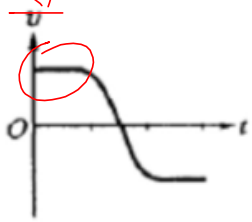
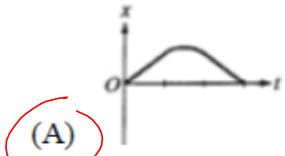
Review

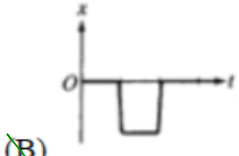
The graph below shows velocity vs time for an object in linear motion. Which of the following would be a possible position vs. time.



(A)

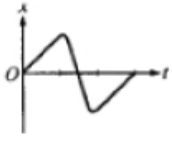


(B)



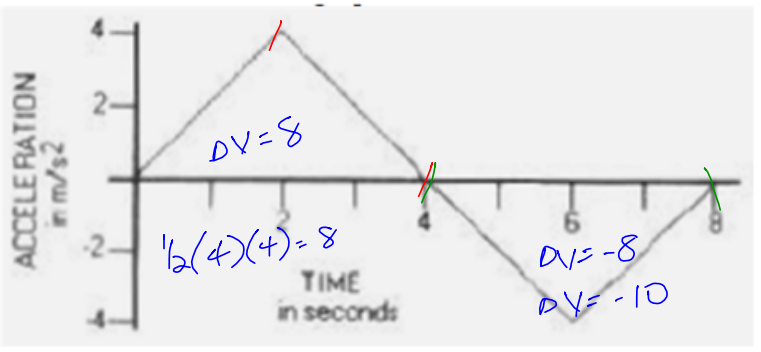
(C)

(D)



Review

Use the same acceleration vs. time graph for the next two questions.



At what time would the car be moving with the greatest velocity?

A. 2 seconds
B. 4 seconds
C. 6 seconds
D. 8 seconds

At what time would the car be farthest from its original starting position?

A. 2 seconds
B. 4 seconds
C. 6 seconds
D. 8 seconds

Example 2

A 45.0 N force pulls on an 8.00 kg cat (why, because cats don't move!) while a force from friction resists the cat's movement. Yet, the cat accelerates forward with an acceleration of 5.04 m/s^2. $\Sigma F_x = ma$

* **Equilibrium or Non-equilibrium:** $\Sigma F_y = 0$

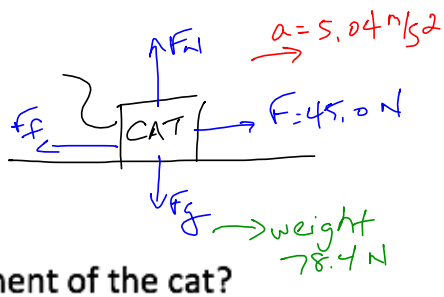
A. Draw the FBD

B. Write a statement for the ΣF_x and ΣF_y

C. What is the value of the normal force?

D. What is the frictional force slowing the movement of the cat?

$m = 8.00\ kg$ *



$\Sigma F_x = F - F_f$

$ma = F - F_f$

$(8.00)(5.04) = 45 - F_f$

$F_f = 4.68\ N$

$\Sigma F_y = F_N - F_g$

$0 = F_N - F_g$

$0 = F_N - mg$

$0 = F_N - (8.00)(9.8)$

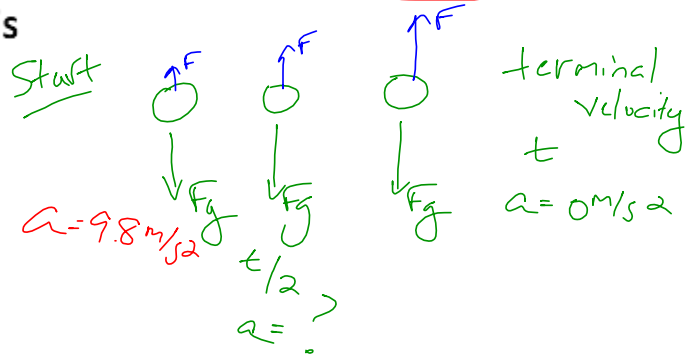
$0 = F_N - 78.4$

$F_N = 78.4\ N$

Example 3

A ball falls straight down through the air under the influence of gravity. There is a retarding force F on the ball with magnitude given by F = bv, where v is the speed of the ball and b is a positive constant. The ball reaches a terminal velocity after a time t . The magnitude of the acceleration at time t /2 is

A. ~~10 m/s/s~~
B. ~~Zero~~
C. Increasing
D. Decreasing



Example 4

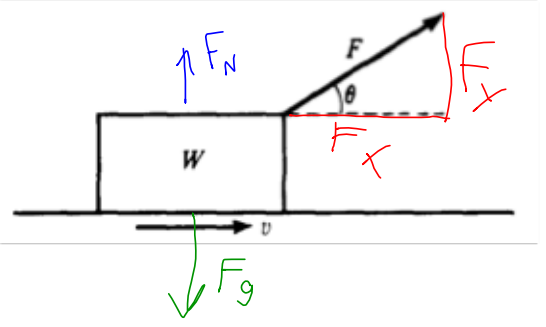
A block of weight W is pulled along a horizontal surface at constant speed v by a force F, which acts at an angle of θ with the horizontal, as shown in the figure to the right. The normal force exerted on the block by the surface has magnitude

A. Greater than W

B. Greater than zero but less than W

C. Equal to W

D. Zero



Example 5

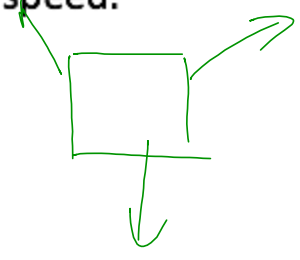
Multiple correct: Three forces act on an object. If the object is moving to the right in translational equilibrium, which of the following must be true? Select two answers.

A. The vector sum of the three forces must equal zero.

B. All three forces must be parallel.

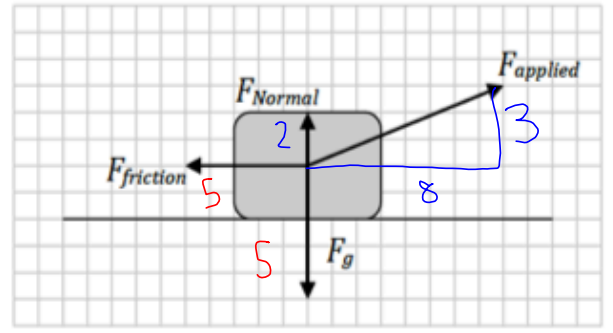
C. The magnitudes of the three forces must be equal.

D. The object must be moving at a constant speed.



Example 6

The free-body diagram shows all forces acting on a box supported by a horizontal surface, where the length of each force vector is proportional to its magnitude. Which statement below is correct?



A. The box is accelerating downwards because the force of gravity is greater than the normal force.

B. The box is accelerating to the right, but not upwards.

C. The box is accelerating upwards, but not to the right.

D. The box is accelerating upwards and to the right.

E. None of the statements above is correct.

$\Sigma F_y = F_N + F_{ay} - F_g$

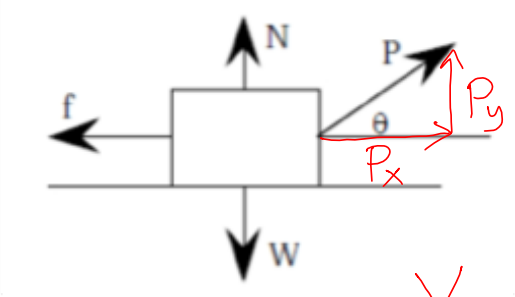
$2 + 3 - 5$

0

Example 7

A student pulls a wooden box along a rough horizontal floor at constant speed by means of a force P as shown below. Which of the following must be true?

A. P > f and N < W
B. P = f and N > W
C. P > f and N = W
D. P = f and N = W



X
$0 = P_x - f$

Y
$0 = N + P_y - W$