

# IGCSE Physics 4437 6H Mark Scheme (Results) Summer 2007

IGCSE

## IGCSE Science DA (Physics) 4437 6H

<b>Question 1</b>			
<b>Qu part</b>	<b>Answer(s)</b>	<b>Extra Information</b>	<b>Mark(s)</b>
a(i)	C		<b>1</b>
a(ii)	sloping downwards	slowing down	<b>1</b>
a(iii)	constant	less than acceleration / decreases slowly / takes a longer time than the acceleration / (area) A is less than (area) C / (train) travels a greater distance while decelerating than when accelerating	<b>1</b>
b(i)	area (under graph)	A + B + C	<b>1</b>
b(ii)	horizontal non zero line below line on graph for the correct time	dop independent	<b>1</b> <b>1</b> <b>1</b>
			<b>7 marks</b>

<b>Question 2</b>			
<b>Qu part</b>	<b>Answer(s)</b>	<b>Extra Information</b>	<b>Mark(s)</b>
a(i)	resistor/resistance/rheostat power supply/battery/cell		<b>1</b> <b>1</b>
a(ii)	= $0.4 \times 20$ = 8 (C)		<b>1</b> <b>1</b>
b	lamp in parallel switch in series with second lamp	dop	<b>1</b> <b>1</b>
			<b>6 marks</b>

<b>Question 3</b>			
<b>Qu part</b>	<b>Answer(s)</b>	<b>Extra Information</b>	<b>Mark(s)</b>
a	<u>angle</u> of incidence equals <u>angle</u> of reflection	(angle) i = (angle) r $\hat{i} = \hat{r}$ $\angle i = \angle r$	<b>1</b>
b(i)	correct ray striking window any ray reflected off at correct angle	independent	<b>1</b> <b>1</b>
b(ii)	cover <u>outside</u> of window	open/close/tilt window/fit shutters (outside)	<b>1</b>
c(i)	infra-red	i.r    ignore heat / radiation	<b>1</b>
c(ii)	ultraviolet	u.v	<b>1</b>
d	(same) speed / velocity	transverse	<b>1</b>
			<b>7 marks</b>

<b>Question 4</b>			
<b>Qu part</b>	<b>Answer(s)</b>	<b>Extra Information</b>	<b>Mark(s)</b>
a	50 000J of <u>chemical</u> 30 000 J of <u>heat / thermal</u> energy	ignore sound / chemical	<b>1</b> <b>1</b> <b>1</b>
b	= $700 \times 2$ (000) convert km to m = 1 400 000 (J)	1400 (J) scores 2	<b>1</b> <b>1</b> <b>1</b>
			<b>6 marks</b>

<b>Question 5</b>			
<b>Qu part</b>	<b>Answer(s)</b>	<b>Extra Information</b>	<b>Mark(s)</b>
a	magnetic field / flux (in coil) changes voltage / current <u>induced</u> / electromagnetic induction / emi	dop	<b>1</b> <b>1</b> <b>1</b>
b	pedal faster	more wire on coils use <u>stronger</u> magnet reduce gap(s)	<b>1</b>
			<b>4 marks</b>

<b>Question 6</b>			
<b>Qu part</b>	<b>Answer(s)</b>	<b>Extra Information</b>	<b>Mark(s)</b>
a (i)	$F$ (is larger) because the lorry is accelerating	or B is smaller because..... not just ' $F$ '	<b>1</b>
a (ii)	(unbalanced) force = mass x acceleration / $F = ma$	or any correctly transposed version	<b>1</b>
a (iii)	1.2 (2) $m/s^2$ or $ms^{-2}$ or N/Kg	or = $15\,000 \div 12\,500$ (1)	<b>2</b> <b>1</b>
b	direction changes  only two of: <ul style="list-style-type: none"> <li>• (because) acceleration is (rate of) change of <b>velocity</b></li> <li>• (and) velocity is speed in a particular direction</li> <li>• acceleration / velocity is a vector / not a scalar</li> </ul>	allow any specific direction change e.g. goes round a bend e.g. goes uphill	<b>1</b>  <b>2</b>
c(i)	(driver) has consumed alcohol/taken drugs/is tired/inexperienced/elderly	accept '... has been drinking' do not credit factors which may only affect the time before the driver reacts e.g. poor weather/visibility /eyesight/ hearing/ lack of concentration accept 'high speed' but not just 'speed'	<b>1</b>
c(ii)	poor brakes/ slippery road/ worn tyres	must be qualified, do not credit just 'brakes' for example accept 'high speed' but not just 'speed' note 'high speed' may be credited for d(i) and again for d(ii)  do not credit any unqualified response e.g. just 'friction'	<b>1</b>
			<b>10 marks</b>

<b>Question 7</b>			
<b>Qu part</b>	<b>Answer(s)</b>	<b>Extra Information</b>	<b>Mark(s)</b>
a(i)	direct current		<b>1</b>
a(ii)	loudspeaker / speaker	do not accept a vague response such as 'in a radio'	<b>1</b>
b	(magnetic) field (1) north ... south (1) (electric) current (1) positive ... negative (1) motion/movement/force (1)	allow north (pole)...south (pole) or + and -	<b>5</b>
c	increase the strength/intensity of the magnetic field (1) increase the current (1)	accept 'use a more powerful magnet' accept 'increase the voltage/p.d.' do not credit references to 'resistance' or 'number of coils/turns'	<b>2</b>
			<b>9 marks</b>

<b>Question 8</b>			
<b>Qu part</b>	<b>Answer(s)</b>	<b>Extra Information</b>	<b>Mark(s)</b>
a(i)	normal	do not accept 'perpendicular' or 'vertical'	<b>1</b>
a(ii)	(angle) e / E		<b>1</b>
a(iii)	(angle of) refraction	accept phonetic spelling but not anything which could be taken for refelction	<b>1</b>
a(iv)	refractive index = sine of angle of incidence ÷ sine of angle of refraction	$n = \frac{\sin i}{\sin r}$	<b>1</b>
a(v)	continues in the same direction / does not bend	allow 'it's a straight line'	<b>1</b>
a(vi)	any one of <ul style="list-style-type: none"> <li>• ray is on the normal</li> <li>• angle of incidence = 0°</li> <li>• angle of refraction = 0°</li> <li>• at 90° / right angles to the boundary / perpendicular</li> </ul>		<b>1</b>
b(i)	refraction towards normal (1) then refraction away from normal at the opposite face (1) emergent ray appears to be parallel to incident ray (1)		<b>3</b>
b(ii)	ray continues in a straight line to back force (1) reflects down and straight out at right angles (1)	dop	<b>2</b>
			<b>11 marks</b>

<b>Question 9</b>			
<b>Qu part</b>	<b>Answer(s)</b>	<b>Extra Information</b>	<b>Mark(s)</b>
a	gravitational/potential (1) kinetic/movement (1)	correct order essential ignore energy	<b>2</b>
b(i)	(some) energy transferred as thermal energy/heat	or some energy transferred as <u>internal</u> kinetic energy or friction (between/with .... ) or energy changes not 100% efficient	<b>1</b>
b(ii)	higher the waterfall then the higher the temperature increase	allow ('temperature increase is directly) proportional (to the height' of the waterfall)	<b>1</b>
c(i)	axes labelled speed and kinetic energy / ke (1) with linear scales (1) both axes labelled with units (1) <b>either</b> all points correct (2) <b>or</b> four points correct (1)  smooth curve of best fit to candidate's points (1)	to the nearest mm in any direction and not 'blobs' (more than 1 mm across) not dot-to-dot or tram-lined or thicker than 1 mm ignore 0 to 3 m/s	<b>6</b>
c(ii)	answer in range 3.7 to 4.0 inclusive	or correct from candidate's graph	<b>1</b>
			<b>11 marks</b>

<b>Question 10</b>			
a	fast random	both required with no additions allow any clear and unambiguous method of indication	<b>1</b>
b	hit/collide with it/the inside / walls creates/exerts a force  on the surface/area (not walls)	or words to that effect  or pressure = force ÷ area or $P = F/A$	<b>1</b> <b>1</b> <b>1</b>
c(i)	270 (2)	accept $150 \times 90 = \text{pressure} \times 50$ for (1)	<b>2</b>
c(ii)	mass remains constant / the same (1) temperature remains constant / the same (1)	<b>or</b> no gas escapes either order	<b>2</b>
c(iii)	kilopascal(s)	accept phonetic spellings	<b>1</b>
			<b>9 marks</b>

<b>Question 11</b>			
a	230 and 90 for thorium (1)  4 and 2 for helium (1)	any change to thorium symbol cancels this mark any change to helium symbol cancels this mark any change to uranium deduct (1) from positive total	<b>2</b>
b(i)	to allow/give/produce a (narrow) beam /in one direction (of alpha particles/radiation)	'so that they go straight to the gold (foil)' not 'all go straight.....'	<b>1</b>
b(ii)	<u>most</u> of the (gold) atom is empty space	do not credit just 'there is space in the gold'	<b>1</b>
b(iii)	<u>repelled</u> by the <u>centre/nucleus</u> (of an atom) (1) (as) both have positive / +ve / same charge (1)	<b>or</b> affected by electrostatic force (1) between the nucleus and the (alpha) particles (1)	<b>2</b>
b(iv)	centre/nucleus <u>very</u> small/tiny	not just '... small'	<b>1</b>
b(v)	(these were) further away from the centre/nucleus (1) (these were) moving faster (1)	either order or more (kinetic) energy	<b>2</b>
b(vi)	(tiny) spark/flash (of light)/scintillation	do not credit 'there was a colour change' ignore references to sound/noise	<b>1</b>
			<b>10 marks</b>