1. The acceleration of an object is directly____________ related to the net force exerted upon it and inversely_________ related to the mass of the object. In equation form: $a = F_{net} / m$.
   a. directly, inversely   b. inversely, directly   c. directly, directly   d. inversely, inversely

2. Use Newton's second law to predict the effect of an alteration in mass or net force upon the acceleration of an object.
   a. An object is accelerating at a rate of 8 m/s^2 when it suddenly has the net force exerted upon increased by a factor of 2. The new acceleration will be 16_______ m/s^2.

   b. An object is accelerating at a rate of 8 m/s^2 when it suddenly has the net force exerted upon increased by a factor of 4. The new acceleration will be 32_______ m/s^2.

   c. An object is accelerating at a rate of 8 m/s^2 when it suddenly has the net force exerted upon decreased by a factor of 2. The new acceleration will be 4_______ m/s^2.

   d. An object is accelerating at a rate of 8 m/s^2 when it suddenly has its mass increased by a factor of 2. The new acceleration will be 4_______ m/s^2.

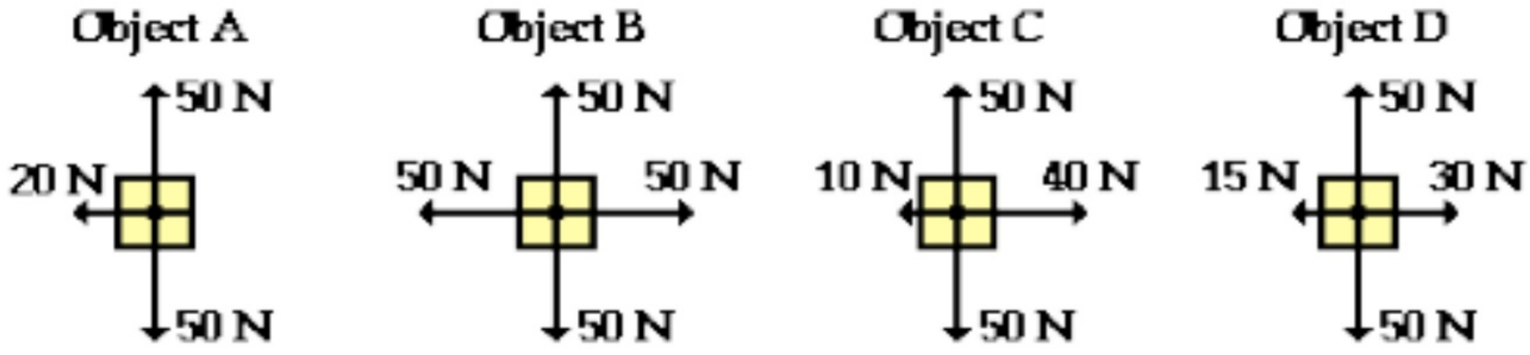
   e. An object is accelerating at a rate of 8 m/s^2 when it suddenly has its mass decreased by a factor of 4. The new acceleration will be 32_______ m/s^2.

   f. An object is accelerating at a rate of 8 m/s^2 when it suddenly has the net force exerted upon increased by a factor of 2 and its mass decreased by a factor of 4. The new acceleration will be 64_______ m/s^2.

   g. An object is accelerating at a rate of 8 m/s^2 when it suddenly has the net force exerted upon increased by a factor of 4 and its mass increased by a factor of 2. The new acceleration will be 16_______ m/s^2.

   h. An object is accelerating at a rate of 8 m/s^2 when it suddenly has the net force exerted upon increased by a factor of 3 and its mass decreased by a factor of 4. The new acceleration will be 96_______ m/s^2.

3. These force diagrams depict the magnitudes and directions of the forces acting upon four objects. In each case, the down force is the force of gravity. Rank these objects in order of their acceleration, from largest to smallest: __C__ > __A__ > __D__ > __B__



20 N, left

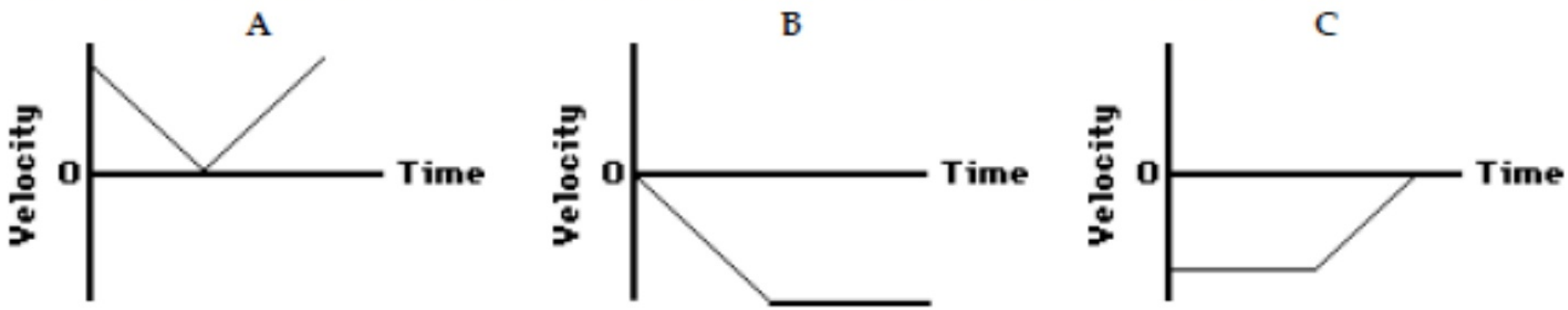
0 N

30 N, right

15 N, right

(Assuming all objects have the same mass)

1. Luke Autbeloe drops a 5.0 kg fat cat (weight = ~50.0 N) off the high dive into the pool below (which on this occasion is filled with water). Upon encountering the water in the pool, the cat encounters a 50.0 N upward restraining force. Which one of the velocity-time graph best describes the motion of the cat? __B______ Accompany your answer with a description of the cat's motion.



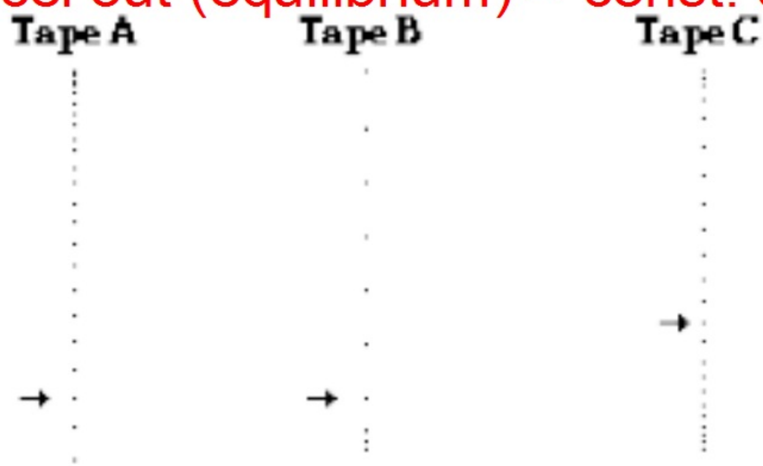
Description of cat's motion while falling through air:

Cat is moving in a negative direction (down) speeding up = neg accel

Description of cat's motion after hitting the water:

Cat's weight and restraining force cancel out (equilibrium) = const. speec

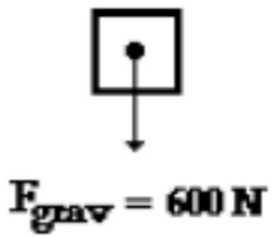
2. Which one of the following dot diagrams best describes the motion of the falling cat from the time that they are dropped to the time that they hit the ground? __A____ The arrows on the diagram represent the point at which the cat hit the water. Support your answer with sound reasoning:



3 Several of Luke's friends were watching the motion of the falling cat. Being "physics types", they began discussing the motion and made the following comments. Indicate whether each of the comments are correct or incorrect? Support your answers.

Student Statement:	Correct? Yes or No
a. Once the cat hit the pool, the forces are balanced and the cat will stop. Reason: Forces are balanced with const. vel.	No
b. Upon hitting the pool, the cat will accelerate upwards because the pool applies an upward force. Reason: Force are equal magnitude, opposite dir'n	No
c. Upon hitting the pool, the cat will bounce upwards due to the upwards force. Reason: Force are equal magnitude, opposite dir'n	No

a.

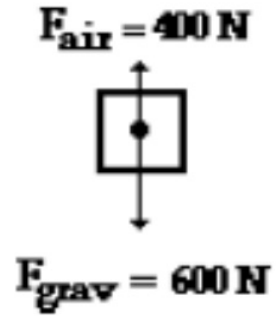


$\sum F$ = 600 N, down

m = 61 kg

a = 9.8 m/s^2, down

b.

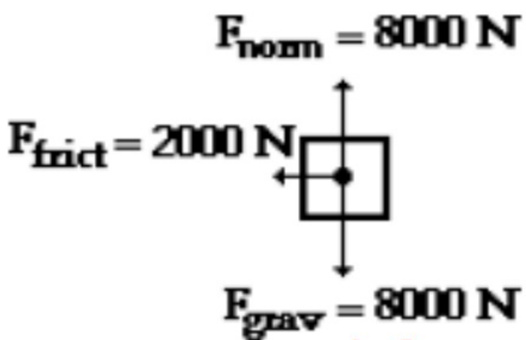


$\sum F$ = 200 N, down

m = 61 kg

a = 3.3 m/s^2, down

c.

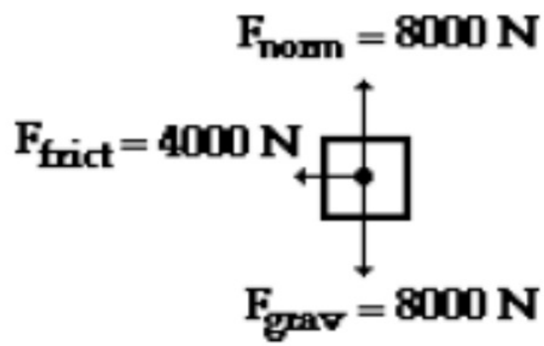


$\sum F$ = 2000 N, left

m = 820 kg

a = 2.5 m/s^2, left

d.

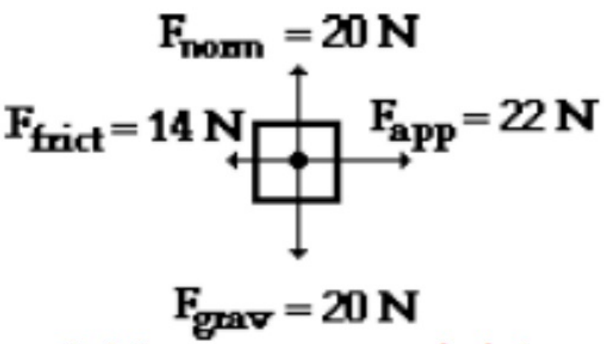


$\sum F$ = 4000 N, left

m = 820 kg

a = 5 m/s^2, left

e.

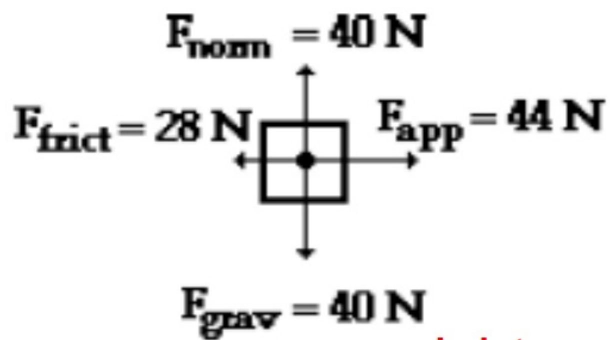


$\Sigma F =$ 8 N, right

m = 2 kg

a = 4 m/s^2, right

f.



$\Sigma F =$ 16 N, right

m = 4 kg

a = 4 m/s^2, right