



CHELtenham COLLEGE

16+ Entrance Examination Paper 2015 - 2016

Physics

Time allowed: 1 hour

Instructions

- Use **black** ink or ball-point pen.
- Remember to include the correct units
- Show your working clearly
- 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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.
- Take the Earth's gravitational field strength to be 10 N/kg.

Candidate's name: _____

For the first ten questions, fill in the following table with the option corresponding to the best answer offered, A, B, C or D.

| Question Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-----------------|---|---|---|---|---|---|---|---|---|----|
| Chosen Answer | | | | | | | | | | |

(10)

1 What is the unit of power?

- A Volts
- B Ohms
- C Amperes
- D Watts

2 The comet 67P gains energy from the sun by the process of?

- A Conduction
- B Convection
- C Radiation
- D Evaporation

3 As comet 67P approaches the sun it speeds up. What happens to the total amount of gravitational and kinetic energy that the comet has?

- A It increases
- B It decreases
- C It remains the same
- D It is impossible to say

4 Which of the following energy resources is non-renewable?

- A Wind
- B Solar
- C Nuclear
- D Tidal

5 Which of the following quantities is a scalar quantity?

- A Velocity
- B Displacement
- C Acceleration
- D Speed

- 6 A 50kg mass is lifted vertically through a height of 2 metres. The gravitational potential energy gained is?
- A 1000J
 - B 100J
 - C 10J
 - D 25J
- 7 What is the most likely total energy input for a car that accelerates gaining 10,000J of kinetic energy?
- A 10,000J
 - B 4000J
 - C 20,000J
 - D 100,000J
- 8 The weight of a person's body is caused by?
- A The atmosphere pushing down
 - B The mass of the Earth
 - C The mass of the Sun
 - D The Earth pushing up on the person
- 9 An atom becomes *ionized* when?
- A It loses an electron
 - B It loses a neutron
 - C It becomes part of a molecule
 - D It emits light
- 10 A light wave travelling from air to glass always has the same?
- A Speed
 - B Direction of travel
 - C Frequency
 - D Wavelength

11 Complete the following unit conversions

| | |
|----------------------|----------------|
| 741000 mm = | m |
| 9200 g = | kg |
| 2.7 kJ = | J |
| 18 mm ² = | m ² |
| 45 mW = | W |
| 4 MJ = | J |
| 500 μm = | m |

(7)

12 This question is about the movements of objects in the Solar System.

Jack read in a textbook that the moon moves at a constant speed around the Earth.

Jill says that the moon is accelerating.

(a)

i) Can Jack and Jill both be correct?

..... (1)

ii) Explain your answer.

.....
.....
..... (2)

(b) The average distance of the Moon from the Earth is 384,400 km. The Moon takes approximately 28 days to orbit the Earth.

i) How long is 28 days in seconds?

.....
.....
..... (2)

ii) How fast is the moon moving in its orbit? (show your working)

.....

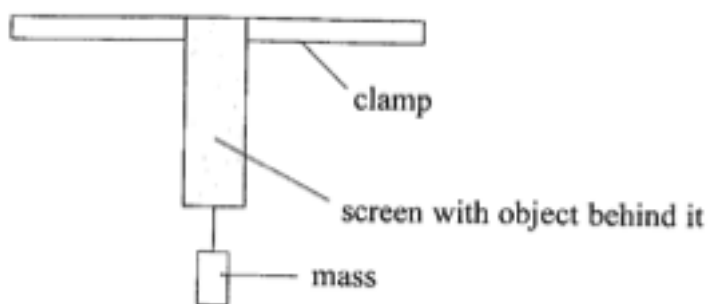
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(4)

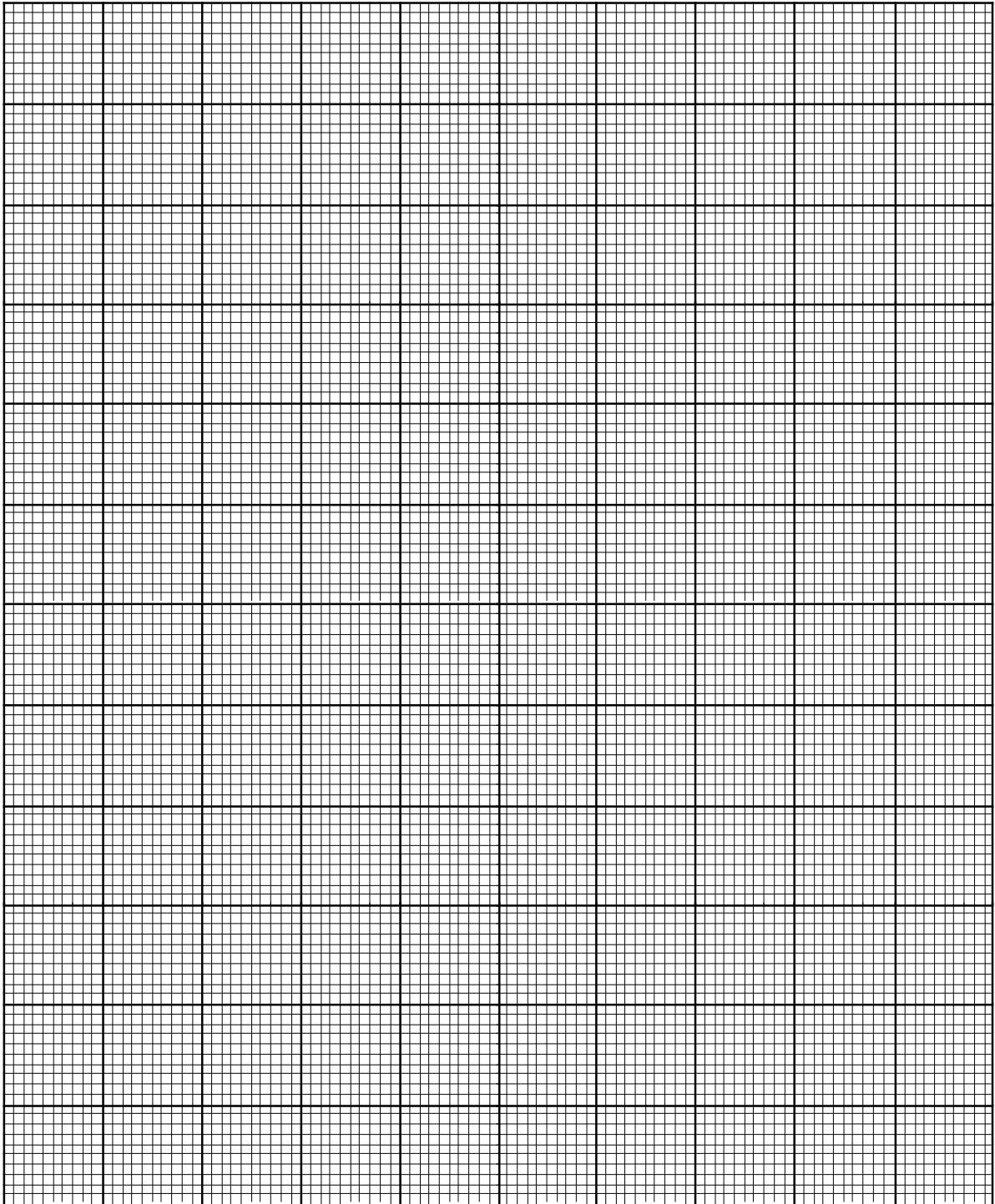
- 13 A teacher suspends an object from a clamp. She places a small screen in front of the object so that the students cannot see it. She then attaches a mass to the bottom of the object. The mass applies a force to the object and the object extends.



- (a) Different masses are attached to the bottom of the object. The teacher measures the extension and the students calculate the value of the applied force. The table shows the results.

| | | | | | | | |
|--------------------------|-----|-----|-----|------|------|----|----|
| Extension (cm) | 0.0 | 5.5 | 9.0 | 12.5 | 17.0 | 23 | 32 |
| Applied force (N) | 0.0 | 3.0 | 5.0 | 7.0 | 9.5 | 12 | 16 |

- (i) Plot a graph of the data on the next page.
- (ii) Draw a suitable line of best fit.



(6)

- (b) Find the extension for a force of 8.0 N. You should mark clearly on your graph to show how you have done this.

Extension = (1)

(c) Explain what the teacher would have to do to find out whether the object had gone past its elastic limit.

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(2)

(d) Explain why the extension for a force of 800 N is unlikely to be one hundred times the value in (b).

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.....

(1)

(e) Calculate the mass that she used to apply a force of 7.0 N

.....
.....
.....

(2)

(f) What would your mass from part (d) weigh on Mars? (On Mars $g = 4 \text{ N/kg}$)

.....
.....

(2)

14 The table shows corresponding values of potential difference across a torch bulb and the current passing through it:

| | | | | | | | | | |
|--------------------------|---|------|------|------|------|------|------|------|------|
| Potential difference / V | 0 | 0.02 | 0.1 | 0.5 | 1.0 | 1.65 | 2.3 | 3.1 | 4.0 |
| Current / A | 0 | 0.04 | 0.08 | 0.12 | 0.16 | 0.20 | 0.24 | 0.28 | 0.32 |

(a) Draw a diagram of a circuit that could have been used to obtain these data.

(5)

(b) What is happening to the resistance of the bulb as the current increases?

..... (1)

(c) Calculate the highest value of resistance from the data in the table. Quote a suitable unit.

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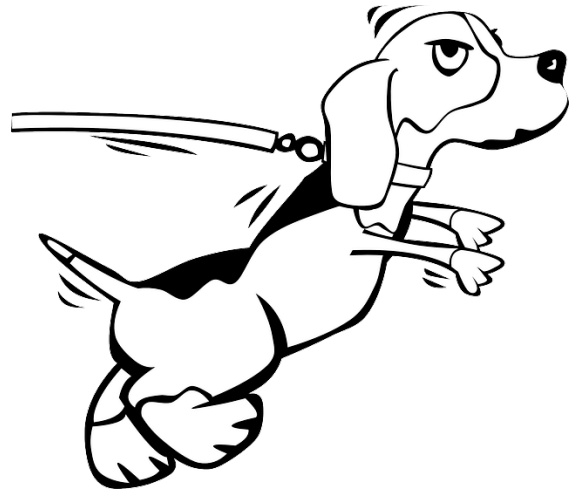
(4)

15 A scientist suggests that painting roads white could reduce the warming of the Earth. Explain the reasoning behind his suggestion and suggest one problem with implementing it.

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(4)

- 16 (a) A small dog pulls on its lead with a force of 50N when its owner takes it out for a walk. The section of the dog's lead pulling against his neck is 10cm long and 2cm wide. Calculate the pressure exerted on the dog's neck in Pascals (Pa).



.....
.....
.....Pa (2)

- (b) The dog is allowed to run off the lead in the park. The owner has a dog whistle which the dog can hear but other humans cannot. Explain why humans cannot hear the whistle.

.....
..... (1)

- (c) It is a warm day and sound travels at 346 m/s. If the wavelength of the sound emitted by the whistle is 1.3 cm, calculate its frequency.

.....
..... (3)

END OF PAPER

Total Marks available = 60