

Equations of Motion

$$v = a t + u \quad s = u t + \frac{1}{2} a t^2 \quad v^2 = u^2 + 2 a s$$

1. A car starts from **rest** and accelerates uniformly for **8.0 s**. It reaches a final speed of **24 m/ s**.
- What is the **acceleration** of the car?
 - Calculate the **distance** travelled by the car.
 - What is the **average velocity** of the car?

2. A racing car can start from rest and **travel 600 m in 14 s**.
- What is its **acceleration** during this time?
 - Calculate the **final velocity of the car**.
 - How fast is this **final velocity in km/ h**?

3. A space-rocket is launched and accelerates uniformly from **rest** to **880 m/ s** in **2.5 s**.
- What is its **acceleration** during this time?
 - How fast is this **final velocity in km/ h**?

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4. A cyclist increases his velocity uniformly from **4.4 m /s** to **6.8 m/s** over a time interval of **5.8 s**.
- Calculate the **acceleration** of the cyclist during this time.
 - How far** does the cyclist travel whilst overtaking?
 - What is the **average velocity** of the cyclist during this time?

5. A ball rolls from **rest** down a stair that is **10.0 m** long. The acceleration of the ball is constant **2.5 m/ s²**.
- What is the **velocity** of the ball when it is **halfway** down the ramp?
 - What is the **final velocity** of the ball?
 - How long** does the ball take to roll the **first 5.0 m**?
 - How long** does the ball take to travel the **final 5.0 m**?

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6. A cyclist is travelling at a **constant velocity** of **15 m/s** when he passes a stationary bus. The bus starts moving just as the cyclist passes and **accelerates** at **1.5 m/s²**.
- When does the bus reach the **same velocity** as the cyclist?
 - What **distance** has the cyclist travelled before the bus catches up with the same speed?

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.