Calculate the work done by the braking force.

Use the Physics Equations Sheet.

[3 marks]

Work done = _____ J

0 4 . 3 Determine the kinetic energy of the car immediately after braking.

[1 mark]

Kinetic energy = _____ J

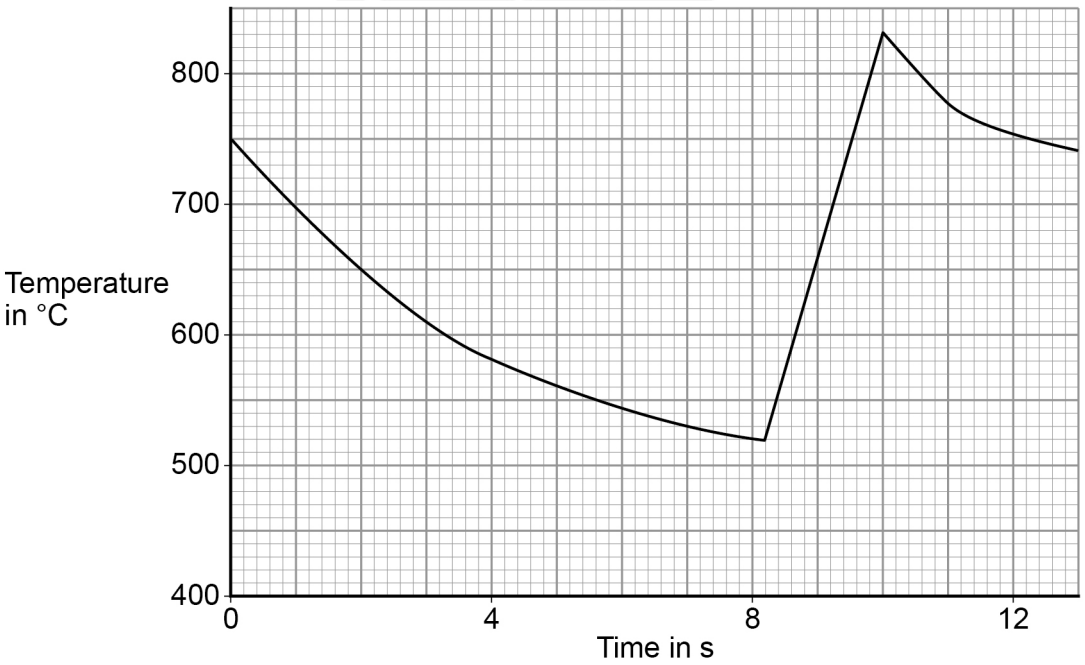
Question 4 continues on the next page

While the brakes were being applied, the temperatures of the brake discs increased.

The temperatures of the brake discs were measured by sensors on the car.

Figure 10 shows data from one of the sensors.

Figure 10



0 4 . 4 Determine the time for which the car was braking.

[2 marks]

Time = _____ s

0 4 . 5 At 4.0 s the sensor reading was 582.7 °C.

What is the resolution of the sensor?

[1 mark]

Resolution = _____

Do not write outside the box

0 4 . 6 The car then braked to a stop. During braking, 630 kJ of energy was transferred to the brake discs.

The temperatures of the brake discs increased by 140 °C.

The specific heat capacity of the brake disc material was 900 J/kg °C.

Calculate the mass of the brake discs.

Use the Physics Equations Sheet.

[3 marks]

Mass = _____ kg

12

Turn over for the next question

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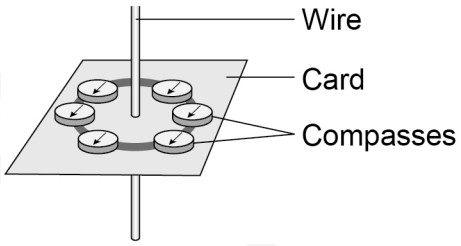
0 5 . 1 **Figure 11** shows a long, straight wire going through a piece of card.

Figure 11



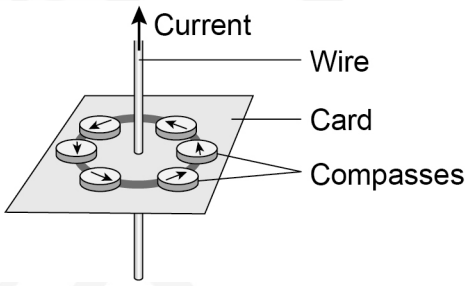
There is no current in the wire.

Why do the compasses all point in the same direction?

[1 mark]

0 5 . 2 **Figure 12** shows the arrangement when there is a current in the wire.

Figure 12



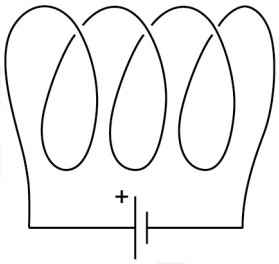
Explain why the compasses now point in different directions.

[3 marks]

Do not write outside the box

0 5 . 3 **Figure 13** shows another wire shaped to form a solenoid.

Figure 13



Complete the sentence. Choose an answer from the box.

[1 mark]

circular	**perpendicular**	**rectangular**	**uniform**

When there is a current in the wire, the magnetic field inside the solenoid is _____ .

Question 5 continues on the next page

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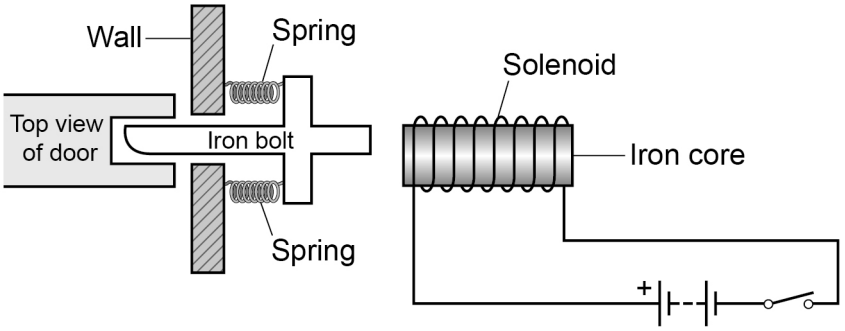
Figure 14 shows how a solenoid is used in an electromagnetic switch for a door lock.

Figure 14



0 5 . 4 When the switch is closed, the iron bolt is pulled to the right and the door is unlocked.

An iron core has been added inside the solenoid. This increases the strength of the magnetic field around the solenoid.

Give **two** other changes that would increase the strength of the magnetic field around the solenoid.

[2 marks]

1 _____

_____

2 _____

_____

Do not write outside the box

0 5 . 5 The door lock is held in place by two identical springs.

When the electromagnet is turned on, the energy stored by each spring is 0.125 J.

The spring constant of each spring is 100 N/m.

Calculate the extension of each spring.

Give your answer in millimetres.

Use the Physics Equations Sheet.

[4 marks]

Extension = _____ mm

Question 5 continues on the next page

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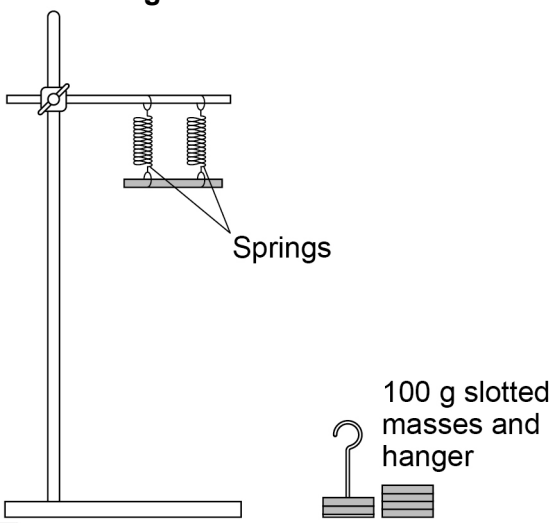
0 5 . 6 **Figure 15** shows two springs, arranged in the same way as those in the door lock.

Figure 15



Plan an experiment to determine the spring constant of this arrangement of springs.

[6 marks]

17

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0 6 Bananas contain a radioactive isotope of potassium (K).

0 6 . 1 There are different isotopes of the element potassium.

What is meant by isotopes of an element?

[2 marks]

0 6 . 2 An isotope of potassium decays into argon (Ar) by emitting a beta particle (β).

$$^{40}_{19}\mathrm{K} \rightarrow {}^{40}_{20}\mathrm{Ar} + {}^{0}_{-1}\beta$$

Compare the numbers of protons and neutrons in the argon nucleus to those in the potassium nucleus.

[2 marks]

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0 6 . 3 A student investigated the radiation emitted by a banana.

The student used the following method:

- Measure the count in one minute without the banana.
- Measure the count in one minute with the banana present.
- Repeat the measurements several times.

Table 2 shows the student's results.

Table 2

Count in one minute without the banana	Count in one minute with the banana
21	23
20	21
21	21
18	22
19	18
20	24

Evaluate whether it is safe to eat a banana.

Use information from **Table 2**. Include a calculation in your answer.

[3 marks]

0 6 . 4 Explain **one** improvement to the student's method.

[4 marks]

11

Turn over ►

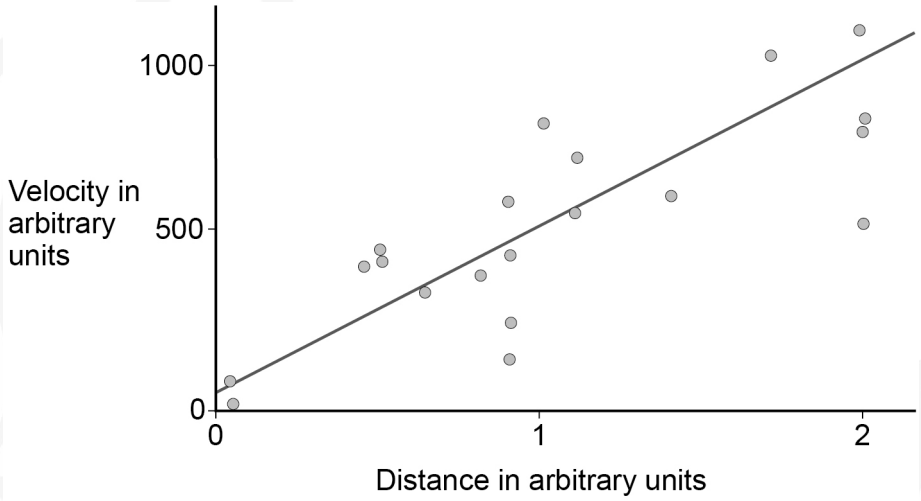
0 7 In 1929 Edwin Hubble made measurements from observations of light from distant galaxies. This light showed a red shift.

0 7 . 1 What is meant by red shift?

[1 mark]

Figure 16 shows how the velocity of distant galaxies varies with their distance from Earth. This graph is based on Hubble's 1929 data.

Figure 16



0 7 . 2 **Figure 16** includes a straight line of best fit.

Explain why Hubble could **not** be sure that the velocity of distant galaxies was directly proportional to their distance from Earth.

[3 marks]

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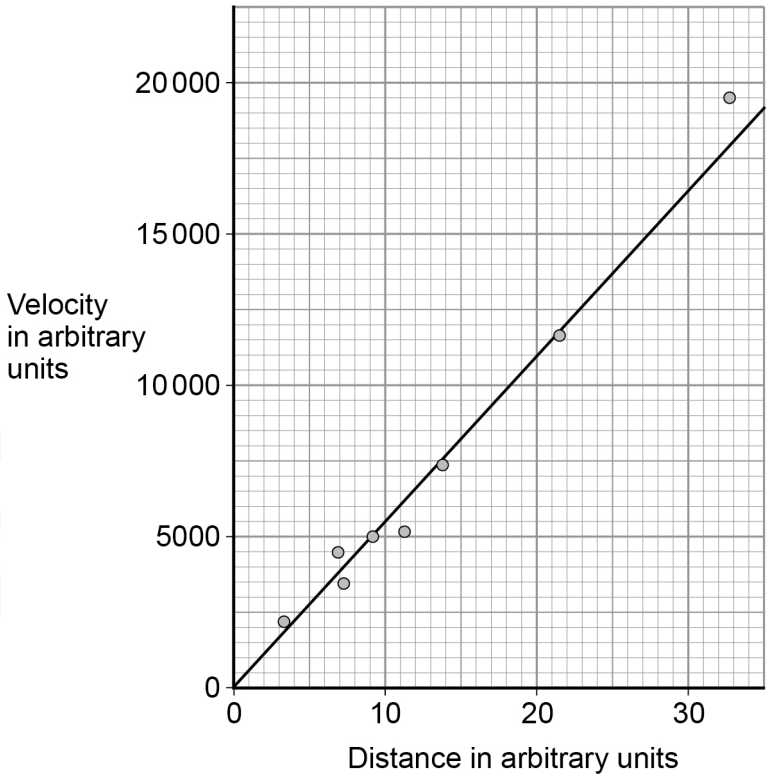
0 7 . 3 Two years later, Hubble worked with another scientist called Milton Humason.

Figure 17 shows their new data.

Figure 17



The age of the universe can be estimated from the equation:

$$\text{Age of universe} = \frac{975}{\text{gradient of line}} \text{ billion years}$$

Calculate the age of the universe using data from **Figure 17**.

[3 marks]

Age of universe = _____ billion years

Turn over ►

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0 7 . 4 Estimates of the age of the universe have continued to improve.

Suggest why.

[2 marks]

0 7 . 5 Hubble's data led to the Big Bang theory. This is the only theory that can explain the existence of Cosmic Microwave Background Radiation (CMBR).

Explain what is meant by CMBR.

[2 marks]

11

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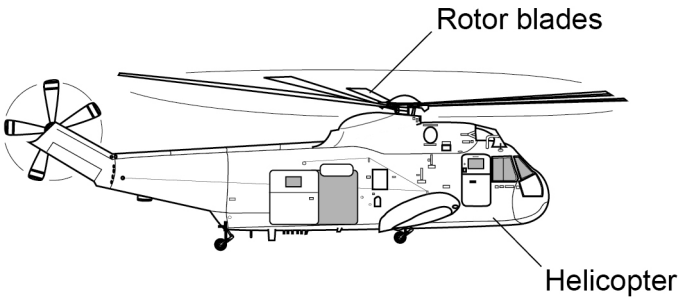
0 8 **Figure 18** shows a helicopter that is stationary in the air.

Figure 18



0 8 . 1 The weight of the helicopter is 81 000 N.

Explain the size and direction of the force that the rotor blades apply to the air.

[3 marks]

0 8 . 2 In one second, the rotor blades increase the velocity of a mass of air by 26 m/s.

Calculate the mass of air moved by the blades in one second.

Use the Physics Equations Sheet.

[3 marks]

Mass of air = _____ kg

6

END OF QUESTIONS

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