Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Double Award Science: Physics

GSD32

Unit P1
Higher Tier

[GSD32]

FRIDAY 9 NOVEMBER 2018, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Questions **1(a)** and **7**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

1 **(a)** Describe an experiment to measure your personal power.

Examiner Only	
Marks	Remark

The description should include:

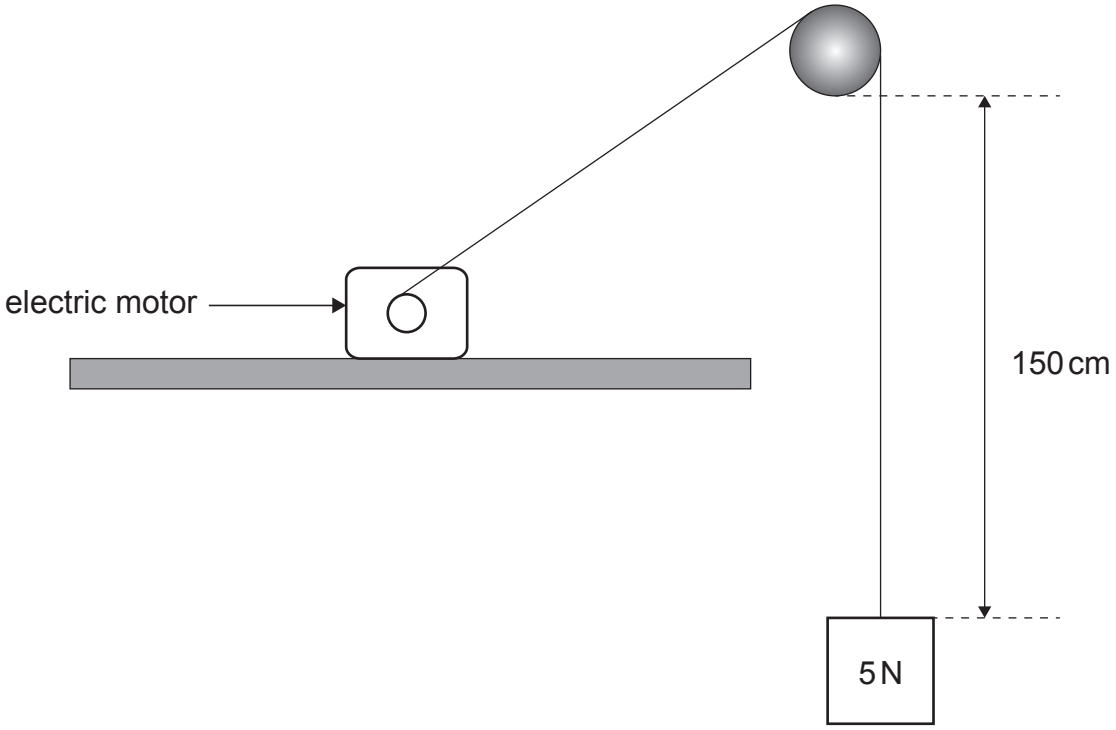
- the measurements you take, and
- the instruments you would use to take the measurements.

It is not necessary to include the equation for calculating power.

In this question you will be assessed on your written communication skills including the use of specialist terms.

[6]

An electric motor raises a load of 5 N through a vertical distance of 150 cm in a time of 3 seconds.



Source: CCEA

(b) Calculate the power of the electric motor.

You are advised to show your working out.

Power = _____ W [4]

Examiner Only

Marks	Remark

Examiner Only

Marks	Remark

2 Three types of radiation, alpha, beta and gamma, may be emitted from radioactive sources.

(a) Complete the table below by writing alpha, beta or gamma in the second column.

Is easily absorbed by a piece of cardboard	
Consists of four particles	
Is a wave rather than a particle	
Comes from the nucleus and has a negative charge	

[4]

(b) **(i)** When a radioactive substance is delivered to a laboratory its activity is 6000 counts per minute.
Complete the table below.

Activity/counts per minute	**Time/half-lives**
6000 (arrives)	0
	1
1500	
	4

[3]

It takes 45 minutes for the count rate to fall from 6000 counts per minute to 750 counts per minute.

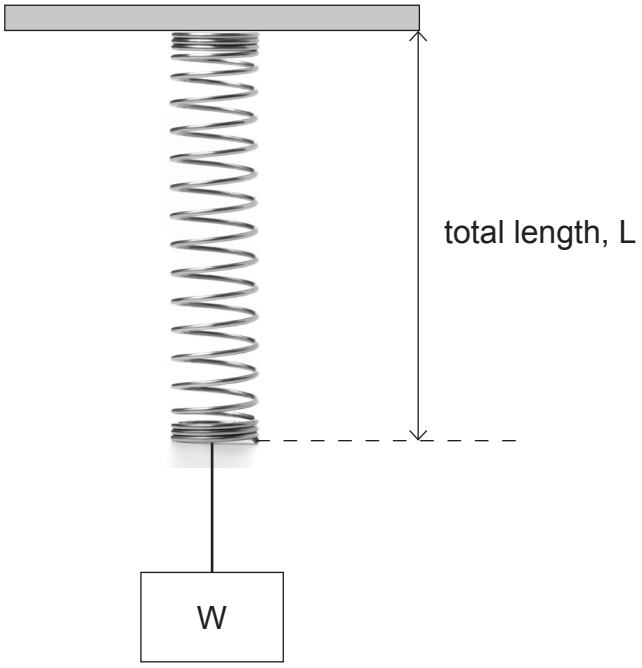
(ii) Calculate the half-life of the radioactive substance.

You are advised to show your working out.

Half-life = _____ minutes [2]

Examiner Only	
Marks	Remark

3 Weights are placed on the end of a spring causing it to increase in length.



A student thinks that the total length L of the spring is proportional to the weight W added.

To test the relationship a number of readings of weight and length were obtained experimentally and these are recorded below.

Weight, W/N	2	4	6	8	10
Total length, L/cm	8	11	14	17	20

You are asked to plot a graph of total length, L against weight, W.

(i) Choose a suitable vertical scale and label it. [2]

(ii) Plot a graph of total length against weight. [2]

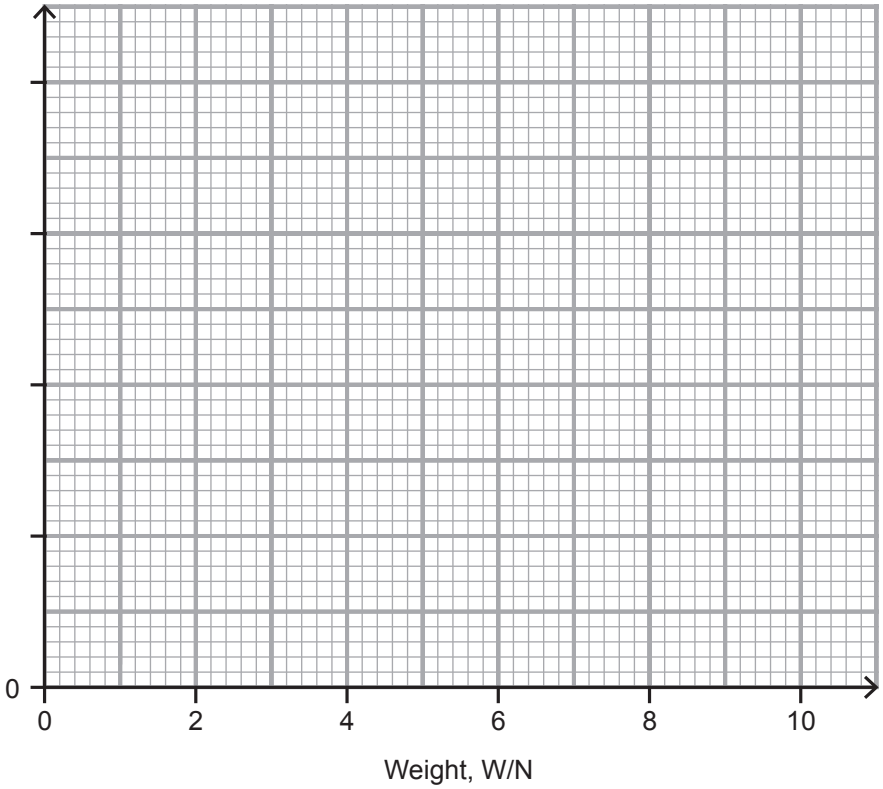
(iii) Draw the best fit line and extend the line until it cuts the vertical axis. [1]

(iv) Give the total length of the spring before any weight has been added.

Total length = _____ cm [1]

Examiner Only

Marks	Remark



(v) Is it true to say that the two quantities are proportional?

Circle the correct response. Yes / No

Give a reason for your answer.

_____ [1]

(vi) Calculate the gradient of your graph and give its unit.

You are advised to show clearly your working out.

Gradient = _____ Unit = _____ [4]

Examiner Only

Marks	Remark

Examiner Only

Marks	Remark

4 **(a)** **(i)** A nucleus of the element X may be written as shown.

$$ {}^{A}_{Z}X $$

A represents the _____ number.

Z represents the _____ number. [2]

(ii) Explain, in terms of **particles**, what isotopes are.

_____

_____ [2]

(b) An isotope of thorium is unstable and disintegrates by alpha (α) decay. Complete the decay equation below.

$$ {}^{\square}_{90}\mathrm{Th} \longrightarrow {}^{228}_{\square}\mathrm{Ra} + {}^{\square}_{\square}\alpha $$

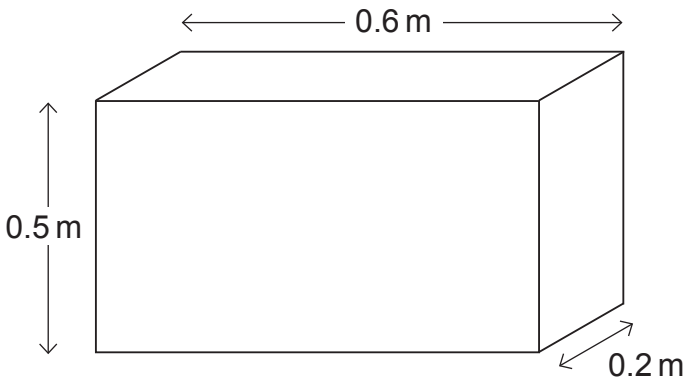
[4]

(c) One type of radioactive decay has no effect on either the mass number or the atomic number of the radioactive nucleus.

Name the type of radiation involved in this decay.

_____ [1]

5 A metal block has the dimensions shown.



(a) Find the volume of the block.

You are advised to show your working out.

Volume of block = _____ m^3 [2]

(b) Another block of metal has a volume of 0.08 m^3.

The metal has a density of 8400 kg/m^3.

Calculate the weight of the block.

You are advised to show your working out.

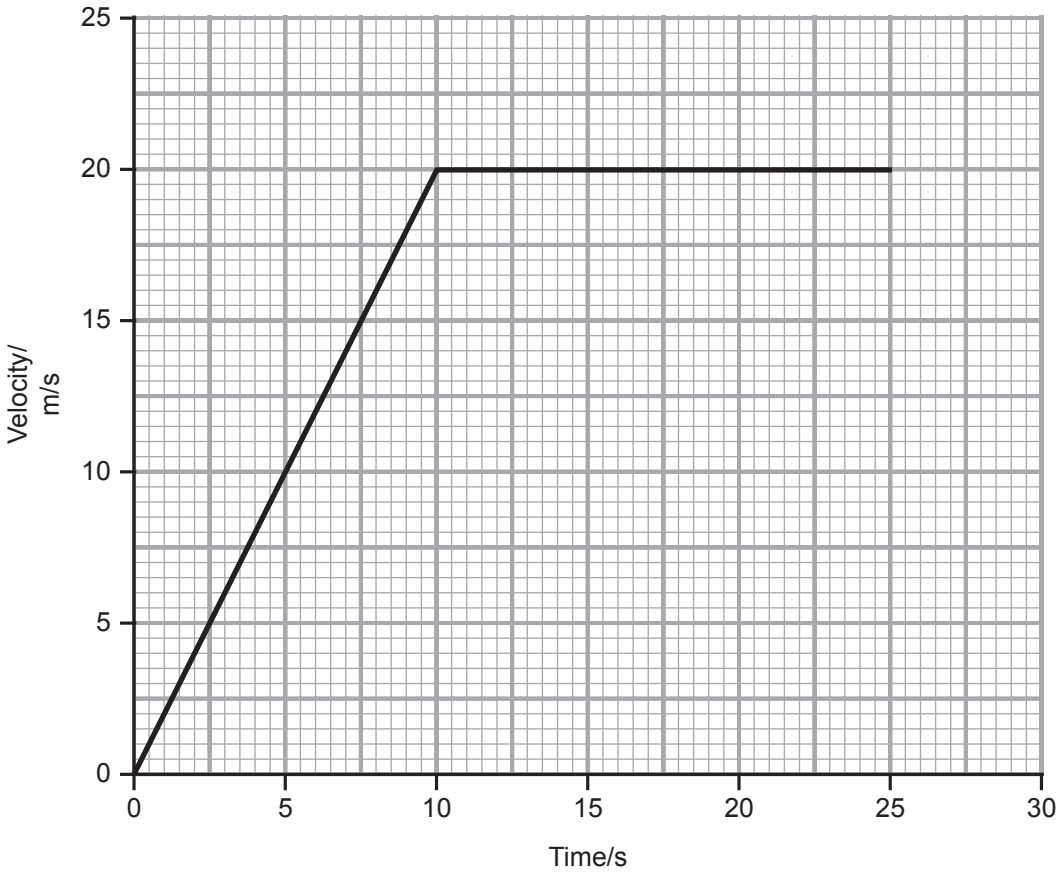
Weight = _____ N [5]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 The velocity–time graph for a helicopter as it moves vertically upwards is shown.



(i) From the graph find the initial acceleration of the helicopter.

You are advised to show your working out.

Acceleration = _____ m/s^2 [3]

(ii) The helicopter has a mass of 1750 kg. Using the graph, calculate the momentum of the helicopter when the vertical resultant force on it is zero. Include the unit with your answer.

You are advised to show your working out.

Momentum = _____ [5]

(iii) Calculate the height of the helicopter 25 seconds after lift-off.

You are advised to show your working out.

Height = _____ m [4]

Examiner Only	
Marks	Remark

7 Write an account of the structure of the atom.

Your answer should include:

- the names of the three particles, and
- their relative charges.

In this question you will be assessed on your written communication skills including the use of specialist terms.

Particle 1 and its relative charge.

Particle 2 and its relative charge.

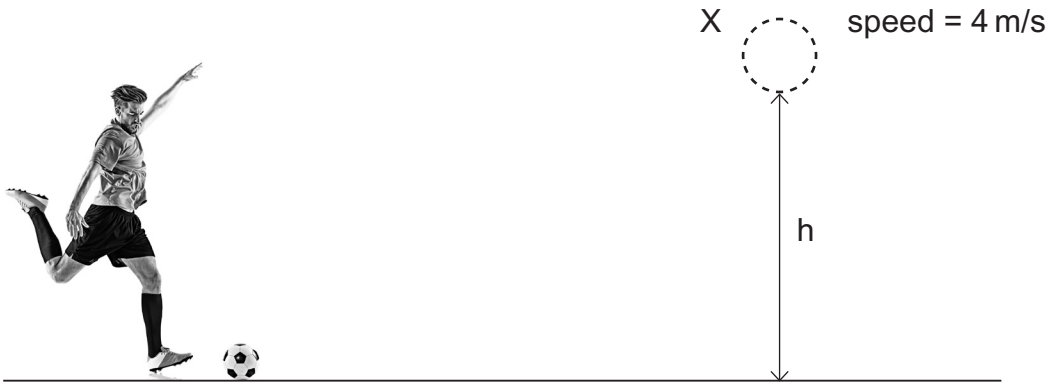
Particle 3 and its relative charge.

[6]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

8 A footballer kicks a football of mass 1.5 kg into the air and gives it a total energy of 87 J.



Later the ball is at position X where it has a speed of 4 m/s.

Calculate the height, h, of the ball at this instant.

Assume no energy losses.

You are advised to show your working out.

Height, h = _____ m [6]

THIS IS THE END OF THE QUESTION PAPER

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