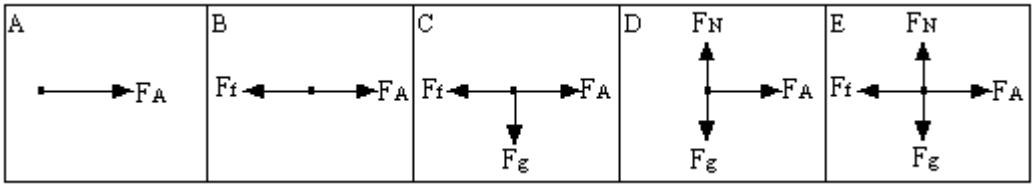
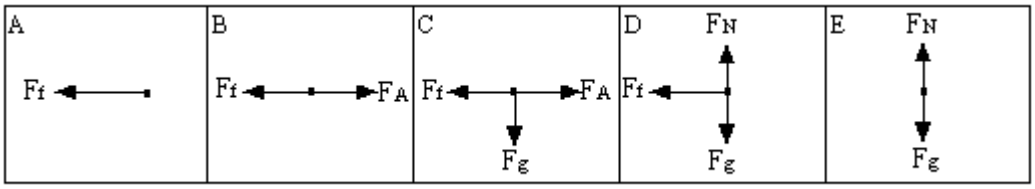
Physics 2204
Worksheet 3 - Newton's Second Law
Finding Missing Forces

1 A curling stone is pushed along the ice surface during its delivery. Which of the following free-body diagrams best represents the curling stone?



2 A hockey puck slides along an ice surface shortly after it has left the hockey stick that propelled it. Which of the following free-body diagrams best represents the hockey puck?



3 How much applied force is needed to accelerate a 2.0 kg block of wood at 4.0 m/s^2 along a rough table, against a 10.0 N force of friction?

4 A car is travelling with uniform motion with a total frictional resistance of 2.8 x 10^3 N acting in a direction opposite to the motion of the car. What is the force acting on the car in the direction of motion?

5 An object of mass 3.8 kg is pushed directly from rest along a horizontal surface, a distance of 1.2 m, and reaches a speed of 2.6 m/s by the end of the push. The frictional force acting is 6.7 N. Determine the value of the applied force that is acting.

6 A wagon of mass 2.4 kg is pushed along the ground at 1.2 m/s^2 against a frictional force of 1.22 N. What is the applied force that is acting? Draw a free-body diagram.

7 If a 7.2 N force is required to accelerate a 3.4-kg object along a horizontal surface at a rate of 1.6 m/s^2, what is the frictional resistance that is acting?

8 If 6.8 N of force are exerted horizontally on a 1.1-kg object and 2.4 N of friction are impeding its slide, what is the object's acceleration? Draw a free-body diagram.

9 A wagon is being pulled with a force of 104 N, so that the handle makes an angle of 35 with the horizontal. The force of friction between the wheels of the wagon and the ground is 78 N. What is the net force acting on the wagon?

10 A block of wood of mass 4.0 kg slides along a skating rink at 8.5 m/s [W]. The block slides onto a rough section of ice that exerts a force of 25.0 N force of friction on the block of wood. Calculate:

(a) the acceleration of the block of wood.
(b) the time it takes the block of wood to come to a stop.
(c) how far the block slides after friction begins to act on it.

11 A hockey puck of mass 3.50×10^2 g is sliding along the ice at 6.0 m/s [E] when it hits a rough patch that exerts a frictional force of 0.42 N [W].

(a) Draw the free-body diagram of the puck while it slides on the rough section.
(b) Determine how far the puck will slide before stopping once it hits the rough section.

12 A stationary box of mass 4.2 kg is given a push of 8.2 N [S] along a surface where the frictional force acting is 5.8 N [N]. The push lasts for 3.6 s and then the box is allowed to slide on its own until it comes to rest.

(a) Draw free-body diagrams to show the box being pushed and sliding on its own.
(b) Determine the acceleration of the box as it is being pushed.
(c) Calculate the speed of the box just as the push ceases.
(d) Determine the acceleration of the box as it is sliding on its own.

13 A block of wood of mass 6.0 kg slides along a skating rink at 12.5 m/s [W]. The block slides onto a rough section of ice that exerts a force of 30.0 N force of friction on the block of wood. Calculate:

(a) the acceleration of the block of wood.
(b) the time it takes the block of wood to come toa stop.
(c) how far the block slides after friction begins to act on it.

14 A car is travelling on an expressway at 90.0 km/h. The driver spots a stalled car and some traffic congestion on the road ahead and so applies the brakes. The braking action causes a frictional force of 8400 N to act on the 1050 kg car.

(a) What is the acceleration of the car when the brakes are applied?
(b) How long does it take for the car to come to a stop?
(c) How far does the car travel while it is braking?