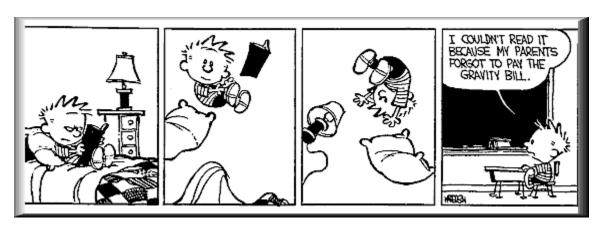
Dynamics Problems Review

- 1. A net force of 41.6 N accelerates an object at 4.2 m/s^2 . What is the mass of the object? (9.9 kg)
- 2. A toy car, starting from rest, moves 5.2 m in 3.2 s. If a 0.4 N force acts on it,
 - a) what was its acceleration? $(1.0 m/s^2)$
 - b) what was its mass? (0.4 kg)
- 3. A dry ice puck, mass 1.5 kg, is accelerated $1.8 cm/s^2$ by a force. A rock is placed on top of the puck and the combined mass is accelerated by the same force resulting in an acceleration of $0.8 cm/s^2$. Determine the rock's mass. (1.9 kg)
- 4. The force of friction on an object is 4.8 N. If the object has a mass of 12.7 kg and is accelerated 1.2 m/s^2 . What is the pulling force? (20 N)
- 5. A sled, mass 7.8 kg, is pulled over snow with a force of 5.2 N. If the acceleration of the sled is 0.61 m/s^2 , determine the frictional force. (-0.44 N)
- 6. A car located on a level highway has a mass of $400 \, kg$. The frictional force on the car is $750 \, N$. What acceleration will a force of $2.25 \times 10^3 \, N$ produce on the car? (3.75 m/s^2)
- 7. A 20 kg sled is pulled along level ground. The sled's rope makes an angle of 60° with the snow-covered ground. If the pull on the rope is 180 N and the friction is 15 N, what is the acceleration of the sled? $(3.75 m/s^2)$
- 8. A red wagon, mass $5.6 \, kg$ is pulled on level ground by a force of $23 \, N$, 30° with the ground. If the frictional force is $7.5 \, N$, determine the acceleration of the wagon. $(2.2 \, m \, / \, s^2)$
- 9. A constant force of 20 N is applied at an angle of 40° to a 4 kg block which rests on a horizontal surface gives the block a velocity of 8 m/s in 2.5 s. Determine the force of friction between the block and the surface. Assume the block was initially at rest. (-2.5 N)
- 10. A constant force of 16 N is applied at an angle of 33° to a 2.5 kg block which rests on a horizontal surface giving the block a velocity of 6 m/s in 1.5 s. Determine the force of friction between the block and the surface. Assume the block was initially at rest. (-3.4 N)
- 11. A dog sled with a mass of 80 kg is pulled by two dogs. The first dog pulls on the sled with a force of 37.5 N [NE] while the second pulls with a force of $45 N [21^{\circ} S \text{ of } E]$. If the frictional force on the sled is 7.5 N, determine the acceleration of the sled. $(0.77 \text{ m/s}^2 [8.6^{\circ} N \text{ of } E])$

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- 12. A 1000 kg barge is pulled upstream by ropes attached to two horses walking along the opposite sides of a canal. If each horse pulls with a force of 350 N at an angle of 45° with a line parallel to the shore and the resistance of the barge through the water is 50 N, determine the acceleration of the boat. (0.44 m/s^2 [Upstream])
- 13. A 12.5 kg mass is pulled on by two forces, $\overrightarrow{F_1}$ and $\overrightarrow{F_2}$. Determine the acceleration of the mass if the force of friction is 5.0 N. $\overrightarrow{F_1} = 10.0 \ N \left[30.3^{\circ} \ N \ of \ W \right]$; $\overrightarrow{F_2} = 15.0 \ N \left[19.7^{\circ} \ S \ of \ W \right] \left(1.42 \ m \ / \ s^2 \ [W] \right)$
- 14. An object is pulled by two forces, the first 40 N [NE] and the second $30 N [37^{\circ} S \text{ of } E]$ If the acceleration of the object is $1.5 m/s^2$, what is the mass of the object? (35.5 kg)
- 15. An object is pulled by two forces, both of magnitude 70 N. The first acts at 25° W of N and the second at 25° E of N. If the acceleration of the object is 2.2 m/s^2 and the frictional force acting is 26.9 N, what is the mass of the object? (45.4 kg)
- 16. An object is being lowered by two ropes. The tension in each is 54 N and each rope makes an angle of 30° with the horizontal. If the object has a mass of 10.0 kg, what is its acceleration? $(-4.4 \ m/s^2)$
- 17. An object is being raised by two ropes. The tension in each is 88 N and each rope makes an angle of 21° with the vertical. If the object has a mass of 13.5 kg, what is its acceleration? (2.4 m/s^2)
- 18. A fish hangs from a spring scale supported from the roof of an elevator.
 - a) If the elevator has an upward acceleration of 1.2 m/s^2 and the scale reads 200 N, what is the true force of gravity on the fish? (178 N)
 - b) Under what circumstances will the scale read 150 N? ($\vec{a} = -1.55 \text{ m/s}^2$)
 - c) What will the scale read if the elevator cable breaks? (0)



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