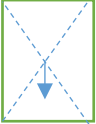


NSS Prelim 2019
Science Physics O level

Paper 1

1	C	6	C	11	B	16	C
2	C	7	B	12	D	17	A
3	C	8	D	13	B	18	B
4	B	9	A	14	B	19	D
5	A	10	B	15	C	20	C

Paper 2

1a	Plotting [1] Line [1]	
b	0 – 3 s: Increasing speed [1] 3-5 s: Constant speed [1]	
a		
2b	$12 \times 200 = F \times 75$ [1] $F = 32 \text{ N}$ [1]	
c	The perpendicular distance to point A will be smaller [1], To obtain the same value of moment , the value of F will increase . [1]	
3a	$50 \text{ g} = 0.05 \text{ kg}$ [1] $GPE = mgh = 0.05 \times 10 \times 1.6 = 0.8 \text{ J}$ [1]	
b	$\frac{1}{2} mv^2 = 0.8$ $\frac{1}{2} \times 0.05 \times v^2 = 0.8$ [1] $V = 5.66 \text{ m/s}$ [1]	
c	Ke at C = lost in GPE from A to C = $0.05 \times 10 \times (1.6 - 1)$ [1] $= 0.3 \text{ J}$ [1]	
4a)	Stopper reduce heat lost by convection. [1] Hot air will rise out of the flask due to the low density. [1]	
b)	Foam is a poor conductor of heat but heat can still be transferred through conduction. [1] Conduction and convection cannot takes place through vacuum. [1]	
c)	Reduce heat lost by radiation	
d)	The features reduce heat transfer; either from the surrounding to the flask or from the flask to the surroundings.	
5a)	$\sin 45 / \sin 29$ [1] $= 1.458 = 1.46$ [1]	

b)	$1.458 = 1 / \sin c$ $C = 43.3^\circ$	
c)	Total internal reflection [1] Angle of reflection 61° [1]	
6a	Focal point and arrows [1] Ray through optical centre [1] Ray through focal point [1]	
b)	26 cm	
c)	Real and magnified	
7a	Arrows pointing away from the spheres Correct shape of electric field.	
b	$0.02 / 0.05$ $= 0.4 \text{ A}$ [1]	
8	$V = RI$ $6 = 8 I$ [1] $I = 0.75 \text{ A}$ [1]	
b)	Same brightness [1] They are connected in series, current through both the bulb is the same. Resistance of the bulbs are also the same. [1]	
c)	$V = RI$ $6 = 6 I$ (Short circuit) [1] $I = 1 \text{ A}$ [1]	
9a	Up	
b	Increase the magnitude of the current Increase the strength of the magnetic field	
c	Draw the parallelogram Resultant force downwards Weight = 14 N (accept 13.8 N – 14.2 N)	
10a)	Anticlockwise directions Gaps gets bigger further away from wire	
b)	When the switch is on, the iron core becomes an electromagnet. [1] It will attract the soft iron spring and the hammer will hit the metal plate on the left.[1] When the switch is released, the iron core loses its magnetism [1] The spring is no longer attracted, therefore the force in the spring will cause it to move to the right and hit the other metal plate. [1]	
c)	Metal A will have a higher pitch As it has a higher frequency	
d	$D = s \times t$ $= 70 / 1000 \times 330$ [1] $= 23.1 \text{ m}$ [1]	
11a	$R = 1.5$ [1]	

	$t = 5 \text{ min} = 300 \text{ s}$ [1] $P = I^2 R t = 0.3 \times 0.3 \times 1.5 \times 300 = 162 \text{ W}$ [1]	
b)	As θ increase, the length of the carbon resistance track in the circuit increase, resistance increase. [1] As θ increase, current decrease, volume decrease [1]	
c)	$\text{Energy} = 4 \times 16 \times 30 = 1920 = 1.92 \text{ kWh}$ [1] $1.92 \times 0.28 = 53.76 \text{ cents}$ [1]	
d)	Additional pin is Earth wire, which is connected to the metal casing. [1] If there is a fault, earth wire will cause a short circuit. [1] The fuse will melt and protect the user from electric shock [1]	
12a)	$F = P \times A$ $= 12240 \times 0.6 = 7\,344 \text{ N}$	
b)	Total weight is equal to $7\,344 \text{ N}$. [1] Since the cylinder is not moving, resultant force is zero. [1]	
c)	$\text{Mass} = 734.4 \text{ kg}$ or $\text{vol} = 1.08 \text{ m}^3$ [1] Density = mass / vol $= 734.4 / 1.8 \times 0.6$ $= 680 \text{ kg/m}^3$ [1]	
d)	The average density of the cylinder is lower than the density of water (1000 kg/m^3).	
e)	Cylinder moves up and down while the energy is transferred horizontally.	
f)	$F = 1/0.02 = 50 \text{ Hz}$ [1] Wavelength = $30 / 5 = 6 \text{ cm} = 0.06 \text{ m}$ [1] Speed = $0.06 \times 50 = 3 \text{ m/s}$ [1]	

