## SEONDARY FIVE NORMAL ACADEMIC SCIENCE (PHYSICS) 5116 NOV 2001 GCE 'O' LEVEL PAPER 2 SUGGESTED ANSWERS

Question	Suggested Answer			
1a	K.E = $\frac{1}{2}$ m v <sup>2</sup> = $\frac{1}{2}$ (0.4) (6) <sup>2</sup> = 7.2 J			
1b	7.2 J			
	Loss in kinetic energy at bottom of slope = gain of gravitational potential energy as it			
	moves up the slope			
1c	Finally at rest (0 m/s)			
	Initially at speed of 6 m/s			
	v - u = 0 - 6			
	$a = \frac{1}{t} = \frac{1}{2} = -3.0 \text{ ms}^{-2}$			
2a	At the highest point, the pendulum has maximum gravitational potential energy			
24	(G P E) and minimum kinetic energy (K E). As it swings down it loses G P E and			
	this G P E lost is converted to K E. As it swings up the K E lost is converted to a gain			
	in G P E as it gains height			
2b	Work is done against air resistance and the initial energy is converted to heat energy.			
	and the heat energy is lost to the surroundings.			
3a	It is to ensure that the clinical thermometer reacts fast to changes in temperature			
	(faster response).			
3b	It is to ensure that the clinical thermometer can detect small changes in temperature			
	(more sensitive).			
3c	It is to prevent the backflow of mercury into the bulb when the clinical thermometer is			
	taken out of the hotter mouth into the cooler air.			
	The mercury thread would be completely halted.			
4a	Total distance travelled = $2 \times 180 \text{ m} = 360 \text{ m}$			
	S = D / T = 360  m / 0.25  s = 1440  m/s			
4b	Sound waves need a medium in order to be transmitted, and the region between Earth			
	and Moon is a vacuum without any medium.			
5a	Series connection: $R = 2 \Omega + 6 \Omega = 8.0 \Omega$			
5b	Series current: $I = V / R = 4 V / 8.0 \Omega = 0.50 A$			
5c	Current in the 2.0 $\Omega$ resistor = series current = 0.50 A			
	Remember to follow your answer in 5b			
5d	Q = I t = (0.50 A) (10 s) = 5.0 C			
	Remember to follow your answer in 5b			
6a	P = I V = (8.0 A) (240 V) = 1920 W			
6b(i)	8.0  A = current in live wire = current in neutral wire			
	Follow the decimal and significant figure			
6b(ii)	8.0  A = current in live wire = current in neutral wire			
	Follow the decimal and significant figure			
6b(iii)	0 A			

7	$R = \rho \frac{L}{4}$				
	A				
	Length	Cross-sectional Area	Resistance / Ω		
	L	А	18		
	2L	Α	$18 \ge 2 = 36$		
	L	3A	$18 \div 3 = 6$		
	2L	2A	18		
8	Out of syllabu	15			
9	Out of syllabu	15			
10a(i)	The centre of mass is the point where object behaves as if all of the mass of the object is concentrated.				
10a(ii)	Textbook Page 93 Experiment 5.2				
	<ul> <li>Note:</li> <li>the lamina must be free-swinging, and hung on a pin or nail so that it can swing freely</li> <li>plumbline is suspended from the pin or nail</li> <li>pin or nail is the pivot</li> <li>holes poked should be small but yet still allow the lamina to swing freely</li> </ul>				
	<ul> <li>holes should</li> </ul>	uld be as far apart as possi	ble		
10b	The moment of a force (turning effect of a force) about a point is the product of the force and the perpendicular distance from the pivot (point) to the line of action of the force.				
10c					
		flat e	urface	nivot	
	flat surface pivot				
		veight = mg			
	N N	eigint – mg	weigh	π = mg	
	Initially, the weight acts through the base, and there is no moment due to the weight of the rectangular block.				
	The rectangul base, and now the weight abo the farthest w	ar block is titled until its v the weight acts through t out the pivot is still zero b e can tilt the rectangular b	weight acts through the c he pivot directly. The pe ecause $M = F d$ and $d =$ lock before it topples ov	corner of the edge of its erpendicular distance of zero, $M = zero$ . This is rer.	

11a Textbook Page 175 Experiment 10.3 An electromagnetic wave travels in a direction perpendicular to the direction of 11b vibration of the medium particles, while a sound wave travels in a direction parallel to the direction of vibration of the medium particles. An electromagnetic wave travels in a series of crests and troughs in the medium, but a sound wave travels in a series of compressions and rarefactions in the medium. An electromagnetic wave travels at a speed of  $3.0 \times 10^8$  m/s in vacuum, but a sound wave cannot travel in a vacuum (with no medium). Direct current battery 12a(i) Steel bar held inside the solenoid Switched on always - Golenoid steel bar being magnetised (held inside Solenoid) I L Switched 01 batter 12a(ii) a.c. supply (mains) Pulling out the permanent magnet slowly from inside the solenoid Circuit is switched on throughout the experiment. permanent magnet pullout slowly to a few metres "way Solenoid switched On always a.c. maing

12b(i)	A bar magnet is a permanent magnet, and we use steel because steel can retain its magnetism better than iron.
12b(ii)	An electromagnet needs to lose its magnetism easily, so we need a temporary magnet. Iron is chosen because iron loses its magnetism faster and more easily than steel.
12b(iii)	A permanent magnet is needed for the compass needle so that is can always point to the North direction, and hence we use steel because steel can retain magnetism better than iron.

## SEONDARY FIVE NORMAL ACADEMIC SCIENCE (PHYSICS) 5116 NOV 2001 GCE 'O' LEVEL PAPER 1 SUGGESTED ANSWERS

Question	Answer	Suggested Explanation
1	В	Micrometer screw gauge: for lengths less than 2 cm
		Measures to the nearest 0.01 mm
2	С	Accelerating: increasing speed
		Higher acceleration: steeper gradient
		Lower acceleration: less steep gradient
3	В	Mass is constant = $10 \text{ kg}$
		Weight = $W = mg$ (varies depending on location)
4	В	For equilibrium, by Principle of Moments, about pivot, Macw = Mcw
		To balance, the force at X must also be 4 N, since X and Y are at the same
		distance of 0.1 m away from the pivot in the centre.
5	D	F = m a
		Hence, $a = F / m = 6 N / 2 kg = 3.0 ms^{-2}$
6	Α	Total energy of the ball is constant
		To have maximum G.P.E and minimum K.E, it must be at the maximum height
7	С	P = W / t = mgh / t = (6000)(15) / 30 = 3000 W
8	А	$0 {}^{0}\mathrm{C} \rightarrow 2.0 \mathrm{cm}$
		$100 ^{0}\mathrm{C} \rightarrow 24.0 \mathrm{cm}$
		Hence, $1 {}^{0}C \rightarrow (24 - 2)/100 = 0.22 \text{ cm}$
9	А	Convection current occurs when heated fluid expands in volume, becomes less
		dense, and floats up while cooler surrounding fluid that is denser sinks down to
		be heated. The density difference causes the fluid to carry the heat around.
10	В	Look for one complete sine curve
		For one complete sine curve, the distance is $20 - 0 = 20$ cm = wavelength
		For one complete sine curve, the maximum height is $0.6 \text{ cm} = \text{amplitude}$
11	D	Electromagnetic waves can travel through a vacuum at a speed of $3.0 \times 10^8$ m/s
12	А	Angle of incidence = Angle of reflection
		Hence, angle of incidence = $80^{\circ} / 2 = 40^{\circ}$
13	С	Hearing is from 20 Hz to 20000 Hz (20 Hz to 20 kHz)
14	С	End X is either a magnetic material, or a S-pole
		The metals that can be magnetized are steel, iron, cobalt and nickel.
15	В	Electrons move in a metal wire, but the current is flowing from the positive
		terminal to the negative terminal.
16	С	In the circuit to the left, total resistance = $4 \Omega + 3 \Omega = 7 \Omega$
		In the circuit to the right, the total resistance should also be 7 $\Omega$
		Hence, $2 + R = 7 \rightarrow R = 7 - 2 = 5 \Omega$
17	А	E = P t = I V t
		t = E / (I V) = 400000 / (250 x 4) = 400 s
18	A	Out of syllabus
19	А	Out of syllabus
20	D	Out of syllabus