

Force And Laws OF motion

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Homework

1.) Force by which the box of books is pulled
= 100 N

Angle by which the box is pulled = 37°
above horizontal surface.

Mass of the box = 40.0 kg

Weight of the box = $M \times g$

$$= 40 \times 9.8$$

$$= 392 \text{ N}$$

Value of component of force tending to

lift off the crate = $F \sin \theta$

$$= F \times \sin 37$$

$$= 100 \times 3/5 = 60 \text{ N}$$

$$\text{Now, } W = N + F \sin \theta$$

$$= 392 = N + 60$$

$$= N = 332 \text{ N}$$

\therefore The normal force is 332 N.

$$= \text{Force dragging the box} =$$

$$= F \cos \theta$$

$$= F \cos 37$$

$$= \frac{100 \times 80}{100}$$

$$= 80 \text{ N}$$

$$\text{mass of box} = 40 \text{ kg}$$

$$\text{As, } F = m \times a$$

$$\therefore \text{Acceleration of box} = \frac{F}{m}$$

$$= \frac{80}{40} = 2 \text{ m/s}^2$$

Thus acceleration of box of books is 2 m/s^2 .

2a) Yes the Earth exerts a force on every particle near its surface.

b) This is a long-range force.

c) If mass of the body is m , then the value of gravitational force

$$= m \times g$$

$$= \text{As } g = 9.8 \text{ m/s}^2$$

$$= \text{Gravitational Force} = m \times g$$

$$= m \times 9.8 = 9.8m \text{ N}$$

The direction of force is towards the Earth.

d) i)

Value of $g = 9.8 \text{ m/s}^2$

mass of body A = 2 kg

Gravitational force on A by Earth = $m \times g$

$$= 2 \times 9.8 = 19.6 \text{ N}$$

mass of body B = 10 kg

Gravitational force on B by Earth.

$$= m \times g$$

$$= 10 \times 9.8 = 98 \text{ N}$$

ii) The acceleration of the falling bodies both A and B is constant as 9.8 m/s^2 .