

PHY 166 Recitation 2

Chapters 4 and 5.

March 17, 2019

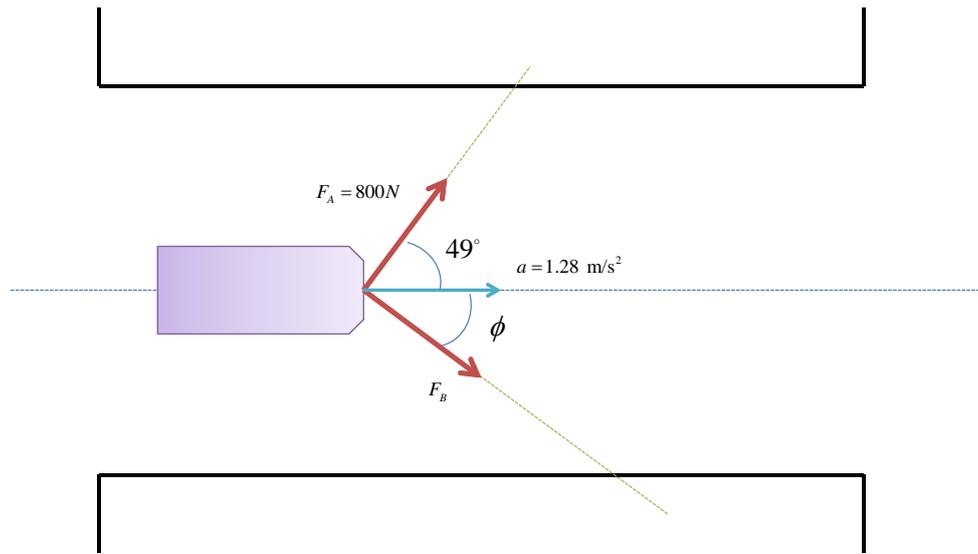
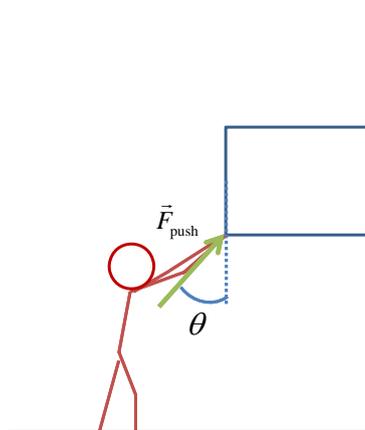


Figure 1: Figure for Problem 1.

1.) Two people want to pull a 1000 kg boat along a canal. Person 'A' pulls the boat with a force of $F_A = 800 \text{ N}$ at an angle 49° . What must the magnitude of the force F_B exerted by person 'B' be, and at what angle ϕ with respect to the $+x$ -axis should they pull the boat, in order to accelerate the boat with acceleration $a = 1.28 \text{ m/s}^2$?



System	Static friction μ_s	Kinetic friction μ_k
Rubber on dry concrete	1.0	0.7
Rubber on wet concrete	0.7	0.5
Wood on wood	0.5	0.3
Waxed wood on wet snow	0.14	0.1
Metal on wood	0.5	0.3
Steel on steel (dry)	0.6	0.3
Steel on steel (oiled)	0.05	0.03
Teflon on steel	0.04	0.04
Bone lubricated by synovial fluid	0.016	0.015
Shoes on wood	0.9	0.7
Shoes on ice	0.1	0.05
Ice on ice	0.1	0.03
Steel on ice	0.4	0.02

Figure 2: Figure for Problem 2.

2.) A person is holding a 70 kg box stationary against a wall by applying a force $F_{\text{push}} = 562 \text{ N}$ at an angle $\theta = 35^\circ$.
(a.) Looking at the chart provided in Figure 2, determine what material interaction this corresponds to. What must the magnitude of F_{push} be in order to push the box **(b.)** up the wall at constant velocity, and **(c.)** down the wall at constant velocity.

- 3.)** A crate lies on an inclined plane tilted at an angle $\theta = 25^\circ$ to the horizontal, with $\mu_k = 0.2$. **(a.)** Determine the acceleration of the crate as it slides down the plane. **(b.)** If the crate starts with an initial speed of 2 m/s, 8.2 meters up along the plane from its base, what will be the crate's speed when it reaches the bottom of the incline?
- 4.)** A device for training astronauts and jet fighter pilots is designed to move the trainee in a horizontal circle of radius 1.1 m. If the force felt by the trainee is 7.45 times her own weight, how fast is she revolving? Express your answer in both m/s and rev/sec.