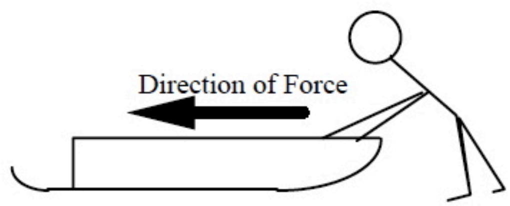
Example

A sled on ice moves in the ways described. Friction can be ignored. A person wearing spiked shoes standing on the ice can apply a force to the sled and push it along the ice. Choose the force (A through G) that would keep the sled moving as described.

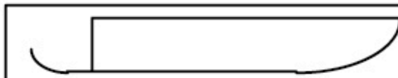
1.2 Which force would keep the sled moving toward the right and speeding up at a steady rate (constant acceleration)?



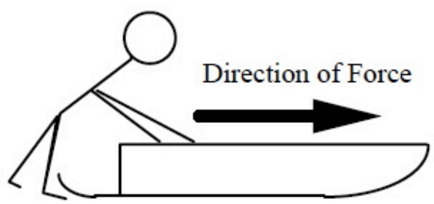
A. The force is toward the **left** and is **decreasing** in strength (magnitude).

B. The force is toward the **left** and is of **constant** strength (magnitude).

C. The force is toward the **left** and is **increasing** in strength (magnitude).



D. No applied force is needed



E. The force is toward the **right** and is **increasing** in strength (magnitude).

F. The force is toward the **right** and is of **constant** strength (magnitude).

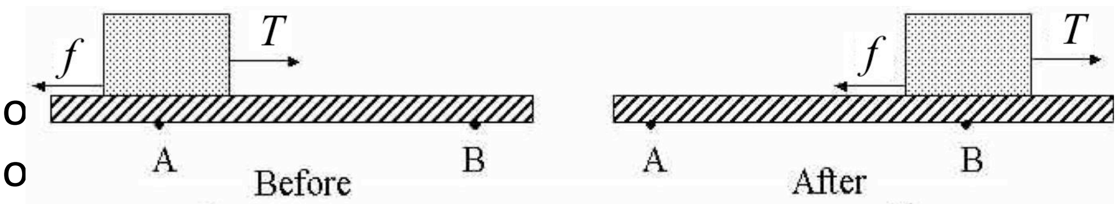
G. The force is toward the **right** and is **decreasing** in strength (magnitude).

What equation might be useful in focusing on the appropriate principle?

$$\vec{a} = \vec{F}^{net} / m$$

How could you have solved problem #2?

Using a rope of negligible mass, you pull a box along a horizontal surface with a constant horizontal force *T*. The box is moving at a constant velocity and passes first position A and then position B. The force of friction *f* cannot be neglected. Which one of the following statements concerning the motion of the box from A to B is true? (Give <u>all</u> the correct answers.)



a. The work do
b. The work do
c. The total work done on the box by the net force is non-zero.
d. The magnitude of the work done on the box by *T* is equal to the magnitude of the work done by *f*.
e. The magnitude of *T* is greater than the magnitude of *f*.

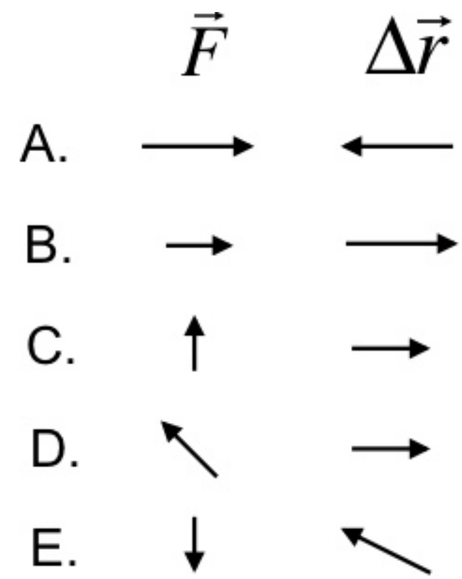
What equation might be useful
in focusing on the appropriate principle?

$$\vec{F}^{net}\cdot\Delta\vec{r} = \Delta\left(\tfrac{1}{2}mv^2\right)$$

Problem #3

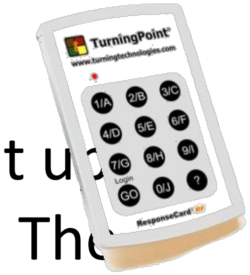
Each row in the table at the left pairs a net force vector acting on an object with a corresponding displacement of the object resulting in work being done.

If the different rows are all to the same scale for force and to the same scale for displacement, in which of these rows is the magnitude of the change in the KE of the object the <u>greatest</u>?



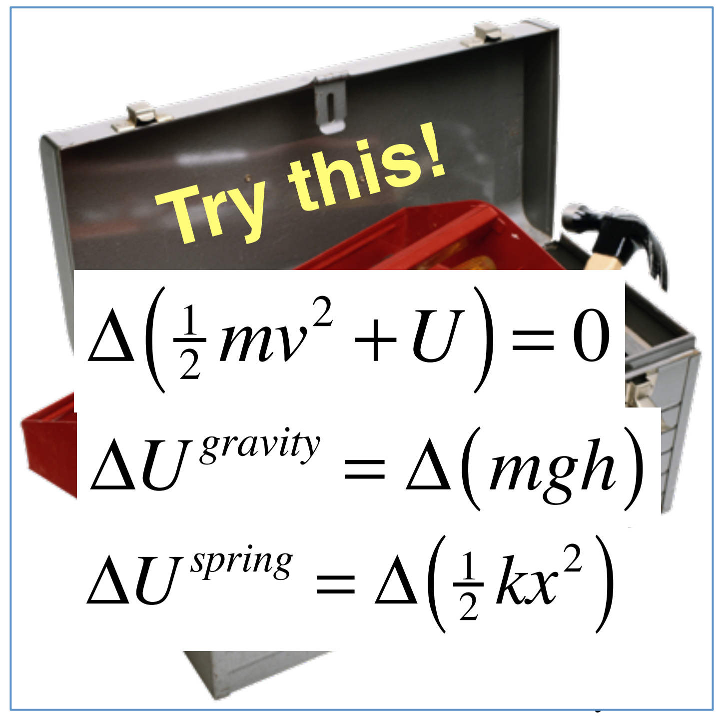
F. It's impossible to tell from the information given.

$$\vec{F}^{net} \cdot \Delta\vec{r} = \Delta\left(\tfrac{1}{2}mv^2\right)$$



A spring-loaded toy dart gun is used to shoot a dart straight up in the air, and the dart reaches a maximum height of 24 m. The same dart is shot straight up
a second time from the same gun, but this time
the spring is compressed only half as far before firing.
How far up does the dart go this time, neglecting friction and air resistance and assuming an ideal spring?

1. 96 m
2. 48 m
3. 24 m
4. 12 m
5. 6 m
6. 3 m
7. Something else

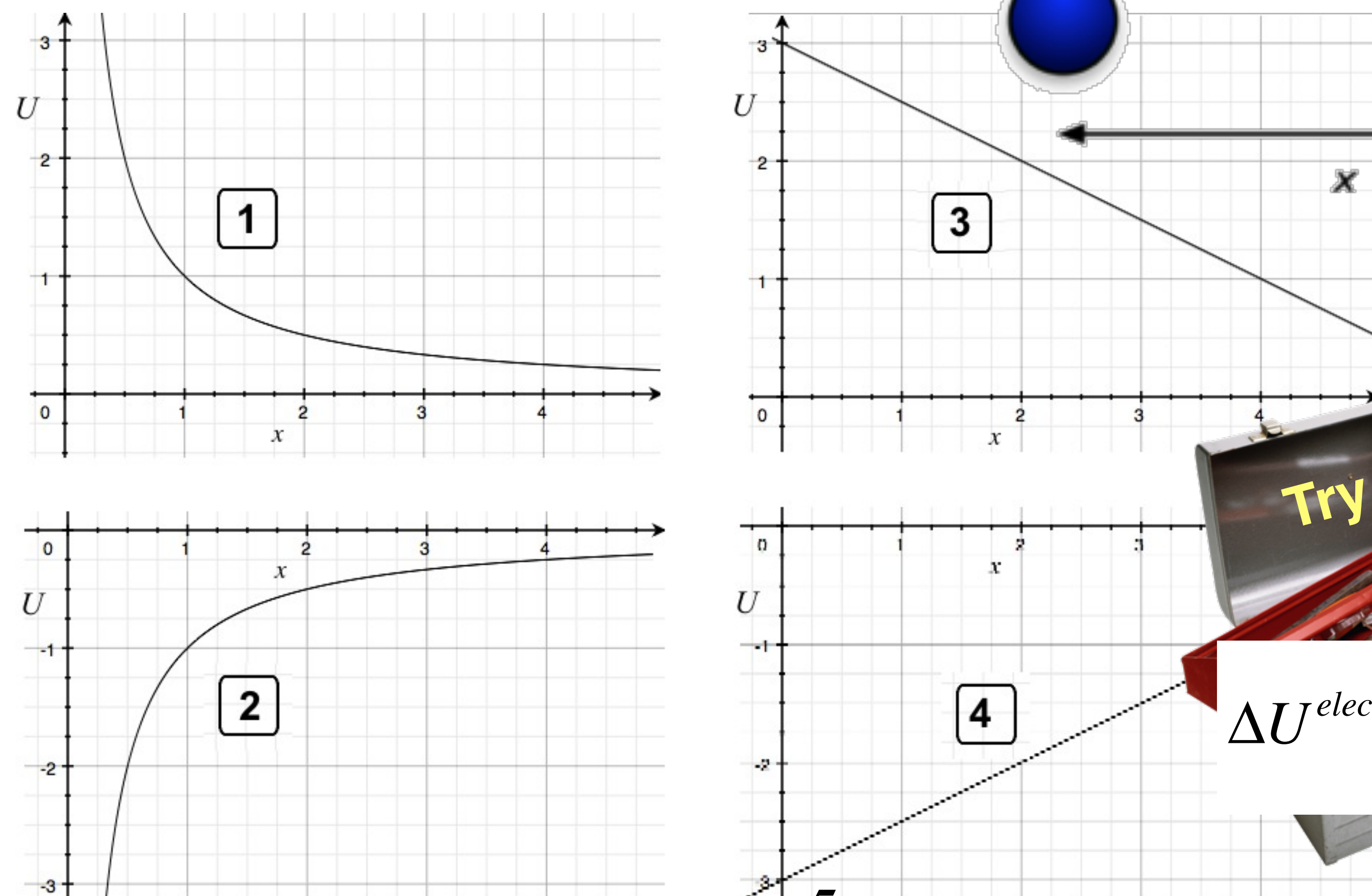


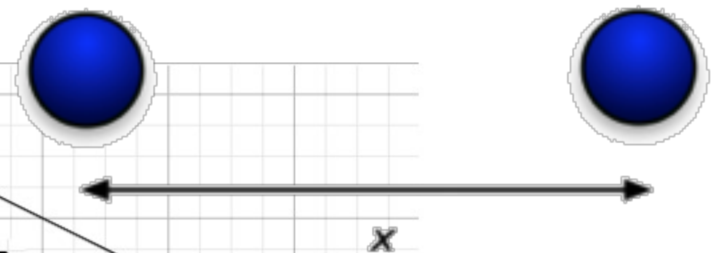
$$\Delta\left(\tfrac{1}{2}mv^2 + U\right) = 0$$

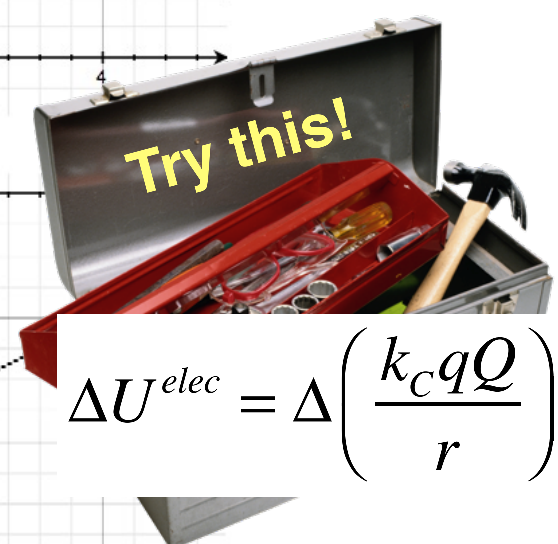
$$\Delta U^{gravity} = \Delta(mgh)$$

$$\Delta U^{spring} = \Delta\left(\tfrac{1}{2}kx^2\right)$$

What does the electric potential energy between two identical charges look like?







$$\Delta U^{elec} = \Delta\left(\frac{k_C qQ}{r}\right)$$

5. None of the above