



General Certificate of Secondary Education

Separate Science Physics 4451

PHY3H Unit Physics 3

Mark Scheme

2008 examination - January series

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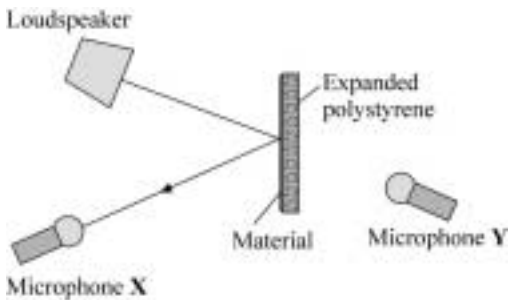
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PHY3H
Question 1

question	answers	extra information	mark
(a)	moment	or torque do not credit 'leverage'	1
(b)	4 (2)	either 0.20 × 20 (1) or allow '400' (1)	2
(c)	use a longer spanner or 'fit a pipe over the (end of the) spanner (to lengthen it)'	or increases the perpendicular distance / length note 'lever' refers to 'spanner' note <u>change</u> the . . . (0) ignore references to wider / larger nut	1
	use a greater force / pull	either order	1
total			5

PHY3H

Question 2

question	answers	extra information	mark
(a)	(mechanical) vibration(s)	not just ‘particles knocking into each other’ not reference to ‘sound particles’	1
(b)	K		1
(c)(i)	<p>reflected by the material from loudspeaker to microphone X</p> <p>shown by straight lines with angle of incidence = angle of reflection (by eye) and at least one arrow in the correct direction</p>	<p>do not credit if the direction is contradicted by any incorrect arrow may be shown by waves / wavefronts in the direction of straight lines ignore any sound to Y or which ‘misses’ the material</p> <p>example</p> 	1 1
(ii)	<p>any one from:</p> <ul style="list-style-type: none"> • so (the student) can compare results • so only one (independent) variable • to get reliable / accurate results • because (the expanded) polystyrene absorbs some of the sound 	do not credit just ‘so it’s a fair test’	1

PHY3H

Question 2 continued

question	answers	extra information	mark
(iii)	[A] wood		1
	[B] either 0.25 or 1/4 or 25 % or 15/60 or 1: 3	do not credit 1 : 4	1
(d)	practical suggestion		1
	appropriate reason / explanation	<p>example line / panel the walls with wood / plasterboard / increase the thickness of the plaster (on the walls) (1) (this) will absorb / reflect (back) (most / some of) the sound (1)</p> <p>credit legal suggestions for attempting to limit the noise made by the neighbours example ask the neighbours to make less noise (1) by limiting the time(s) music played (1)</p> <p>do not credit reference to 'sound particles' for second mark</p>	1
total			9

continued

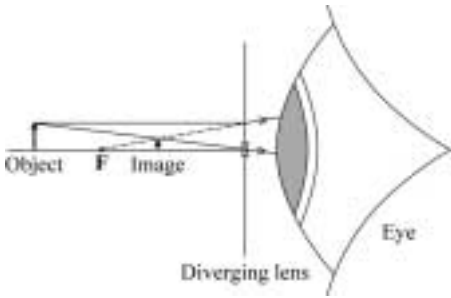
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Question 3

question	answers	extra information	mark
(a)(i)	ellipse / elliptical	allow ovoid / oval	1
(ii)	focus		1
(iii)	gravitational attraction (between the Sun and the planet)	allow '(force of)gravity' allow 'force due to mass of the planet and mass of the Sun' do not credit references to 'weight' not just 'the Sun'	1
(iv)	the greater the distance then the greater the time (taken) or the converse	allow 'it's longer if it's further away (from the Sun)'	1
(b)	either box ticked	credit is for the reason not just for ticking a box example arguing about the classification is a distraction which does not really matter (at the moment) example new evidence may cast doubt on any decision taken now example (Sedna) cannot be (correctly) classified until the nature of its orbit is known example (the object could be a comet / an asteroid do not credit 'could be a meteor'	1
total			5

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Question 4

question	answers	extra information	mark
(a)	straight line from the tip of the object ... straight through the centre of the lens (1) ... parallel to the axis, then diverges from the lens as if from F (1) image drawn from where these lines intersect, vertically to the axis (1)	<p>example</p> 	3
(b)	any two from: <ul style="list-style-type: none"> • smaller (than the object) • (both) upright • image is virtual / imaginary (whereas object is real) 	no errors carried forward from the candidate's diagram mark first two points given	2
total		5	

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Question 5

question	answers	extra information	mark
(a)	(line of action of) its weight		1
	falls inside its wheel base	accept 'falls between the wheels' the first two points may be credited by adding a vertical line from the centre of the X on the diagram (1) and labelling it weight / force / with a downwards arrow (1) provided there is no contradiction between what is added to the diagram and anything which may be written	1
	(so there is) no (resultant / clockwise) moment / turning effect		1
(b)	centre of mass should be lower	accept '... centre of gravity' accept 'weight / mass low down' not just 'lower the roof'	1
	wheel base should be wider	accept 'long axle(s)' for 'wide wheel base' allow bigger / larger wheel base do not credit ' <u>long</u> wheel base' responses in either order	1
total		5	

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Question 6

question	answers	extra information	mark
(a)(i)	step-down (transformer) because fewer turns on the output/secondary (coil)	no credit for just 'step-down transformer' accept '...less turns...' do not credit '...fewer coils...' or 'the p.d. across the input / primary will be greater than the p.d. across the output / secondary'	1
(ii)	to prevent a short (circuit)(through the turns of wire or through the core	do not credit references to safety or heat (insulation)	1
(iii)	(easily) magnetised (and demagnetised)	accept '(it's) magnetic' do not accept 'because it's a conductor'	1
(b)	2250	correct substitution eg $\frac{150}{\text{p.d. across secondary}} = \frac{500}{7500}$ gains 1 mark or appropriate transformation eg (p.d. across secondary =) $\frac{\text{number of turns on secondary}}{\text{number of turns on primary}} \times \text{p.d. across primary}$ gains 1 mark	2

continued

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Question 6 continued

question	answers	extra information	mark
(c)	any two from: <ul style="list-style-type: none"> • to reduce the <u>voltage</u> / p.d. (of the domestic supply) • higher voltage difficult to insulate • higher voltage (would) result in (fatal) electric shock • domestic appliances are not designed for (very) high voltage (input) / (are designed) for 230V 	or to reduce to 230 V allow 'to reduce to 240 V' do not credit 'reduce <u>current</u> to 230V' not just 'less dangerous' do not credit 'to increase efficiency' / 'to save energy' do not credit just 'it's safer'	2
(d)	any two (1) each <ul style="list-style-type: none"> • if the (local) power station breaks down / fails / demand / load exceeds supply • electricity / power can be switched from elsewhere in the system / from other power station(s) • electricity can be generated in places remote from customers • (in total) fewer power stations are needed • power available in rural / remote areas • National Grid allows for (better) control of supply and demand 	or words to that effect or words to that effect or words to that effect do not credit just cheaper / more efficient / safer	1 1
total		9	

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Question 7

question	answers	extra information	mark
(a)	(magnetic) field / lines of force / flux rotate(s) / move(s) / through / in / cut(s) the coil	do not credit the idea that movement 'creates' the magnetic field	1
	potential difference / p.d. / voltage <u>induced</u> across the coil	do not credit just 'current induced'	1
(b)	any one from: <ul style="list-style-type: none"> • more powerful / stronger / lighter magnet • larger / more / bigger / lighter cups / with a bigger surface area • longer arms • lubricate the spindle • add more turns to the coil / nail 	do not credit 'a bigger magnet'	1
total			3

PHY3H**Question 8**

question	answers	extra information	mark
(a)	(a) supernova (explosion)		1
(b)	<p>solar system contains heavy elements / elements heavier than hydrogen <u>and</u> helium (1)</p> <p>these (heavy) elements are / were formed by (nuclear) <u>fusion</u> (1)</p> <p>(at the very high temperature(s)) in a super nova / when stars explode (1)</p>	accept minor misspellings for 'fusion' but not anything which could also be 'fission'	3
total			4