Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

PHYSICS

MARK SCHEME

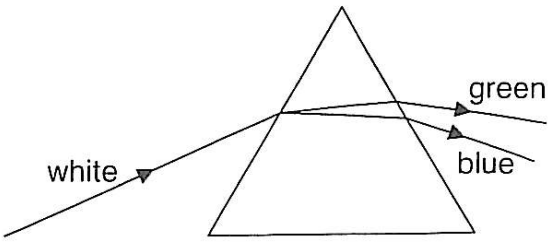
This is a suggested, not a prescriptive, mark scheme.

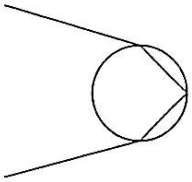
Wednesday 27 January 2010

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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)	the Moon	6	
(b)	tidal		
(c)	LED		
(d)	N		
(e)	Saturn		
(f)	extension		
2. (a)	2 × 10 = 20 N	2	unit must be given to gain 2 marks
(b)	pressure = force/area	1	*or* any correct arrangement
(c)	force = 20 N, area = 4 cm^2 pressure = 20/4 = 5 N/cm^2	2	allow e.c.f. for weight from (a)
(d) (i)	smaller	1	
(ii)	the same	1	
(iii)	smaller	1	
(e)	gravitational (potential)	1	
(f)	more	1	
3. (a)	*use of a suitable source* *means of making a narrow beam*, e.g. use of a slit	2	
(b)	it slows down	1	allow 'changes speed' or 'glass is denser than air'
(c)	*refraction in correct direction at both surfaces* 	2	blue ray must be below green

Q.	Answer	Mark	Additional Guidance
(d)	the light is separated into its different colours	1	
(e)	continuous refracted ray, with one reflection off middle of back surface of raindrop 	2	1 mark if reflection is off a point above/below the middle of the back surface of raindrop no mark for simply joining entry and exit points
(f)	*any one of:* red/orange/yellow	1	
(g)	diagram showing Tim moved to the right so that a ray from the lowest raindrop which is parallel to the one marked 'green' enters his eye	2	
4. (a)	distance from magnet	1	
(b) (i)	*both axes labelled, with 'distance' on x-axis* *sensible choice of scales*	2	
(ii)	*accurate plotting for all 8 points*	2	1 mark if six or seven points correct
(iii)	*neat, accurate, good fit curve*	2	no marks for single straight line or if points joined by straight lines award 1 mark for a curve which could fit better
(c)	17 cm	1	accept 16.0 cm – 17.5 cm if consistent with the graph
(d)	deflection will be away from the magnet because the N pole will repel the tip of the compass needle	2	credit 'angles will be the same'
(e)	the magnet's field is in the same direction as the Earth's field	2	allow 'magnet is pointing towards Earth's north pole'
5. (a)	the bars vibrate (causing the air to vibrate)	1	
(b)	the frequency/pitch will be different	1	accept higher/lower frequency/pitch accept different loudness

<table>
<tr><th>Q.</th><th>Answer</th><th>Mark</th><th>Additional Guidance</th></tr>
<tr><td>(c) (i)

(ii)</td><td>moment = force × distance from pivot

3.2 m = 320 cm

force × distance = 15 N × 320 cm
= 4800 N cm</td><td>1

2</td><td>

credit the method only; the answer is given</td></tr>
<tr><td>(d)</td><td>so that the force needed to open the gate is as small as possible</td><td>1</td><td></td></tr>
<tr><td>6 (a)</td><td>any sensible comment, e.g.:
it takes her time to react and press the start/stop button</td><td>1</td><td>accept 'the time is too short to measure accurately'</td></tr>
<tr><td>(b) (i)

(ii)</td><td>the time measured will be longer

and this makes the measurement more accurate/precise/reliable

e.g. it helps to check that she has counted the correct number of revolutions/ averaging her readings helps reduce the effect of her reaction time</td><td>2

2</td><td>

credit one point well made, or two relevant statements</td></tr>
<tr><td>(c) (i)

(ii)</td><td>she might have counted 11 revolutions

18.19 seconds</td><td>1

2</td><td>

ignore the unit

18.67 s gets no marks as the anomaly has been included</td></tr>
<tr><td>(d)</td><td>words or diagram which make it clear that the stopwatch should be started/stopped when one blade is passing the support column

because then it is easier to tell when the blade is at a particular point in its rotation</td><td>2</td><td></td></tr>
<tr><td>7. (a)</td><td><table><tr><th>brightness of P</th><th>brightness of Q</th></tr><tr><td>normal</td><td>normal</td></tr><tr><td>brighter</td><td>brighter</td></tr><tr><td>brighter</td><td>out</td></tr><tr><td>out</td><td>out</td></tr></table></td><td>4</td><td></td></tr>
<tr><td>(b)</td><td>the switch and lamp Q</td><td>1</td><td>both required</td></tr>
<tr><td>Total</td><td></td><td>60</td><td></td></tr>
</table>