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Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE (9–1)

Time 1 hour 15 minutes

Paper reference **4PH1/2P**

Physics

UNIT: 4PH1
PAPER: 2P

You must have:
Ruler, calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 70.
- 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.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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FORMULAE

You may find the following formulae useful.

energy transferred = current × voltage × time $\qquad E = I \times V \times t$

$$\text{frequency} = \frac{1}{\text{time period}} \qquad f = \frac{1}{T}$$

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{orbital speed} = \frac{2\pi \times \text{orbital radius}}{\text{time period}} \qquad v = \frac{2 \times \pi \times r}{T}$$

(final speed)^2 = (initial speed)^2 + (2 × acceleration × distance moved)

$$v^2 = u^2 + (2 \times a \times s)$$

pressure × volume = constant $\qquad p_1 \times V_1 = p_2 \times V_2$

$$\frac{\text{pressure}}{\text{temperature}} = \text{constant} \qquad \frac{p_1}{T_1} = \frac{p_2}{T_2}$$

$$\text{force} = \frac{\text{change in momentum}}{\text{time taken}} \qquad F = \frac{(mv - mu)}{t}$$

$$\frac{\text{change of wavelength}}{\text{wavelength}} = \frac{\text{velocity of a galaxy}}{\text{speed of light}} \qquad \frac{\lambda - \lambda_0}{\lambda_0} = \frac{\Delta\lambda}{\lambda_0} = \frac{v}{c}$$

change in thermal energy = mass × specific heat capacity × change in temperature

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

Where necessary, assume the acceleration of free fall, $g = 10\ \text{m/s}^2$.

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Answer ALL questions.

1 The photograph shows a person using a roll of plastic wrapping to cover a plate of food.

The plastic wrapping sticks to the plate due to electrostatic charges.



(Source: © goffkein.pro/Shutterstock)

The passage explains why the plastic wrapping sticks to the plate.

Use words from the box to complete the passage.

Each word may be used once, more than once, or not at all.

attract	electrons	negative	neutral
neutrons	positive	protons	repel

The person pulls a layer of plastic wrapping from the roll.

Forces between the layers of wrapping transfer particles called ..... from one layer to another layer.

The layer gaining these particles acquires a ..... charge.

The layer losing these particles acquires a ..... charge.

The negatively charged layer of wrapping repels ..... in the plate, leaving a positive charge in the plate where it touches the plastic wrapping.

The wrapping and plate ..... due to them having opposite charges.

(Total for Question 1 = 5 marks)

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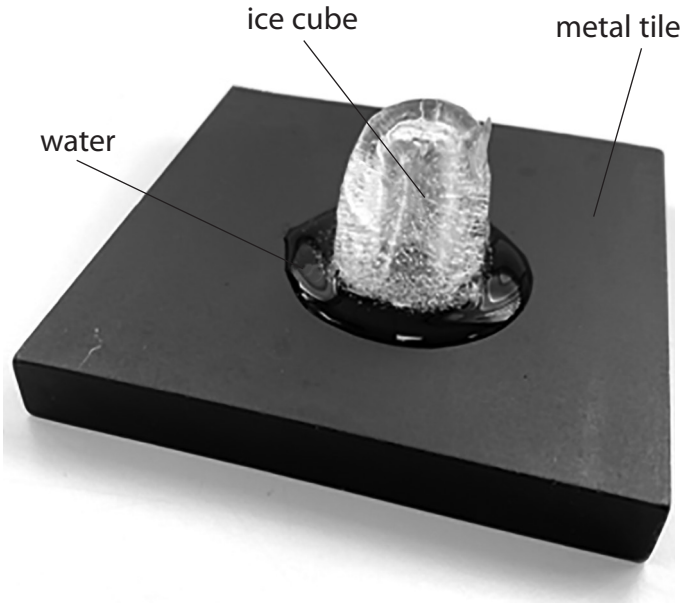
2 The photograph shows an ice cube placed on a metal tile.

The solid ice cube melts to become liquid water.



(a) Compare the arrangement of particles in a solid with the arrangement of particles in a liquid.

You may draw a diagram to help your answer.

(3)

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(b) Describe the difference in the movement of particles in a solid compared with the movement of particles in a liquid.

(2)

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(c) After the ice cube has melted, the liquid water increases in temperature.

The water has a mass of 16 g and a specific heat capacity of 4200 J/kg °C.

Calculate the energy transferred to the liquid water as it increases in temperature from 3 °C to 21 °C.

(3)

energy transferred = ... J

(Total for Question 2 = 8 marks)

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3 Kori Nuclear Power Plant in South Korea is one of the world's largest nuclear fission power stations.



(Source: © seo byeong gon/Shutterstock)

(a) The reactors at Kori use nuclear fission to generate electricity.

The products released during nuclear fission have high energy in their kinetic store.

Give a product of nuclear fission.

(1)

.....

(b) Give two disadvantages of using nuclear fission to generate electricity.

(2)

1 .....

.....

2 .....

.....

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(c) Kori has a maximum power output of 7.49×10^9 W.

(i) State what is meant by the term **power**.

(1)

.....

.....

.....

(ii) Calculate the minimum time taken for Kori to transfer 6.47×10^{14} J of energy.

(3)

minimum time = ... s

(Total for Question 3 = 7 marks)

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4 A squash ball is made of rubber and used to play a game called squash.



(Source: © mexrix/Shutterstock)

A student observes that the squash ball bounces higher after its temperature increases.

The student designs an investigation to see how the temperature of the ball affects the maximum height after it bounces.

(a) State the independent and dependent variables in the student's investigation.

(2)

independent variable

.....

dependent variable

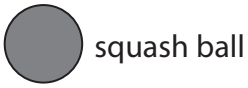
.....

(b) The diagram shows the ball at its maximum height after it bounces.

Determine the distance the ball moves from the floor to its maximum height.

Assume the ball does not change shape when it bounces.
[1 cm on diagram = 4 cm in laboratory]

(2)



floor

distance = ... cm

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(c) Design a method that the student could use to investigate how the temperature of the ball affects the maximum height after it bounces.

Your answer should include details of

- apparatus needed
- measurements required
- control variables

You may draw a diagram to support your answer.

(6)

(Total for Question 4 = 10 marks)

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5 Diagram 1 shows a wooden plank balanced horizontally on two supports, A and B.

A block is suspended from the plank between the supports by a cable of negligible weight.

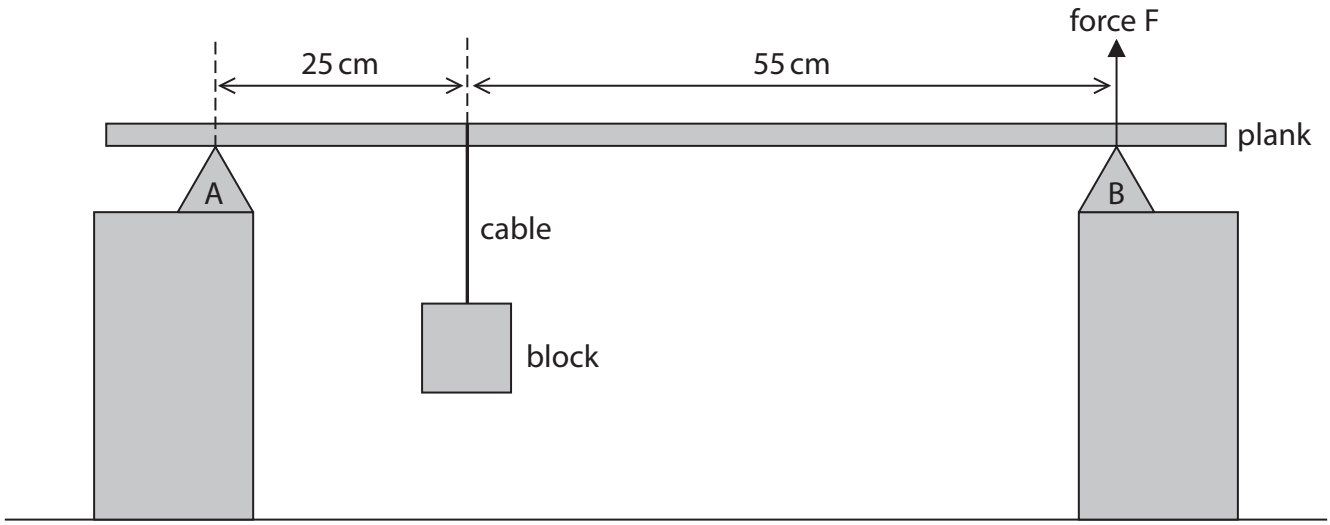

Diagram 1

(a) The weight of the block is 260 N.

(i) State the formula linking moment, force and perpendicular distance from the pivot.

(1)

(ii) By taking moments about support A, calculate force F.

Assume the weight of the plank is negligible.

(3)

force F = ... N

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(iii) Explain what will happen to the magnitude of force F if the block is moved towards support B.

(3)

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(b) Diagram 2 shows the block and the cable connecting the block to the plank.

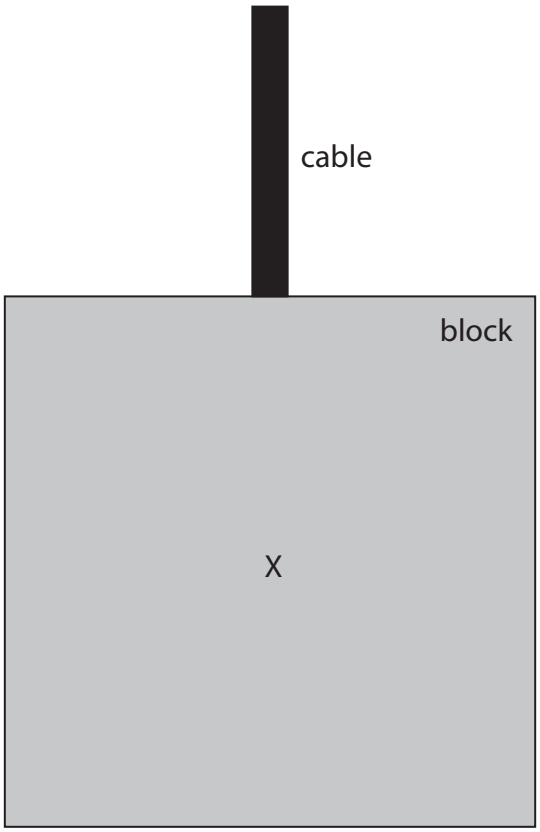

Diagram 2

(i) The centre of gravity of the block is located at point X.

Draw an arrow on diagram 2 to show the weight of the block.

(2)

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(ii) The block also experiences a force due to the tension in the cable.

Explain why the block remains stationary when it is supported by this tension force.

(2)

(iii) Explain why the forces acting on the block are **not** an example of Newton's third law of motion.

(2)

(Total for Question 5 = 13 marks)

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6 This question is about magnetic fields.

(a) A student positions a thick wire vertically through the centre of a horizontal card.

The student then passes a constant current through the wire in the downward direction, as shown in diagram 1.

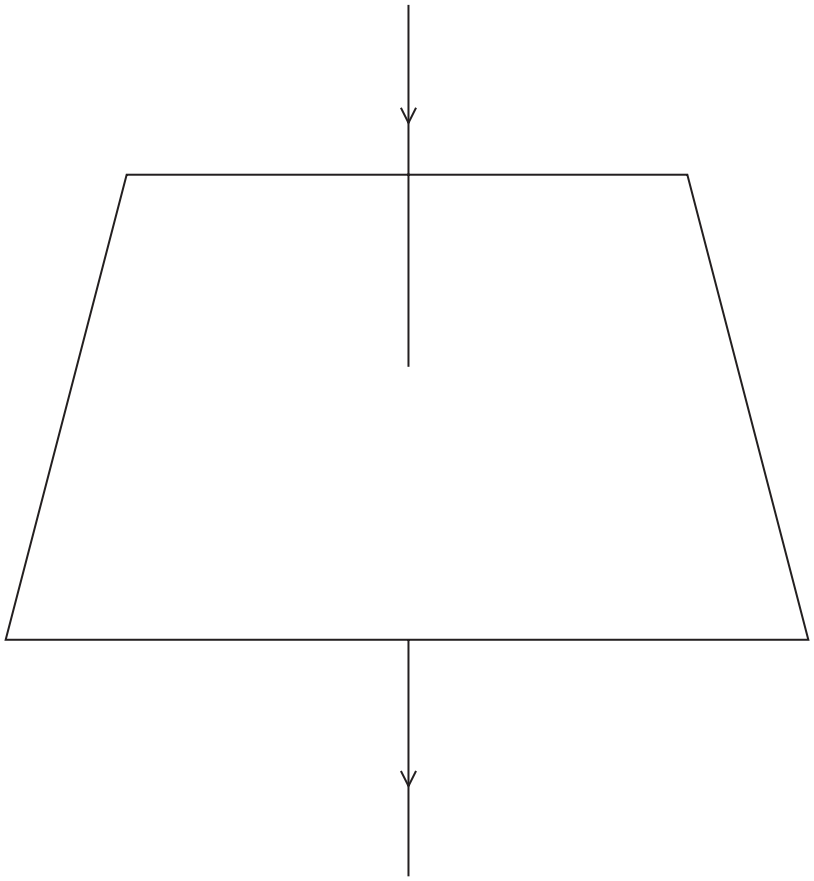

Diagram 1

(i) On diagram 1, draw the shape and direction of the magnetic field produced by the current in the wire.

(3)

(ii) Describe a method the student could use to show the shape of the magnetic field produced by the current in the wire.

(2)

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(b) The student then removes the card and sets up a second wire next to the first wire, as shown in diagram 2.

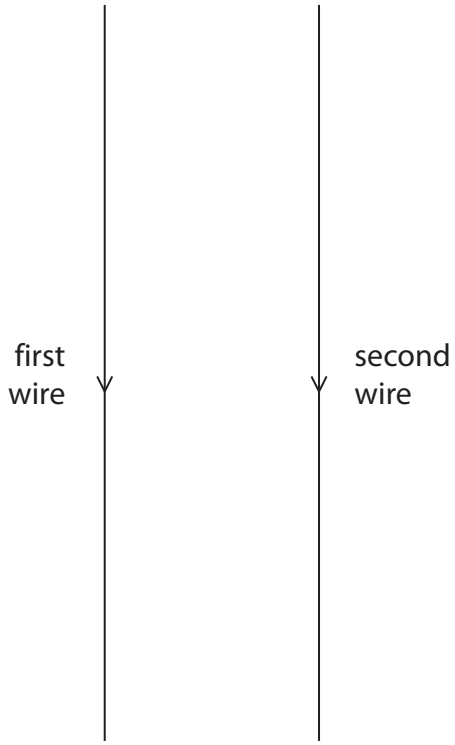

Diagram 2

The current in both wires is in the downward direction.

The student observes that the wires move towards each other.

Explain why the wires move towards each other.

(3)

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(Total for Question 6 = 8 marks)

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7 A student uses this method to investigate the speed of sound in air.

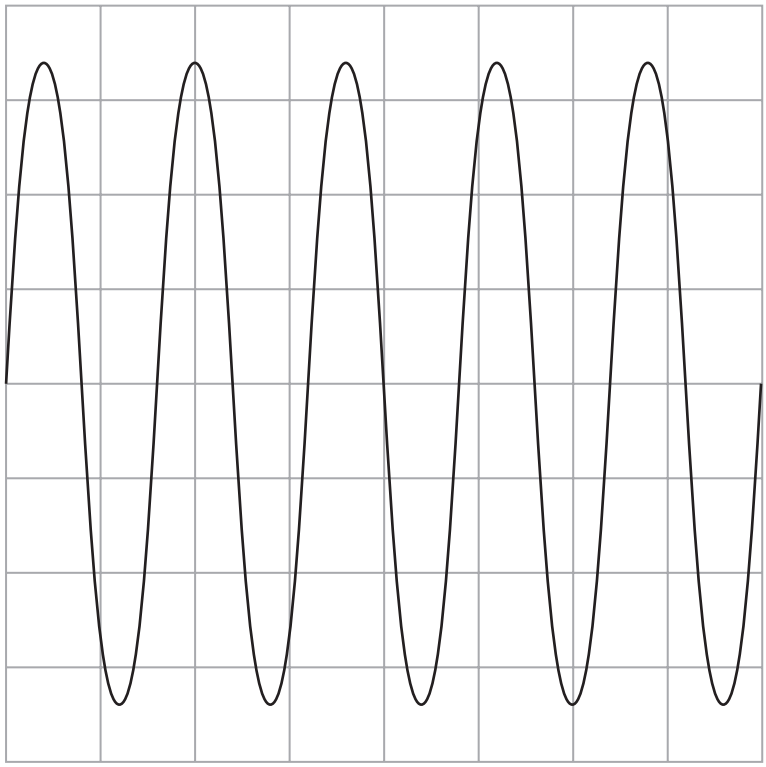
- set up an oscilloscope to detect and display a sound wave
- use a computer and a speaker to produce a sound of known wavelength
- use the oscilloscope to determine the frequency of the sound wave
- use a formula to calculate the speed of sound

(a) Give the name of the equipment that should be connected to the oscilloscope to detect the sound wave.

(1)

.....

(b) The diagram shows the oscilloscope screen and the oscilloscope settings.



Oscilloscope settings

y direction: 1 square = 5 mV

x direction: 1 square = 0.5 ms

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(i) Determine the frequency of the sound wave.

(4)

frequency = ... Hz

(ii) The wavelength of the sound wave is 27 cm.

Calculate the speed of sound.

(3)

speed of sound = ... m/s

(iii) Describe how the oscilloscope could be adjusted to show fewer wave cycles on the screen.

(2)

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(Total for Question 7 = 10 marks)

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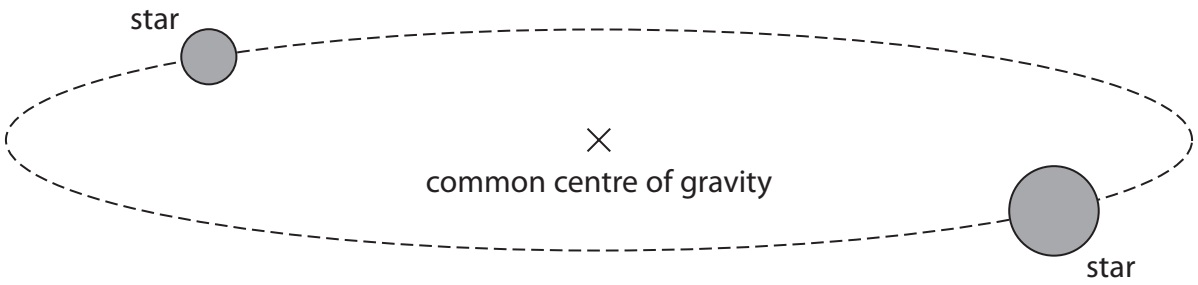
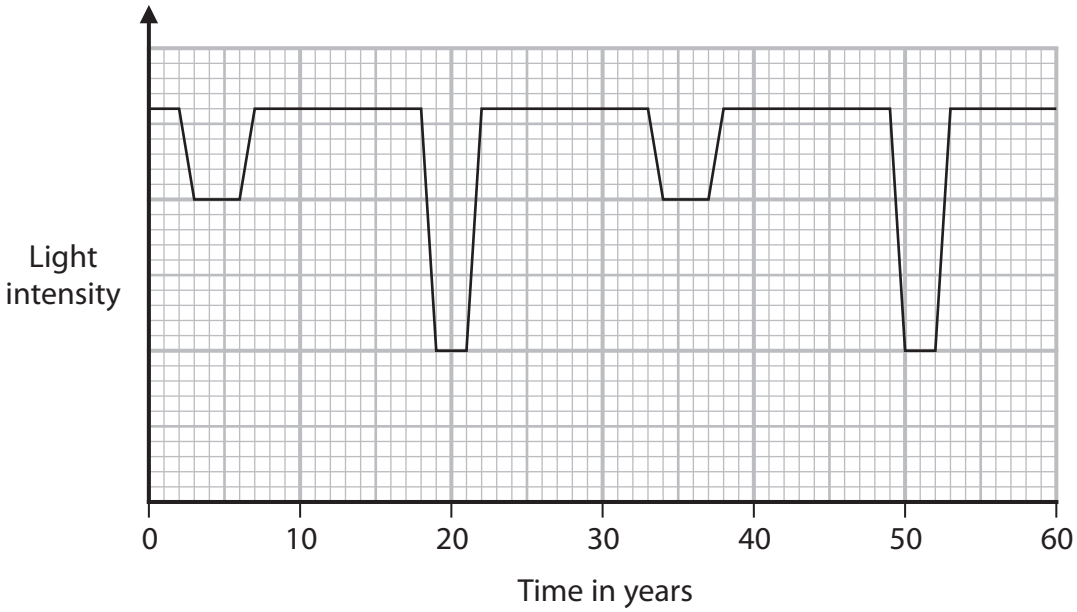
8 A binary star system has two nearby stars, which orbit each other in a circular path around a common centre of gravity.



(a) In an eclipsing binary system, one star passes behind the other star in its orbit. This causes a decrease in the light intensity of the binary star system when viewed from Earth.

The graph shows how the light intensity of the binary star system changes with time.



(i) Suggest why the decreases in light intensity are not all the same.

(1)

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(ii) Use the graph to determine the time period of the binary star system.

(1)

time period = ... years

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(iii) One of the stars in this binary system has an orbital speed of 19 km/s.

Calculate the orbital radius of this star.

(4)

orbital radius = ... km

(b) A different binary star system is in a distant galaxy.

When observed from the Earth, light from this galaxy has a longer wavelength than the wavelength of the light when it is emitted from the galaxy.

Explain why this gives evidence for the Big Bang theory.

(3)

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(Total for Question 8 = 9 marks)

TOTAL FOR PAPER = 70 MARKS

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