**PHYSICS PAPER 2: MARKING SCHEME**

| NO. | SOLUTION: | MARKS |
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| **Q1** | (a) (i) 0.01 cm<br>(ii) 1.36 cm<br>(b) (i) 0.02 mm<br>(ii) 1.53 mm | |
| **Q2** | (a) (i) Time<br>(ii) acceleration<br>(iii) Part AB<br>(b) Area under the graph | |
| **Q3** | (a) - Water pressure, $p = h\rho g$<br>- Depth of the water, h, decreases when air bubble moves towards the water surface<br>- Pressure decreases<br>- Volume of the air bubble increases<br>(b) Boyle's law<br>(c) The volume of the air bubble at X decreases.<br>(d) 9.45 $cm^3$ | |
| **Q4** | (a) Circuit B<br>(b) (i) 6 Ω<br>(ii) 2.50 A<br>(iii) The ammeter reading decreases. | |
| **Q5** | (a) Frequency is the number of complete oscillations made in one second<br>(b) (i) The depth of water in region *Q* is greater than the depth of water in region *P*<br>(ii) The wavelength of the waves in region *Q* is longer than the wavelength of the waves in region *P*<br>(iii) When the depth of the water increases, the wavelength of the waves increases<br>(iv) Refraction of waves<br>(c) When a wave moves towards the shore, the velocity of the wave decreases due to the depth of sea water decreases<br><br>Waves are refracted towards the normal and causes the wavefronts to follow the shape of the shore | |

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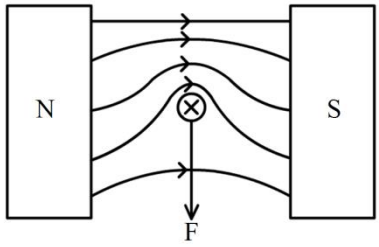
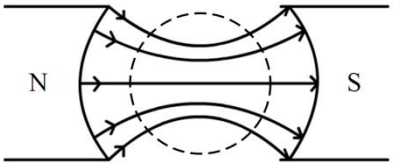
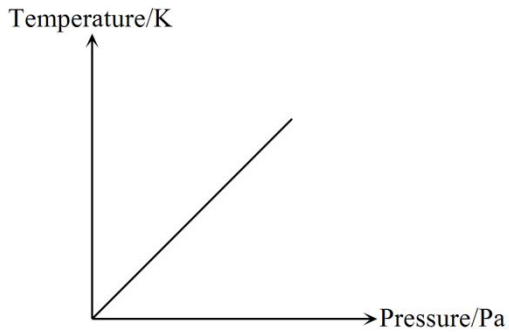
| **Q6** | (a) (i) Fleming's left-hand rule<br>(ii)<br>  <br> | |
| | (b) (i)<br>  <br><br>(ii) To produce radial magnetic field so that the force, F, produced on the coil of copper wire is constant.<br>(iii) Component: A plane mirror placed below the pointer.<br>Explanation: To position the eye so that the image of the pointer seen in the mirror coincides with the actual pointer. | |
| **Q7** | (a) Air pressure<br>(b) (i) The reading of the thermometer in Diagram 7.2 is higher than that in Diagram 7.1.<br>(ii) The reading of the Bourdon gauge in Diagram 7.2 is higher than that in Diagram 7.1.<br>(iii) The air pressure in flask increases as the temperature increases.<br>(c) - molecules move faster when received heat<br>- kinetic energy of the air molecules increases<br>- collision between the molecules become more often<br>(d) Pressure law<br>(e)<br>  <br> | |
| **Q8** | (a) Convex mirror<br>(b) Because convex mirror has a wider view than a plane mirror | |

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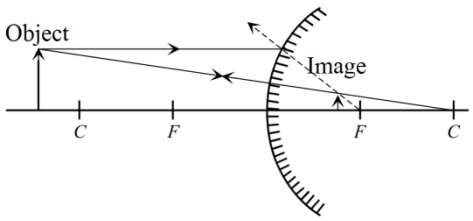
| | (c) (i)<br>  <br><br>(ii) Virtual, upright, diminished<br>(iii) Shaving mirror produces a magnified image for a near object but image that is produced by convex mirror is diminished | |
| **Q9** | (a) Elasticity is an ability to return to the original shape after an applied force is removed<br>(b) (i) Thickness of spring *Q* > thickness of spring *P*<br><br>Maximum height reached by the ball in Diagram 9.2(b) > maximum height reached by the ball in Diagram 9.2(a)<br>(ii) The maximum height of the ball increases as the thickness of the spring increases<br>(iii) Thickness of the spring is proportional to the spring constant, *k*<br>(iv) The elastic potential energy of the spring increases as the thickness of the spring increases<br>(v) Elastic potential energy → kinetic energy → gravitational potential energy<br>(c) $F_2$ is bigger than $F_1$<br><br>Because the spring in Diagram 9.1(b) is made of thicker wire than the spring in Diagram 9.1(a)<br>(d) (i) Athlete's attire:<br>Tight and light attire produces less air friction and this will increase the speed<br>(ii) Athlete's movement:<br>Sprints to increase the kinetic energy or momentum<br>(iii) Pole used:<br>Light and more elastic pole is used to increase the elastic potential energy<br>(iv) Safety:<br>Thicker mattress is used to increase the collision time or reduce the impulsive force | |
| **Q10** | (a) (i) The amount of heat required to increase the temperature by 1°C<br>(ii) - The water in the big pot cools down to 75°C whereas the water in the small pot cools down to 50°C<br>- The water in the big pot has a larger heat capacity than the water in the small pot<br>(iii) An object with a larger mass will have a larger heat capacity than a same object with smaller mass<br>(b) - The base is made of copper because it has low specific heat capacity and high density<br>- It shortens the time for food to be cooked | |

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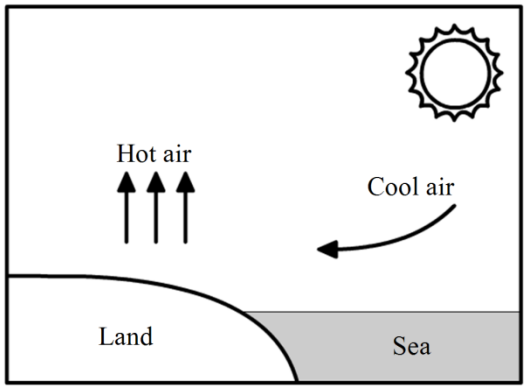
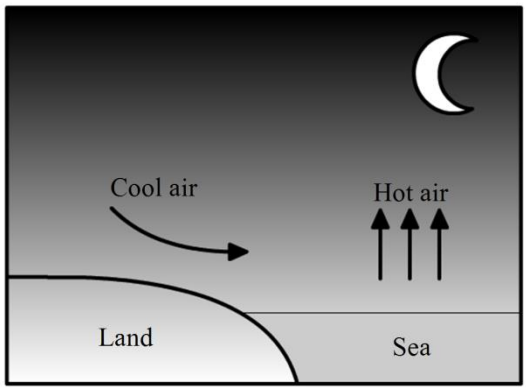
| | - Heavier base make the pot more stable and will not topple over easily<br>- The body is made of aluminium because it has relatively low specific heat capacity and low density<br>- It becomes hot very quickly<br>- It reduces the overall weight of the pot<br>- The handle is made of synthetic material or wood<br>- It is a poor conductor of heat and has low density<br>- Little heat is transferred to the hand of the person who is holding it<br>- Does not add much weight to the pot<br>(c) Sea breeze<br>  <br><br>- Breeze blows from the sea towards the land.<br>- Occurs during the day<br>Land breeze<br>  <br><br>- Breeze blows from the land towards the sea<br>- Occurs at night | |
| **Q11** | (a) (i) A region where a charge will experience an electrical force.<br>(ii) - polystyrene ball oscillates between the two metal plates<br>- it receives electrons and becomes negatively charged when touches plate Y and then attracted to plate X<br>- negative charges neutralized and the ball becomes positively charged when touches plate X and then attracted to plate Y<br>- the cycle repeats | |

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| | (b) (i) connected in series to produce a higher total voltage<br>(ii) positive terminals of the cells are connected to negative terminals of the cells to make current flow<br>(iii) resistor connected with the bulbs in series to increase the resistance<br>(iv) connected in parallel so that the other bulbs still light up when one is blown<br>- The most suitable circuit is S.<br>(c) (i) 1.50 A<br>(ii) 1.53 A | |
| **Q12** | (a) Frequency<br>(b) • Frequency is inversely proportional to wavelength<br>• High pitch sound has high frequency and short wavelength<br>• The short wavelength sound is more difficult to be diffracted by the corner. Only student *Z* can hear the sound clearly.<br>• Low pitch sound has low frequency and longer wavelength<br>• The long wavelength sound is easier to be diffracted by the corner. All the students can hear the sound clearly.<br>(c) (i) The diameter of the parabolic disc:<br>Diameter of the parabolic disc should be large to receive more signals<br>(ii) The distance of the signal receiver from the centre of the parabolic disc:<br>The distance of the signal receiver from the centre of parabolic disc should be same as the focal length so that the signals which travel in parallel lines will be reflected and focused onto the signal receiver<br>(iii) The types of wave transmitted:<br>The type of wave transmitted should be microwave because microwave has high frequency and short wavelength. High frequency wave is easily reflected.<br>(iv) The height of the parabolic disc from the ground:<br>The height of the parabolic disc from the ground should be high so that the signals are easy to be detected<br>*P* is chosen because the diameter of the parabolic disc is large, the distance of the signal receiver from the centre is same as the focal length, it transmits microwave, and has a high position<br>(d) (i) $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$<br>$v = \frac{2s}{t}$<br>$v = \frac{2 \times 85}{0.16} = 1\,063 \text{ m s}^{-1}$<br>(ii) $v = f\lambda$<br>$\lambda = \frac{1\,063}{30\,000} = 0.035 \text{ m}$ | |