Jurongville Secondary School
Science Department 2019
Marking Scheme & Marker's Report

Assessment: Prelim Examination **Level:** Sec 4E / 5N

PAPER 1

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

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Science Department 2019
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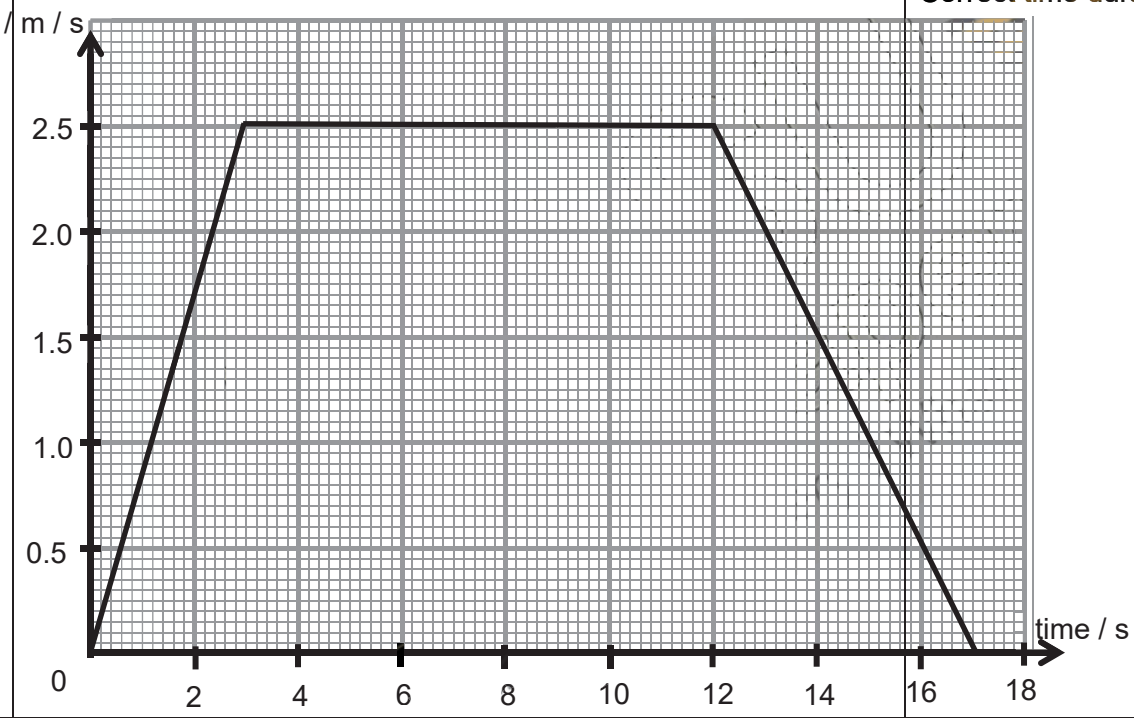
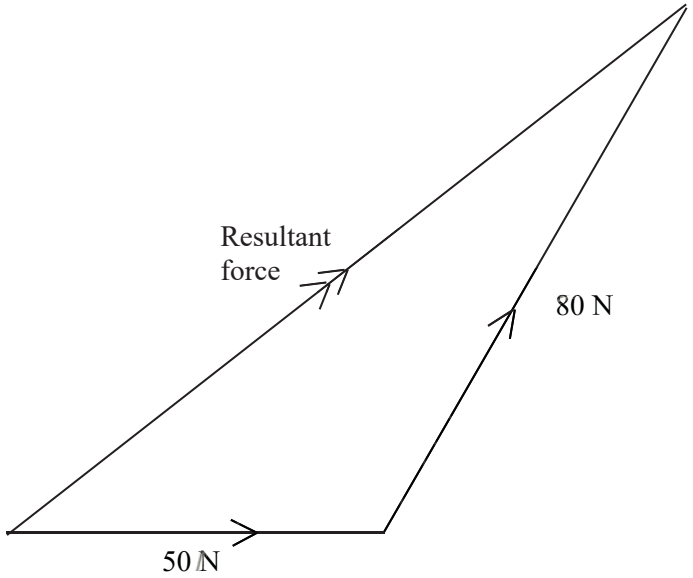
Assessment: Preliminary Examination Sc(Physics) (5076) **Level:** 4 Express / 5NA

Paper 2

Qn	Marking Scheme	Remarks	Marks	Marker's Report
Section A				
1a		Correct straight lines Correct time duration	B1 B1	Most were able to get the correct graph. A few students did not read the question carefully and drew with wrong time.
1b	Distance travelled = 1/2 (9 +17) (2.5) = 32.5 m Average speed = 32.5 / 17 = 1.91 m / s	Correct distance with working. Correct average speed with working	Allow for ecf in (a) B1 B1	Most were able to calculate total distance and average speed. A few students made careless mistakes in using 18 s instead of 17 s.

Qn	Marking Scheme	Remarks	Marks	Marker's Report
2a	Scale 1 cm rep 10 N 114 N ± 1 N Info – direction is 38° anticlockwise from horizontal  	Correct vector diagram Correct scale Correct magnitude	B1 B1 B1	Most were able to draw vector diagram correctly. A few students did not draw orientation of forces correctly and were penalized. A few students drew wrong direction arrows and were also penalized. Common mistake was to write scale as 1cm = 10 N which was penalized. Another error was to write as scale as 10 N : 1 cm which was also not accepted. Magnitude out of range was rejected.
2b	Resultant force = mass x acceleration 114 = 6 x a a = 19 m / s^2	Accept ecf from a Correct answer with working.	C1 A1	Most were able to do this question. A few students left this blank.
3a	Gain in gravitational potential energy = 48 x 10 x (3.1 – 1.4) = 816 J	Correct answer with working.	C1 A1	Most students were able to do this. A few students did not include g in calculation. A few use either 3.1 m or 1.4 m height instead of the difference.
3b	As she rises from the trampoline, the **kinetic energy decreases and is converted to gravitational potential energy**. At the **highest point, all the kinetic energy has been converted to gravitational potential energy. Thus she is momentarily stationary at the highest point**.	OWTTE	B1 B1	Some students wrote that gravitational potential energy has converted to kinetic energy instead. A few students stated Principle of Conservation of energy without applying to this situation.

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4a	The loosely woven mesh T-shirt **traps air which is a bad thermal conductor**. This **reduces the transfer of thermal energy by conduction from the fire to the fireman's body and thus keeping him cool**.	OWTTE	B1 B1	Many students did not state that air is a bad conductor. Many wrote that air cools the fireman down without explaining correctly.
4b	The fireman's jacket should be **silver** in colour as silver colour is a **bad absorber of thermal energy** and thus reduces transfer of thermal energy by radiation.	Accept white. OWTTE	B1 B1	Some students wrote bright and shiny colour. Accepted shiny as BOD.
5a	The **molecules of air in the cylinder are far apart from each other** and **moving randomly at high speed**.	OWTTE	B1 B1	Some students did not state that air particles are far apart from each other. Some students also did not state that the air particles are moving at high speed.
5b	**When air is heated, the air molecules gain kinetic energy**. This would cause the **air molecules to move even further apart and move even faster**.	OWTTE	B1 B1	Some students wrote about energy needed to break the intermolecular bonds and was penalized.
6a	Total internal reflection	CAO	B1	A few students wrote 'reflection'. A few wrote 'total internal refraction'.
6b	The **angle θ must be greater than critical angle of water**.	OWTTE	B1	A few students wrote 'lesser'.
6c	Refractive index of water = $3 \times 10^8 / 2.25 \times 10^8$ $= 1.33$	Correct calculation. Must show speed of light in air.	C1 A1	Most students were able to do this question.
6d	Position of 'x' at same distance perpendicularly above the surface of water as the light source is at distance below the surface of water.	Accept tolerance of 5 mm	B1	Most were not able to answer this. Some students placed the image at point on water surface at normal.
7a	Since the cloud is negatively charged, the **top end of the lightning rod should be positively charged**. This is because the **electrons on the lightning rod would be repelled by the electrons on the thundercloud leaving protons behind**.	OWTTE	B1 B1	Many students wrote that the lightning rod is negatively charged. Some thought that negatively charged rod will repel the thundercloud. Only a few students can explain correctly.
7b	If lightning occurs, the **electrons in the thundercloud would travel through the air and hit the building at the lightning rod**. The **electrons would transfer to the ground through the lightning conductor**	OWTTE	B1 B1	Most students did not mention the electrons from the thundercloud flowing to the ground through the lightning conductor. A few students were penalized for not stating clearly

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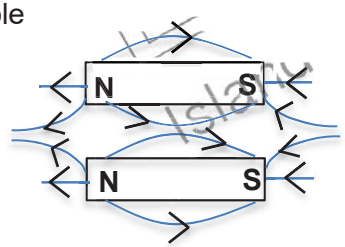
				that electrons flow from thundercloud to lightning rod.
8a	Effective resistance = (1/100 + 1/50)$^{-1}$ = 33.3 Ω	Correct working and answer	B1	Some students did not write working correctly and were penalized. Some students made wrong calculation. Some wrote 100 + 50.
8b	Ammeter reading = 20 / 33.3 = 0.6 A Or Ammeter reading = (20/100) + (20/50) = 0.2 + 0.4 = 0.6 A	Allow for ecf in (a) Correct working and answer	B1 B1	Most students were able to do this. A few students used the wrong formula.
8c	The **current in the fixed resistor will still flow** because the **fixed resistor and light bulb are connected in parallel and current flow would not be affected by the spoilt light bulb**.	OWTTE	B1 B1	Most students can answer correctly. But a few students left this blank.
9a	The pointed end of the **second nail is north pole** since the iron nails has **become induced magnets**. The **magnetic domains in the iron nail has aligned itself with north pole pointing away from the north pole of the magnet**.	OWTTE	B1 B1	Most students can identify that the pole is North. But only some students correctly stated the iron nails becoming induced magnets. Some wrote that the iron nails had become electromagnets.
9b	**Iron nails are easily magnetized but lose its magnetism easily** while **steel nails are not as easily magnetized but does not lose its magnetism easily**.	OWTTE	B1 B1	Some students wrote that steel is not a magnetic material and thus will not be attracted to the magnet. Some students were confused by stating steel is stronger magnet because it is used as permanent magnet. Some students were penalized for not stating the difference between magnetic effect of iron and steel.
9c	Correct pattern of magnetic field lines with arrows pointing from north to south pole 	Correct arrow Correct pattern	B1 B1	Most students indicated the correct direction of arrow. But most students are not able to draw the pattern of magnetic field lines correctly.

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10a	Compass needle with arrow pointing downwards using right-hand grip rule.	Correct direction of needle arrow	B1	Most students indicated arrow direction to the right in the direction of current. Need to revise such questions with students.
10b	By increasing the variable resistor value, the **current in the circuit will decrease**. This will cause the **magnetic effect around the straight conducting wire to decrease**.	OWTTE	B1 B1	Most students answered correctly. A few students did not state that current had decreased.
10c	The force will be acting into the paper.	OWTTE Reject 'downwards'	B1	Many students wrote downwards and was penalized.
11a	The **pair of jeans has the greatest amount of inertia because inertia is dependent on mass of object.**	OWTTE Accept if student state jeans has 'greatest mass'.	B1 B1	Most students answered jeans correctly. But only some students stated that inertia is dependent on mass of object.
11b	Total weight = (0.1 + 1.2 + 0.4) x 10 = 17 N	Convert g to kg Correct answer	C1 A1	Many students did not multiply by g. Many students wrote kg instead of N.
11ci	Centre of gravity **is the point where the whole weight of object appears to act.**	OWTTE	B1	Many students wrote about balance or equilibrium.
11cii	Moment = (0.4 x 10 x 0.4) + (0.1 x 10 x 1.0) + (1.2 x 10 x 2.2) = 1.6 + 1.0 + 26.4 = 29 N m	Allow for ecf in (b) Correct working with answer Correct unit	C1 A1 B1	Most students are not able to calculate this as they did not use the correct distance from the left end. Many students did not write the correct unit.
11ciii	The **jeans should be placed nearest to the left end. The t-shirt is placed in the centre while face towel is place furthest from the left end**. This is because **the heaviest item is nearest to the pivot while the lightest is furthest from the pivot to reduce the moment about the left end.**		B1 B1	Many students left this blank. Some students did not explain why moment is smallest.
12ai	Period = 2 ms = 0.002 s Frequency = 1 / 0.002 = 500 Hz	Accept 2 ms Correct working with answer. Correct unit	B1 B1	Most students did not write the correct unit for period. Most students did calculate frequency correctly.
12aii	Same period but with twice the amplitude	Correct amplitude Correct period	B1 B1	Most students were able to answer this correctly.
12aiii	The higher pressure is the compression region while the lower pressure region is the rarefaction region.	OWTTE	B1	Many students are not able to answer this correctly. Need to revise this.

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12bi	Ultraviolet radiation	CAO	B1	Many students are not able to answer this correctly. Need to revise this.
12bii	Speed = $1.48 \times 10^{15} \times 2 \times 10^{-7}$ $= 2.96 \times 10^{8}$ m/s	Correct working with answer. Correct unit	C1 A1	Most students can calculate this. Some students did not write the unit.
12biii	Electromagnetic waves are transverse waves while sound waves are longitudinal waves. Electromagnetic waves can travel through vacuum but sound waves cannot travel through vacuum.	Any suitable answer	B1 B1	Many students wrote that electromagnetic waves are longitudinal and sound is transverse. Some students describe longitudinal and transverse waves as second difference.
13a	P is the live wire while Q is the neutral wire. This is because the fuse and switch are on the live wire.	OWTTE	B1 B1	Some students wrote that Q is earth wire. Most students were able to state that fuse and switch is on the live wire.
13b	Current flowing through oven = 2500 / 240 = 10.4 A Suitable fuse would be 13 A fuse	Correct answer and unit with working.	B1 B1	Most students can answer this. A few students selected the lower rating fuse.
13c	The oven and toaster are connected in parallel so that if there is a fault in the oven or toaster, the appliance will still work.	OWTTE	B1	Most students answered this correctly. A few gave wrong answers like current being shared to prevent overheating.
13d	The **fuse consist of a thin wire which will melt when it excess the amount of current allowed in the fuse rating**. This will **cut current flow to the appliance thus protecting it**.	OWTTE	B1 B1	Most students can answer this question.
13ei 13eii	Electrical consumption for oven = (2.5 x 5) + (1 x 2) = 14.5 kWh Total cost of electrical consumption = 14.5 x 0.3 = $4.35	Correct answer and unit with working. Correct unit Correct answer and unit with working	C1 A1 B1	Most students are able to answer this question.