Centre No.						Paper Reference (complete below)							Surname	Initial(s)
Candidate No.										H	/	1 H	Signature	

Paper Reference(s)

5020H/1H 5048H/1H

Edexcel GCSE

Additional Science (5020H)

Physics (5048H)

P2 – Topics 9 to 12

Higher Tier

Tuesday 7 June 2011 – Afternoon

Time: 30 minutes

Materials required for examination
Calculator

Items included with question papers
Nil

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
Total	

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature, and complete the paper reference.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
Do not use pencil. Use blue or black ink.
Show all stages in any calculations and state the units. Calculators may be used.
Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 5 questions in this question paper. The total mark for this paper is 30.
There are 12 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

You are reminded of the importance of clear English and careful presentation in your answers.

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FORMULAE

You may find the following formulae useful.

$\text{average velocity} = \dfrac{\text{displacement}}{\text{time}}$	$v = \dfrac{s}{t}$
$\text{acceleration} = \dfrac{\text{change in velocity}}{\text{time}}$	$a = \dfrac{(v-u)}{t}$
force = mass × acceleration	$F = m \times a$
momentum = mass × velocity	$p = m \times v$
change in potential energy = mass × gravitational field strength × change in height	$PE = m \times g \times h$
kinetic energy = ½ × mass × (velocity)^2	$KE = ½ \times m \times v^2$
electrical energy = voltage × current × time	$E = V \times I \times t$
$\text{power} = \dfrac{\text{work done}}{\text{time taken}}$	$P = \dfrac{W}{t}$
work done = force × distance moved in the direction of the force	$W = F \times s$

Leave blank

1. Alex flies a Boeing 777 over a city at night.
The plane's anti-collision lights flash once every second.
The photograph shows several seconds of his flight from left to right.

The photograph shows the plane as it accelerates from left to right.
State **two** pieces of evidence in the photograph which suggest that the plane is accelerating.

1 .....

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2 .....

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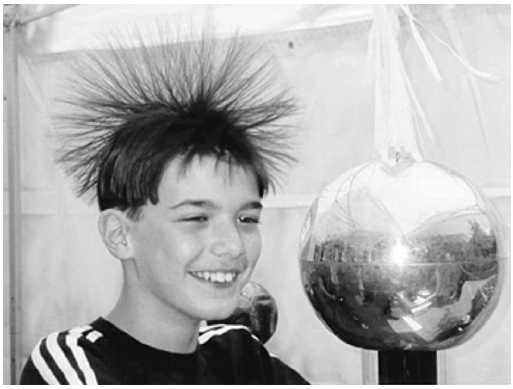
Q1

(Total 2 marks)

Leave blank

2. (a) Darren has been charged up using a Van de Graaff generator.
His teacher tells him he is negatively charged.



State why his hair stands on end.

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(1)

(b) Bev combs her hair with a plastic comb.
Bev's hair also gains a negative charge and her hair stands on end.

Explain how Bev's hair gains a negative charge.

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(3) **Q2**

(Total 4 marks)

Leave blank

3. Safety engineers investigate car crashes.

(a) First the safety engineers accelerate a car.
The car contains a test dummy which has a mass of 80 kg.
The average acceleration of the test dummy is 7.5 m/s^2.

Calculate the average accelerating force acting on the test dummy.
State the unit.

force = ... unit = ...

(3)

(b) Next the safety engineers crash the car into a wall.

The car hits the wall at 25 m/s.
The car takes 0.12 s to stop.
Calculate the average acceleration of the car.

acceleration = ... m/s^2

(2) **Q3**

(Total 5 marks)

Leave blank

4. (a) (i) The table shows some properties of alpha and beta particles.
Complete the table.

particle	nature	charge	range in air	ionising ability
alpha	2 protons and 2 neutrons	+2	5 cm	.....
beta	.....	.....	over 50 cm	medium

(2)

(ii) Why do alpha particles travel a shorter distance in air than beta particles?

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(1)

(b) Radon-222 and radon-226 are both unstable isotopes of radon.

(i) Explain the word **isotopes**.

.....

.....

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(1)

(ii) The activity of a sample of radon-222 is 160 Bq.
Calculate its activity two half-lives later.
Show your working.

activity two half-lives later = ... Bq

(2)

Leave blank

(iii) Radon-222 occurs naturally as a gas and decays by emitting alpha particles. Explain why radon-222 is more dangerous as a gas than it would be as a solid.

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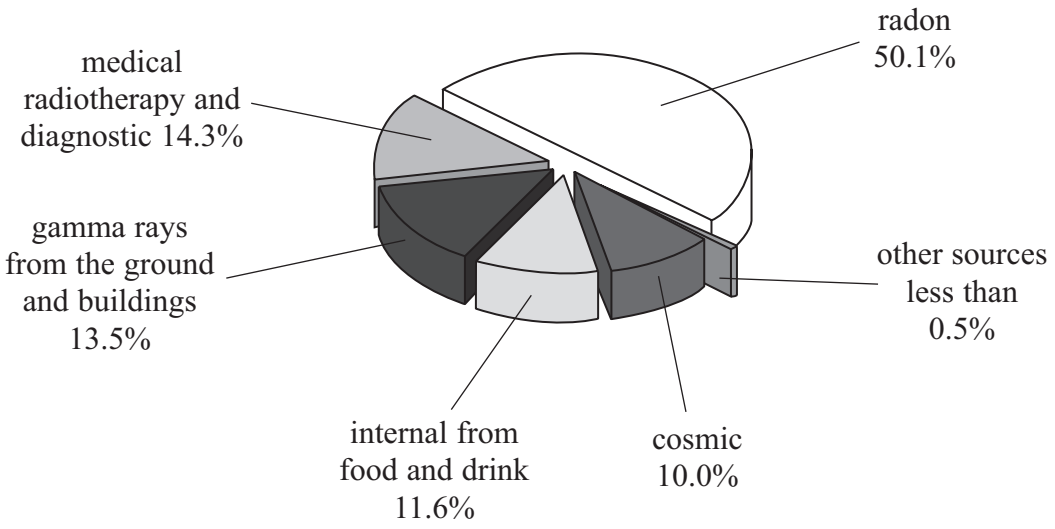
(2)

(iv) The diagram shows the composition of the average background radiation in the U.K.



The background radiation is different from place to place within the U.K.

Explain how radon-222 gas contributes to these regional variations in the background radiation.

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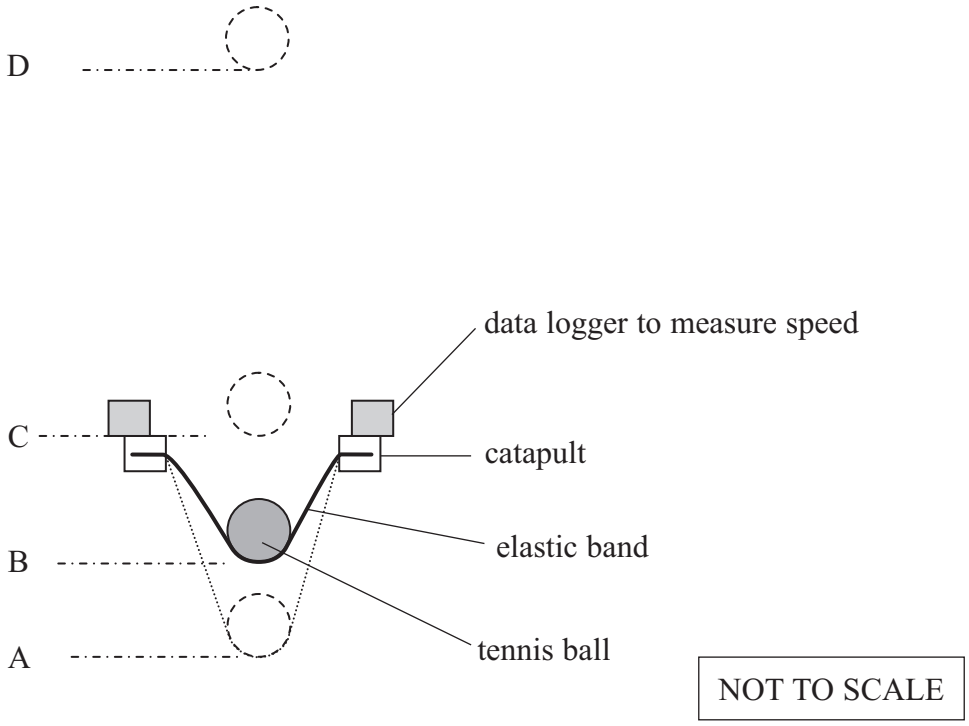
(2)

Q4

(Total 10 marks)

Leave blank

5. Andrew investigates gravitational potential energy and kinetic energy.
He uses a modified catapult to fire a tennis ball vertically upwards as shown.
He pulls the elastic band to position B and then lets it go.
The data logger measures the speed of the tennis ball at position C, just above the level of the catapult.



(a) The mass of the tennis ball is 0.057 kg.
The speed of the tennis ball at C is 5.6 m/s.

(i) Show that the kinetic energy of the tennis ball at C is about 0.9 J.

(2)

(ii) Calculate the theoretical maximum height that the tennis ball can rise above C.
Gravitational field strength is 10 N/kg.

maximum height above C = ... m

(3)

Leave blank

(iii) In practice, the tennis ball does not reach this theoretical maximum height. Explain why.

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(1)

(b) Andrew repeats his investigation.
This time he stretches the elastic band further, to A.
Compare the speed at C now with that when it was released from B.
Explain your answer in terms of energy.

speed at C is .....

reason.....

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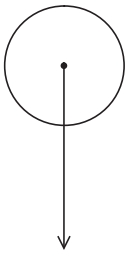
(1)

(c) The diagram shows the resultant vertical force acting on the tennis ball when it passes C on the way up.



Explain why the ball continues to move upwards even though the resultant force is downwards.

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(2) **Q5**

(Total 9 marks)

TOTAL FOR PAPER: 30 MARKS

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