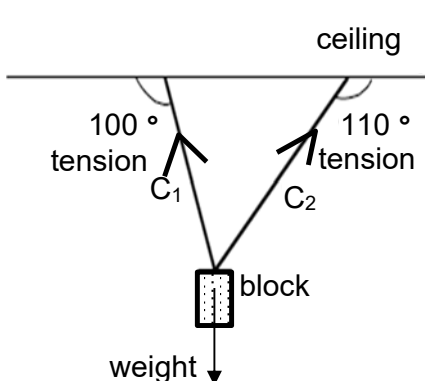
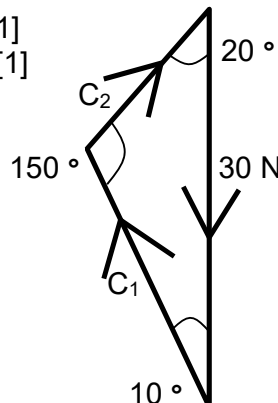
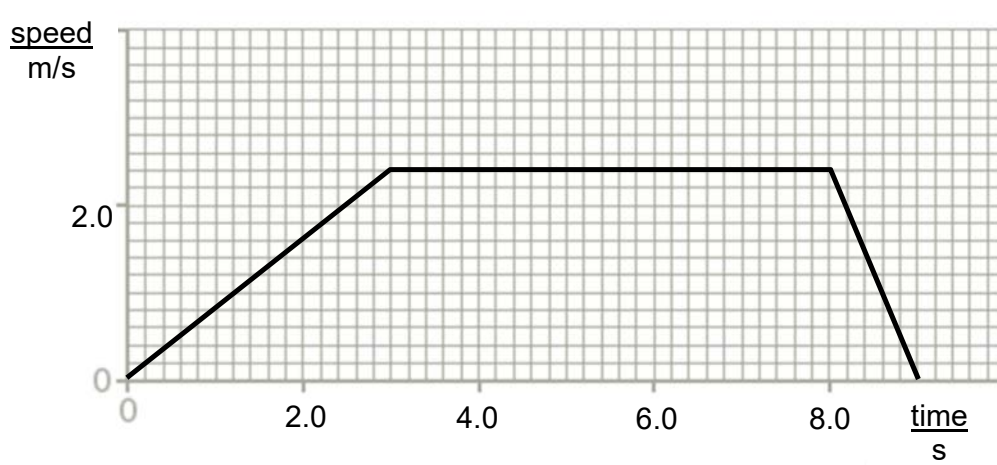


NANYANG GIRLS' HIGH SCHOOL
ANSWERS
Preliminary Examination 2022
Physics SIP Secondary Four

Paper 1

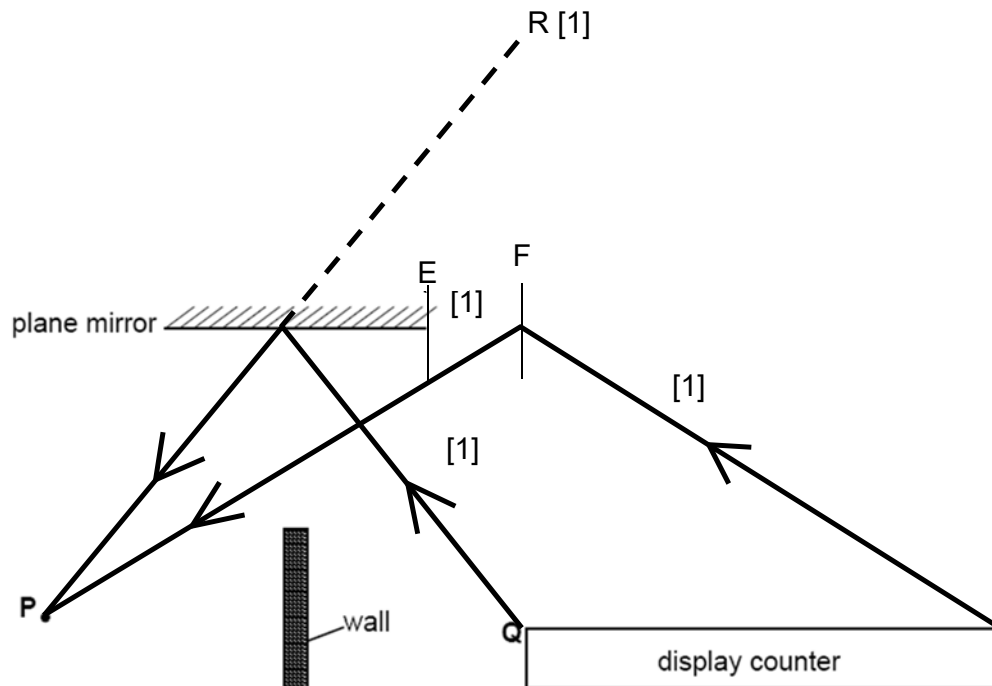
1	A	2	B	3	C	4	D	5	D	6	B	7	B	8	A	9	C	10	B
11	B	12	B	13	C	14	A	15	C	16	B	17	D	18	B	19	A	20	D
21	C	22	A	23	A	24	D	25	A	26	C	27	D	28	D	29	B	30	B
31	B	32	C	33	B	34	C	35	C	36	A	37	D	38	D	39	B	40	A

Paper 2

Question	Answer
1 (a) 	(b) correct arrangement of vectors [1] $C_1 = 20.2\text{ N}$ [1] $C_2 = 10.6\text{ N}$ [1] 
	[1]
2 (a) change in velocity per unit time is constant [1] (b) 	[1] for correct shape, [1] for correct values (c) (i) Area under graph (allow e.c.f.) = $\frac{1}{2}(9.0 + 3.0)\text{ s} \times (2.4)\text{ m/s}$ [1] = 16.8 m [1] (ii) total distance / total time = $16.8\text{ m} / 9.0\text{ s} = 1.9\text{ m/s}$ [1] (d) $gh = \frac{1}{2}v^2$ $10\text{ m/s}^2 \times (7.0\text{ m} - 4.0\text{ m}) = \frac{1}{2}v^2$ [1] $v = 7.7\text{ m/s}$ [1]

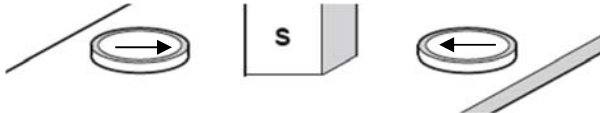
3	(a) $\text{Volume} = m / d = 86.4 \text{ g} / 2.7 \text{ g/cm}^3 = 32 \text{ cm}^3$ [1] Final reading = $40 + 32 = 72 \text{ cm}^3$ [1] (b) density will be lower [1]
4	(a) $F \times 8.0 \text{ m} = 2000 \text{ N} \times 2.0 \text{ m}$ [1] $F = 500 \text{ N}$ [1] (b) The force will decrease as the perpendicular distance of F from A increases [1]. The moment due to the weight will decrease. [1]
5	(a) The water particles move/vibrate perpendicular to the direction of the water wave. [1] (b) (i) $6.0 \text{ m} / 4 = 1.5 \text{ m}$ [1] (ii) $5 / 12.5 = 0.40 \text{ Hz}$ [1] (iii) $v = 0.40 \text{ Hz} \times 1.5 \text{ m} = 0.60 \text{ m/s}$ [1]
6	(a) volume of fixed mass of liquid [1] (b) $(28^\circ\text{C} - 0^\circ\text{C}) / (40^\circ\text{C} - 0^\circ\text{C}) = (T_L - 0^\circ\text{C}) / (50^\circ\text{C} - 0^\circ\text{C})$ [1] T_M correctly located on M at a position corresponding to 35°C on thermometer L. [1] (c) Thermal energy is used to increase spacing between molecules in the liquid state to change it into vapour state. Potential energy in the molecules increase. [1] No change in K.E. which determines the temperature. [1]

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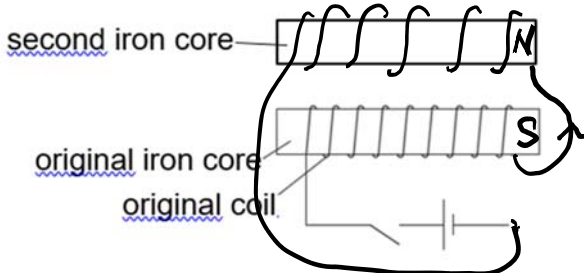


- 8 (a) metal sphere **induced** to have negative charges closer to A and positive charges closer to B. [1]
Unlike charges attract. [1]
- (b) $I = Q/t$ $Q = 30\,000\text{ A} \times 0.20\text{ s}$ [1] = 6 000 C [1]
- 9 (a) e.m.f. is the work done to move 1 coulomb of charge around the entire circuit. [1]
- (b) (i) $18\ \Omega + (1/30\ \Omega + 1/20\ \Omega)^{-1}$ [1] = 30 Ω [1]
(ii) p.d. = $12\text{ V} / 30\ \Omega \times 12\ \Omega$ [1] = 4.8 V [1]
(iii) current = $4.8\text{ V} / 20\ \Omega$ [1] = 0.24 A [1]
- (c) $L_P / 2\text{ A} : L_Q / 3\text{ A} = 18\ \Omega : 30\ \Omega$ [1]
 $L_P : L_Q = 6 : 15 = 2 : 5$ [1]
- 10 (a) current flows from A to B [1]
- (b) (i) split ring commutator [1]
(ii) Y reverses the direction of the current in the coil every $\frac{1}{2}$ cycle [1]
when the coil passes the vertical position so that the forces are reversed [1]

- 11 (a) Sound wave with frequency higher than **20 000 Hz**. [1]
- (b) Ultrasound cannot be heard / less easily dispersed / transmitted with less energy loss compared to sound. [1]
- (c) (i) 170 ms [1]
- (ii) time taken to receive reflected signal is longer [1] for vacant lots as the distance travelled is longer [1]
amplitude of signal is smaller as there is greater energy loss for longer distance travelled for vacant lots [1]
- (iii) $340 \text{ m s}^{-1} \times (20 \times 10^{-3}) \text{ s} \div 2 [1] = 3.4 \text{ m} [1]$
- (iv) Time taken between transmission and reception of signals is shorter.
OR
The amplitude is smaller.
- (d) Presence of wind may carry away the wave and hence the wave cannot be detected by the receiver.

- 12 (a)  horizontal arrows [1]
both arrows point towards S-pole [1]

- (b) (i) Current flowing in the circuit will magnetise iron core.[1]
Armature induced to form an unlike pole and is attracted to iron core. [1]
Armature rotates clockwise and contacts are pushed up to close secondary circuit. [1]
- (ii) soft iron [1], easily magnetised and easily demagnetized. [1]
- (iii) operator does not have to be physically close to a secondary circuit with high current/operating dangerous machines.[1]

- (iv)  complete the circuit [1]
north pole set up as shown [1]

13 E	(a) infra-red radiation [1] (b) reflects heat/radiation down to food, which cooks faster OR reflects heat away from outer metal case, which does not get hot. [1] (c) (i) live wire: 230 V, 8.3 A neutral wire: 0 V, 8.3 A earth wire: 0 V, 0 A all current correct [1], all voltage [1] OR more than 3 items correct [1] (ii) Earth wire is connected to metal case. [1] When metal case becomes live, current is directed to earth and not user who touches it. [1] (iii) $P = IV = 8.3 \text{ A} \times 230 \text{ V} [1] = 1900 \text{ W} [1]$ (iv) The heating element temperature will be lower OR other effects due to lower temperature e.g. longer cooking time or food not properly cooked. [1]
13 O	(a) (i) current going right to left [1] (ii) rings around the iron ring [1] direction of field anti-clockwise [1] (iii) X is a South pole. [1] (b) (i) When switch is closed, coil S experiences increasing magnetic flux. [1] By Faraday's Law, an emf is set up in coil S which then drives a current through the galvanometer.[1] (ii) There is a deflection in the opposite direction. [1] Coil S experiences decreasing magnetic flux when the switch is opened. [1] (iii) use d.c. source with larger emf [1], increase number of turns in coil S [1]