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 10 minutes

Paper reference **4SS0/1P**

Science (Single Award)

Physics
PAPER: 1P

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **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.*
- Calculators may be used.

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.
- 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.

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

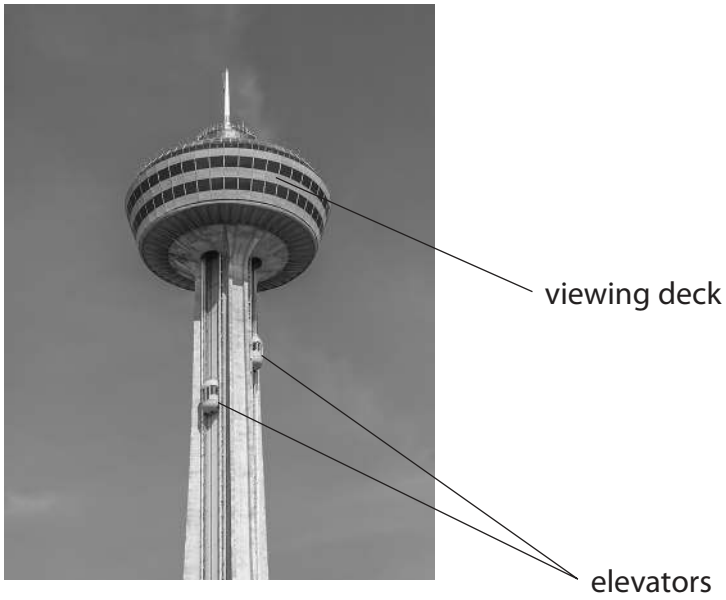
$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{W}{t}$$

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

Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 The Skylon Tower in Canada has external elevators. The elevators transport people from the bottom of the tower to a viewing deck at the top of the tower.



(Source: © Denis Pepin/Shutterstock)

(a) (i) An elevator moves upwards at a constant speed.

Which energy store of the elevator increases as the elevator moves upwards?

(1)

☒ **A** chemical

☒ **B** gravitational

☒ **C** kinetic

☒ **D** magnetic

(ii) The elevator is pulled upwards using a motor.

Thick steel cables connect the elevator to the motor.

How is energy transferred usefully from the motor to the elevator?

(1)

☒ **A** by heating

☒ **B** by radiation

☒ **C** electrically

☒ **D** mechanically

(b) The viewing deck at the top of the tower rotates and completes one full rotation every hour.

The mechanism that rotates the viewing deck is powered by a 2.2 kW motor.

(i) Which of these is the definition of the term **power**?

(1)

- ☒ **A** the amount of charge transferred
- ☒ **B** the amount of energy transferred
- ☒ **C** the rate of charge transferred
- ☒ **D** the rate of energy transferred

(ii) Which of these is the same power as 2.2 kW?

(1)

- ☒ **A** 0.0022 W
- ☒ **B** 0.022 W
- ☒ **C** 220 W
- ☒ **D** 2200 W

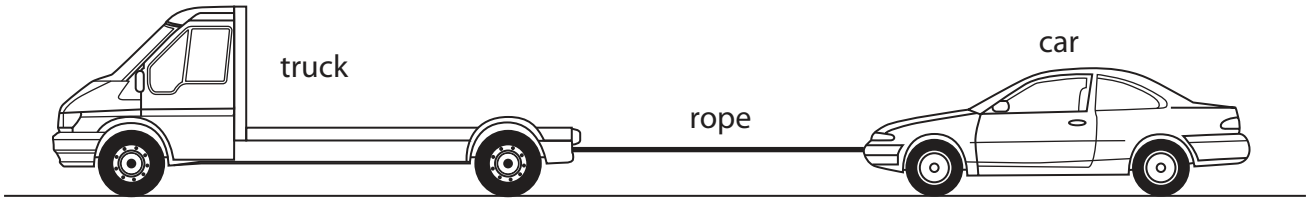
(iii) How many seconds does the viewing deck take to complete one full rotation?

(1)

- ☒ **A** 24 s
- ☒ **B** 60 s
- ☒ **C** 3600 s
- ☒ **D** 86 400 s

(Total for Question 1 = 5 marks)

2 The diagram shows a truck using a rope to pull a car along a level road.



(a) The truck and car are travelling at a velocity of 14 m / s.

The truck and car then accelerate at 1.6 m / s^2 until they are travelling at a velocity of 22 m / s.

(i) State the formula linking acceleration, change in velocity and time taken.

(1)

(ii) Calculate the time taken for the truck and car to accelerate from 14 m / s to 22 m / s.

(3)

time taken = ... s

(iii) State the formula linking unbalanced force, mass and acceleration.

(1)

(iv) The car has a mass of 1200 kg.

Calculate the unbalanced force acting on the car to produce an acceleration of $1.6\,m/s^2$.

Give your answer to two significant figures.

(3)

unbalanced force = ... N

(b) The rope breaks so the car and the truck are no longer connected.

The engine of the car is not working.

Explain what happens to the motion of the car after the rope breaks.

(2)

.....

.....

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(Total for Question 2 = 10 marks)

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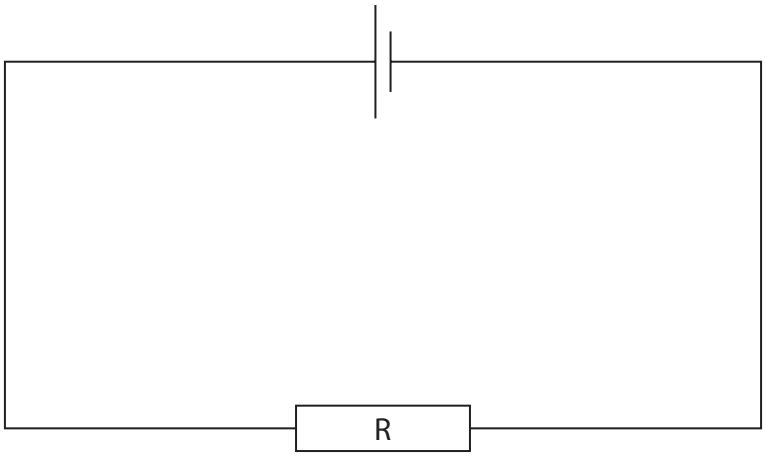
3 The circuit diagram shows a resistor, R, connected to a cell.



(a) Draw additional components on the circuit diagram to measure the voltage of the resistor and the current in the resistor.

(3)

(b) The voltage across the resistor is 9.00 V and the current in the resistor is 1.91 mA.

(i) State the formula linking power, current and voltage.

(1)

(ii) Calculate the power dissipated by the resistor.

(2)

power = ... W

(c) The cell in the circuit is a source of direct current.

State what is meant by the term **direct current**.

(1)

(d) Explain how the current in the circuit changes when an identical resistor is connected in series with resistor R.

(2)

(Total for Question 3 = 9 marks)

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4 Wind speed affects the wavelength of water waves on the surface of the sea.

The table shows the wavelength of waves on the surface of the sea for different wind speeds.

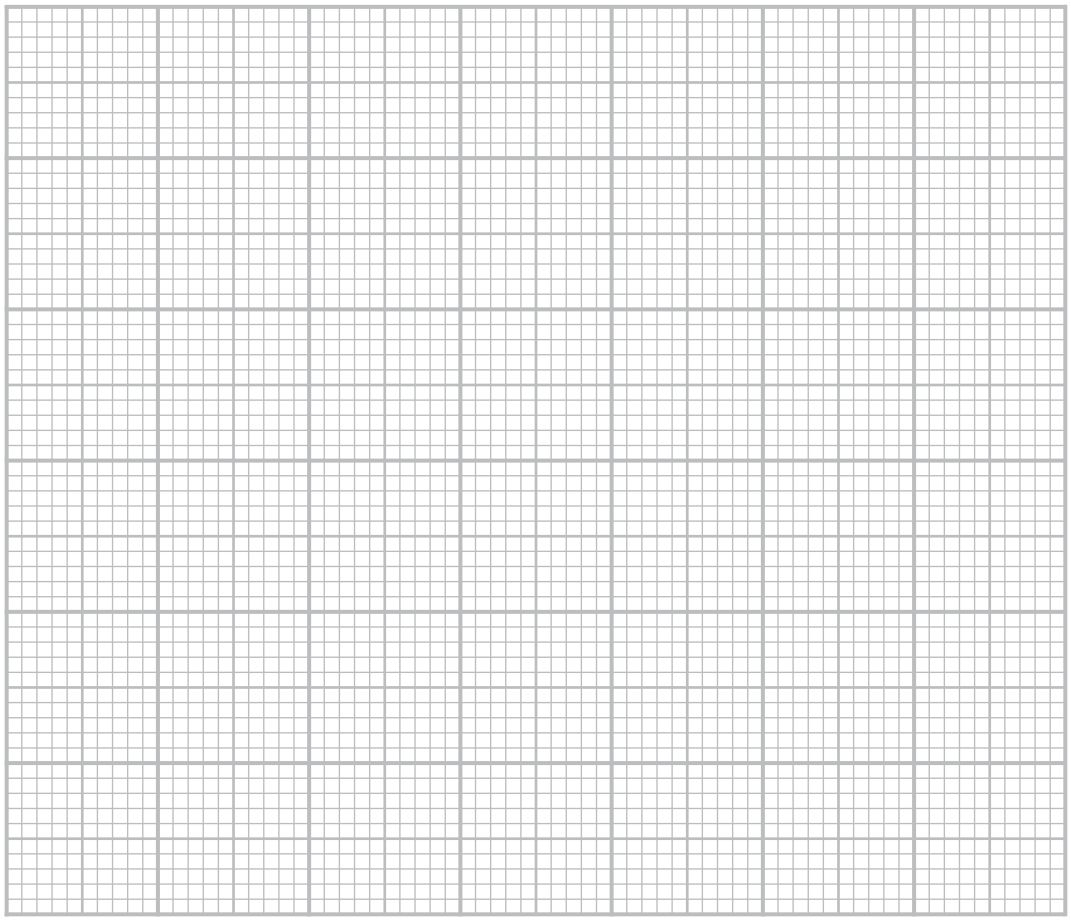
Wind speed in m / s	Wavelength of waves on the surface of the sea in m
0	0
5	12
10	49
15	110
20	196
25	306
30	441
35	600

(a) Plot a graph of this data.

(3)

(b) Draw the curve of best fit.

(1)



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(c) Describe the relationship between wind speed and the wavelength of waves on the surface of the sea.

(2)

(d) A student claims that ships are most likely to be damaged by water waves that have a wavelength equal to the length of the ship.

Based on the student's claim, determine whether a ship of length 350 m is likely to be damaged by water waves if the wind speed is 29 m / s.

(2)

(Total for Question 4 = 8 marks)

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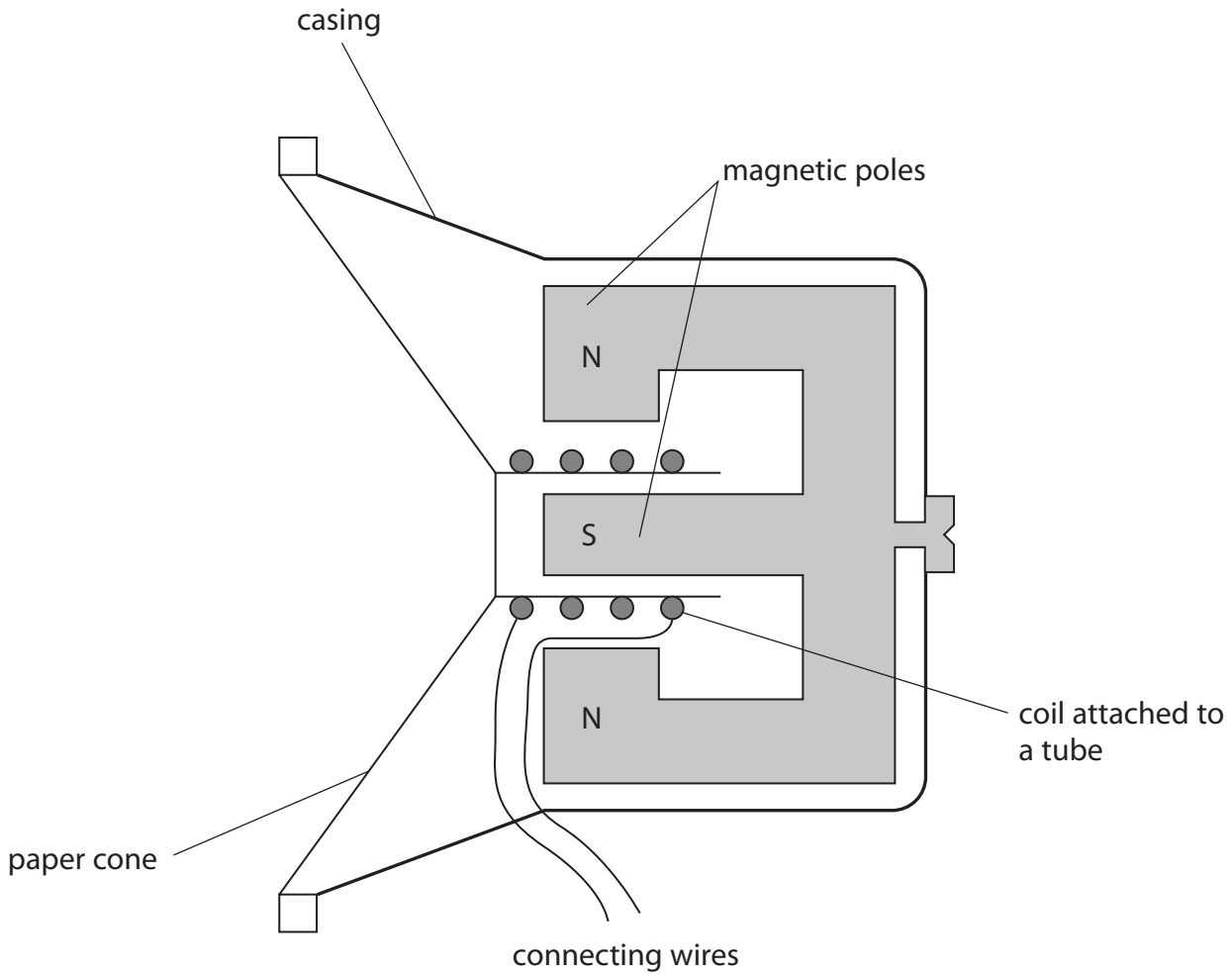
5 The diagram shows a loudspeaker.

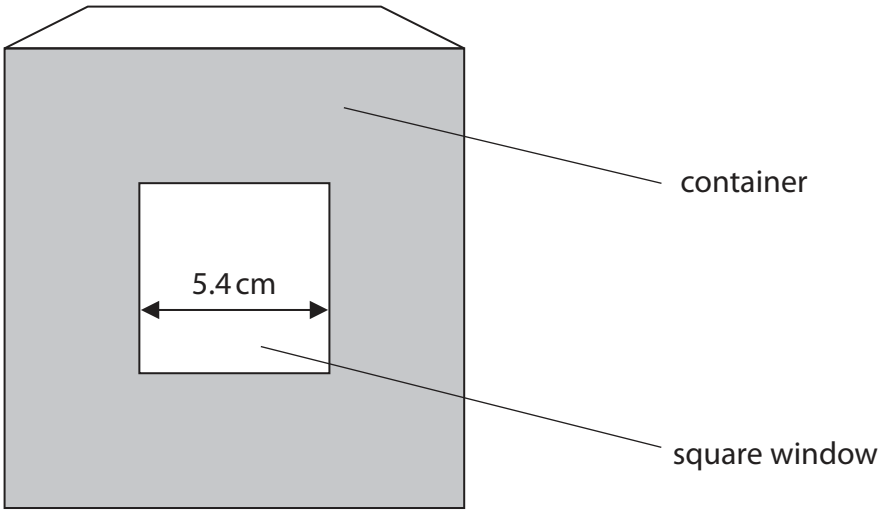


The connecting wires connect the coil to a power supply.

Explain how the loudspeaker uses an electric current to produce sound waves.

(Total for Question 5 = 5 marks)

6 The diagram shows a container used to cool gases to very low temperatures.



(a) The gas inside the container is at a temperature of −251 °C.

(i) Calculate the temperature, in kelvin, of the gas.

(1)

temperature = ... K

(ii) Explain why the gas in the container cannot be cooled below a temperature of −273 °C.

(2)

.....

.....

.....

.....

(b) The gas in the container exerts a pressure of 7500 Pa on the inner surface of the container.

The container has a square window of side length 5.4 cm.

Calculate the force the gas exerts on the inner surface of the square window.

(5)

force = ... N

(Total for Question 6 = 8 marks)

7 A teacher does an investigation to determine the half-life of a radioactive source.

(a) The radioactive source emits particles of radiation that are negatively charged.

Name the type of radiation emitted by this source.

(1)

.....

(b) This is the teacher's method.

- measure the count rate in the room
- bring the radioactive source into the room
- measure the count rate from the radioactive source every two hours
- to determine the corrected count rate, subtract the count rate in the room from each count rate measured from the radioactive source
- plot a graph of corrected count rate against time
- use the graph to determine the half-life of the radioactive source

(i) Give a reason why the teacher measures the count rate in the room before bringing the radioactive source into the room.

(1)

.....

.....

(ii) State the dependent variable in the teacher's investigation.

(1)

.....

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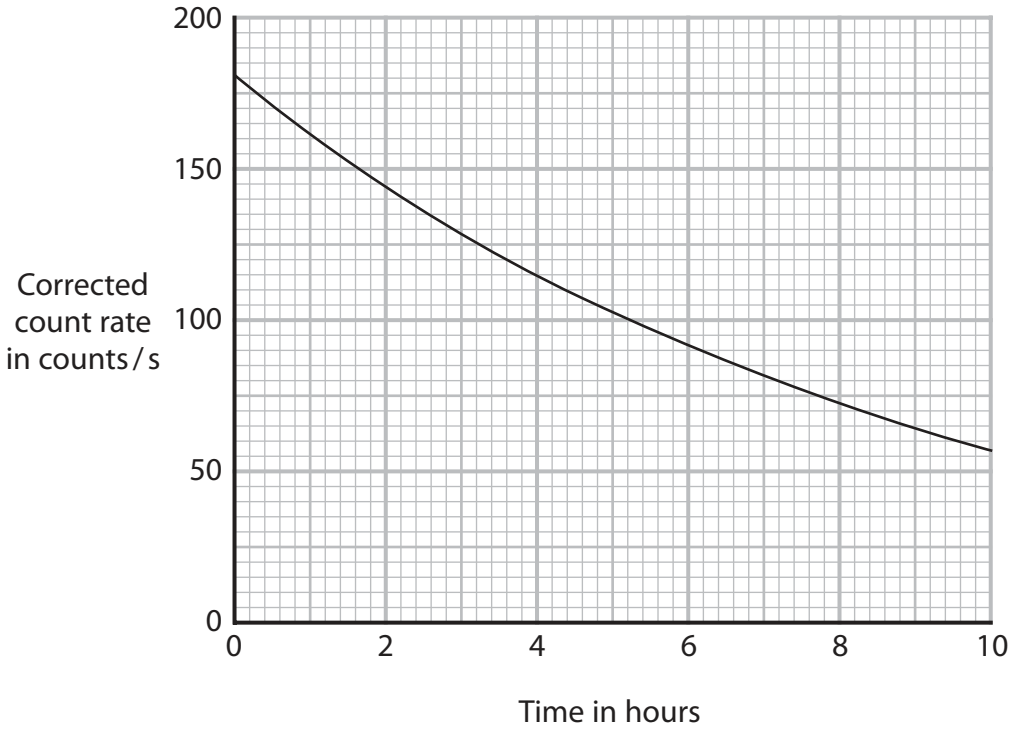
(c) The graph shows the teacher's results.



(i) State what is meant by the term **half-life**.

(2)

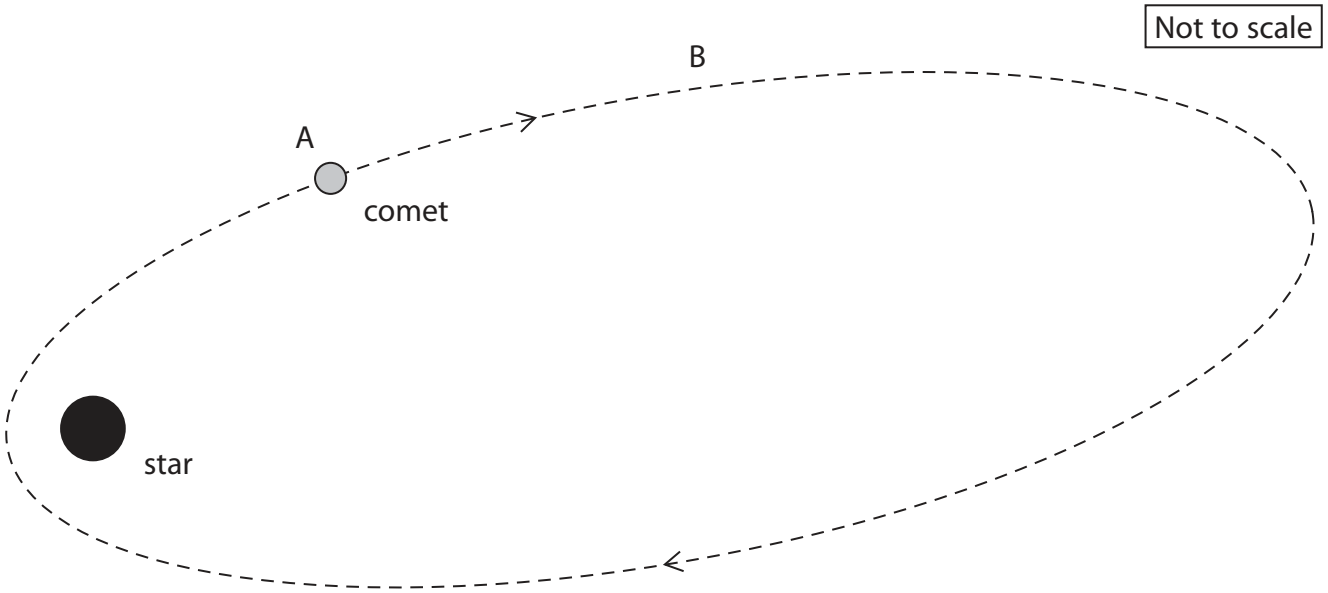
(ii) A different radioactive source has the same initial corrected count rate but a shorter half-life.

Sketch another line on the graph to show how the corrected count rate of this different source changes with time.

(2)

(Total for Question 7 = 7 marks)

8 A comet orbits a star because of the gravitational force between the comet and the star.



(a) Draw an arrow on the diagram to show the gravitational force acting on the comet due to the star.

(1)

(b) Weight is another term used for gravitational force.

At point A on the diagram the comet has a weight of 4.4×10^9 N.

The comet has a mass of 2.2×10^{14} kg.

Calculate the gravitational field strength at point A.

Give a suitable unit for your answer.

(4)

gravitational field strength = ... unit = ...

(c) The comet moves from point A to point B during its clockwise orbit around the star.

Explain what happens to the gravitational force acting on the comet due to the star as the comet moves from point A to point B.

(3)

(Total for Question 8 = 8 marks)

TOTAL FOR PAPER = 60 MARKS

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