
Relationship between force, mass and acceleration: F= ma

Newton's second law states that the " Acceleration of a body is directly proportional to the applied force and is inversely proportional to its mass."

F= ma

Hence:

Resultant force(N)= Mass(kg) X acceleration(m/s^2)

Example⟹F=ma

(c) Fig. 1.1 shows three forces acting on an object of mass 0.5 kg. All three forces act through the centre of mass of the object.

O/N/05-P3-Q1

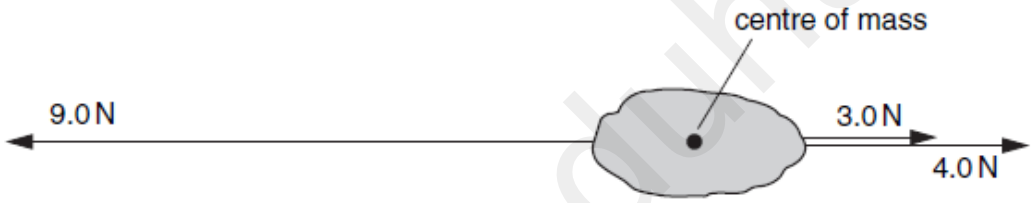

Fig. 1.1

Calculate

(i) the magnitude and direction of the resultant force on the object,

magnitude = ... direction ..... [2]

(ii) the magnitude of the acceleration of the object.

acceleration =..... [2]

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1 **(a)** A truck of mass 12 kg is rolling down a very slight incline as shown in Fig. 1.1.

O/N/08-P32

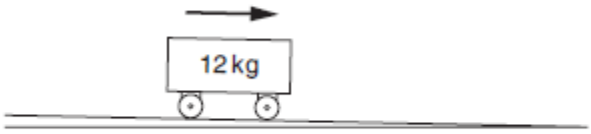

Fig. 1.1

The truck travels at constant speed.

Explain why, although the truck is on an incline, it nevertheless does not accelerate.

.....

..... [1]

B **(ii)** Write down an equation linking the resultant force on the truck and the acceleration of the truck.

[1]

(iii) The truck's acceleration is 2.0 m/s^2.

Calculate the resultant force on the truck.

resultant force = ... [2]

2 The rocket shown in Fig. 2.1 is about to be launched.

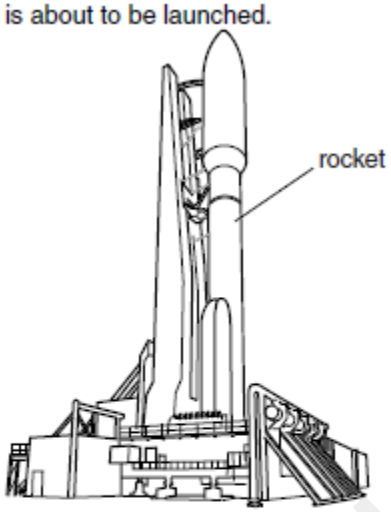

Fig. 2.1

The total mass of the rocket and its full load of fuel is 2.8×10^6 kg. The constant force provided by the rocket's motors is 3.2×10^7 N.

(a) Calculate

(i) the total weight of the rocket and the fuel,

weight = ... [1]

(ii) the resultant force acting on the rocket,

resultant force = ... [2]

(iii) the vertical acceleration of the rocket immediately after lift-off.

acceleration = ... [2]

2 Fig. 2.1 is a head-on view of an airliner flying at constant speed in a circular horizontal path. The centre of the circle is to the left of the diagram.

O/N/12-P32-Q2

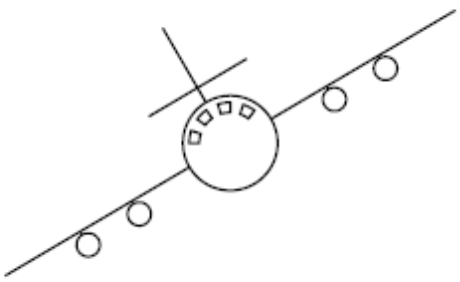

Fig. 2.1

(a) On Fig. 2.1, draw the resultant force acting on the airliner. Explain your answer.

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..... [3]