

SMJK YU HUA KAJANG  
MARKING SCHEME  
PEPERIKSAAN PERTENGAHAN TAHUN 2014  
PHYSICS PAPER 2 FORM 4

NO	MARKING CRITERIA	MARKS	
		SUB	TOTAL
<b>No 1</b>			
1 (a)	Systematic	1	
(b) (i)	+ 0.03 cm	1	
(b) (ii)	To measure the internal diameter	1	
(b) (ii)	Actual Reading: 4.38 cm – 0.03cm = 4.35cm	1	
<b>TOTAL</b>			<b>4</b>

No 2		SUB	MARKS
(a) (i)	Momentum is product of mass and velocity or Momentum = mass x velocity	1	
(b) (i)	Momentum before collision: $2.5 + 0 = 2.5 \text{ kgms}^{-1}$	1	
(ii)	Momentum after collision: $0.4 + 2.1 = 2.5 \text{ kgm}^{-1}$	1	
(c)	Compare: Total momentum before collision equals to total momentum after collision.	1	
(d) (i)	Principle of conservation of momentum	1	
<b>TOTAL</b>			<b>5</b>

No 3		SUB	TOTAL
(a)(i)	Initial Velocity $u = s/t = 0.5/0.02 = 25 \text{ cms}^{-1}$	1	
(ii)	Final velocity: $v = s/t = 0.8/0.02 = 40 \text{ cms}^{-1}$	1	
(iii)	$a = (v-u)/t = (40-25)/0.02 \times 3 = 250 \text{ cms}^{-2} = 2.50 \text{ ms}^{-2}$	1	
(b)	Uniform acceleration or constant acceleration	1	
(c)	Net Force $F=ma \rightarrow 1.5 \times 2.5 = 3.75 \text{ N}$	1	
(d)	New distance of ST = 1.6 cm	1	
<b>TOTAL</b>			<b>6</b>

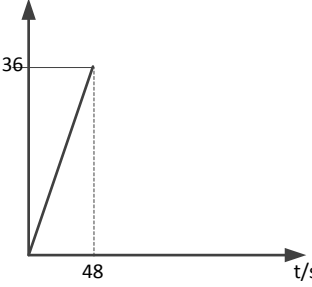
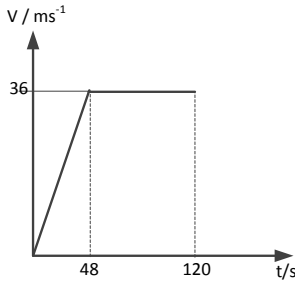
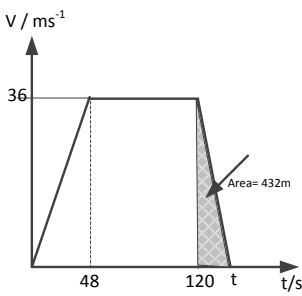
No 4		SUB	TOTAL
(a)	Force is defined as the rate of change of momentum	1	
(b)(i)	Horizontal Component: $F \cos\theta = 20 \times \cos 40 = 15.32 \text{ N}$	1	
(ii)	Verticle component : $F \sin\theta = 20 \times \sin 40 = 12.86 \text{ N}$	1	
(iii)	Reaction force acting on stroller $R = mg + F_y = 8 \times 10 + 12.86 = 92.86 \text{ N}$  <i>(No need to draw Free Body Diagram)</i>	1	
(c)	Acceleration : $F = ma \rightarrow a = F_x/m = 15.32 / 8 = 1.92 \text{ ms}^{-2}$	2	
(d)	Decreases	1	
<b>TOTAL</b>			<b>7</b>

No 5		SUB	TOTAL
(a)(i)	A to B : <u>Constant velocity //uniform velocity // acceleration = 0</u>	1	
(ii)	B to C: Uniform acceleration //constant acceleration	1	
(iii)	C to D : Uniform deceleration // constant deceleration	1	
(b)	Acceleration in 1 <sup>st</sup> 3 seconds $a = 5/5 = 1 \text{ ms}^{-2}$	2	
(c)	Total distance travelled $s = 12.5\text{m} + 35\text{m} + 22.5\text{m} + 15\text{m}$ $= 85\text{m}$	1 1	
(d)	Average velocity = total displacement / total time $v = 85/18 = 4.72 \text{ ms}^{-1}$	1	
		<b>TOTAL</b>	<b>8</b>

No 6		SUB	TOTAL
(a)(i)	$F_w = F_R$ If in words also accept answer	1	
(ii)	$F_w > F_R$ If in words also accept answer	1	
(iii)	$F_w < F_R$	1	
(b)	$F = ma$ $F_w - F_R = ma$ $20000 - F_R = 1500 \times 5$ $F_R = 20000 - 7500 = 12,500\text{N}$	2	
(c)	Impulsive Force = $(mv - mu)/t$ <b>Note: <math>110 \text{ kmh}^{-1}</math> is converted to <math>30.556 \text{ ms}^{-1}</math></b> Impulsive Force = $(0 - 1500 \times 30.556) / 0.5$ $= 91668 \text{ N}$ or $91667 \text{ N}$	1 1	
(d)	2 ways to reduce the impulsive force  Way 1: Soft front bumpers Way 2: Crumple zone at the front bonnet	1 1	
		<b>TOTAL</b>	<b>9</b>



No 8		SUB	TOTAL
(a)	X: Meter ruler Y: Vernier Caliper Z: Micrometer Screw gauge	1 1 1	3
(b)	Average  X : 1.3 cm ( <i>If 1.26 or 1.27 is wrong</i> ) Y: 1.23 cm Z: 1.204 cm	2	
(c)	Accurate instrument is : Z	1	
(d)(i)	Passengers are thrown forward	1	
(ii)	Inertia	1	
(iii)	1. Anti inertia Seatbelts 2. Air bags 3. ABS Brakes 4. Crumple zone 5. Head rest 6. Bumpers 7. Shatter proof windscreen <i>(Select any 3)</i>	3	
(iv)	Higher speed, higher frictional force Value: > 30,000 N <i>(Any value greater than 30000N accept)</i> <i>Both answers right, then award 1 mark</i>	1	
<b>TOTAL</b>			<b>12</b>

No 9		SUB	TOTAL
(a) (i)	Momentum is the product of mass and velocity or $p=mv$ where $m$ : mass (kg) and $v$ is the velocity ( $\text{ms}^{-1}$ )	1	1
(ii)	<ul style="list-style-type: none"> <li>○ Total momentum in diagram 9.1 is zero</li> <li>○ Total in Diagram 9.2 <math>m_1v_1 + m_2v_2 = 60 \times 5 + 50(-6) = 0</math></li> <li>○ Total momentum before and after boy jumped to jetty are equal</li> <li>○ Principle of conservation of momentum</li> </ul>	1 1 1 1	4
(b) (i)	 <p data-bbox="332 798 852 903">Straight line through the (0,0) Values are marked correctly on axis labels on axis and units of physical quantity</p> <p data-bbox="332 934 755 966"><b>No units in axis label – less 1 mark</b></p>	1 1 1	3
(ii)	Acceleration of train: Gradient of graph $a = 36/48$ $= 0.75 \text{ ms}^{-2}$	1 1	2
(c)(i)			2
(ii)	Total distance travelled is the area under the v-t graph $\text{Area} = \frac{1}{2} \times (120 + 72) \times 36 = 3456 \text{ m}$		2
(d) (i)	 <div data-bbox="673 1528 1201 1680" style="border: 1px solid black; padding: 5px;"> <p>(i) Area of shaded part is 432m <math>432 = \frac{1}{2} (t-120) \times 36</math> <math>\rightarrow (t-120) = 24 \text{ sec}</math></p> </div> <div data-bbox="673 1743 1201 1837" style="border: 1px solid black; padding: 5px;"> <p>(ii) Deceleration = gradient <math>a = 36/24 = -1.5 \text{ ms}^{-2}</math></p> </div>	2  2  2	6
(iii)	Acceleration is the rate of change of velocity	2	
<b>TOTAL</b>			<b>20</b>

No 10		SUB	TOTAL																		
(a) (i)	Impulsive Force	1	1																		
(ii)	1. The surface of metal block is hard 2. The time of impact is shorter 3. The impulsive force is bigger	1 1 1	3																		
(iii)	Drop on a soft surface // drop on a pile of sand/mud		1																		
(b) (i)	<table border="1"> <thead> <tr> <th>Specification</th> <th>Characteristic</th> <th>Explanation</th> </tr> </thead> <tbody> <tr> <td>Mass of pile driver</td> <td>Bigger mass of load</td> <td>Produce a bigger force during impact</td> </tr> <tr> <td>Height of pile driver</td> <td>Higher position of pile drive</td> <td>Produce a higher velocity when striking the pile</td> </tr> <tr> <td>Pile Material</td> <td>Steel Pile is used</td> <td>Steel is stronger and stiffer. Is not brittle and does not crack on impact</td> </tr> <tr> <td>Shape of the base pile</td> <td>Shape must be pointed</td> <td>Produce a higher pressure // easy to push the pile into the ground</td> </tr> <tr> <td>Choose</td> <td>Q is chosen</td> <td>Because piling system Q has big mass of pile driver, position of pile driver is high and steel piles are use with sharp pointed base</td> </tr> </tbody> </table>	Specification	Characteristic	Explanation	Mass of pile driver	Bigger mass of load	Produce a bigger force during impact	Height of pile driver	Higher position of pile drive	Produce a higher velocity when striking the pile	Pile Material	Steel Pile is used	Steel is stronger and stiffer. Is not brittle and does not crack on impact	Shape of the base pile	Shape must be pointed	Produce a higher pressure // easy to push the pile into the ground	Choose	Q is chosen	Because piling system Q has big mass of pile driver, position of pile driver is high and steel piles are use with sharp pointed base	2 2 2 2 2	10
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(c)(i)	W = mg = (50) (10) = 500 N		1																		
(ii)	Velocity of metal pile just before it hits the pile  $v^2 = u^2 + 2gh$ $= 0 + 2 (10) (20)$ $= 400$ $\rightarrow v = 20 \text{ ms}^{-1}$	1  1	2																		
(iii)	Impulsive Force $F = \frac{mv - mu}{t}$ $= \frac{50(0-20)}{0.5}$  $= 2000 \text{ N}$	1  1	2																		
		<b>TOTAL</b>	<b>20</b>																		