

Describing movement and average speed

Grade 6 science (Year 7 · Class 6) · Lab answers

The sample data give a speed close to 0.38 m/s for every distance and a straight line through the origin. Compare your own values with these answers and explain any differences using the uncertainty in timing.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS2-2

Question 1 Mean time

The three times add up to $3.95 + 3.91 + 3.99 = 11.85$ s. Mean = $11.85 \div 3 = \mathbf{3.95}$ s.

Question 2 Speeds

$0.50 \div 1.31 = \mathbf{0.382}$ m/s; $1.00 \div 2.60 = \mathbf{0.385}$ m/s; $1.50 \div 3.95 = \mathbf{0.380}$ m/s; $2.00 \div 5.24 = \mathbf{0.382}$ m/s.

Question 3 Graph

The points lie close to a **straight line through the origin**. This shows that the car moves at an almost constant speed once it leaves the ramp.

Question 4 Gradient

Gradient = $2.00 \div 5.24 = \mathbf{0.382}$ m/s. The mean of the four speeds is $(0.382 + 0.385 + 0.380 + 0.382) \div 4 = 1.529 \div 4 = 0.382$ m/s, so the two values agree.

Question 5 Timing error

$0.1 \div 1.31 \times 100 = \mathbf{7.6}$ %; $0.1 \div 5.24 \times 100 = \mathbf{1.9}$ %. The longer distance gives the smaller percentage uncertainty, so it is better.

Question 6 Prediction

$t = d \div v = 3.00 \div 0.382 = 7.85$ s, so about **7.9** s.

Question 7 Improvements

Use a light gate or phone video with a frame counter instead of a hand-held stopwatch, and repeat more times, ignoring any result far from the others. Using a longer track also reduces the effect of reaction time.