

Name:

Use the equation  $v^2 - u^2 = 2as$  to help you answer these questions.

1. A car begins at a speed of 3m/s and accelerates at 2m/s<sup>2</sup> over a distance of 40m, calculate the final speed of the car.

$$v = \sqrt{(2 \times 2 \times 40) + 3^2} = 13 \text{ m/s}$$

2. A runner reaches a speed of 3m/s after accelerating at 2.25m/s<sup>2</sup> whilst travelling a distance of 2m, calculate the initial speed of the runner.

$$u = \sqrt{3^2 - (2 \times 2.25 \times 2)} = 0 \text{ m/s}$$

3. A bicycle accelerates from rest to 6m/s in a distance of 50m, calculate the acceleration.

$$a = \frac{(6^2 - 0^2)}{(2 \times 50)} = 0.36 \text{ m/s}^2$$

4. A person who is initially stationary is eventually walking at a speed of 1.5m/s after an acceleration of 0.5 m/s<sup>2</sup>, calculate the distance it takes them to reach this speed.

$$s = \frac{(1.5^2 - 0^2)}{2 \times 0.5} = 2.25$$

5. A car reaches a speed of 15m/s after an acceleration of 2m/s<sup>2</sup> over a distance of 44m, calculate the initial speed.

$$u = \sqrt{15^2 - (2 \times 2 \times 44)} = 7 \text{ m/s}$$

6. A motorbike reaches a speed of 20m/s over 60m, whilst accelerating at 3m/s<sup>2</sup>, determine the bike's initial speed.

$$u = \sqrt{20^2 - (2 \times 3 \times 60)} = 6.32 \text{ m/s}$$

7. A person begins moving after initially being stationary, the person accelerates at 0.5m/s<sup>2</sup> over a distance of 9m, what is their final speed?

$$v = \sqrt{2 \times 0.5 \times 9 + 0^2} = 3 \text{ m/s}$$

8. A lorry pulls forward after initially being stationary, it takes the lorry 40m to reach a speed of 8m/s, calculate the lorry's acceleration.

$$a = \frac{(8^2 - 0^2)}{(2 \times 40)} = 0.8 \text{ m/s}^2$$

9. A child travels down a slide, at the top the child is initially at rest, at the bottom the child is travelling at a speed of 3m/s, the child's acceleration is 1m/s<sup>2</sup>, how long is the slide?

$$s = \frac{(3^2 - 0^2)}{(2 \times 1)} = 4.5 \text{ m}$$