WJEC England Physics GCSE

Specified Practical

Acceleration

SP4.2 Determination of the acceleration of a moving object

Equipment

- Ramp
- Ball
- Metre ruler
- Stopwatch
- Clamp stand, clamp and boss

Diagram

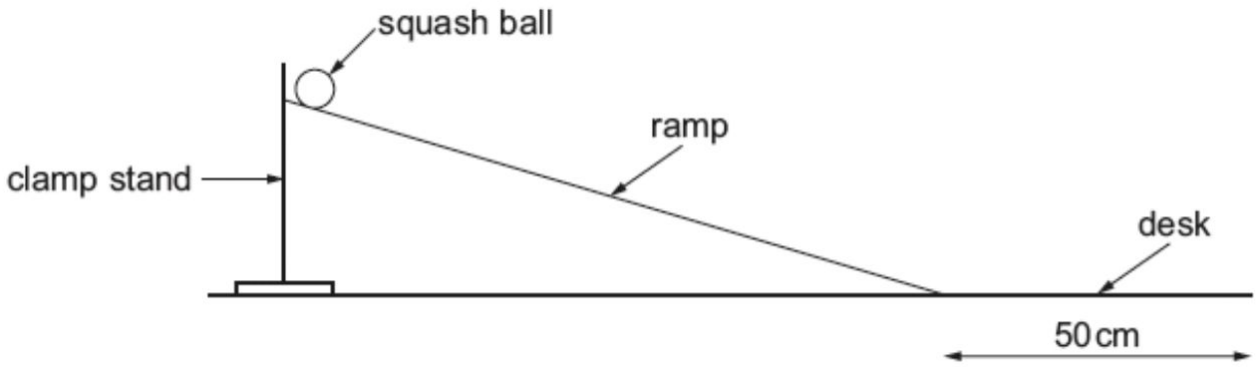

Image: Eduqas

Method

1. Clamp the ramp in position so that the top is 10cm above the workbench.
2. Mark a point 50cm from the bottom of the ramp.
3. Release the ball from rest at the top of the ramp and start the stopwatch.
4. Press the lap button on the stopwatch as the ball reaches the bottom of the ramp.
5. When the ball reaches the 50cm mark, stop the stopwatch.
6. Record the time taken for the ball to travel down the ramp (this is the lap time) and the total time on the stopwatch.
7. Repeat the experiment, increasing the height of the ramp by 5cm intervals, up to 25cm.
8. Repeat the whole process two more times for reliable results and take the mean.
9. Calculate the time for the ball to travel from the bottom of the ramp to the 50cm mark.
    - Total time - lap time
10. Calculate the velocity of the ball at the bottom of the ramp.
    - $velocity = \frac{distance}{time}$, so in this case use the formula:
      $velocity = \frac{0.5}{mean\ time\ to\ travel\ 50cm\ along\ the\ bench}$
11. Calculate the acceleration of the ball.
    - $acceleration = \frac{velocity\ at\ the\ bottom\ of\ the\ ramp}{mean\ time\ to\ reach\ the\ bottom\ of\ the\ ramp}$
12. Plot a graph of ramp height against acceleration.