

Newton's Laws

$$g = 10 \text{ m/s}^2$$

1 A 1520 kg car accelerates at a rate of 1.5 m/s^2 . What is the force on the car?

2 A catcher in a professional baseball game exerts a force of -65 N to stop the ball. If the baseball has a mass of 0.145 kg , what is the ball's acceleration as it is being caught?

3 A stone is dropped from rest to the ground. What is its speed

- a) after 1 s,
- b) after 2 s,
- c) after 5 s.

4 A stone is thrown downwards at 20 m/s . What is the speed

- a) after 1 s,
- b) after 2s,
- c) after 5 s.

5 We let an object fall from a height of 45 m . Determine the time it takes to reach the floor and the velocity it has at the moment of hitting the floor.

6 Work out the weights of each of the masses below,

- a) 2 kg,
- b) 5.5 kg,
- c) 0.4 kg,
- d) 28 kg.

7 An object weighs 125 N in a place where the acceleration caused by gravity is 10 m/s^2 . What is the mass of the object? What is the object's weight in a place where the acceleration caused by gravity is 9.65 m/s^2 ?

8 What would be the acceleration of a 28 tonne lorry if it takes 100 seconds to speed up from 36 km/h to 54 km/h. And what would be the force exerted by the lorry?

9 We throw an object vertically upwards with an initial velocity of 108 km/h. How long (time in seconds) will it take to reach its maximum height? What would be the value of this maximum height?

10 We throw a stone from a bridge with an initial velocity of 18 km/h, and it takes

2 s to reach the surface of the water. Calculate:

a) the velocity of the stone as it

hits the water,

b) the height of the bridge,

and c) the velocity of the stone after half a second of being thrown.

11 Determine the initial velocity of a ball which falls from a balcony, knowing that it takes 1.5 s to reach the ground with a final velocity of 108 km/h. What is the height of the balcony? What is the velocity of the ball after 1 second, from the time it falls from the balcony?

12 The same force is applied to two different objects. The resulting acceleration of the first object is 1.8 m/s^2 and of the second object is 9.8 m/s^2 . Explain which of the two objects have the greatest mass