

Question Number	Answer	Mark
<b>12a</b>	<p><u>kinetic</u> energy is not conserved (1)</p> <p><b>Or</b></p> <p><u>kinetic</u> energy before collision not equal to <u>kinetic</u> energy after collision</p> <p><b>Or</b></p> <p><u>kinetic</u> energy before collision greater than <u>kinetic</u> energy after collision</p>	<b>1</b>
<b>12b</b>	<p>(<math>p = mv</math> and mass of the balls is the same) so velocity (to scale) is proportional to momentum</p> <p><b>Or</b></p> <p>(conservation of momentum) (vector) sum of momentum after collision = momentum before collision (1)</p> <p>Velocities (drawn to scale) will form a triangle</p> <p><b>Or</b></p> <p>(a scaled vector diagram can show) (vector) sum of velocity after collision = velocity before collision (1)</p>	<b>2</b>
<b>12c</b>	<p>Straight line with arrow labelled for any of white ball before collision, white ball after collision, black ball (accept velocity values) (1)</p> <p>Evidence of correct use of a recognisable scale (1)</p> <p>Vectors drawn correctly end to end (e.g. white before collision is longest line) (1)</p> <p>Correct arrows on vectors (such that white before = resultant of white and black after) (Dependent on MP3) (1)</p> <p>Angle of black ball with initial white ball line measured as <math>50^\circ</math> with consistent conclusion</p> <p>Angle of black ball with final white ball line measured as <math>95^\circ</math> with consistent conclusion</p> <p>If drawn as angle-side-angle, velocity of white ball after collision = <math>0.92 \text{ m s}^{-1}</math>, with consistent conclusion</p> <p>If drawn as angle-side-angle, velocity of black ball after collision = <math>0.69 \text{ m s}^{-1}</math>, if supported by calculation, with consistent conclusion (1)</p> <p>Allow MP5 for correct value <math>50^\circ</math> (<math>49.8^\circ</math>) determined by calculation and consistent conclusion</p> <p>Angle tolerance <math>\pm 4^\circ</math>, length tolerance <math>\pm 0.05 \text{ m}</math></p> <p><u>Example of Diagram</u></p>	<b>5</b>