

6 minutes

- 1) Four skaters hold hands on the ice ($m_1 = 40$ kg, $m_2 = 60$ kg, $m_3 = 10$ kg, $m_4 = 50$ kg). The first skater holds a cable that pulls with a force of 500 N [L]. Find the acceleration of the skaters and the forces applied to their arms.

ANSWER: $a = 3.13 \text{ m/s}^2$ [L], $F_{12} = 375.6 \text{ N}$, $F_{23} = 187.8 \text{ N}$, $F_{34} = 156.5 \text{ N}$

3 minutes

3) You ($m=90\text{kg}$) are being pulled up a cliff on a rope at a rate of 5m/s^2 .

- a) What is the tension of the rope?
- b) If you were travelling at constant velocity, what would the unbalanced force be?

ANSWER: a) $F_T=1332\text{N}$ b) $F_{\text{net}}=0$

10 minutes

- 5) You push Jeb ($m=20\text{kg}$) across the couch with a force of 200 N $[\text{R}35^\circ\text{D}]$. The force of friction is 50N .
- a) Draw the FBD
 - b) What is the unbalanced force?
 - c) What is the frictional coefficient
 - d) Find the final velocity of the dog if you push him 50cm .
 - e) After you stop pushing the dog, how long does he continue to slide?

ANSWER: b) $F_{\text{net}} = 113.8\text{N}[\text{R}]$ c) $\mu = 0.16$ d) $v_f = 2.38\text{ m/s} [\text{R}]$ e) $t = 1.52\text{s}$

6 minutes

6) a) Calculate the force of gravity of a communication satellite ($m=500\text{kg}$) on the Earth's surface, before it gets sent to space.

b) Once sent in space, what is its altitude if the gravitational force is 4840N ?

$$m_E = 5.97 \times 10^{24} \quad r_E = 6.38 \times 10^6 \text{ m}$$

ANSWER: a) $F_g=4891 \text{ N}$ [D]

b) Altitude = 33756 m