

Bedok South Secondary School
Sec 4Exp/ 5NA Science (Physics) Prelim Exam 2019
Marking scheme

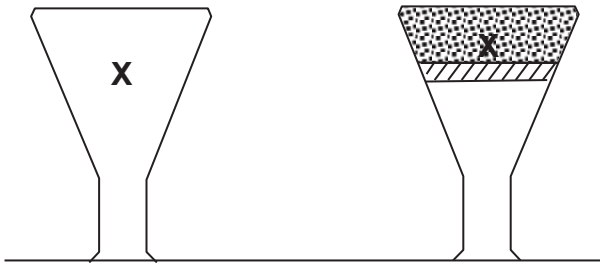
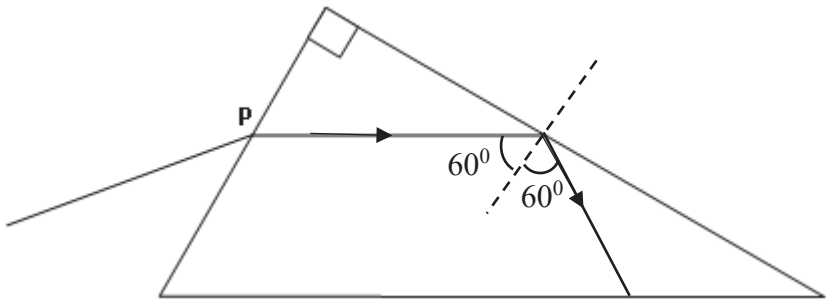
Paper 1

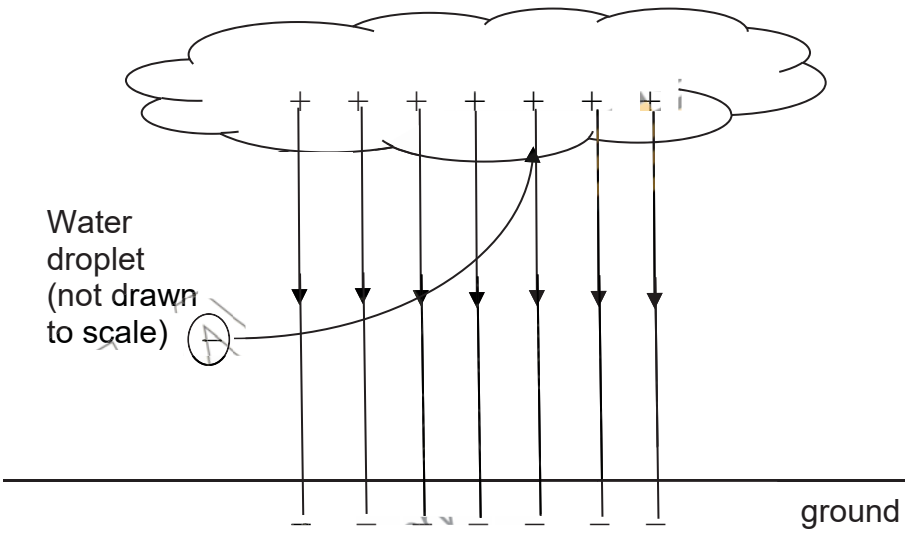
1. D	2. C	3. C	4. B	5. D
6. B	7. A	8. A	9. A	10. B
11. D	12. A	13. C	14. B	15. C
16. B	17. A	18. D	19. C	20. B

Paper 2

Section A

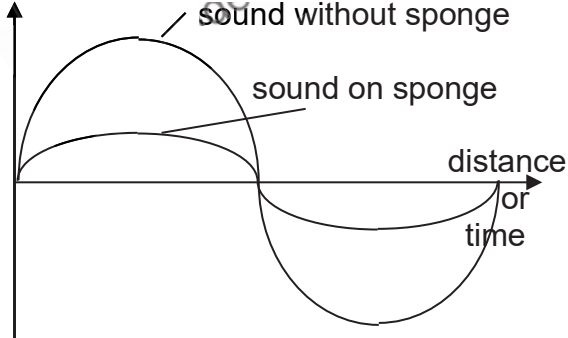
No.	Answers	Marks
1a	Acceleration is the rate of change of velocity or acceleration refers to the change in velocity per unit time.	1
b	Lorry Z	1
c	Lorry X The increase in the value if the speed per unit time is constant.	1 1
d	$a = \Delta v / \Delta t$ $= 8 / 10$ $= 0.80 \text{ m/s}^2$ $F = ma$ $= 20000 \times 0.80$ $= 16\,000 \text{ N}$	1 1
2a	Density = mass / volume Mass = volume x density $= (0.04 \times 0.28) \times 750$ $= 8.4 \text{ kg}$	1 1
b	Weight, $w = mg$ $= 8.4 \times 10$ $= 84 \text{ N}$	1
3a	Pressure = force / area Force = pressure x area $= 4000 \times 0.0035$ $= 14 \text{ N}$	1 1

3b	Apply principle of moment, Sum of Clockwise moments = Sum of anti-clockwise moments $F \times 0.25 = 14 \times 0.06$ $F = 3.36 \text{ N}$	1 1
4a		[1] each 2
b	Sand filled flask as its centre of gravity is higher. Easier for the line of action of the weight to cross over the pivot.	1 1
5a	$\frac{\sin i}{\sin r} = n$ $\frac{\sin i}{\sin 30} = 1.54$ $i = 50.4^\circ \text{ or } 50^\circ$	1 1
b	$\sin c = \frac{1}{n}$ $= \frac{1}{1.54}$ $c = 40.5^\circ \text{ or } 40^\circ$	1 1
c	 Total internal reflection occur at point Q as The angle of incidence (60°) is greater than the critical angle 40°.	1 1

6a(i)	Distance = speed x time = 1.5×1.2 = 1.8 m	1
(ii)	$2\lambda = 1.8$ $\lambda = 0.90 \text{ m}$	1
b(i)	The boat move up and down, perpendicular to the travelling direction of the wave.	1
(ii)	Velocity, $v = f\lambda$ $1.5 = f \times 0.90$ $f = 1.67 \text{ Hz or } 1.7 \text{ Hz}$	1
	OR $f = \frac{1}{T}$ $= \frac{1}{0.6}$ $= 1.67 \text{ Hz or } 1.7 \text{ Hz}$	1
7a, b(i)	 Water droplet (not drawn to scale) ground	1 ↑
b(ii)	Like charges repel and unlike charges attract.	1
8a	Total resistance = $\left[\frac{1}{16+8} + \frac{1}{12} \right]^{-1}$ = 8.0Ω	1 1
b	Current or ammeter reading, $I = \frac{V}{R}$ $= \frac{6}{8}$ = 0.75 A	1 1

c	$\text{Current} = \frac{V}{R}$ $= \frac{6}{16+8}$ $= 0.25 \text{ A}$	1 1
d	Voltmeter reading, $V = R I$ $= 8 \times 0.25$ $= 2.0 \text{ V}$	1 1
13a	When the currents are switched on: Coils P and Q are induced with the following poles as shown:  Since the two nearer ends has <u>unlike poles which attract</u>, they move towards each other. When the currents are switched off: The two coils <u>lost their magnetic fields</u>, so they are easy to separate.	1 1 1
b	When the currents are switched on: The two nearer ends will still have <u>unlike poles which attract</u>, but they move towards each other with <u>greater speed</u> since the <u>iron core in P makes a stronger electromagnet</u>. When the currents are switched off: They <u>remain attracted</u> to each other. The <u>steel core in Q retains its magnetism</u> and continues to attract the iron core of coil P.	1 1 1

Section B

No.	Answers	Marks
a	Kinetic energy (KE), $E_k = \frac{1}{2} mv^2$ $= \frac{1}{2} \times 0.25 \times 4.2^2$ $= 2.205 \text{ J}$ $= 2.21 \text{ J or } 2.2 \text{ J}$	1 1
b(i)	Gravitational potential energy (GPE), $E_p = mgh$ $= 0.25 \times 10 \times 0.28$ $= 0.70 \text{ J}$	1 1
b(ii)	Work done against friction $= \text{kinetic energy X} - (\text{GPE} + \text{KE}) \text{ of sphere at Y}$ $= 2.205 - (0.7 + \frac{1}{2} \times 0.25 \times 1.4^2)$ $= 1.26 \text{ J}$	1 1
c	KE at floor = KE + GPE at top $= \frac{1}{2} mv^2 + 0.7$ $= \frac{1}{2} \times 0.25 \times 1.2^2 + 0.7$ $= 0.88 \text{ J}$ $\frac{1}{2} mv^2 = 0.88 \text{ J}$ $\frac{1}{2} \times 0.25 \times v^2 = 0.88 \text{ J}$ $v = 2.65 \text{ or } 2.7 \text{ m/s}$	1 1
d	longitudinal	1
	displacement 	1
11a	Foam-filled wall: It traps air which is a poor conductor of heat. It reduces heat loss through conduction Shiny outer casing: A shiny surface is a poor emitter of heat. It reduces heat loss by radiation.	1 1

b	The liquid near the heating element gets heated, it becomes less dense and rise. The cooler, denser liquid at the top will sink, and in turns gets heated and rise. This process continues, setting up convection current and heat up the entire liquid.	1 1
c	When temperature increases, the particles in the liquid gain kinetic energy and slide pass one another with greater speed.	1 1
d	During evaporation, the more energetic particles at the surface of the liquid break the forces of attraction and left the liquid. Leaving behind particles with lower kinetic energy and thus, lowering the temperature of the liquid.	1 1
e	Energy = Power x time = 200 W x (5 x 60 s) = 60 000 J or 60 kJ	1 1
12a(i)	S ₃	1
a(ii)	S ₁ and S ₃	1
b	the hair dryer has a plastic case which is an insulator so any current leakage from the wires will not be conducted outwards	1
c(i)	$P = VI$ $I = 1140/240$ $= 4.75 \text{ A}$	1 1
c(ii)	fuse rating = 5 A	1
d	$E = Pt$ $= (1.14 \times 15) + (0.63 \times 8)$ $= 22.14 \text{ kWh C1}$ Cost = \$7.08	1 1 1
e	if one heating coil is faulty, the other cannot work OR the power of the hot air cannot be changed	1

