Net Force and Acceleration

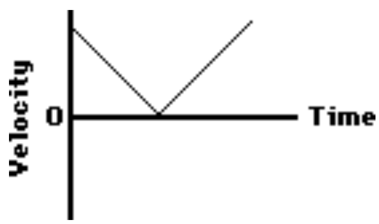
Read from **Lesson 3** of the **Newton's Laws** chapter at **The Physics Classroom**:

http://www.physicsclassroom.com/Class/newtlaws/u2l3a.html
http://www.physicsclassroom.com/Class/newtlaws/u2l3b.html
http://www.physicsclassroom.com/Class/newtlaws/u2l3c.html

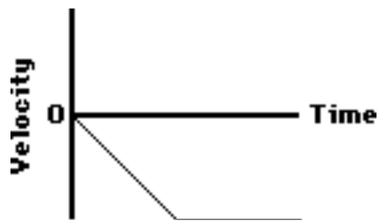
MOP Connection: Newton's Laws: sublevels 3 (front), 8 and 9 (back)

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 graphs best describes the motion of the cat? ________ Accompany your answer with a description of the cat's motion.

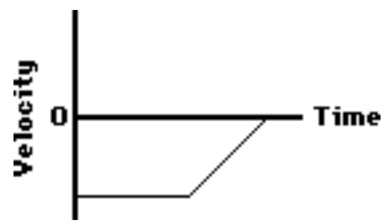
A



B



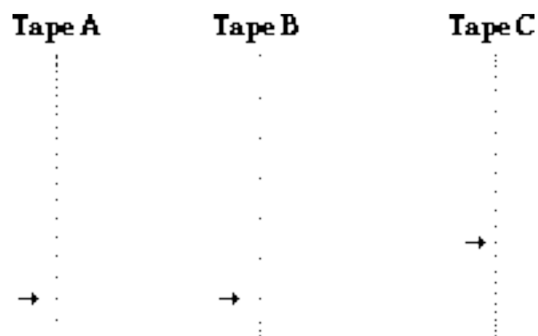
C



Description of cat's motion while falling through air:

Description of cat's motion after hitting the water:

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? _______ The arrows on the diagram represent the point at which the cat hit the water. Support your answer with sound reasoning:

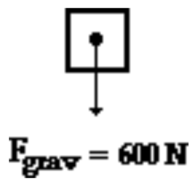


3 Several of Luke's friends were watching the motion of the falling cat. Being "physics types", they began discussing the motion and made the following comments. Indicate whether each of the comments are correct or incorrect? Support your answers.

Student Statement:	**Correct? Yes or No**
a. Once the cat hit the pool, the forces are balanced and the cat will stop. Reason: ____________________	
b. Upon hitting the pool, the cat will accelerate upwards because the pool applies an upward force. Reason: ____________________	
c. Upon hitting the pool, the cat will bounce upwards due to the upward force. Reason: ____________________	

4. For each force diagram, determine the net or resultant force ($\sum F$), the mass and the acceleration of the object. Identify the direction (the second blank) of the two vector quantities. NOTE: F_{grav} stands for the weight of the object.

a.

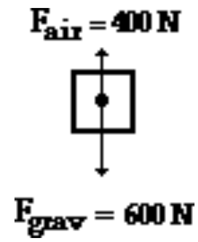


$\sum F$ = ____________________, ________________

m = ____________________

a = ______________________, ________________

b.

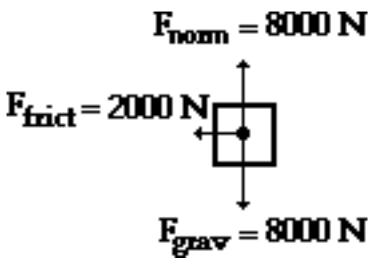


$\sum F$ = ____________________, ________________

m = ____________________

a = ______________________, ________________

c.

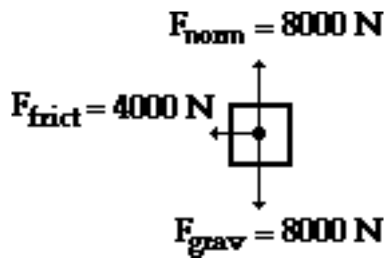


$\sum F$ = ____________________, ________________

m = ____________________

a = ______________________, ________________

d.

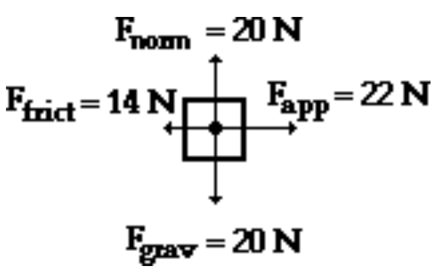


$\sum F$ = ____________________, ________________

m = ____________________

a = ______________________, ________________

e.

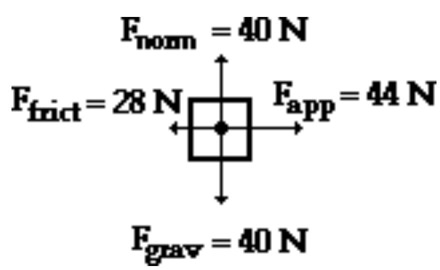


$\sum F$ = ____________________, ________________

m = ____________________

a = ______________________, ________________

f.



$\sum F$ = ____________________, ________________

m = ____________________

a = ______________________, ________________