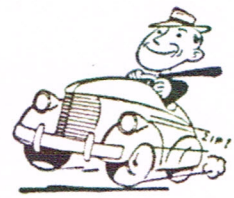
Acceleration Calculations



$a = \frac{v-u}{t}$ or $\frac{\text{Change in speed}}{\text{time}}$

1. Change in speed = 14 m/s; time taken = 2 seconds. Calculate the acceleration.

$\frac{14}{2} = 7 m/s^2$

2. A car accelerates from rest (zero speed) up to a speed of 30 m/s in 12 seconds. Calculate the acceleration.

$\frac{30-0}{12} = 2.5 m/s^2$

3. A cyclist in the Tour de France accelerates down a hill from 22 m/s to a speed of 37 m/s. This acceleration takes him 2 seconds. Calculate the acceleration.

$\frac{37-22}{2} = 7.5 m/s^2$

4. A rocket launching in the Ukraine accelerates upwards from rest to a speed of 12 km/s in 8 seconds. Calculate the acceleration.

$\frac{12-0}{8} = 1.5 km/s^2$ or $\times 1000 = 1500 m/s^2$

5. A cyclist accelerates from 0 m/s to 8 m/s in 3 seconds. What is his acceleration ? Is this acceleration higher than that of a car which accelerates from 0 to 30 m/s in 8 seconds?

(*) cyclist has a lower acceleration cyclist $\frac{8-0}{3} = 2.7 m/s^2$ car $\frac{30-0}{8} = 3.75 m/s^2$

6. A car advertisement states that a certain car can accelerate from rest to 70 km/h in 7 seconds. Find the car's average acceleration.

$\frac{7 sec}{(60 \times 60)} = 1.94 \times 10^{-3}$ hours $\frac{70-0}{1.94 \times 10^{-3}} = 36000 km/h^2$

7. A lizard accelerates from 2 m/s to 10 m/s in 4 seconds. What is the lizard's average acceleration?

$\frac{10-2}{4} = 2 m/s^2$

8. If a Ferrari, with an initial velocity of 10 m/s, accelerates at a rate of 50 m/s^2 for 3 seconds, what will its final velocity be?

$a = \frac{v-u}{t}$ $\therefore$ $a \times t + u = v$

$(50 \times 3) + 10 = 160 m/s$

9. Complete the following table:

Acceleration (m/s^2)	Starting speed (m/s)	Final speed (m/s)	Time taken (s)
2	2	6	2
2	5	25	10
10	4	24	2
8	5	85	10
4	0	8	2