Edexcel Physics A-level

CP10 - Use ICT to Analyse Collisions Between Small Spheres

Practical Flashcards

What is momentum?

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An object's momentum is the product of its mass and velocity. Momentum is always conserved in a collision.

How could the diameter of a sphere be measured?

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The diameter of a sphere could be measured using a screw gauge micrometer or a vernier calliper.

How can you determine whether momentum is conserved using momentum vectors?

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You can construct a momentum vector triangle. If the vectors form a closed triangle, momentum is conserved.

When using the velocity overlay feature on Tracker, how can you analyse momentum?

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The velocity overlay feature will produce velocities. To convert these into momentums, you need to multiply by mass.

What two pieces of information about the velocities do you need to record?

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Velocity is a vector quantity and so both the magnitude and direction need to be recorded. The direction can be expressed as an angle.

Why should the surface be slightly angled?

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There will be friction between the spheres and the surface. By tilting the surface at an angle, this can be compensated for.

Why may glass marbles not be suitable for this experiment?

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The edges of a glass marble may not be clear when recorded on a camera. This may reduce the accuracy of your results.

How should the camera be positioned?

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The camera must be positioned so that it has a wide enough field of view to catch the tracks of the spheres both before and after the collision.

What is an elastic collision?

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An elastic collision is one in which kinetic energy is conserved.

How can you determine if momentum is conserved through calculation?

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The x and y planes should be considered separately. The initial momentum should equal the final momentum in both planes if momentum is conserved.

$$m_1U_{1x} + m_2U_{2x} = m_1V_{1x} + m_2V_{2x} \text{ (likewise for y)}$$

How can the uncertainty in your velocity readings be calculated?

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The uncertainty in each velocity value can be considered to be equal to half the range of the repeat readings.

If you know the separate x and y components of velocity, how can the overall velocity be calculated?

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Pythagoras theorem can be used:

$$V = \sqrt{V_x^2 + V_y^2}$$

If you know the separate x and y components of velocity, how can the direction of the overall velocity be calculated?

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Trigonometry can be used to obtain the angle.

$\tan\theta = V_y/V_x$