EDEXCEL GCSE ADDITIONAL SCIENCE (360SCIENCE)

SCIENCE



EXAM QUESTION PACK

UNIT P2 FOUNDATION TIER 5020F PAPERS

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

Paper Reference(s)

5020F/1F 5048F/1F

Edexcel GCSE

Additional Science (5020F)

Physics (5048F)

P2 – Topics 9 to 12

Foundation Tier

Tuesday 7 June 2011 – Afternoon

Time: 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
Total	

Materials required for examination
Calculator

Items included with question papers
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 black ink.
Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (~~☒~~) and then mark your new answer with a cross (☒).
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 6 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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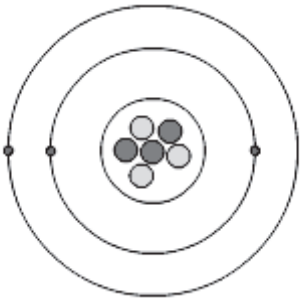
You may find the following formulae useful.

$\text{average velocity} = \frac{\text{displacement}}{\text{time}}$	$v = \frac{s}{t}$
$\text{acceleration} = \frac{\text{change in velocity}}{\text{time}}$	$a = \frac{(v-u)}{t}$
force = mass × acceleration	$F = m \times a$
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	$W = F \times s$

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Leave blank

1. The diagram shows a lithium atom.



(a) Use words from the box to complete the sentences.
Each word may be used once, more than once or not at all.

electrons	ions	neutrons	protons

The particles in orbit around the nucleus are called .....

This nucleus contains ..... and .....

(3)

(b) Complete the sentence by putting a cross (☒) in the correct box.

The charge on this nucleus is

- negative ☒
- neutral ☒
- positive ☒

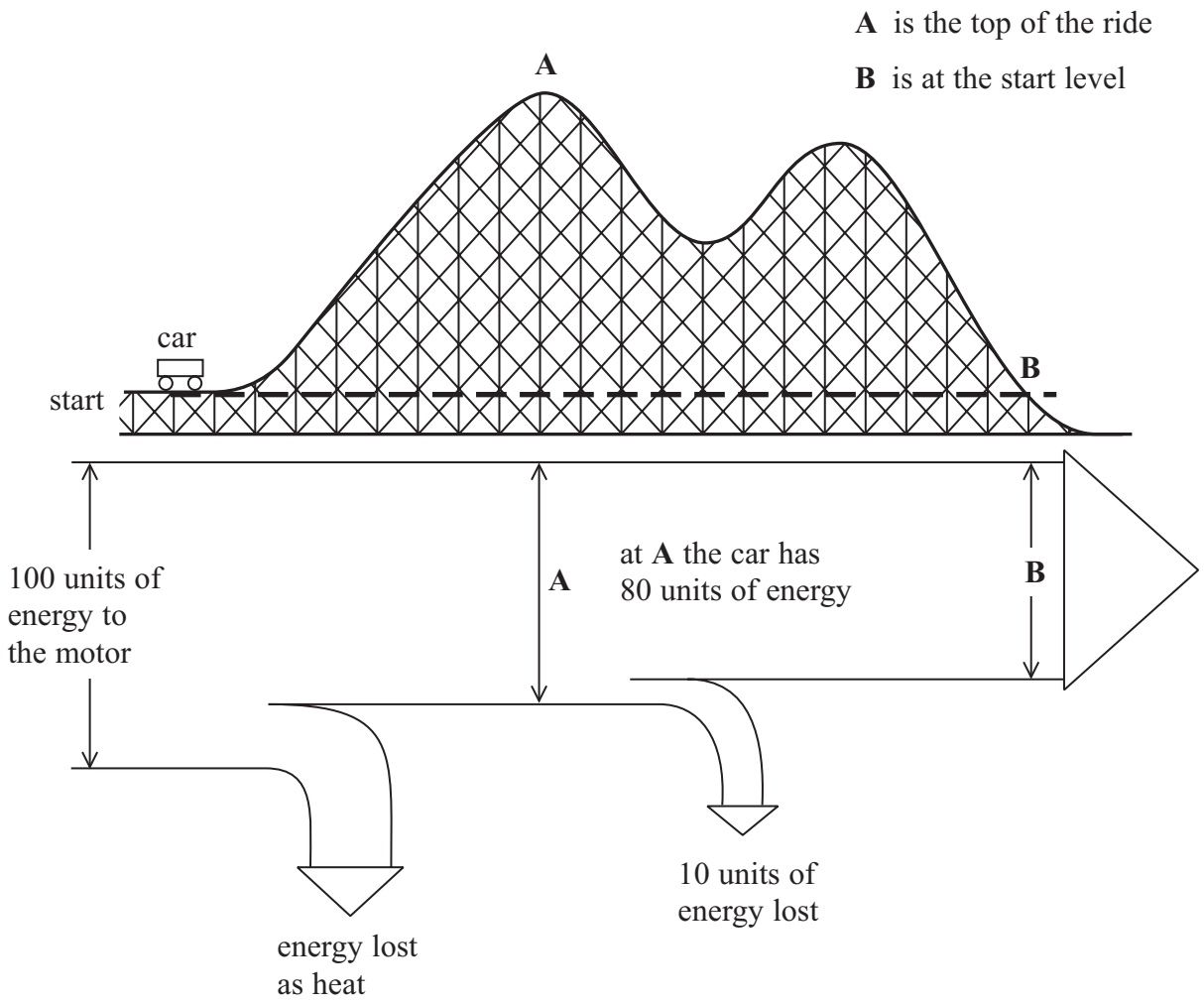
(1)

Q1

(Total 4 marks)

Leave blank

2. The figure shows a roller coaster ride and the energy flow diagram for the roller coaster car.



(a) 100 units of energy are supplied to the motor which lifts the car up to **A**. How many units of energy are lost as heat before the car reaches **A**?

number of units lost before **A** = ...

(1)

(b) At **A**, the motor is switched off and the car carries on moving along the ride. Complete the sentence by putting a cross (☒) in the correct box.

At **A**, the roller coaster car has gained

- gravitational potential energy only ☒
- kinetic and gravitational potential energy ☒
- kinetic energy only ☒

(1)

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Leave blank

(c) The car loses 10 units of energy as it goes between **A** and **B**.
How many units of energy does the car still have at **B**?

number of units of energy at **B** = ...

(1)

(d) How does the roller coaster car lose energy between **A** and **B**?
Explain your answer.

.....

.....

.....

.....

.....

.....

(2)

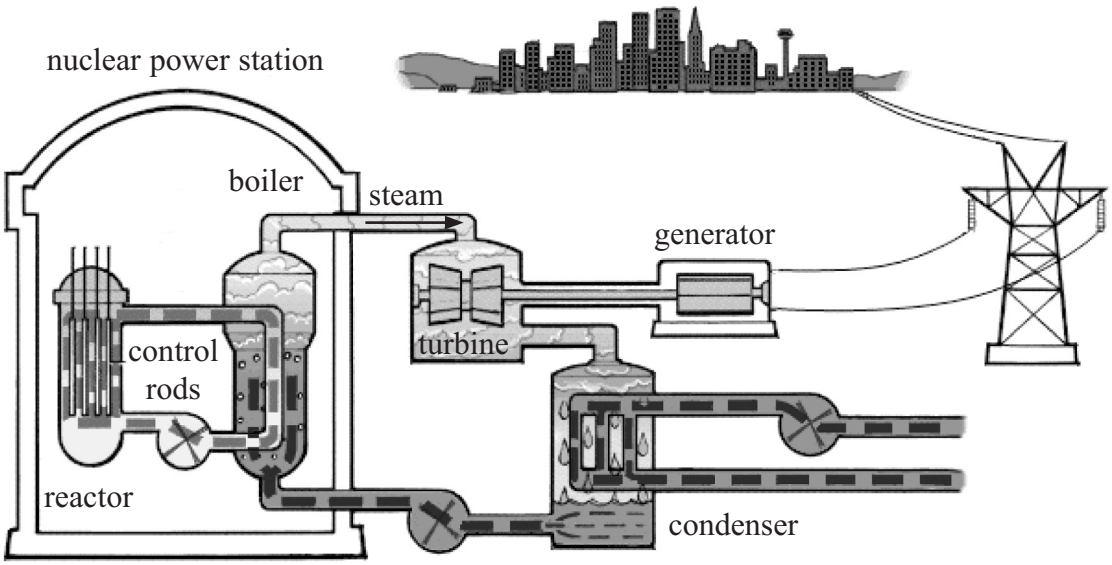
Q2

(Total 5 marks)

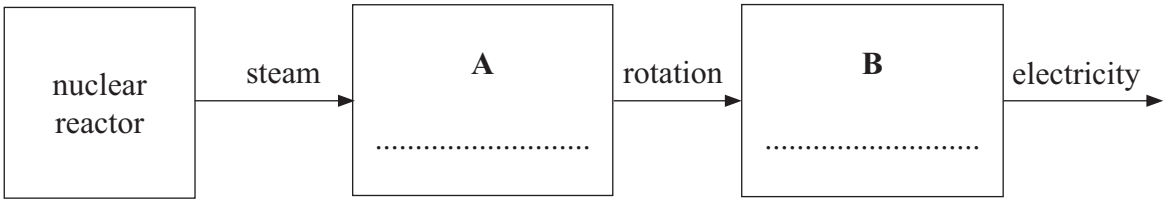
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Leave blank

3. The diagram shows stages in electricity generation at a nuclear power station.



(a) Use a word or words from the diagram to complete each of the boxes **A** and **B**.



(2)

(b) State one **advantage** a nuclear power station has over a fossil fuel power station.

.....

.....

(1)

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Leave blank

(c) Inside the nuclear reactor, a chain reaction produces heat and some waste products. These waste products will remain dangerous for many years.

(i) The splitting of a uranium-235 nucleus in this process is called

.....

(1)

(ii) Why are the waste products dangerous?

.....

.....

(1)

(iii) Why will the waste products remain dangerous for many years?

.....

.....

.....

(1)

Q3

(Total 6 marks)

Leave blank

4. 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.



(a) (i) The plane's average speed between **A** and **B** is 220 m/s.
Use the equation below to calculate how far Alex's plane travels from **A** to **B**.

distance = average speed × time

distance = ... m
(2)

(ii) 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 .....

.....

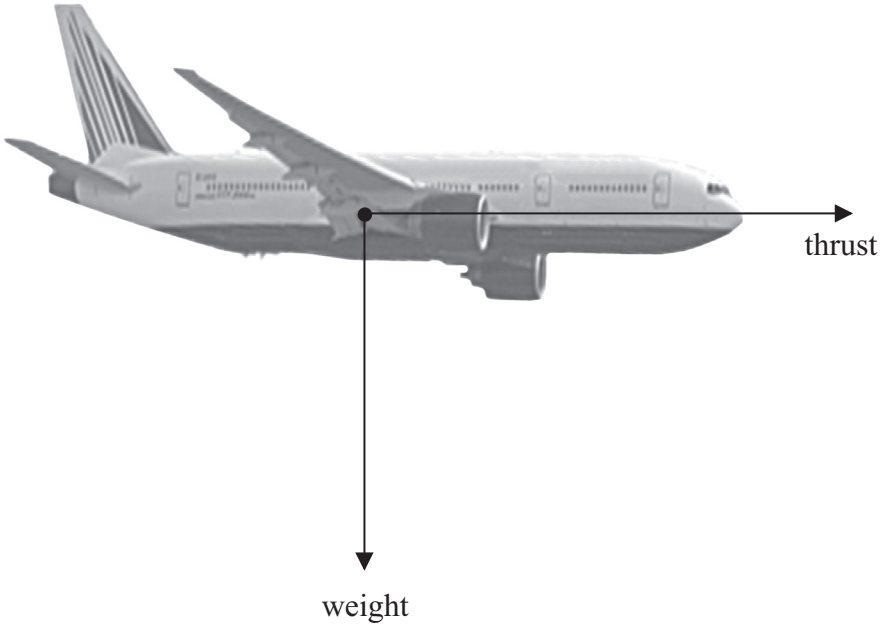
2 .....

.....
(2)

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Leave blank

(b) The photograph below shows Alex's plane as it flies at **constant speed** and **constant height**.



Two of the forces acting on the plane are shown.
The other two forces acting on the plane are lift and air resistance.

Complete the photograph **accurately** to the same scale by adding

(i) a force arrow for the lift, labelled **L**.

(ii) a force arrow for the air resistance, labelled **R**.

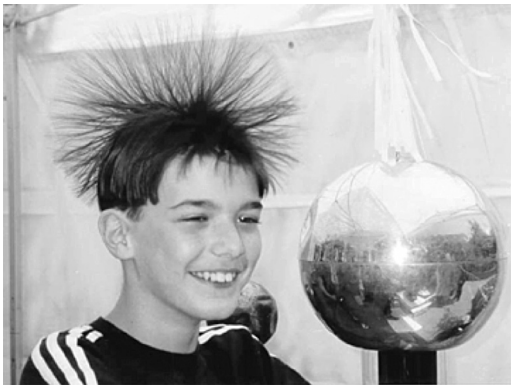
(2) **Q4**

(Total 6 marks)

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Leave blank

5. (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.

.....

.....

(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.

.....

.....

.....

.....

.....

.....

(3)

Q5

(Total 4 marks)

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Leave blank

6. 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) **Q6**

(Total 5 marks)

TOTAL FOR PAPER: 30 MARKS

END

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Mark Scheme (Results)

June 2011

360Science

GCSE Additional Science
Structured Paper P2 (5020F/1F)

GCSE Physics
Structured Paper P2 (5048F/1F)

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June 2011
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5020F & 5048F Mark Scheme
June 2011

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
1(a)	electrons ; protons neutrons ;; (either order)	any recognisable spelling, allow singular of any e.g. electron, neutron, proton	apostrophes sign (e.g. positive or negative)	in the top line, reject protons, neutrons, ions reject electrons and ions in either space for 1 mark each	**(3)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
1(b)	positive ;				**(1)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
2(a)	20 (units);	100-80	J joules 10, 70, 90		**(1)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
2(b)	kinetic and gravitational potential energy ;				**(1)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
2(c)	70 (units) ;	80-10	J joules		**(1)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
2(d)	**Any two marks from** 1. mention of any suitable energy type; 2. mention of any suitable energy losing mechanism ; 3. mention of any suitable place ;	 heat, sound, waste e.g. air resistance, friction, conduction, vibration e.g. at wheels, of the track (energy is) **dissipated** as heat allow 2 marks	ideas of energy converted (lost) into speed, acceleration, movement mention of gpe/ke/going up the slope		**(2)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
3(a)	**A** turbine ; **B** generator ;				**(2)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
3(b)	any ONE from 1. does not contribute to global warming ; 2. high energy density/less fuel needed;	• does not emit carbon dioxide /greenhouse gas/ harmful gases /fumes /RA • fuel can be reprocessed /recycled	• economic arguments • efficiency • renewability • better for the environment • finite resource arguments		**(1)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
3(c)(i)	fission ;	nuclear fission accept alternative spellings		fusion	**(1)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
3(c)(ii)	radioactive ;	• emits radiation / alpha / beta /gamma • toxic • damages/ionises cells /eq • unstable (nuclei /isotope)	damage to people	references to electron shells or reactivity for (c)(ii)	**(1)**
(iii)	with (very) long half life ;	• allow ½ life of 25yrs or more • take a (very) long time to decay • stay /still be (radio)active for years • keep splitting up mark where seen for both parts	• stay around for years • reactive /reactivity		**(1)**

Question Number	Answer		Acceptable answers	Ignore	Reject	Mark
4(a)(i)	**substitution** **evaluation**	d= 2 x 220 440 (m)	bald correct answer = 2 marks	incorrect units		**(2)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
4(a)(ii)	**Marks may be in any order**. 1. (flashes of)light get further apart ; 2. idea that plane changes direction;	allow dots for lights path is curved /bent	getting dimmer		**(2)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
4(b)	for 2 marks all 4 correct for 1 mark any 2 or 3 correct 1. up arrow same size as weight 2. backwards arrow same size as thrust ; 3. L (labelled) up 4. R (labelled) backwards ;;	tolerance +/-20%			**(2)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
5(a)	like charges repel ;	• (negative) hairs repel (each other) • hair repelled by head • (because of) static (electricity) • electrons repel	• repeat of stem • idea of transfer of electrons to positive hair		**(1)**

Question Number	Answer	Acceptable answers	Ignore	Reject	Mark
5(b)	Any **three** from: 1.comb / plastic is an insulator; 2.idea of charging by friction or rubbing; 3.electrons; 4.(negative charges) <u>transfer</u>; 5. from comb (to hair) ;	friction causes static	repeat of stem e.g. 'combs' 'puts a negative charge'	for MP3,4 and 5 idea of protons or positive charges moving	**(3)**

Question Number	Answer		Acceptable answers	Ignore	Reject	Mark
6(a)	**substitution** **evaluation** **unit**	= 80 x 7.5; = 600; N;	 bald correct answer = 2 marks unit independent acceptable units are • kg m/s^2 • newton		for unit mark • Ns • kg/m/s^2	**(3)**

Question Number	Answer		Acceptable answers	Ignore	Reject	Mark
6(b)	**substitution** **evaluation**	(a =) $\frac{0 - 25}{0.12}$ (-)210	a = $\frac{25 - 0}{0.12}$ 208 bald correct answer = 2 marks	signs		**(2)**

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Mark Scheme Summer 2009

GCSE

GCSE 360Science

Science (2101)
Additional Science (2103)
Biology (2105)
Chemistry (2107)
Physics (2109)

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Additional Science 5020F/1F
Physics 5048F/1F
P2 Mark Scheme

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>1(a)</td><td>one mark for each; if 4 ticks max mark =2, if all boxes ticked no marks can be awarded

<table>
<tr><th>condition</th><th>Increases stopping distance?</th></tr>
<tr><td>car full of passengers</td><td>✓</td></tr>
<tr><td>driving slower</td><td></td></tr>
<tr><td>good brakes</td><td></td></tr>
<tr><td>icy roads</td><td>✓</td></tr>
<tr><td>worn tyres</td><td>✓</td></tr>
</table>
</td><td>(3)</td></tr>
</table>

Question Number	Answer	Accept	Ignore	Reject	Mark
1(b)	(his reaction time) is increased;	*be careful that it is his reaction time that is increased and not his reaction speed,* hence allow 'longer' /OWTTE (his reactions are) slower/eq	References to stopping distances /car speed	decreases	**(1)**

Question Number	Answer	Accept	Reject	Mark
2(a)	bombarded ;			**(1)**

Question Number	Answer	Accept	Reject	Mark
2(b)	**One mark for each correct line ;** **Any two lines to or from a box negates that mark** fuel -----uranium ; energy-------heat ;			**(2)**

Question Number	Answer	Accept	Reject	Mark
2(c)	turbine and a generator ;			**(1)**

Question Number	Answer	Accept	Ignore	Reject	Mark
2(d)	any sensible suggestion;	• mention of previous incident e.g. Chernobyl • possible terrorist activity • idea of 'radioactivity' (radiation, waste) *possibly* dangerous • possible incident e.g. meltdown /going critical	idea of nuclear power stations exploding 'dangerous substances' Idea of radiation emission in normal use		**(1)**

Question Number	Answer	Accept	Ignore	Reject	Mark
2(e)	any sensible suggestion ;	• no greenhouse effect • no CO_2 emitted • no pollution of the atmosphere e.g. smoke, dangerous gases, acid rain, specified (correct) gas • very energy dense	ref to other pollution fossil fuels natural resources environmentally friendly no waste		**(1)**

Question Number	Answer	Accept	Ignore	Reject	Mark
2(f)	any sensible suggestion;	• deep burial land /sea • vitrification /eq • sealed containers with security (both ideas necessary)	landfill---------- security by itself is not enough	idea of local surface tip burn it	**(1)**

Question Number	Answer	Accept	Reject	Mark
3(a)(i)	ionises the air ;			**(1)**

Question Number	Answer	Accept	Reject	Mark
3(a)(ii)	smaller;			**(1)**

Question Number	Answer	Accept	Reject	Mark
3(a)(iii)	alpha particles;			**(1)**

Question Number	Answer	Accept	ignore	Reject	Mark
3(b)	any ONE correct explanation/ statement about any one of ; range penetration /absorption	e.g. • (highly ionising *and therefore*)small range • alpha can only travel few cm (max 20cm if a number given) • it can be stopped by paper/ shielding **also allow** • small <u>activity</u> level /eq • fitted in ceiling so no one can get near it	beta bald 'highly ionising' quickly half-life strength	incorrect physics, i.e. ionising ability is small	**(1)**

Question Number	Answer	Accept	ignore	Reject	Mark
4(a)	58 ;	allow +/- 0.5	Units		**(1)**

Question Number	Answer		Accept		Reject	Mark
4(b)	subst.; ans;	400/58 6.9	**allow ecf from 4a** Bald correct answer (6.9) scores both marks allowed range 6.8-7.0 for both marks **For 1 mark** 13/2 = 6.5	Bald incorrect ans = 0 Ignore no of dp/ sig figs	units if seen must be correct in the ans	**(2)**

Question Number	Answer	Accept	Reject	Mark
4(c)	C ;	at the end of the race	A B	**(1)**

Question Number	Answer		Accept	Comments	Reject	Mark
4(d)	subst.; answer ; 6760	0.5 × 80 × 13^2	*ensure that any substitution is dimensionally correct* 0.5 × 80 ×13 ×13 allow velocity range of 12.5-13.5 **Ans in the range 6250-7290** For 1 mark • 520 (.5 X 80 X 13) • 13520 (80 X 13 X 13) • 1849 - 1961 (using 6.8-7.0 not 13)	276 (.5 X 80 X 6.9) 2 mistakes =0	incorrect units for one mark incorrect sub of 800 for mass for both marks	**(2)**

Question Number	Answer	Accept	Ignore	Reject	Mark
5(a)	any 2 from: causal mechanism what moves which direction;;	e.g. (due to) friction/rubbing negative charge moves OR electrons onto hose OR from fuel	repeat of stem	Reject incorrect physics reject for the last two marking points ions or positive electrons	**(2)**

Question Number	Answer	Accept	Ignore	Reject	Mark
5(b)	consequence AND *some* explanation; OR explanation AND *some* consequence;	both needed for the mark e.g. chance of explosion as fuel is flammable chance of explosion/ignition if spark static build-up/it could ignite fuel static build-up/it could cause explosion spark/it could ignite fuel	Do not award repeat of stem…'it is dangerous' (electric /static) shock	unqualified explosion	**(1)**

Question Number	Answer	Accept	Comments	Reject	Mark
5(c)	movement of charge (in wire); effect of this movement;	electrons/charges move (along the wire) electrons/charges move (from hose to plane) this discharges it/the static build-up this neutralises it this earths it/to earth this grounds it/to ground gives plane and hose the same potential / same charge this prevents a build up of charge for **both** marks	Mark in either order floor	ions or positive electrons for the first mark UNLESS mark has been deducted in 5a	**(2)**

Question Number	Answer	Accept		Reject	Mark
6(a)	any sensible *suggestion*;	• lack of perception of risk • to check for fit (with movement of feet) • children had scientific interest • to keep them happy/amused			**(1)**

Question Number	Answer	Accept	Ignore	Reject	Mark
6(b)	any sensible concept **and** consequence based on physics; OR they can cause DNA mutation	**both** needed Any sensible suggestion e.g. X-rays are dangerous…. <u>and</u> • need trained operator • need to limit dose of X-rays • in high doses • with long exposure • shielding is needed *look for reversed answers such as* ionising radiation and therefore dangerous they can cause cancer / cell mutation / cell damage	Confusion with gamma too expensive unqualified ‘health risk’ unqualified ‘dangerous’		**(1)**

Question Number	Answer	Accept	Ignore	Reject	Mark
6(c)(i)	any sensible *suggestion*;	• doctors are trained • doctors understand the risks /know what they are doing • (they) closely monitor /control the dose • (they)/doctors take suitable precautions during use • idea of lesser of 2 risks--X-ray or illness • will do more good than harm • this use is sensible / eq / ORA	• Can/ helps to diagnose illness unless qualified, e.g. barium x-ray • Dose is less nowadays • Used to treat illness		**(1)**

Question Number	Answer	Accept	Ignore	Reject	Mark
6(c)(ii)	can 'see' what is happening in real time/eq	• ORA • X-ray gives you one photo—fluoroscope gives continuous monitoring • See it as it is done • Moving/video images possible	'better (image)' is not enough portability cost smaller area can be in same room or converse clear(er) image bald 'quicker'		**(1)**

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5020F / 5048F / 1F (P2) Mark Scheme

<table>
<tr><th>Q1a</th><th></th><th>Correct Answer</th><th>Mark</th></tr>
<tr><td></td><td>1a</td><td>x rays----photographing bones;
gamma rays-----killing cancer cells;</td><td>2</td></tr>
<tr><th>Q1b</th><th></th><th>Correct Answer</th><th>Mark</th></tr>
<tr><td></td><td>1b</td><td>x rays ----a high voltage machine;
gamma rays----the nucleus of an atom;</td><td>2</td></tr>
<tr><th>Q2a</th><th></th><th>Correct Answer</th><th>Mark</th></tr>
<tr><td></td><td>2a</td><td>1 mark for each correct tick
BUT
if 4 ticks, deduct 1 mark from the total
if 5 ticks, then 0 marks
;;;
<table>
<tr><th>quantity</th><th>must measure to calculate acceleration</th></tr>
<tr><td>direction</td><td></td></tr>
<tr><td>final velocity</td><td>✓</td></tr>
<tr><td>starting position</td><td></td></tr>
<tr><td>starting velocity</td><td>✓</td></tr>
<tr><td>time taken</td><td>✓</td></tr>
</table></td><td>3</td></tr>
</table>

<table>
<tr><th>Q2b</th><td></td><td>Correct Answer</td><td>Mark</td></tr>
<tr><td></td><td>2b</td><td>IGNORE GIVEN TICK
1 mark for each correct tick
BUT
if 3 ticks, deduct 1 mark from the total
if 4 ticks or more ticks, then 0 marks
<table>
<tr><td>controls</td><td>can cause acceleration</td></tr>
<tr><td>accelerator pedal</td><td>✓</td></tr>
<tr><td>air conditioning</td><td></td></tr>
<tr><td>brake pedal</td><td>✓</td></tr>
<tr><td>steering wheel</td><td>✓ given</td></tr>
<tr><td>turn indicator</td><td></td></tr>
<tr><td>windscreen wiper</td><td></td></tr>
</table>
;;</td><td>2</td></tr>
<tr><th>Q3a</th><td></td><td>Correct Answer</td><td>Further Instruction</td><td>Mark</td></tr>
<tr><td></td><td>3a</td><td>labels in order are
neutron;
nucleus;
electron;</td><td>ignore incorrect spelling
allow plurals, e.g. neutrons,
‘nucleuses’/nuclei
electrons,</td><td>3</td></tr>
<tr><th>Q3b/c</th><td></td><td>Correct Answer</td><td>Mark</td></tr>
<tr><td></td><td>3b/c</td><td>-1;
gamma;
alpha;</td><td>1
1
1</td></tr>
</table>

Q4a/b		Correct Answer	Acceptable Answers	Ignore	Reject	Mark
	4a	any ONE sensible e.g. • no fumes • no atmospheric pollutants • no CO_2 / SO_2 OWTTE • does not contribute to global warming • does not contribute to climate change • does not pollute/damage (the environment) **as much** • does not damage landscape;	look for ORA fossil fuels are limited resource	idea of greener without suitable qualification cheaper/ dearer idea of diversity of supply references to nuclear fuel reserves	idea of nuclear power as dangerous/ polluting without qualification	**1**
	4b	any ONE sensible e.g. • mention of previous incident or bombs • perception of 'radiation' or radioactivity as dangerous • possibility of meltdown or going critical • waste is dangerous / toxic/ radioactive • small chance of catastrophic incident • radiation/radioactivity can cause cancer;	• idea of nuclear power stations exploding or imploding • waste is hard to dispose of • chance of terrorist activity/leaks	'it'/'nuclear power' is dangerous 'waste'	contradictions with ans in 4a	**1**

<table>
<tr><th>Q4c</th><th></th><th>Correct Answer</th><th>Mark</th></tr>
<tr><td></td><td>4c</td><td>1 mark for each correct tick
BUT
if 3 ticks, deduct 1 mark from the total
if 4 ticks or more ticks, then 0 marks
<table>
<tr><td>method</td><td>suitable?</td></tr>
<tr><td>burn it</td><td></td></tr>
<tr><td>bury it down a deep mine</td><td>✓</td></tr>
<tr><td>pump it out with the cooling water</td><td></td></tr>
<tr><td>put it in a landfill site</td><td></td></tr>
<tr><td>turn it into glass and sink it in an ocean</td><td>✓</td></tr>
</table>
;;</td><td>2</td></tr>
</table>

Q5a,b,c		Correct Answer		Acceptable Answers		Reject	Mark
	5a	0.135(m)				13.5 cm	**1**
	5b	subst.; ans; units;	250 000 × 0.135 33 750 J / joules / Nm	ecf from incorrect ans in (a) bald correct answer (allowing for ecf from (a) if appropriate) gains 2 marks (if (a) is omitted a bald 3 375 000 =1 mark) **independent mark**		 nm / NM /Js	3
	5c	33750 (J);		**allow ecf from 5b** Can give credit for correct unit mark if *missing* in (b) but correctly written in response to (c)			**1**

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Q5d/e		Correct Answer		Acceptable Answers	Ignore	Reject	Mark
	5d	subst.; ans;	230 × 21 × 12 57960(J)		units (note: units were tested in Qib)		2
	5e	idea of transferred into heat / thermal /sound or named E type AND named place or 'dissipated to the surroundings'		changed/dissipated / OWTTE e.g. the motor/bearings heat(s) up (overcome) friction in named place	 wasted to the surroundings	KE PE chemical	**1**
Q6a	6	Correct Answer		Acceptable Answers	Ignore	Reject	Mark
	6a	subst; ans;	18/2.4 7.5 (m/s)	 7 ½ 7.50 bald correct answer gains both marks		incorrect units in the answer	**2**

Q6b		Correct Answer	Acceptable Answers	Ignore	Reject	Mark
	6b	either **idea** that ball does not travel at constant speed; or **idea** that path of ball is not straight;	• speed decreases • velocity changes/varies/ alters spin/swerve of ball	• references to possible experimental error • differences in bowlers • need to repeat the experiment etc. • references to the bowling action	• increase in speed • speed **fluctuates** (implies goes up as well as down)	**1**