Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2018–2019

Double Award Science
Physics

Unit P1

Higher Tier

[GDW32]

GDW32

WEDNESDAY 22 MAY 2019, AFTERNOON

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
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 Question **1**.

12328

1 A student wants to find the density of milk. Describe the experiment she would carry out.

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

Your account should include:

The two measuring instruments the student would use.

The two readings which must be taken to allow the mass of the milk to be found.

The equation for density in **words**.

A precaution to ensure accuracy.

[6]

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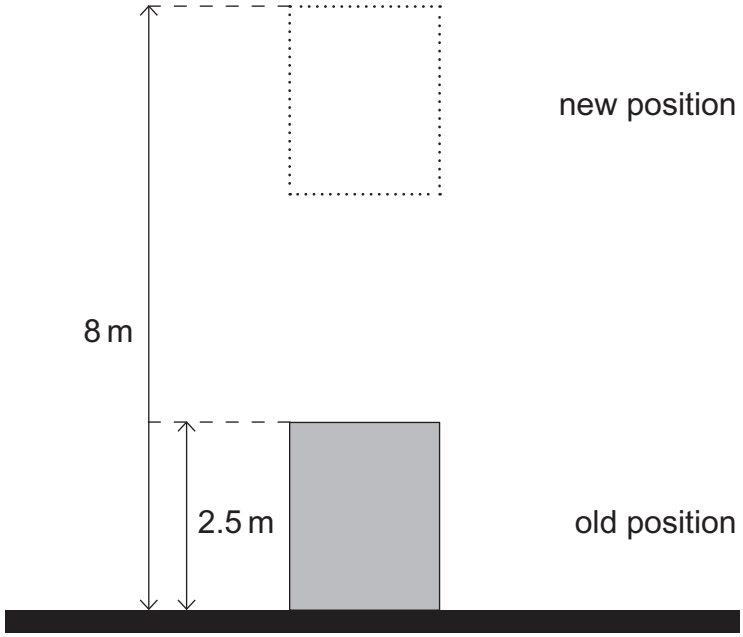
(Questions continue overleaf)

2 A crane lifts a crate of weight 4000 N to a new position above the ground.



(a) (i) Calculate the work done by the crane.

You are advised to show your working out.

Work done = _____ J [4]

(ii) Express your answer in kilojoules (kJ).

Work done = _____ kJ [1]

On another occasion the crane does 30 000 J of work in lifting a crate and develops 2000 W of power.

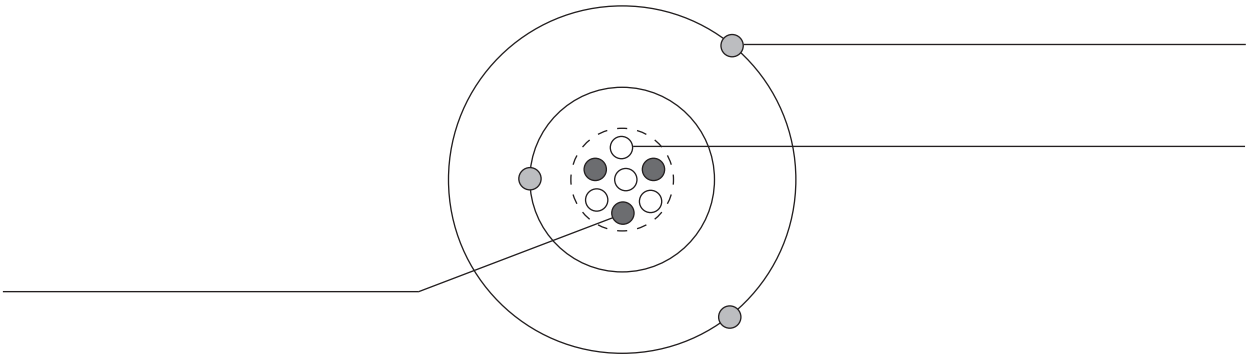
(b) Calculate how long it takes to lift the crate.

You are advised to show your working out.

Time = _____ s [3]

[Turn over

3 The diagram shows a neutral atom.



(a) **(i)** Write the names of the different particles in the correct spaces. [3]

(ii) Explain why this atom is neutral.

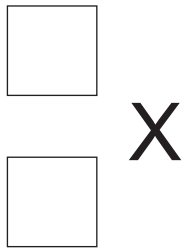
_____ [1]

(iii) What change, in terms of particles, will occur to this atom if it is to become an ion?

_____

_____ [2]

The nucleus of another atom X has 6 protons and 8 neutrons.



(b) Insert the correct numbers in the two boxes to represent the nucleus. [2]

(c) In terms of **particles** describe what isotopes are.

_____

_____ [2]

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(Questions continue overleaf)

4 An isotope of a certain metal has a half-life of 46 days.

(a) (i) Complete the statement below by circling the correct choice in each case.

You must circle two choices.

After a time of

23 days
46 days
92 days

the number of

decayed atoms
decayed nuclei
undecayed nuclei

will have decreased to half of their original number. [2]

(ii) A sample of this isotope has an activity of 32 counts per second.
How much time has passed since its activity was 512 counts per second?

You are advised to show your working out.

Time = _____ days [3]

We can get energy from nuclear reactions.

In each case below, give the name of the nuclear process to which the statement refers.

(b) (i) This reaction occurs when light nuclei are combined.

_____ [1]

(ii) This reaction is currently used in reactors to supply electricity commercially.

_____ [1]

(iii) This reaction uses fuel that can be found in seawater.

_____ [1]

[Turn over

5 Radioactive isotopes are used in industry and medicine.

Three applications are described below:

- a radioactive isotope is used to sterilise medical equipment;
- a radioactive tracer is introduced into underground pipes to detect leaks;
- a radioactive isotope is used in smoke alarms.

(a) In the table below:

- choose with a tick (✓) if a long or short half-life would be suitable, and
- choose what type of radiation, alpha, beta or gamma would be the most suitable.

Application	Short half-life	Long half-life	Alpha, beta or gamma
Sterilising medical equipment			
Tracer in pipes			
Smoke alarms			

[6]

(b) This question is about the dangers of using radioactive substances.

State a health danger involved in using radioactive substances.

_____

State three different methods that people who work with radioactive substances can use to protect themselves.

Method 1 _____

_____

Method 2 _____

_____

Method 3 _____

_____ [4]

[Turn over

6 A military tank has a mass of 8.48×10^4 kg and **each** caterpillar tread has an area of 3 m^2 in contact with the ground.

(a) Calculate the pressure exerted by the tank on the ground.
Remember to include the unit.

You are advised to show your working out.

Pressure = _____ [5]

(b) Explain why a metal wire may be used to cut through a piece of cheese with a smaller force than using a metal knife.

_____

_____

_____ [2]

[Turn over

7 Pearl climbs to the top of a slide.

© izzzy71 / Getty Images

Pearl, who has a mass of 50 kg, reaches a velocity of 7 m/s at the bottom of the slide.

On her way down she loses 500 J of energy because of friction.

(a) By first calculating her kinetic energy at the bottom, find the height of the slide. Give your answer correct to one decimal place.

You are advised to show your working out.

Kinetic energy = _____ J

Height of slide = _____ m [7]

(b) Pearl has speed, velocity and acceleration as she slides down.

Complete the table to indicate whether these quantities are scalars or vectors. In each case indicate your choice with a tick (✓).

	Scalar	**Vector**
Speed		
Velocity		
Acceleration		

[3]

(c) Study the shape of the slide in the diagram.

Consider Pearl's displacement and distance from the top to the bottom.

Choose the correct statement below by ticking (✓) the box.

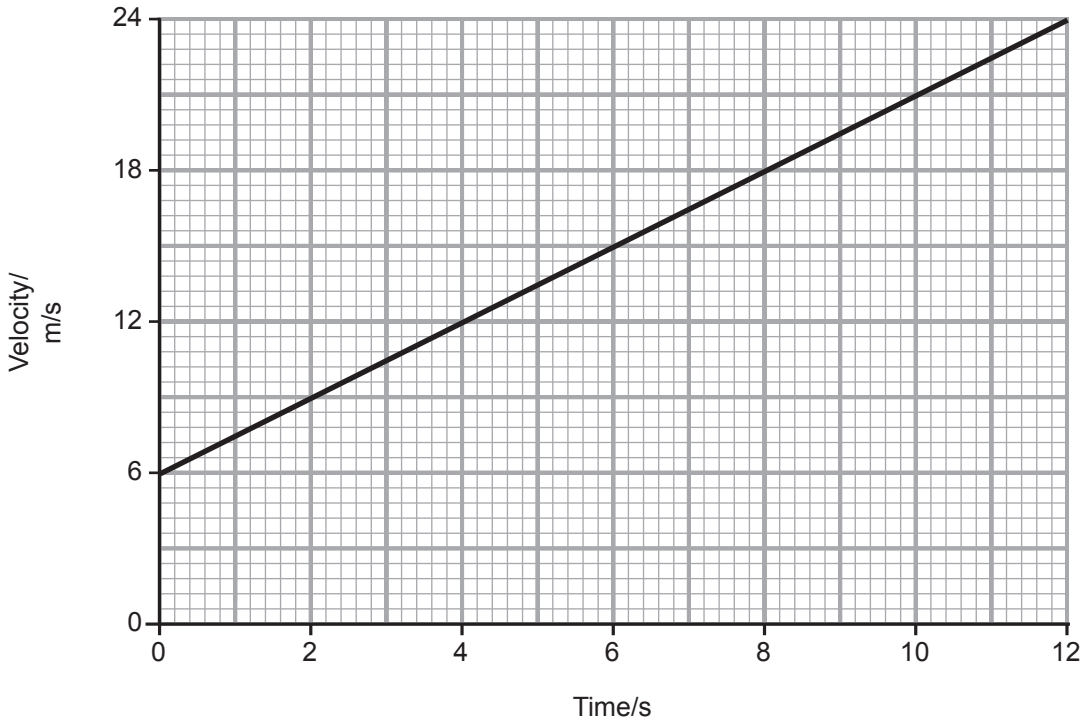
Her displacement and distance are equal. ☐

Her displacement is greater than her distance. ☐

Her distance is greater than her displacement. ☐ [1]

[Turn over

8 The graph below shows part of the velocity–time graph for a car journey.



(i) Use the graph to calculate the displacement of the car during this 12 second time interval.

You are advised to show your working out.

Displacement = _____ m [4]

(ii) The car exerts a resultant force of 2250 N.
Use the graph to help you calculate the mass of the car.

You are advised to show your working out.

Mass of car = _____ kg [6]

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

Examiner Number