

Newton's 2nd Law and Friction Problems

1. A 3 kg block is pushed across a horizontal surface with a constant velocity when a force of 13 N is applied to the block.
 - a. Draw a force diagram.

 - b. What is the acceleration of the block?

 - c. What is the net force on the block?

 - d. What is the force of friction acting on the block?

2. A 15 kg block is pushed from rest to a speed of 10 m/s in 3 s. The force of friction acting between the block and the floor is 3 N.
 - a. Draw a force diagram.

 - b. What is the acceleration of the block?

 - c. What is the net force on the block?

 - d. What applied force is needed to accelerate the block?

3. A force of 20 N is applied to a 10 kg block. The force of friction between the block and the floor is 8 N.
 - a. Draw a force diagram.

 - b. What is the net force on the block?

 - c. What is the acceleration the block?

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4. A net force of 30 N is applied to a 15 kg block at rest.
- What is the acceleration of the block?

 - After 10 seconds, how fast will the block be moving?
5. A 30 kg child in a toy wagon is pulled with an applied force of 100 N. There is also 40 N of friction acting on the wagon.
- What is the acceleration of the child?

 - If the child started at rest, how fast is the child going after 4 seconds?
6. A 100 kg water skier is pulled with an applied force of 500 N. Starting from rest, the skier speeds up to 25 m/s in 7 seconds.
- What is the acceleration of the skier?

 - What is the force of friction on the skier?

Answers: 1. b) 0 m/s^2 c) 0 N d) 13 N 2. b) 3.33 m/s^2 c) 50 N d) 53 N 3. b) 12 N c) 1.2 m/s^2
4. a) 2 m/s^2 b) 20 m/s 5. a) 2 m/s^2 b) 8 m/s 6. a) 3.57 m/s^2 b) 143 N