

	Centre Number					
Candidate Numbe						
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General Certificate of Secondary Education 2016–2017

Double Award Science: Physics

Unit P1 Foundation Tier



[GSD31] FRIDAY 11 NOVEMBER 2016, AFTERNOON

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 nine** 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 7.

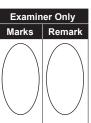
For Examiner's use only				
Question Number	Marks			
1				
2				
3				
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9				

Total	
Marks	

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4	The hov	contains the	namaa af	different	forme o	f oporav
1	THE DOX	contains the	names or	amerent	IOIIIIS O	i energy

	sound	electrical	strain
light	kinetic	heat	chemical



The pictures below show situations in which energy changes are taking place.

Use words in the box to describe each of the main energy changes.

(a) An electric kettle boiling water



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changes electrical energy to ______ energy. [1]

(b) A microphone



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changes _____ energy

to _____ energy.

[2]

(c) A catapult



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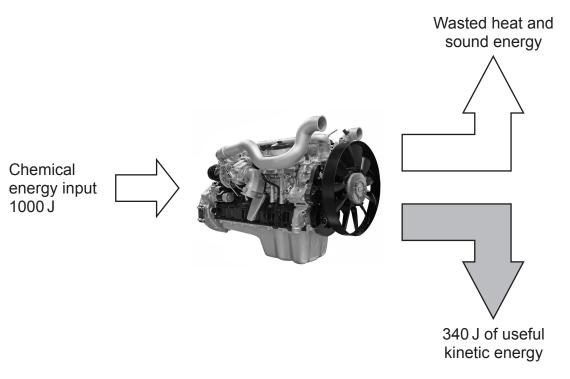
changes ______ energy

to energy

[2]

		lorthern Ireland some electricity is generated using wind farms. Wir newable energy resource.	nd is	Examin Marks	er Only Remark
	(a)	Tick (\checkmark) the statement which best describes renewable energy resources.			
		They produce unlimited amounts of energy.			
		They produce energy which can be used over and over again.			
		They produce limited amounts of energy.	[1]		
((b)	Name two other renewable energy resources.			
		1 2	[2]		
	(c)	Name a non-renewable energy resource which does not produce greenhouse gases.			
			[1]		
				1	

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(d) (i) How much energy is converted into wasted heat and sound energy?

Wasted heat and sound energy = ______ J [1]

(ii) Calculate the diesel engine's efficiency.

You are advised to show your working out.

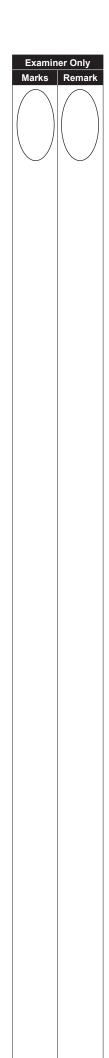
3 In the gym, a runner jogs 1500 m on a treadmill. The time taken by the runner to run this distance is 5 minutes.



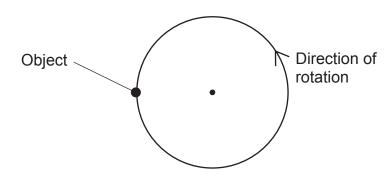
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(a)	By first converting the time to seconds	, calculate the runner's average
	speed on the treadmill in m/s.	

You are advised to show your working out.



(b) The diagram shows an object moving in a circle.



- (i) On the diagram, draw an arrow, beginning at the object, to show the direction of the centripetal force. Label this arrow F. [1]
- (ii) What happens to the size of the centripetal force if the mass of the object moving is increased and the speed remains the same? Tick (✓) the correct box.

1			
	Increases	Decreases	Remains the same [1]

(iii) What happens to the size of the centripetal force if the speed of the object is increased and the mass remains the same? Tick (✓) the correct box.

	Increases	Decreases	Remains the same	[1]

(iv) On the diagram draw an arrow, beginning at the object, to show the direction the object would move if the centripetal force was removed.

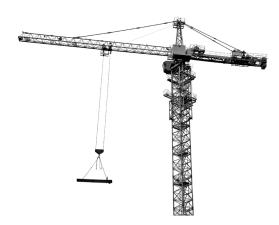
Label this arrow T. [1]

	(i)	A student is given a lump of coal with an irregular shape and asked to find its volume. Describe how the student could find the volume of the lump of coal.	Examiner O Marks Rer
	(ii)	State one precaution the student should take to ensure an accurate result.	_ [1]
(b)	its r	e student finds that the volume of the lump of coal is 175 cm ³ armass is 280 g. culate the density of the lump of coal, in g/cm ³ .	nd
	You	are advised to show your working out.	

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(Questions continue overleaf)

5 A crane raises a load, as shown below.



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Information about the process is given in the table below.

Load in N	Time in s	Height raised in m
2000	5	2.5

(a) (i) Select information from the table to calculate the work done by the crane.

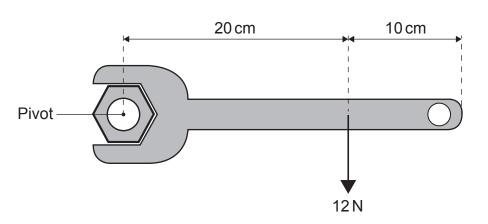
You are advised to show your working out.

(ii) What is the change in the potential energy of the load when it is raised?

10

(b)	Calculate the power output of the crane.		ner Only
	Remember to include the unit with your answer. You are advised to show your working out.	Marks	Remark
	Tou allo davioca to elloll your mortaling out.		
	Power = [4]		

6 The diagram shows a spanner being used to tighten a nut.



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Examiner Only

(a) Calculate the moment of the	e 12 N force about the pivot
---------------------------------	------------------------------

You are advised to show your working out.

Moment =	N cm	[3]

(b) Tick (\checkmark) the box to show the direction of the moment of the 12 N force.

Anticlockwise

Vertically downwards

Clockwise [1]

Describe an experiment you would carry out to measure the power output of an electric motor.	Examiner Only Marks Remar
In your description you should include:	
the apparatus used;the measurements you take.	
Do not include any formulas.	
In this question you will be assessed on your written communication skills including the use of specialist scientific terms.	
	-
[6]	

The incomplete table which make up an atc Complete the table.		erties of the three parti	cles
Particle	Relative mass	Relative charge	
	1	+1	
Neutron			
Electron	<u>1</u> 1840		[4]
			[2]
			[2]
The lithium nucleus concern the complete the symbol			[2]
	Li same number of neur	trons but a different	
Another atom has the number of protons.	below for the lithium r	trons but a different	
Another atom has the number of protons.	below for the lithium r	trons but a different	

Nuclear reactors are used in power stations to release energy through nuclear fission.

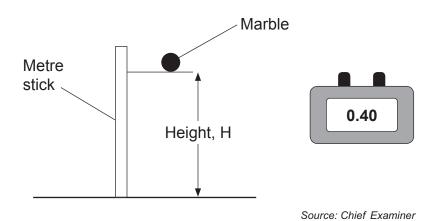
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Marks	Remark			



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(f)	(i)	What is meant by nuclear fission ?	
			[2]
	(ii)	Name one fission fuel commonly used in nuclear reactors.	[1]
	(iii)	State one disadvantage, not related to cost, of producing electricity using nuclear power.	
			[1]

9 The acceleration due to gravity can be measured by finding the times, T, for a marble to fall through various heights, H, above the Earth's surface.



According to theory, the relationship between the height, H and the time T, is given by:

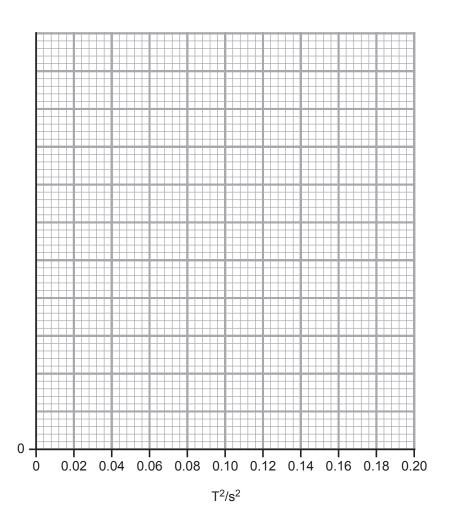
 $H = k T^2$ Equation 9.1

The following data was obtained.

Height/m	0.2	0.4	0.6	0.8	1.0
T ² /s ²	0.04	0.08	0.12	0.16	0.20

- (a) On the grid opposite, draw a graph of height H on the vertical axis versus T^2 on the horizontal axis.
 - (i) Label the vertical axis and insert the appropriate scale. [2]
 - (ii) Plot the points. [2]
 - (iii) Draw a line of best fit. [1]

Examiner Only Marks Remark



Examiner Only

Marks Remark

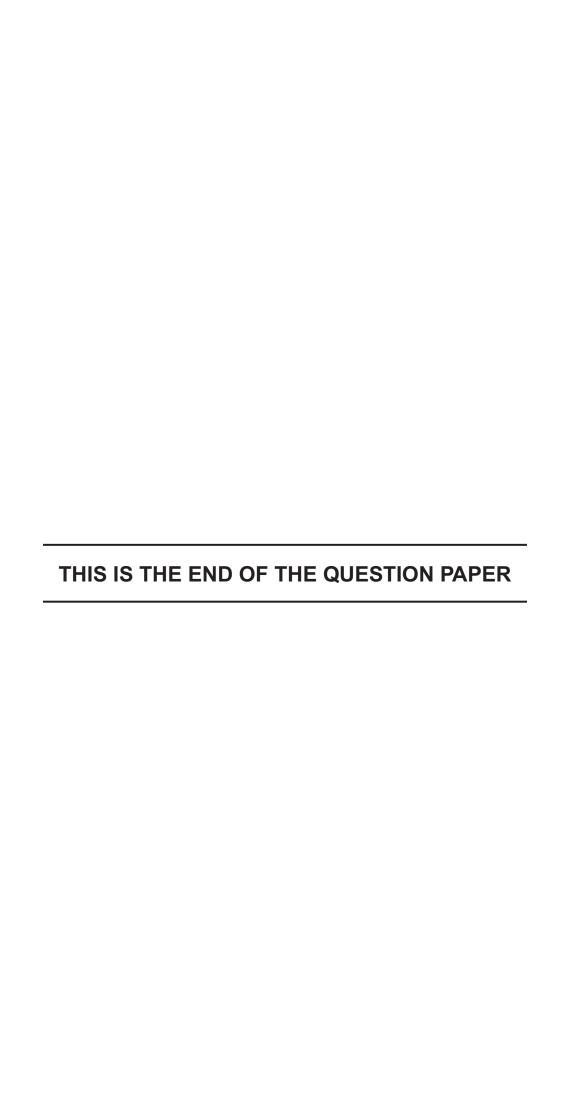
(b) (i) Use your graph to find the value of k. Remember to include the unit for k.

You are advised to show your working out.

(ii) Does your graph support the relationship between H and T^2 in equation 9.1?

YES NO Circle the correct answer.

Explain your answer.



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