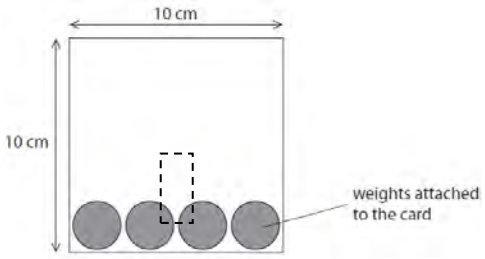
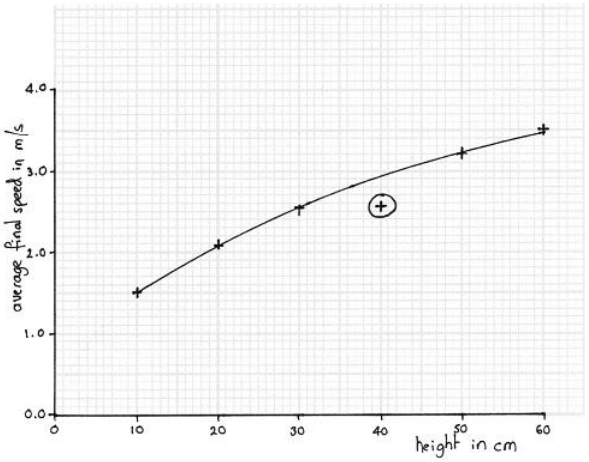
Question number	Answer	Notes	Marks
3 (a)	X drawn at the horizontal centre AND <u>below</u> the vertical centre (by eye); i.e.  	allow any clear symbol in place of the X X must be in the area marked by the dashed lines	1
(b)	A – the final speed of the card; The only correct answer is A B is not correct because it's the independent variable C is not correct because it's a control variable D is not correct because it's a control variable		1
(c) (i)	correct value; given to 2 decimal places; e.g. 3.3966... 3.40	allow any value given to 2 d.p. 3.39 gains 1 mark only	2

<table>
<tr>
<td>(ii)</td>
<td>suitable linear scale chosen (>50% of grid used);
axes labelled with quantities and unit;
plotting correct to nearest half square (minus one for each plotting error);;

 
</td>
<td>ignore orientation

ignore final point
i.e. two plotting errors = no marks for plotting

<table>
<tr><th>height in cm</th><th>average final speed in m/s</th></tr>
<tr><td>10.0</td><td>1.39</td></tr>
<tr><td>20.0</td><td>1.97</td></tr>
<tr><td>30.0</td><td>2.43</td></tr>
<tr><td>40.0</td><td>2.45</td></tr>
<tr><td>50.0</td><td>3.09</td></tr>
<tr><td>60.0</td><td>3.40</td></tr>
</table>
</td>
<td>4</td>
</tr>
<tr>
<td>(iii)</td>
<td>(40.0,2.45) identified clearly;</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>(iv)</td>
<td>line (curve) of best fit acceptable, ignoring anomalous point;</td>
<td>i.e. smooth curve within 1 small square of each point
ignore parts of curve outside plotted points if extrapolated</td>
<td>1</td>
</tr>
<tr>
<td>(v)</td>
<td>idea that (average final) speed increases with height;

idea that relationship is non-linear;</td>
<td>allow RA
ignore ‘positive correlation’
ignore references to line being curved
allow
not proportional
allow idea of gradient changing</td>
<td>2</td>
</tr>
</table>

(d)	any two of: MP1. move scale closer to card / use a ruler and place it nearer the light gate; MP2. measure height at eye level / parallax; MP3. drop using a clamp / eq; MP4. make sure scale is vertical / perpendicular to ground / use a set square; MP5. idea of accounting for zero error;	ignore references to precision, human error, repeats allow 'ruler' for scale allow idea of consistent release mechanism allow put light gate at zero	2

Total for question 3 = 14 marks