

# MOMENTUM MARK SCHEMES 1

## Question 1

Question	answers	extra information	mark
a)	4 (m/s)	1 mark for correct transformation of either equation 1 mark for correct substitution with or without transformation 1 mark for correct use of 0.6N max score of 2 if answer is incorrect	3
b)	greater change in momentum or greater mass of air (each second) or increase in velocity of air force upwards increased or force up greater than force down	accept speed for velocity lift force is increased do not accept upthrust accept weight for force down	1  1
c)	<input type="checkbox"/> increase the time to stop <input type="checkbox"/> decrease rate of change in momentum or same momentum change <input type="checkbox"/> reducing the force on the toy	accept reduced deceleration/ acceleration do not accept answers in terms of the impact/ force being absorbed do not accept	1 1 1

		answers in terms of energy transfer do not credit impact is reduced	
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## Question 2

Question	answers	extra information	mark
a)i	210  kg m/s or Ns	allow 1 mark for correct substitution i.e. $35 \times 6$ do not accept n for N accept 210 000g m/s for 3 marks	2  1
a)ii)	840	if answer given is not 840 accept their (a)(i) in kg m/s $\div 0.25$ correctly calculated for both marks allow 1 mark for correct substitution i.e. $210 \div 0.25$ or their (a)(i) $\div 0.25$	2
b)	increases the time to stop decreases rate of change in momentum reduces the force (on the child)	accept increases impact time do not accept any references to slowing down time accept reduces acceleration/ deceleration	1 1 1

		reduces momentum is insufficient	
c)	<p>any two from:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> insufficient range of tests/ thicknesses for required cfh</li> <li><input type="checkbox"/> (seems to be) some anomalous data</li> <li><input type="checkbox"/> (repeats) needed to improve reliability (of data)</li> <li><input type="checkbox"/> need to test greater range/variety of dummies</li> </ul>	<p>accept need data for thicknesses above 80 mm/ cfh 2.7m</p> <p>not enough tests is insufficient</p> <p>accept data/ results are unreliable</p> <p>do not accept maybe systematic/ random error</p> <p>do not accept reference to precision</p> <p>accept children for dummies</p> <p>accept specific factor such as weight/height/size</p>	2
d)	Tyres do not need to be dumped/ burned/ less land-fill/ saves on raw materials	<p>accept less waste</p> <p>do not accept recycling on its own</p>	1

### Question 3

Question	answers	extra information	mark
a)i)	<p>momentum before = momentum after</p> <p>or</p> <p>(total) momentum stays</p>	<p>accept no momentum is lost</p> <p>accept no momentum is</p>	1

	the same	gained	
a)ii)	an external force acts (on the colliding objects)	accept colliding objects are not isolated	1
b)i)	9600 kg m/s or Ns	allow 1 mark for correct calculation of momentum before or after ie 12000 or 2400 or correct substitution using change in velocity = 8 m/s ie $1200 \times 8$ this may be given in words rather than symbols	2 1
b)ii)	3 or their (b)(i) $\div$ 3200 correctly calculated	allow 1 mark for stating momentum before = momentum after or clear attempt to use conservation of momentum	2