Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

LEVEL 2

PHYSICS

MARK SCHEME

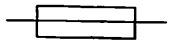
This is a suggested, not a prescriptive, mark scheme.

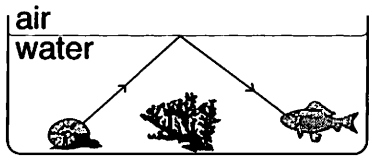
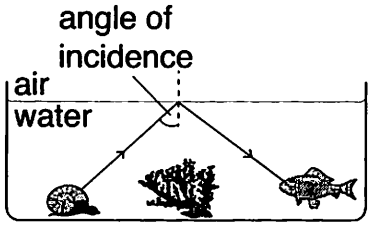
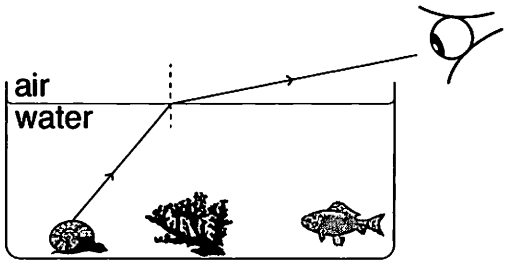
Wednesday 29 January 2014

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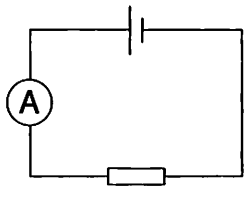
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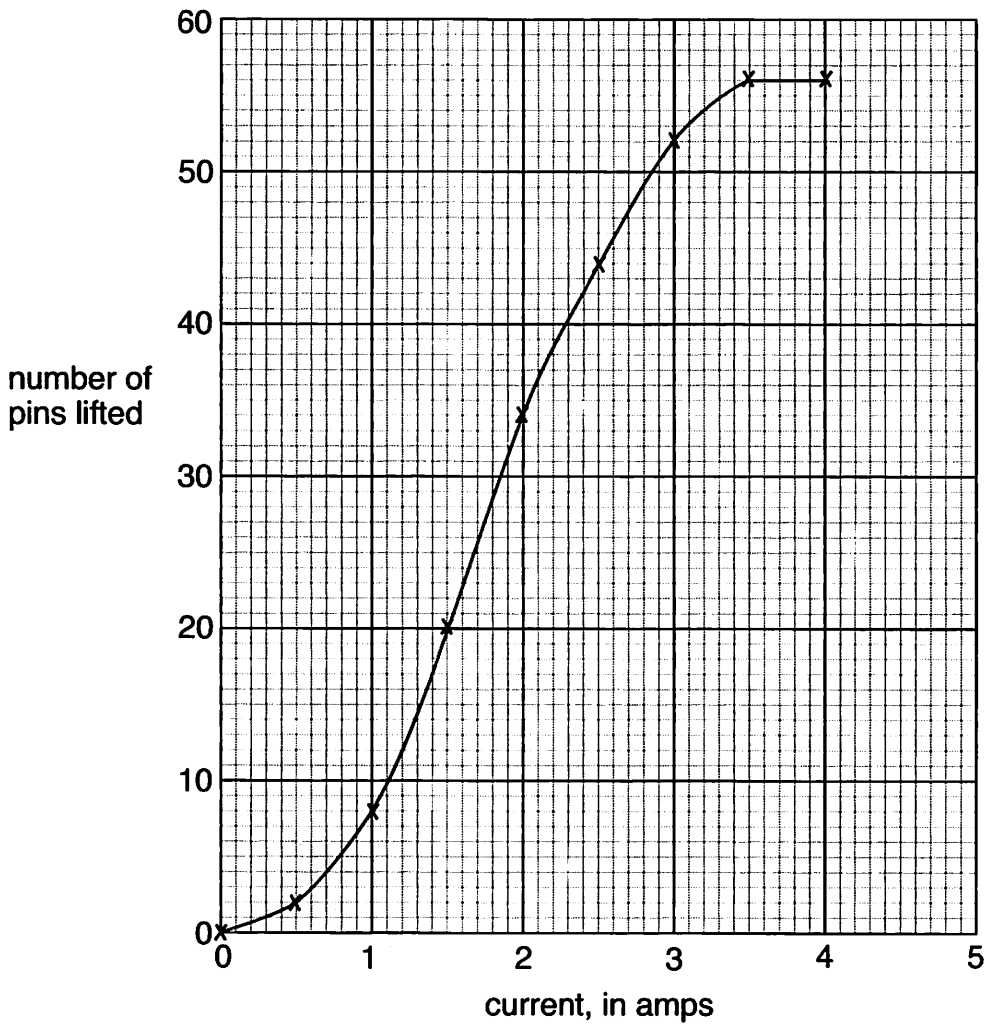
Although candidates should be encouraged to show their working clearly, full marks should be awarded for the correct answer to numerical questions even if the working is not shown.

Q.	Answer	Mark	Additional Guidance
1. (a)	a candle	6	
(b)	the Moon lies between the Sun and the Earth		
(c)	sunlight being dispersed by passing through raindrops		
(d)			
(e)	coal		
(f)	all forces on it are balanced		
2. (a) (i)	A and B	1	
(ii)	because they have the same amplitude	1	accept 'same height'
(b) (i)	yes	1	
(ii)	the frequency increases	1	accept 'waves happen more often' – the answer must relate to time, not distance
3. (a)	she is not moving	1	accept 'all her energy is gravitational potential'
(b)	4320	1	
(c)	the total energy is the same at all four points	1	accept 'the gpe and ke add up to 6000 each time'
(d)	weight	1	accept 'gravity'
(e)	she moves a bigger distance in the same time	1	reference to 'same time' essential accept 'her kinetic energy increases'
(f)	*any of:* friction/drag/water resistance	1	accept 'upthrust' or 'buoyancy'

Q.	Answer	Mark	Additional Guidance
9. (a) (i)			
	rays correctly drawn from snail to fish	1	ignore absence of arrow but penalise incorrect arrow
	angles approximately correct (by eye)	1	
(ii)			
	normal drawn correctly at the point where the ray is reflected	1	the normal need not be labelled
	angle of incidence shown and labelled correctly	1	
(b) (i)			
	ray from snail to surface of water	1	arrow not essential but penalise incorrect arrow
	ray refracted correctly	1	ignore absence of normal
(ii)	refraction	1	
Total		**60**	

Q.	Answer	Mark	Additional Guidance
(d)	as the current increases, the strength of the electromagnet increases *further detail e.g.:* it does not get stronger after the current has reached 3.5A	1 1	accept 'it picks up more pins as the current increases'
(e)	the iron core is fully magnetised	1	accept 'the domains are all aligned'
(f)	increase the number of turns on the coil/ use a larger iron core	1	accept either
8. (a)	time = 60 × 30 ÷ 1.2 = 1500 s	2	
(b)	gravity is weaker on Mars because Mars is smaller/less massive than Earth	2	
(c)	*reason:* lots of wheels/large wheels *explanation:* large surface area (in contact with the ground) means that the pressure is low	1 2	'pressure' must be mentioned and used correctly to gain the second mark
(d)	Mars is further from the Sun so the light is weaker/less intense	2	accept the converse accept 'less light reaches Mars'

Q.	Answer	Mark	Additional Guidance
4. (a)	= 0.4 × 30 = 12 N cm	3	accept '0.12 Nm'
(b)	equating moments weight = 12/10 = 1.2 (N)	2	
5. (a)	 *correct symbols* *all components in series*	1 1	
(b)	the same cells the same length of each wire	2	do not accept 'the same diameter of wire' as this was stated in the question
(c)	note the reading on the ammeter as he tests each wire the higher the ammeter reading, the lower the resistance of the wire	2	
6. (a)	65 g	1	
(b)	76 − 50 = 26 (cm^3)	1	
(c) (i)	density = mass/volume	1	accept any correct arrangement
(ii)	$\frac{65}{26}$ = 2.5 g/cm^3	2	allow ecf from (a) and (b)

Q.	Answer	Mark	Additional Guidance
7. (a) (i)	they have the same strength	1	
(ii)	because both electromagnets picked up the same number of pins	1	accept 'they picked up the same mass/weight'
(b)	*iron:* all/most of the pins will fall off	1	
	steel: all/some of the pins will remain attracted	1	
	reason: the iron will lose its magnetism but the steel will remain magnetised	1	accept 'iron is a temporary/soft magnet but the steel is a permanent/hard one'
(c) (i)			
	accurate plotting of points	2	within $\frac{1}{2}$ square
(ii)	*curve (not a sequence of straight lines) which is a good fit to the plotted points*	1	