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

Monday 10 March 2008 – Morning

Time: 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
Total	

Materials required for examination	Items included with question papers
Calculator	Nil

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 4 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

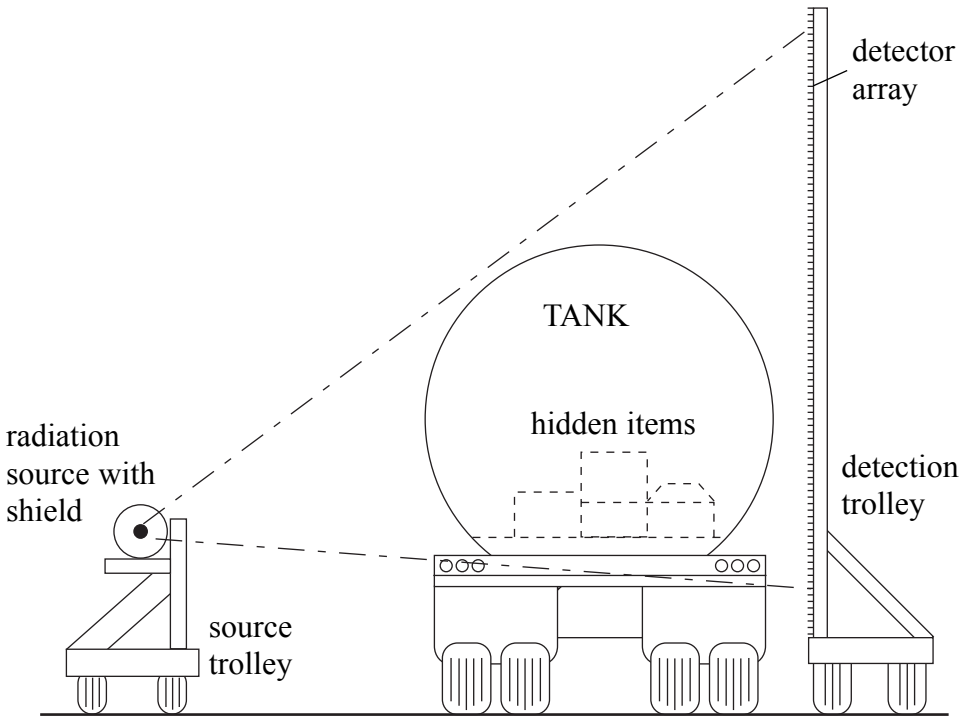
You may find the following formulae useful.

$\text{average velocity} = \frac{\text{displacement}}{\text{time}}$	$v = \frac{s}{t}$
$\text{acceleration} = \frac{\text{change in velocity}}{\text{time}}$	$a = \frac{(v-u)}{t}$
force = mass × acceleration	$F = m \times a$
momentum = mass × velocity	$\rho = m \times v$
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	$E = V \times I \times t$
$\text{power} = \frac{\text{work done}}{\text{time taken}}$	$P = \frac{W}{t}$
work done = force × distance moved in the direction of the force	$W = F \times s$

Leave blank

1. (a) Ron and Pat work at the docks. Their job is scanning lorries for hidden items.

They have a new scanner that uses a radioactive source instead of X-rays.
The diagram shows the scanner in use.



Different radiations have different abilities to penetrate and ionise.

Complete the table below to compare alpha, beta and gamma radiations.
Place **one** tick in **each** row of the table.

	alpha	beta	gamma
most penetrating			
least penetrating			
most ionising			
least ionising			

(2)

Leave blank

(b) Which source (alpha, beta or gamma) should be used in the scanner?
Explain the reason for your choice.

Source .....

Reason .....

.....

(1)

(c) The radioactive isotope used is cobalt-60.
This is its symbol.

$$^{60}_{27}\mathrm{Co}$$

Fill in the table below to show the numbers of electrons, neutrons and protons in an atom of cobalt-60.

number of protons =	
number of electrons =	
number of neutrons =	

(2)

Leave blank

(d) Pat and Ron disagree about which scanner is best.

I think the X-ray scanner was better.

I think that the cobalt-60 scanner is best.

Use the information below to compare the two scanners in terms of performance and safety.

	X-ray scanner	**Cobalt-60 scanner**
time taken to scan 1 lorry	105 s	7 s
penetration through wood	23 m	40 m
penetration through iron	2.8 m	5.3 m
energy of source	300 keV	1300 keV

Performance

Better scanner is .....

Reason .....

.....

(1)

Safety

Better scanner is .....

Reason .....

.....

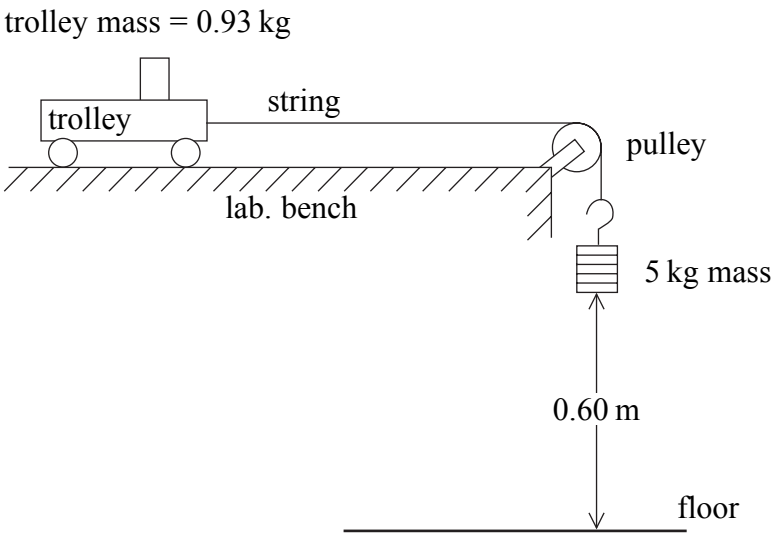
(1)

Q1

(Total 7 marks)

Leave blank

2. (a) Fawzia is investigating acceleration.
She uses the apparatus shown.



She starts her trolley from rest and uses a data logger to measure the acceleration. Fawzia finds that the acceleration is 7.92 m/s^2.

(i) Calculate the accelerating force on the trolley.

.....

..... Force = ... N
(2)

(ii) What is the direction of the frictional forces acting on the trolley?

.....
(1)

(iii) State two places in the system where the friction occurs as the trolley moves.

1 .....

2 .....
(2)

Leave blank

(b) (i) Calculate the change in potential energy of the mass as it falls to the floor.

You may take the gravitational field strength as 10 N/kg.

.....

.....

.....

Potential energy = ... J

(2)

(ii) If there were no frictional forces, what would be the kinetic energy gained by the trolley and mass?

.....

Kinetic energy = ... J

(1)

(iii) Use your answer to part (ii) to calculate the velocity of the trolley just as the mass hits the ground.

.....

.....

Velocity = ... m/s

(2)

Q2

(Total 10 marks)

Leave blank

3. The sun is a nuclear fusion reactor.

(a) Explain what is meant by nuclear fusion.

.....

.....

(1)

(b) What are the conditions needed for nuclear fusion?

.....

.....

.....

(2)

Q3

(Total 3 marks)

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4. (a) Francine is a flight attendant.
She has heard that cosmic radiation is a problem for people who fly a lot.
Francine normally works on routes which go over the North Pole.

(i) What is cosmic radiation?

.....

.....

(1)

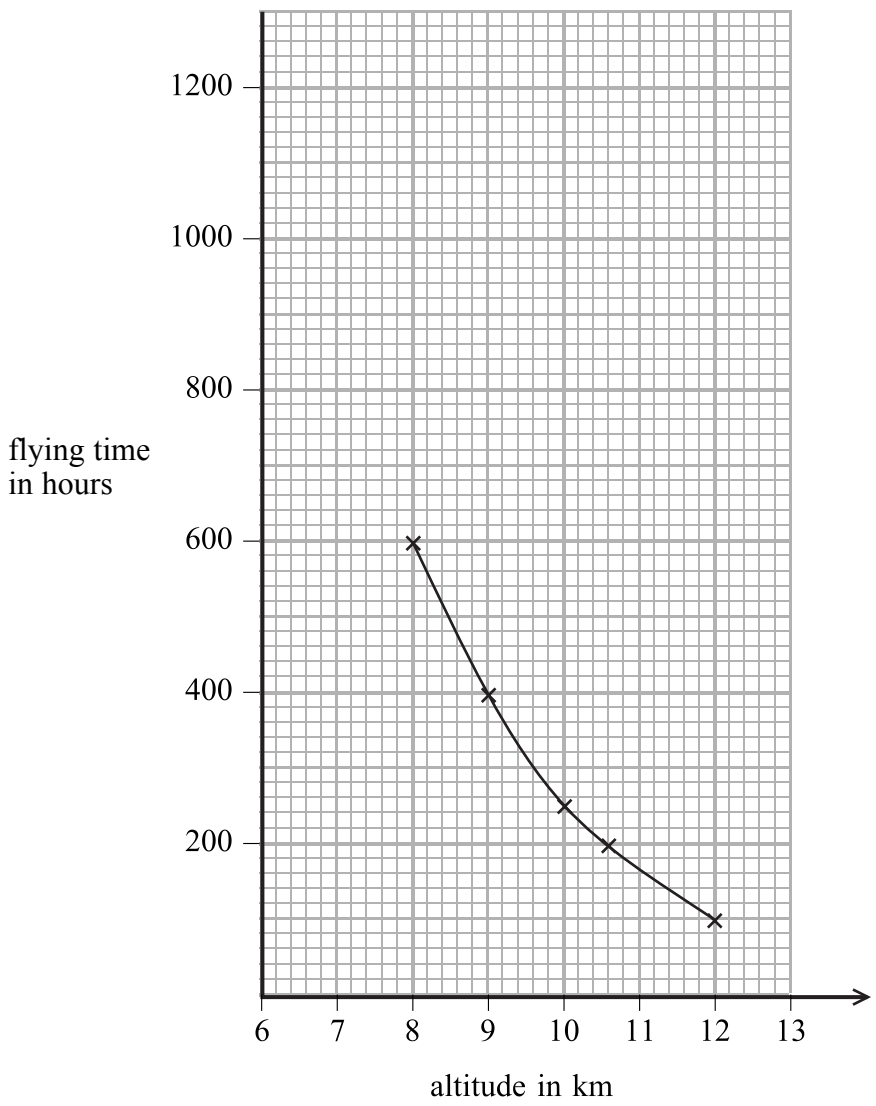
(ii) Why is cosmic radiation dangerous?

.....

.....

(1)

(b) Francine does an Internet search and finds this graph.



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The graph shows how many hours you need to fly to get the same dose of cosmic radiation at different altitudes over Northern Europe.

(i) Use the graph to describe how the flight time varies with altitude for the same dose of radiation.

.....

.....

(1)

(ii) How does the graph show that the strength of cosmic radiation increases with altitude?

.....

.....

(1)

(iii) Explain why the cosmic radiation is more at greater altitude.

.....

.....

(1)

(c) The table shows the data for flights over the equator, giving the same dose of cosmic radiation as in part (b).

altitude (km)	**number of hours of flying time over the equator**
8	1200
9	800
10	500
10.6	400
12	300

(i) Draw a graph of this data on the same axes as in part (b).

(2)

(ii) Explain why the flight time over the equator that produces the same dose of cosmic radiation is larger than the flight time over Northern Europe.

.....

.....

(1)

Leave blank

(d) Francine discovers that she is pregnant.

(i) State a possible ill-effect to her unborn baby caused by exposure to cosmic radiation while flying.

.....

(1)

(ii) She wants to continue working for another six months.
Suggest what she could do to protect her unborn baby.

.....

.....

(1)

Q4

(Total 10 marks)

TOTAL FOR PAPER: 30 MARKS

END