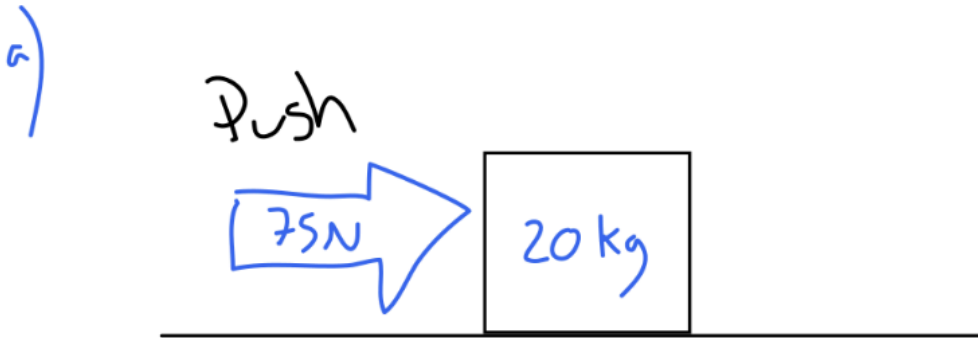


Section B

7. A box with a mass of 20 kg rests on a horizontal surface. The box has a force of 75 N applied to it in a direction parallel to the horizontal surface. Determine EACH of the following:
- (a) the acceleration of the box with no friction; (3)
 - (b) the acceleration of the box when a friction coefficient of 0.35 exists between the box and the surface. (5)



$$F = ma$$

$$\begin{matrix} \text{Force} & = & \text{mass} & \times & \text{accel} \\ (N) & & (kg) & & (m/s^2) \end{matrix}$$

$$F = 75 N$$

$$m = 20 kg$$

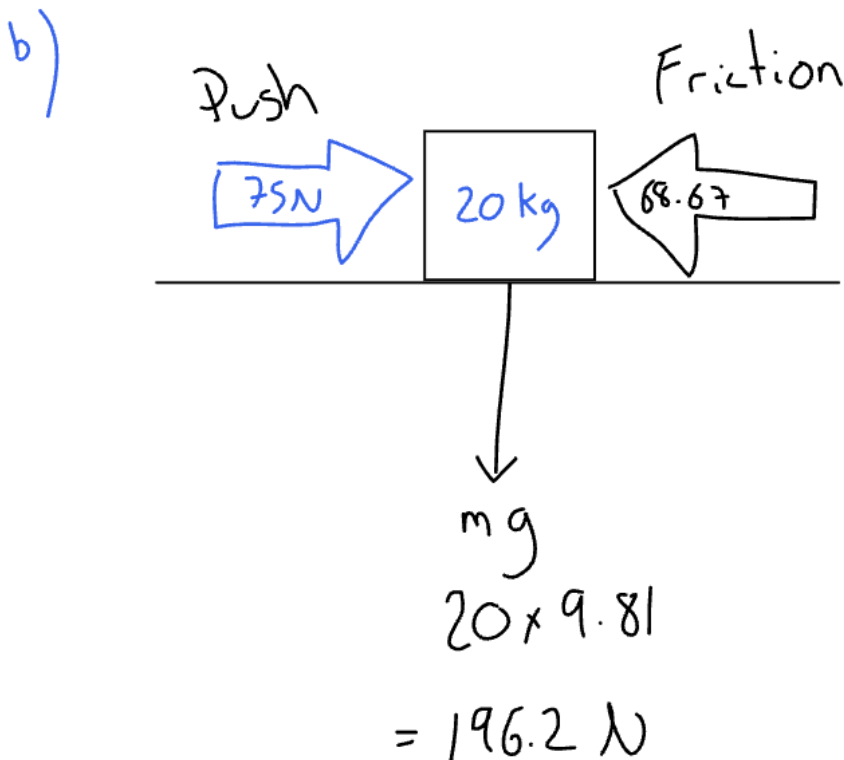
$$a = x$$

$$75 = 20x$$

$$\frac{75}{20} = x$$

$$\boxed{3.75 \text{ m/s}^2 = \text{accel}}$$

7. A box with a mass of 20 kg rests on a horizontal surface. The box has a force of 75 N applied to it in a direction parallel to the horizontal surface. Determine EACH of the following:
- the acceleration of the box with no friction; (3)
 - the acceleration of the box when a friction coefficient of 0.35 exists between the box and the surface. (5)



$$F_{\text{ric}} = \mu N$$

$$\text{Friction} = \text{coeff}_{\text{fric}} \times \text{Normal Force}$$

$$(N) = 0.35 (N)$$

$$0.35 \times 196.2$$

$$68.67 \text{ N}$$

Net Horizontal	
Push →	Friction ←
75	68.67
$75 - 68.67 = 6.33 \text{ N}$	

Accel

$$F = ma$$

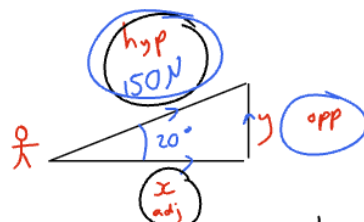
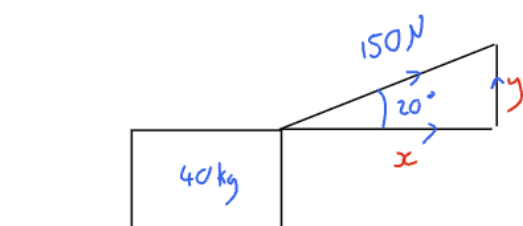
$$6.33 = 20 \times$$

$$\frac{6.33}{20} = x$$

$$\boxed{0.3165 \text{ m/s}^2} \text{ accel}$$

8. A box with a mass of 40 kg rests on a horizontal surface. The box has a force of 150 N applied to it at an angle of 20° to the horizontal surface. Determine EACH of the following:

- the acceleration of the box with no friction; (4)
- the acceleration of the box when a friction coefficient of 0.35 exists between the box and the surface. (4)



SOH
CAH
TOA

a) $F = ma$

$$140.9538 = 40x$$

$$\frac{140.9538}{40} = x$$

$$\boxed{3.5238 \text{ m/s}^2 \text{ Accel}}$$

Horizontal
CAH

$$\cos \theta = \frac{A}{H}$$

$$\cos 20 = \frac{x}{150}$$

$$150 \cos 20 = x$$

$$140.9538 \text{ N}$$

→
Push

Vertical
SOH

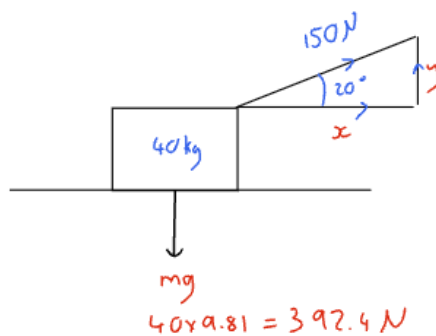
$$\sin \theta = \frac{O}{H}$$

$$\sin 20 = \frac{y}{150}$$

$$150 \sin 20 = y$$

$$51.303 \text{ N}$$

↑
up



Net Vertical

↓ - ↑

$$392.4 - 51.303$$

$$= 341.097 \text{ N}$$

$$F_{\text{fric}} = \mu N$$

$$0.35 \times 341.097$$

$$= 119.3839 \text{ N}$$

Net Horizontal

→ ←

Push - Fric

$$140.9538 - 119.3839$$

$$= 21.56985 \text{ N}$$

Accel

$$F = ma$$

$$21.56985 = 40 \times$$

$$\frac{21.56985}{40} = x$$

b)

$$0.539246 \text{ m/s}^2$$

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...ing the retardation period.

(3)

- ✓ 10. A box with a mass of 35 kg rests on a horizontal surface. The box has a force of 130 N applied to it in a plane parallel to the horizontal surface aligned with the centre of mass of the box.

Determine EACH of the following:

3.9143

- (a) the acceleration of the box with no friction;

(3)

0.767

- (b) the acceleration of the box when a friction coefficient of 0.3 exists between the box and the surface.

(5)

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10. A stationary body with a mass of 20 kg has a force of 70 N applied to it which causes acceleration in a horizontal plane.

Calculate EACH of the following:

- (a) the acceleration of the body, ignoring friction;

(4)

- (b) the acceleration of the body if the coefficient of friction is 0.25.

(4)

12. A stationary body with a mass of 50 kg has a force applied to it which causes acceleration on a horizontal plane. The force of 120 N is applied at an angle of 10° below the horizontal pulling the block. There is a coefficient of friction is 0.2 between the block and the surface.

Determine EACH of the following:

- (a) the effective normal force on the surface caused by the block;

(4)

- (b) the frictional force;

(3)

- (c) the acceleration of the block.

(3)