NOV 2006 GCE 'O' LEVEL PAPER 1 (MCQ)
SUGGESTED ANSWERS

Question	Answer	Suggested Explanation
1	D	From the starting point all the way back to the starting point
2	A	Acceleration = gradient of speed time graph = zero
3	C	Average speed = total distance / time S = D / T = 75 km / 1.25 h = 60 kmh^{-1}
4	A	Density = mass ÷ volume Volume = mass ÷ density
5	B	Moment about pivot = F d = 60 N (30 cm) = 1800 Ncm anti-clockwise To balance, we need 1800 Ncm clockwise
6	D	For energy conservation, total energy is conserved. Total energy at all points is the same.
7	C	W = F s = 300 N (5 m) = 1500 J [force and the distance in direction of force)
8	A	Ice (solid) is melted → solid changes to liquid VW: solid WX: solid + liquid XY: liquid YZ: liquid + gas
9	A	Amplitude = 2.0 cm (same as sine curve)
10	B	$n = \frac{\sin(\text{bigger angle})}{\sin(\text{smaller angle})} = 1.52$ Air → glass so the light ray bends towards the normal
11	D	Ronald → Radio waves Macdonald → Microwaves Is → Infrared Very → Visible light Ugly → Ultraviolet Xcept → X-rays Gary → Gamma rays
12	B	Total distance travelled = S T 2 x D = 0.060 x 330 D = 9.9 m
13	D	V = work done ÷ charge = W ÷ Q
14	C	Resistance of wire = V / I = gradient of V-I graph = (20 – 0) / (4 – 0) = 5.0 Ω
15	A	V = V1 + V2
16	C	Switch at live wire, and metal casing to earth wire. Lamp is connected between live wire and neutral wire.
17	D	Test for repulsion because like poles repel
18	B	Out of syllabus
19	C	3 protons and total of 7 particles in the nucleus
20	C	Out of syllabus

November 2006
Paper 2 Suggested Answers

1(a)
It is due to the reflection of sound wave from the sea bed.

1(b)
It is a wave form where the plane of vibration of the particles is parallel to the plane of propagation of the wave.

1(c)
Time taken to travel to and fro is 0.1s. Time taken to travel one way is 0.05s.
Distance travelled = v x t
= 1500 x 0.05
= 75 m.

2(a)
Acceleration
= change of velocity / time
= 30 / 12 = 2.5 m/s^2
[Remember your unit. It will cost you 1 mark here]

2(b)
F = m x a
= 1300 x 2.5
= 3250 N
≈ 3300 N

2(c)
Work done
= force x distance
= 5200 x 200
= 1 040 000 J
≈ 1000000 J

3(a)
KE = $\frac{1}{2}mv^2$
= ½ x 5 x 7.8^2
= 152.1 J
≈ 150 J

3(b)
According to conservation of energy,
KE gained is equal to PE lost
$\frac{1}{2}mv^2$ = mgh
152.1=mgh
h= 152.1 / (5x10) = 3.0 m

3(c)
Gravitational Potential Energy

4(a)
Taking the pivot at the head of the hammer, the moment produced by the force at handle should equate with the moment applied at the nail.

$$F_{\text{handle}}\, d_{\text{handle to hammerhead}} = F_{\text{at nail}}\, d_{\text{nail to head}}$$

Because the $d_{\text{nail to head}}$ is so much smaller than $d_{\text{handle to hammerhead}}$, the force at the nail should be much bigger than the force at the handle

4(b)
Now that the nail is further away from the pivot, and the force at the nail being constant, the moment due to the force at the nail is now higher (M = F d, d increases), and the force at the handle should be higher to produce a larger moment to overcome the larger moment due to the force at the nail.

5(a)
They have different wavelength and frequency

5(b)(i)
3.0×10^8 m/s

5(b)(ii)
Frequency is defined at the number of complete oscillation per second.
In this case, it means there will be 27000000 complete radio waves produced in 1 second.

6(a)
P = IV
2400 = I x 240
I = 2400 / 240 = 10 A

6(b)
When the current following through the fuse exceed its rating, the fuse would melt and cause a open circuit. No current will flow, and the appliance is also isolated from the mains.

6(c)
Double insulation means that there are two layers of non-conducting materials wrapped around the wire to protect the wire from being exposed. It will prevent the user from touching the bare exposed wire so that the user will not get a electric shock upon touching the bare exposed wire.

7(a)
Ice point is the temperature where solid pure ice melts into liquid state at a pressure of one atmospheric pressure.
It is known to be at 0 degree Celsius.

7(b)
Have a narrow bore (bore of a smaller diameter).
Have a bigger bulb with more mercury inside the bulb.

8(a) Out of syllabus
As the magnet rotates, magnetic poles move near, and then move away from the coil. The coil of wire experiences a changing magnetic field due to the changing magnetic poles. Upon experiencing that changing magnetic field, a emf is induced in the coil according to faraday's law.

8(b) Out of syllabus
As the force in the spring decrease, the magnet rotates slower, the coil will experience a smaller rate of change in magnetic field. The induced emf will be smaller compare to when the magnet was rotating faster. The torch will have a smaller potential difference, and the power P = I V is hence smaller.

8(c) Out of syllabus
Have more turns of coil per unit length

9
NOT IN SYLLABUS

10(a)
Density = mass / volume
[**MUST MUST state formula**]

Density = m / V
= 10/11 = 0.91g/cm^3
[**For this question, 3 marks was given stating of formula is 1 mark, choosing the right volume 1 mark, then the correct unit 1 mark**][you have to chose 11 cm^3 because that is the volume when it is solid when it is still liquid the volume is 10cm^3]

10(b)
From -10°C to 0°C, the density is constant at 0.91g/cm^3
At 0°C, when the ice has melted to become water, the density suddenly increases to 1.0 g/cm^3
From 0°C to around 4°C, the density slowly increases till it reached its max density of 1.04 g/cm^3
From 4°C to 10°C, the density slowly decreases from 1.04 g/cm^3 back to 1.0 g/cm^3.

10(c)
Water around the heating source are heated up and they expand and increase in volume. This causes its density to decrease as density = mass / volume. As a result, the heated water starts to rise above the cooler surrounding water that is denser, while the cooler water that is denser sinks down to be heated. This cycle repeats itself and hence a convection current is created where the water carries the heat around.

11(a)
X = 6
Y = 12
Z = 3

[This is done using the formula $R = \rho\frac{l}{A}$]

11(b)
The 8Ω has the highest potential difference.
Since the resistors are arranged in series, the current flowing through them is the same. Using the formula V = IR to find the potential difference across them, the one with the highest R will have the highest potential difference V.

11(c)
The 2Ω will transfer energy at the greatest rate.
The resistors are arranged in parallel which means the voltage across all of them is the same (12V).
Using the formula $P = V^2 / R$, the resistor with the lowest resistance will yield the biggest Power, which is the largest rate of transfer of thermal energy.

11(d)