

# Mark Scheme (Results)

## November 2009

IGCSE

### IGCSE Physics (4420) Paper 1F

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel's centres receive the support they need to help them deliver their education and training programmes to learners.

For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our website at [www.edexcel.com](http://www.edexcel.com).

If you have any subject specific questions about the content of this Mark Scheme that require the help of a subject specialist, you may find our **Ask The Expert** email service helpful.

Ask The Expert can be accessed online at the following link:

<http://www.edexcel.com/Aboutus/contact-us/>

Alternately, you can speak directly to a subject specialist at Edexcel on our dedicated Science telephone line: 0844 576 0037

(If you are calling from outside the UK please dial + 44 1204 770 696 and state that you would like to speak to the **Science** subject specialist).

November 2009

Publications Code UG022384

All the material in this publication is copyright

© Edexcel Ltd 2009

The following abbreviations have been used:

ecf error carried forward

dop dependent on previous

owtte or words to that effect

ora or reverse argument

Question Number	Acceptable Answers	Extra Information	Mark
1 (a)	friction	accept 'air resistance' or 'friction with the air/table' or 'drag'	1

Question Number	Acceptable Answers	Extra Information	Mark
1 (b)(i)	gravitational (potential) (1)	do not credit just 'potential'	2
	kinetic (1)	correct order essential	

Question Number	Acceptable Answers	Extra Information	Mark
1 (b)(ii)	heat (1)	accept 'thermal'	2
	sound (1)	either order	

Question Number	Acceptable Answers	Extra Information	Mark
1 (b)(iii)	chemical		1

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
2 (a)	45		1

Question Number	Acceptable Answers	Extra Information	Mark
2 (b)(i)	Hooke's	accept minor misspellings	1

Question Number	Acceptable Answers	Extra Information	Mark
2 (b)(ii)	extension is (directly) proportional to load		1

Question Number	Acceptable Answers	Extra Information	Mark
2 (b)(iii)	elastic (1) removed (1) longer (1)	accept 'taken off'	3

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
3 (a)(i)	LDR	accept ldr or Ldr	1

Question Number	Acceptable Answers	Extra Information	Mark
3 (a)(ii)	shine a light (on it)/increase the illumination		1

Question Number	Acceptable Answers	Extra Information	Mark
3 (a)(iii)	cover it/put it in the dark	credit (1) if the answers to (a)(ii) and (a) are 'correct' but reversed	1

Question Number	Acceptable Answers	Extra Information	Mark
3 (b)	thermistor		1

Question Number	Acceptable Answers	Extra Information	Mark
3 (c)(i)	variable resistor	allow 'variable resistance'	1

Question Number	Acceptable Answers	Extra Information	Mark
3 (c)(ii)	....increased .... decreased	or .... decreased .... increased	1

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
4 (a)	either energy ... information ... matter	or information ... energy matter all correct in either case	1

Question Number	Acceptable Answers	Extra Information	Mark
4 (b)	any one of <ul style="list-style-type: none"> <li>• sound (waves)</li> <li>• ultrasound (waves)</li> <li>• push and pull wave (on a spring/slinky/in an earthquake)</li> </ul> P/primary (seismic waves)	do not credit just 'seismic waves' or 'in an earthquake'	1

Question Number	Acceptable Answers	Extra Information	Mark
4 (c)(i)	transverse	or electromagnetic/em (waves)	1

Question Number	Acceptable Answers	Extra Information	Mark
4 (c)(ii)	<b>no ecf</b> any one of <ul style="list-style-type: none"> <li>• water (waves)</li> <li>• S/secondary (seismic waves)</li> <li>• light (waves)</li> </ul>	do not credit 'side to side wave on a spring/slinky' do not credit just 'seismic waves' or 'in an earthquake'  or gamma/X-ray/ultraviolet/infra-red /microwaves/radio	1

(Total 4 marks)

Question Number	Acceptable Answers	Extra Information	Mark
5 (a)	gamma rays → sterilising medical equipment (1) infra-red → night vision equipment (1) microwaves → satellite transmissions (1) ultra violet → fluorescent lamps (1)	if more than one link to or from a box then cancel all the links to or from the box	4

Question Number	Acceptable Answers	Extra Information	Mark
5 (b)	speed	accept 'velocity'	1

(Total 5 marks)

Question Number	Acceptable Answers	Extra Information	Mark
6 (a)	all six ticked (2)	any four or five ticked (1) otherwise (0)	2

Question Number	Acceptable Answers	Extra Information	Mark
6 (b)(i)	.....magnet .....wire..... coil.....field	either all four correct (2) or any two correct (1)	2

Question Number	Acceptable Answers	Extra Information	Mark
6 (b)(ii)	any two (1) each <ul style="list-style-type: none"> <li>• increase the strength of the magnet/field /magnetic field</li> <li>• spin/rotate/move the magnet /field/coil faster</li> <li>• more turns on coil</li> <li>• larger area of coil</li> </ul>	do not credit just 'use a bigger magnet'  accept 'greater (relative) movement'	2

(Total 6 marks)



Question Number	Acceptable Answers	Extra Information	Mark
7 (a)(i)	... neutrons ... protons	both required but either order	1

Question Number	Acceptable Answers	Extra Information	Mark
7 (a)(ii)	protons (1) neutrons (1)	correct order essential	2

Question Number	Acceptable Answers	Extra Information	Mark
7 (a)(iii)	... electrons ... protons	both required but either order	1

Question Number	Acceptable Answers	Extra Information	Mark
7 (b)	... particles ... particles ... rays	all three correct (2) any two correct (1) otherwise (0)	2

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
8 (a)	arrow from centre (by eye) of X vertically (by eye) downwards		1

Question Number	Acceptable Answers	Extra Information	Mark
8 (b)(i)	90 (seconds) (2)	or 1.5 x 60 for (1)	2

Question Number	Acceptable Answers	Extra Information	Mark
8 (b)(ii)	(average) speed = $\frac{\text{distance (moved)}}{\text{time (taken)}}$	allow any correctly transposed version	1

Question Number	Acceptable Answers	Extra Information	Mark
8 (b)(iii)	6 (m/s) (2)	or $\frac{500}{90}$ or 5.5..... (1)	2

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
9 (a)(i)	... friction...	do not credit just 'rubbing'	1
	... wool/ cloth ... polythene/rod	correct order essential	1

Question Number	Acceptable Answers	Extra Information	Mark
9 (a)(ii)	(electrical) conductor	do not credit reference to 'heat conductor'	1

Question Number	Acceptable Answers	Extra Information	Mark
9 (b)	sparking/(a) spark (1)		2
	(an) exploding (1)	allow '(a) fire'	

(Total 5 marks)

Question Number	Acceptable Answers	Extra Information	Mark
10 (a)(i)	state		1

Question Number	Acceptable Answers	Extra Information	Mark
10 (a)(ii)	evaporating/evaporation		1

Question Number	Acceptable Answers	Extra Information	Mark
10 (b)	liquid		1

Question Number	Acceptable Answers	Extra Information	Mark
10 (c)	(pressure) increases (1)  (mass) stays the same (1)	accept any unambiguous indication  accept any unambiguous indication	2

(Total 5 marks)

Question Number	Acceptable Answers	Extra Information	Mark
11 (a)	wire melts/blows breaks circuit/no current		1 1

Question Number	Acceptable Answers	Extra Information	Mark
11 (b)	Use of $P = V I$ $1500 / 240$ $= 6.25 (A)$		3

Question Number	Acceptable Answers	Extra Information	Mark
11 (c)(i)	13A		1

Question Number	Acceptable Answers	Extra Information	Mark
11 (c)(ii)	all the others would blow dop		1

Question Number	Acceptable Answers	Extra Information	Mark
11 (d)	toaster / oven / kettle /bread machine /soldering iron etc.	not microwave	1

(Total 8 marks)

Question Number	Acceptable Answers	Extra Information	Mark
12 (a)(i)	protons and neutrons/ Helium atom  2p + 2n /He nucleus/nuclei scores 2		2
Question Number	Acceptable Answers	Extra Information	Mark
12 (a)(ii)	another source of background radiation	buildings rock soil nuclear power medical uses radon etc	1
Question Number	Acceptable Answers	Extra Information	Mark
12 (b)	less absorption/space less dense or vacuum owtte		1
Question Number	Acceptable Answers	Extra Information	Mark
12 (c)(i)	time for activity to halve <b>owtte</b>		1

Question Number	Acceptable Answers	Extra Information	Mark
12 (c)(ii)	1. method shown on graph 6 000 (years)  2. count similar to background/no (carbon-14) activity		1 1  1

Question Number	Acceptable Answers	Extra Information	Mark
12 (c)(iii)	smoke detector sterilising tracers checking welds cancer treatment etc	accept 'medical'	1

(Total 8 marks)

Question Number	Acceptable Answers	Extra Information	Mark
13 (a)	force	either order  <i>independent marks</i>	1
	distance		1
	direction		1

Question Number	Acceptable Answers	Extra Information	Mark
13 (b)	2000/ 5		1
	= 400 (W)		1

Question Number	Acceptable Answers	Extra Information	Mark
13 (c)(i)	efficiency = useful output energy/ input energy	= ( input energy – waste energy) / input energy	1
13 (c)(ii)	20 000/ 50 000 = 0.4 or 40%	0.4 scores 3 (c) marks	1
			1

(Total 8 marks)

Question Number	Acceptable Answers	Extra Information	Mark
14 (a)(i)	(loft) insulation or named material		1

Question Number	Acceptable Answers	Extra Information	Mark
14 (a)(ii)	curtains/shutters/double glazing/triple glazing		1

Question Number	Acceptable Answers	Extra Information	Mark
14 (b)	air heated/hot air expands / less dense rises  <b>ora</b>	not 'lighter'	1
			1
			1

(Total 5 marks)



Question Number	Acceptable Answers	Extra Information	Mark
15 (a)	2 <sup>nd</sup> 5 <sup>th</sup>		2

Question Number	Acceptable Answers	Extra Information	Mark
15 (b)(i)	one line with arrow second line with arrow	do not credit either if they contradict	1 1

Question Number	Acceptable Answers	Extra Information	Mark
15 (b)(ii)	attract / move towards		1

Question Number	Acceptable Answers	Extra Information	Mark
15 (b)(iii)	opposite poles attract <i>independent mark</i> no <b>ecf</b>		1

Question Number	Acceptable Answers	Extra Information	Mark
15 (c)(i)	flat circular coil	allow solenoid	1

Question Number	Acceptable Answers	Extra Information	Mark
15 (c)(ii)	(no) lines not evenly spaces and/or parallel		1

(Total 8 marks)

Question Number	Acceptable Answers	Extra Information	Mark
16 (a)	A diffraction B reflection C refraction  <i>independent marks</i>		1 1 1

Question Number	Acceptable Answers	Extra Information	Mark
16 (b)	wavelength changes  wavelength reduced	scores both marks	2

Question Number	Acceptable Answers	Extra Information	Mark
16 (c)	wavefront(s) as concave curve(s) more curved than A  three equally spaced  <i>independent marks</i>		2

(Total 7 marks)

PAPER TOTAL: 100 MARKS

Further copies of this publication are available from  
International Regional Offices at [www.edexcel.com/international](http://www.edexcel.com/international)

For more information on Edexcel qualifications, please visit [www.edexcel.com](http://www.edexcel.com)  
Alternatively, you can contact Customer Services at [www.edexcel.com/ask](http://www.edexcel.com/ask) or on + 44 1204 770 696

Edexcel Limited. Registered in England and Wales no.4496750  
Registered Office: One90 High Holborn, London, WC1V 7BH