SEKOLAH BERASRAMA PENUH
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA 2015
PHYSICS
Kertas2
Mark Scheme
Ogos / September

Question	Mark Scheme	Sub Mark	Total Mark
1 (a) (i)	Triple beam balance	1	1
(b) (i)	Zero adjustment knob	1	2
(ii)	To adjust zero reading of the instrument	1	
(c)	62.4 g	1	1
			4

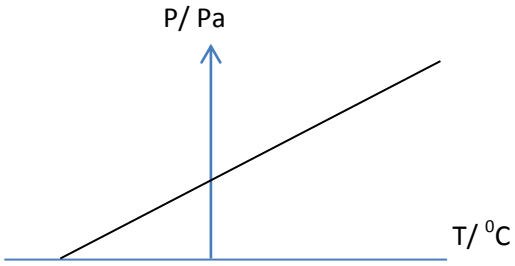
Question	Mark Scheme	Sub Mark	Total Mark
2 (a) (i)	Elasticity is the property of an object to return to its original length/shape after force exerted is removed	1	
(ii)	The spring is permanently deformed/damage // It has reached its elastic limit // Beyond the elastic limit, Hooke's Law is no longer applied.	1	2
(b) (i)	Extension, x = 5 cm	1	
(ii)	Upper spring, 100 g → x = 5 m Two lower parallel springs, 100 g → x =2.5 m Total extension = 5 + 2.5 = 7.5 cm Total length, y = 10+10+5+2.5 = 27.5 cm	 1 1	3
			5

Question	Mark Scheme	Sub Mark	Total Mark
3 (a)	Gamma	1	1
(b) (i)	Q neutral	1	
(ii)	P and R has charges // P has positive charge // R has negative charge	1	2
(c) (i)	141	1	

(ii)	$E = mc^2$ $= (2.988 \times 10^{-28})(3 \times 10^8)^2$ $= 2.6892 \times 10^{-11}$ J	 1 1	 3
			6

Question	Mark Scheme	Sub Mark	Total Mark
4 (a) (i)	Thermal equilibrium is a condition where the net rate of heat transfer between two bodies that are in contact is zero // same temperature	1	
(ii)	The heat is transferred The net rate of heat transfer is zero// Temperature is equal	1 1	3
(b) (i)	$m_w c_w (95 - \theta) = m_e c_e (\theta - 27)$ $0.6 (4200)(95 - \theta) = 0.05(3320)(\theta - 27)$ $\theta = 90.78\ ^0C$	1 1 1	4
(ii)	No heat loss to the surrounding.	1	
			7
5 (a) (i)	Diagram 5.1: convex lens, Diagram 5.2: concave lens	1	
(ii)	Diagram 5.1: parallel rays converged after passing through the lens while, Diagram 5.2: parallel rays diverged after passing through the lens	1	3
(iii)	The focal point of the lens in Diagram 5.1 is the other side of the incident rays//The position in Diagram 5.1 at the right //the focal point of the lens in Diagram 5.2 is at the same side as the incident rays // the position focal point in Diagram 5.2 at the left	1	
(b) (i)	If the lens is a convex lens, the light converges after pass through the lens or vice versa	1	
(ii)	If the lens is a convex lens, the focal point real and if the lens is a concave lens, the focal point virtual.	1	2
(c) (i)	The image that can be formed on the screen	1	
(ii)	Magnified inverted	2	3
Jumlah			8

Question	Mark Scheme	Sub Mark	Total Mark
6 (a)	A region where a charged body experiences electrical force	1	1
(b)	When the polystyrene ball is brought to touch plate P, the polystyrene ball received *negative* charges It is *repelled* and moves to plate Q. When it touches plate Q, it is *positively* charged and it is *repelled/attracted* to plate P. Note: Any two correct – 1 mark All correct -2 marks	1 1	2
(c) (i)	Potential difference in Diagram 6.2 > Diagram 6.1 // vice-versa	1	3
(ii)	Equal	1	
(iii)	Strength of electric field in Diagram 6.2 > Diagram 6.1 // vice-versa	1	
(d) (i)	When potential difference between metal plates increases, the strength of electric field increases // vice-versa	1	**2**
(ii)	When strength of electric field increases, speed of oscillation increases // vice-versa	**1**	
			8

Question	Mark Scheme	Sub Mark	Total Mark
7 (a)	Pressure Law	1	1
(b) (i)		1	2
(ii)	-273	1	

(c)	$\frac{1.55 \times 10^5}{(12+273)} = \frac{P_2}{(37+273)}$ P_2 = (1.55 x 10 5)(310) 285 $P_2 = 1.69 \times 10^5 Pa$	1 1	2
(d)	Kinetic energy increased // Rate of collision between particles and the wall increase	1	1
(e) (i)	-Thicker wall - withstand higher pressure// wall not easily broken	1 1	4
(ii)	-More number of lock - Lid not easily open	1 1	
			10

Question	Mark Scheme	Sub Mark	Total Mark
8 (a)	Rate of charge flow	1	1
(b)	Cut magnetic flux //To produce induced current	1	1
(c)	1. current flows through the coil P produced magnetic field 2. cut by coil Q 3.Induced e.m.f across coil Q is produced//current	1 1 1	3
(d) (i)	1.Bigger diameter 2.Lower resistance/higher current flow	1 1	6
(ii)	1.More number of turns 2.Higher magnetic field/higher rate of cutting of magnetic flux	1 1	
(iii)	1.Copper 2.Lower resistance/higher current flow	1 1	
(e)	P	1	1
			12

Question	Mark Scheme	Sub Mark	Total Mark
9 (a)	The ratio of sin i to sin r // the ratio of the speed of light in vacuum or air to the speed of light in medium.	1	1
(b)	1. The incident angles in both prisms are the same. 2. The refractive index of glass is higher than the refractive index of water. 3. The critical angle of glass is smaller than the critical angle of water. 4. The higher the refractive index the smaller the	1 1 1	

<table>
<tr><td></td><td>critical angle.

5. If the incident angle > the critical angle of glass will result in total internal reflection // while water which has bigger critical angle will result in refraction of light .</td><td>1

1</td><td>

5</td></tr>
<tr><td>(c)</td><td>1. Diamond has higher refractive index than glass.

2. The critical angle of diamond is much smaller than the critical angle of glass.

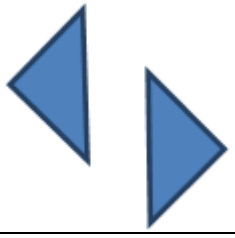
3. Most of the rays that entered diamond will be total internally reflected that makes diamond sparkles.

4. Most of the rays that entered glass will be refracted but not reflected,</td><td>1

1

1

1</td><td>

4</td></tr>
<tr><td>(d)</td><td><table>
<tr><th>Suggestion /Design/Way</th><th>Explanation / Reason</th></tr>
<tr><td>2 prisms 45-90-45 // from drawing</td><td>To get total internal reflection</td></tr>
<tr><td>Arrangement of prisms:
  </td><td>To make the image upright and not laterally inverted</td></tr>
<tr><td>Long focal length for objective lens and short focal length for eye lens</td><td>To form a magnified image</td></tr>
<tr><td>Big diameter of lens</td><td>More light can enter the instrument</td></tr>
<tr><td>The outer body made from lower density material</td><td>Light and easy to carry.</td></tr>
<tr><td>The body made from strong material</td><td>Does not break easily.</td></tr>
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2</td><td>Max

10</td></tr>
<tr><td></td><td></td><td></td><td>20</td></tr>
</table>

<table>
<tr><td>10 (a)</td><td>A beam of fast moving electron</td><td>1</td><td>1</td></tr>
<tr><td>(b)</td><td>The voltage supplied in Diagram 10.1 is smaller than that in Diagram 10.2

The strength of electric field in Diagram 10.1 is smaller than that in Diagram 10.2.

The deflection of the cathode ray in Diagram 10.1 is smaller than that in Diagram 10.2

When the value of voltage supplied is smaller, the strength of electric field is lower

The smaller the strength of electric field, the less the deflection of the cathode ray</td><td>1

1

1

1

1</td><td>5</td></tr>
<tr><td>(c)</td><td>When the cathode is heated, electrons are emitted on the surface // thermionic emission.
Electrons then accelerate/ attracted to anode
The electrons travel in straight line
The electrons / cathode ray stopped by the Maltese Cross produce shadow.</td><td>1

1
1
1</td><td>4</td></tr>
<tr><td>(d) (ii)</td><td><table><tr><th>Suggestion</th><th>Reason</th></tr><tr><td>AND gate</td><td>To activate the fire extinguisher when the the smoke detector detect smoke and the temperature is high</td></tr><tr><td>OR gate</td><td>To activate the device X when it detects smoke or detect high temperature</td></tr><tr><td>Relay switch</td><td>To switch on the secondary circuit with higher voltage supplied</td></tr><tr><td>Siren/ Alarm</td><td>To produce sound</td></tr><tr><td>Thermistor</td><td>Sensitive to heat // resistance varies with temperature</td></tr></table></td><td>2

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2</td><td>10</td></tr>
<tr><td colspan="3">Jumlah</td><td>20</td></tr>
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<table>
<tr><th>Question</th><th>Mark Scheme</th><th>Sub Mark</th><th>Total Mark</th></tr>
<tr><td>11(a)(i)</td><td>Bernoulli’s principle states that the pressure of a moving liquid decreases as the speed of the fluid increases and vice versa.</td><td>1</td><td>1</td></tr>
<tr><td>(a)(ii)</td><td>• The speed of air at the upper part of the roof is higher / The speed of air at the lower part of the roof is lower
• The pressure at upper part is lower / the pressure at lower part is higher
• The difference in air pressure between upper part and lower part of the wing produces
• Lifting force // F = difference P x A</td><td>1
1
1
1</td><td>4</td></tr>
<tr><td>(b)(i)</td><td>W = mg
= (10 000)(10)
= 100 000 N</td><td>1</td><td rowspan="3">5</td></tr>
<tr><td>(b)(ii)</td><td>F = difference P x A
= (3 000)(100)
= 300 000 N</td><td>1
1</td></tr>
<tr><td>(b)(iii)</td><td>Net force, F = 300 000 -100 000
= 200 000 N</td><td>1
1</td></tr>
<tr><td>(c)</td><td><table>
<tr><th>Aspects</th><th>Explanations</th></tr>
<tr><td>Size of air hole is big</td><td>More air can flows into Bunsen burner</td></tr>
<tr><td>Size of gas nozzle is small</td><td>Produce high velocity / lower pressure</td></tr>
<tr><td>Size of base is wider</td><td>More stable</td></tr>
<tr><td>Has moveable collar</td><td>To control the amount of air entering the Bunsen burner through the air hole</td></tr>
<tr><td>Chosen design: R</td><td>Because R has big size of air hole, small size of gas nozzle, wider base and has moveable collar.</td></tr>
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2</td><td>10</td></tr>
<tr><td></td><td colspan="2">JUMLAH</td><td>20</td></tr>
</table>

<table>
<tr><th>Question</th><th>Mark Scheme</th><th>Sub Mark</th><th>Total Mark</th></tr>
<tr><td>12(a)(i)</td><td>Frequency of any oscillating system in the absence of any other forces.</td><td>1</td><td rowspan="4"></td></tr>
<tr><td>(ii)</td><td>Forced oscillation</td><td>1</td></tr>
<tr><td>(iii)</td><td>Pendulum B
because the natural frequency of B is the same as the natural/ driving frequency of X.</td><td>1
1</td></tr>
<tr><td>(iv)</td><td>Resonance</td><td>1</td><td>5</td></tr>
<tr><td>(b)</td><td>
<table>
<tr><th>Characteristics</th><th>Reason</th></tr>
<tr><td>Large diameter of the parabolic disc</td><td>that more signals are received</td></tr>
<tr><td>Type of wave is microwave</td><td>frequency is high.</td></tr>
<tr><td>Distance of signal receiver from parabolic disc is same as focal length</td><td>signals are focused at the receiver.</td></tr>
<tr><td>Height of the disc is high</td><td>signal is not blocked.</td></tr>
<tr><td>R is chosen</td><td>diameter of the parabolic disc is large, transmits microwave, distance of signal receiver from the disc is the same as the focal length and height of the parabolic disc is high.</td></tr>
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</td><td>2
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2</td><td>10</td></tr>
<tr><td>(c)(i)</td><td>$s = \frac{vt}{2}$
$= \frac{1\,500 \times 0.12}{2}$
$= 1\,500 \times 0.06$
$= 90$ m</td><td>1
1
1</td><td></td></tr>
<tr><td>(ii)</td><td>$\lambda = \frac{v}{f}$
$= \frac{1\,500}{25\,000}$
$= 0.06$ m</td><td>1
1</td><td>5</td></tr>
<tr><td></td><td></td><td></td><td>20</td></tr>
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