<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>4 (a)</td><td>one mark for each correct tick;;
if three ticks, 1 mark maximum
if four ticks, zero marks
<table><tr><th>Statement</th><th>Tick</th></tr><tr><td>negatively charged particles move from the cloth onto the balloon</td><td>✓</td></tr><tr><td>positively charged particles are rubbed off the balloon</td><td></td></tr><tr><td>negatively charged particles on the balloon are protons</td><td></td></tr><tr><td>the cloth becomes positively charged</td><td>✓</td></tr></table></td><td></td><td>2</td></tr>
<tr><td>(b) (i)</td><td>any 1 of:
(possibility of a) spark;
(possibility of an) explosion / fire / eq;</td><td>ignore references to shock

allow ‘ignite the petrol’</td><td>1</td></tr>
<tr><td>(ii)</td><td>earthing / grounding the {tank / pipe};</td><td>allow hose for pipe
allow can for tank
allow description of earthing e.g. ‘connecting tank/pipe to ground (with a wire)’</td><td>1</td></tr>
<tr><td>(c)</td><td>(granules) repel;

(because) charge on the granules is all the same / eq;</td><td>ignore references to attraction to container</td><td>2</td></tr>
</table>

Total for question 4 = 6 marks

Question number	Answer	Notes	Marks
7 (a) (i)	momentum = mass x velocity;	in words or accepted symbols e.g. p = m x v	1
(ii)	substitution; evaluation; unit; e.g. (p =) 0.000 035 x 8.8 (p =) 0.00031 kg m/s	-1 for power of ten (POT) error kg m/s or Ns 3.08×10^{-4}, 0.000308 N s allow 0.308 g m/s for 3 marks	3
(b) (i)	gravitational (potential) energy = mass x g x height;	allow in standard symbols or in words e.g. GPE = m x g x h reject 'gravity' for g	1
(ii)	substitution; evaluation; e.g. (GPE =) 0.000 035 x 10 x 1200 (GPE =) 0.42 (J)	allow use of g=9.8 / 9.81 420 (J) gets 1 mark max. allow 0.4116, 0.41202	2
(iii)	same answer as (b)(ii);	allow 0.42 (J)	1
(c) (i)	KE = ½ x m x v^2;	allow in accepted symbols or words	1
(ii)	substitution; rearrangement; evaluation; e.g. $0.42 = \frac{0.000\,035 \times v^2}{2}$ $v^2 = 24000$ (v =) 155 (m/s)	ECF from (b)(iii) answer must be seen to at least 3 s.f. award 2 marks max. for reverse calculation of KE = 0.394 (J) 154.919…	3
(iii)	any 2 of: MP1. (raindrop reaches) terminal velocity; MP2. drag / air resistance / friction acts; MP3. energy lost to surroundings / eq.; MP4. (resultant) downwards force is less;	 ignore unqualified "it loses energy" allow 'acceleration is less'	2

Total for question 7 = 14 marks