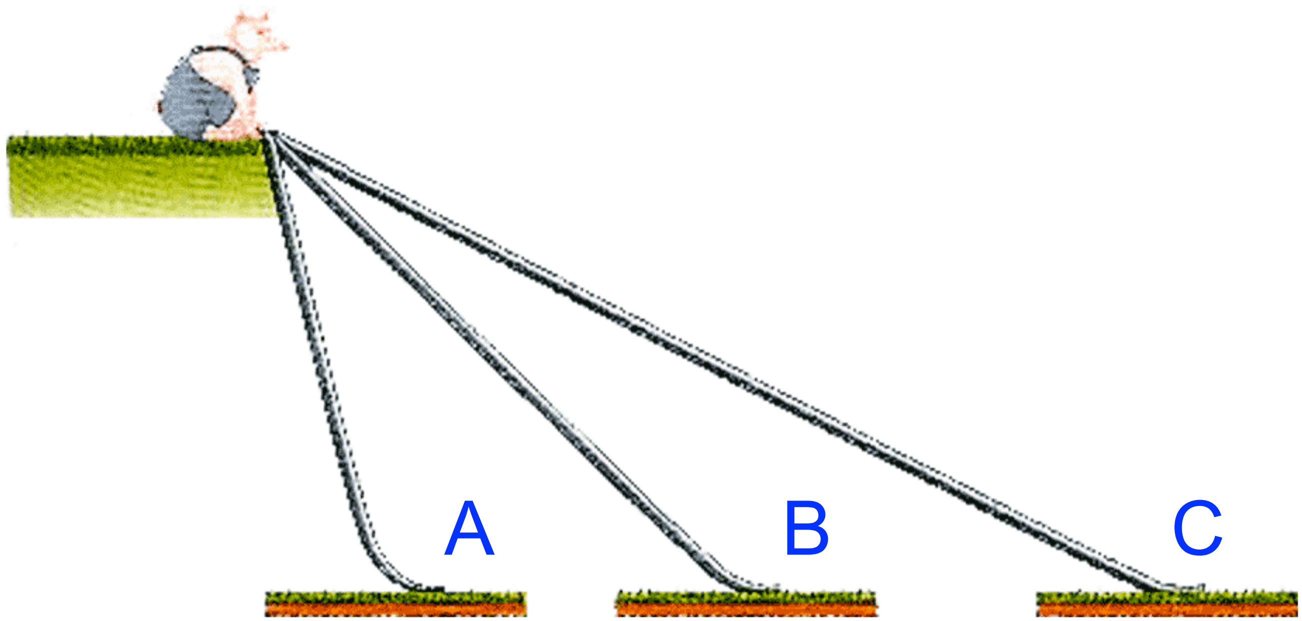
Concept Question

The piglet has a choice of three frictionless slides to descend. Along which slide would the piglet slide the longest distance?



D. The distance is the same for all.

Exam #1

- Thursday, March 3. 5-7pm. CR 306
- Chapters 1-5
- Closed book. Calculators are allowed.
- 1 page of notes allowed (single-sided)

Ch 6.1-2
Work & Kinetic Energy

PHYS 1210 - Prof. Jang-Condell

Goals for Chapter 6

- To understand and calculate the work done by a force
- To understand the meaning of kinetic energy
- To learn how work changes the kinetic energy of a body and how to use this principle
- To relate work and kinetic energy when the forces are not constant or the body follows a curved path
- To solve problems involving power

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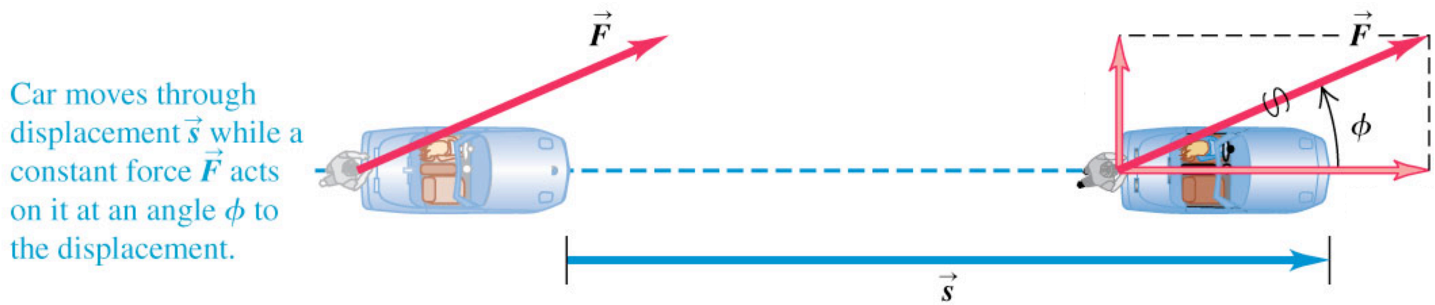
Work = Force x Distance

Units

- SI unit of work and energy = Joule
- 1 joule = (1 newton) (1 meter)

  $= 1\ kg\ m^2 / s^2$

Work = Force x Distance



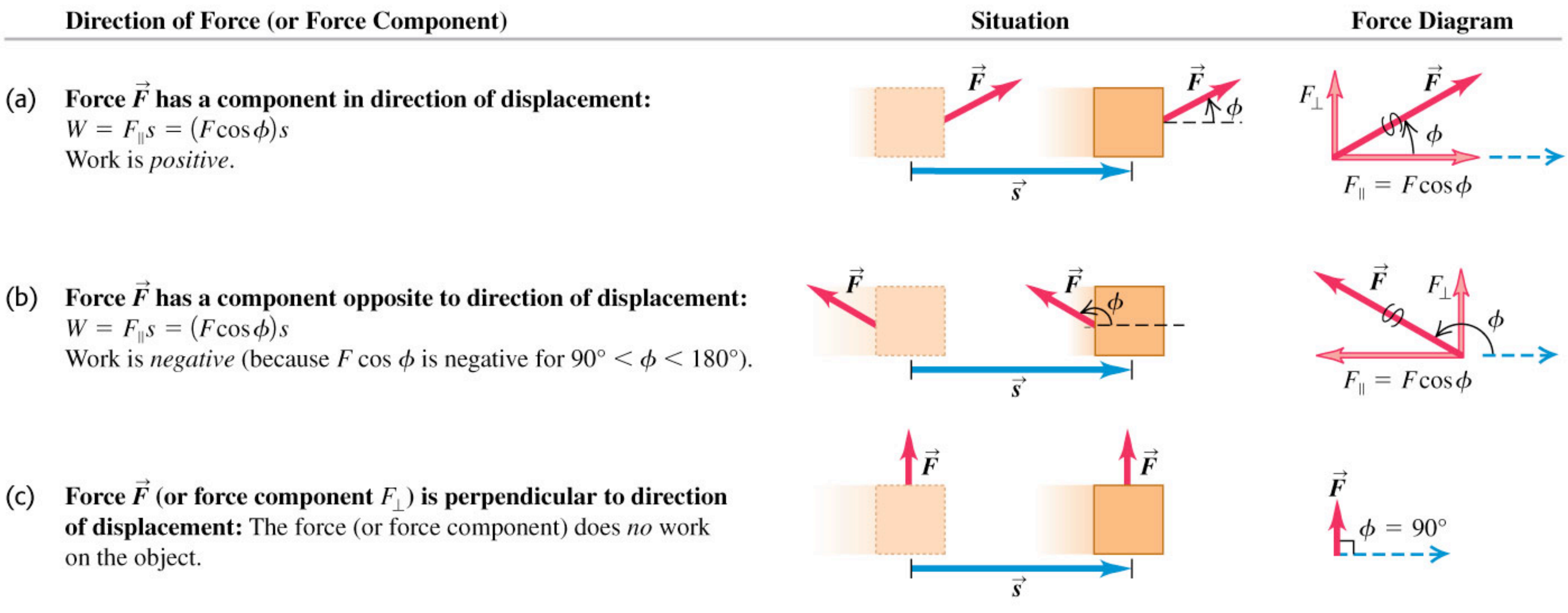
- Only the component of force along direction of displacement counts toward work!
- $W = F \cdot s \cdot \cos\phi$

Dot product

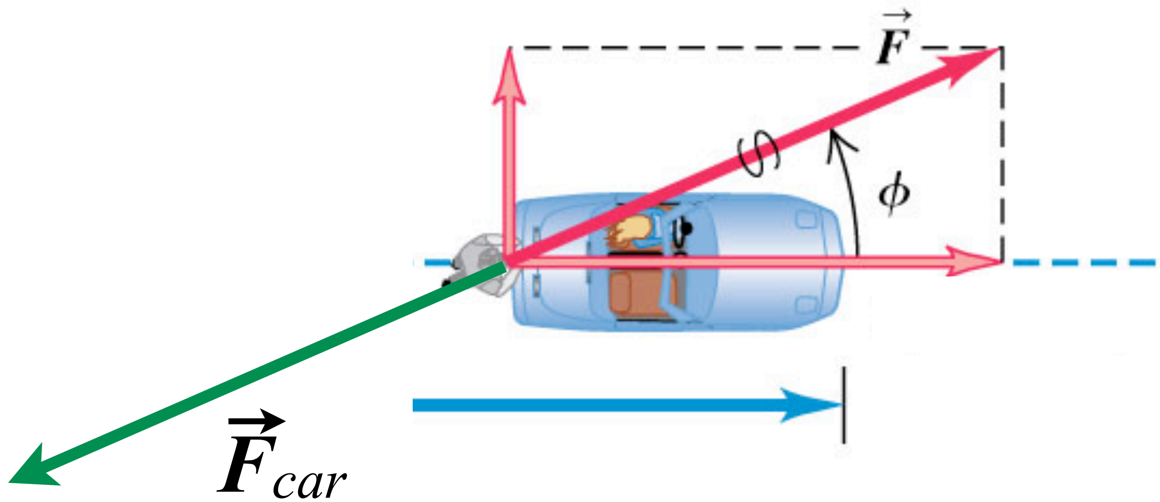
- $W = \vec{\mathbf{F}} \cdot \vec{\mathbf{s}}$
- Result of the dot product is a scalar.
- Work is a scalar.

Positive, negative, and zero work

- A force can do positive, negative, or zero work depending on the angle between the force and the displacement. Refer to Figure 6.4.



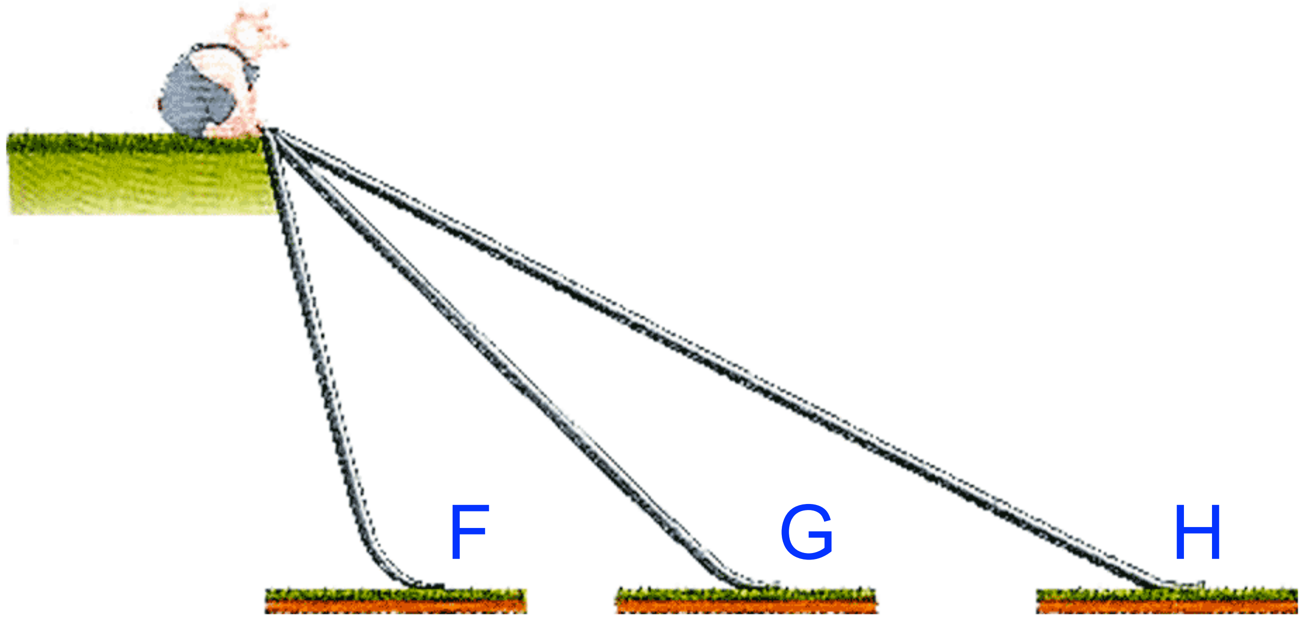
Positive and Negative Work



- Person does **positive** work on car
- Car does **negative** work on person

Concept Question

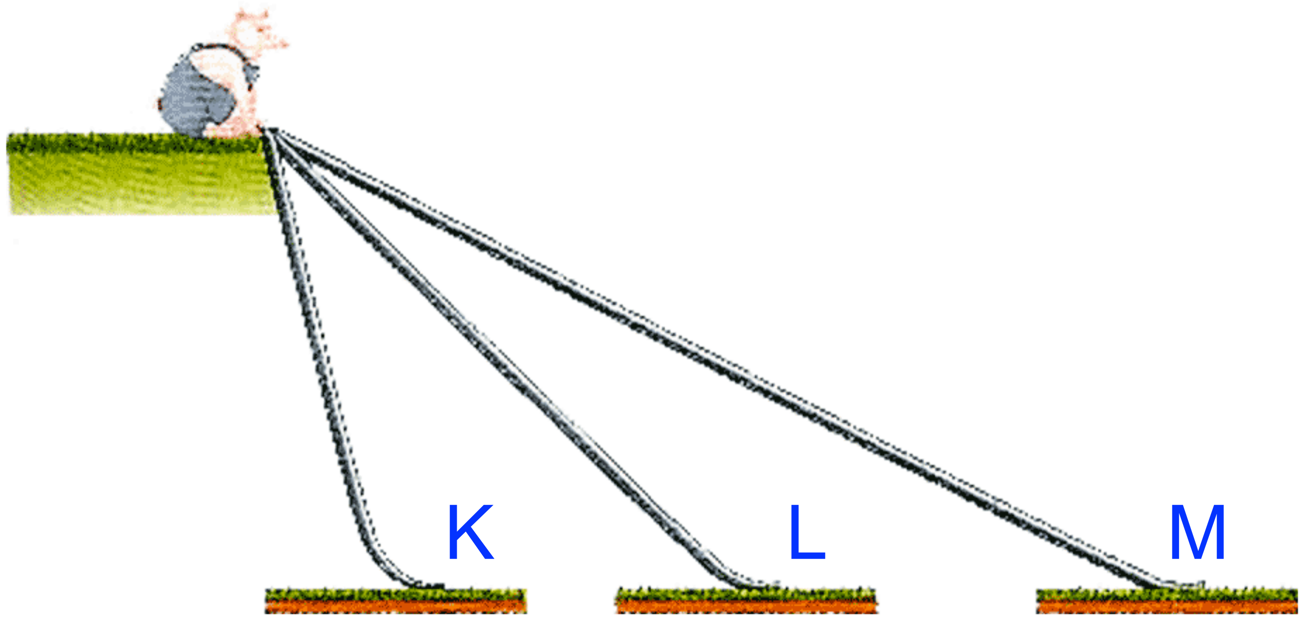
The piglet has a choice of three frictionless slides to descend. Along which slide is the greatest net force exerted on the piglet?



I. The net force is the same for all.

Concept Question

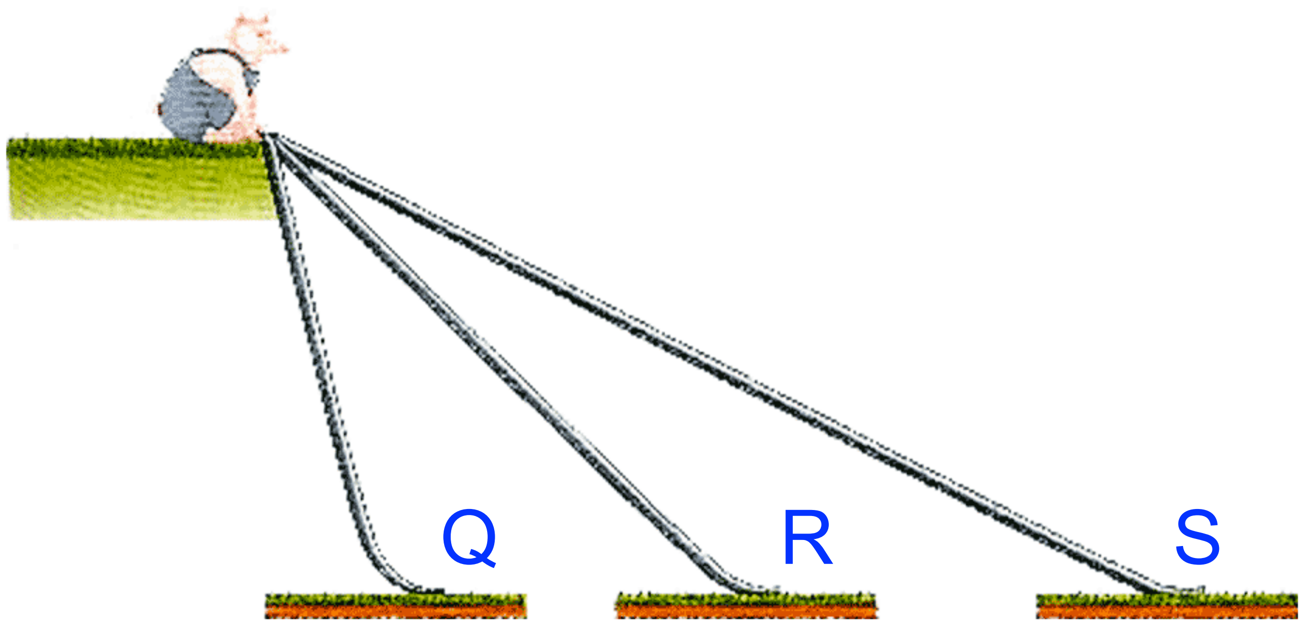
The piglet has a choice of three frictionless slides to descend. Along which slide would the piglet finish soonest?



N. The time is the same for all.

Concept Question

The piglet has a choice of three frictionless slides to descend. Along which slide would gravity do the most work on the piglet?

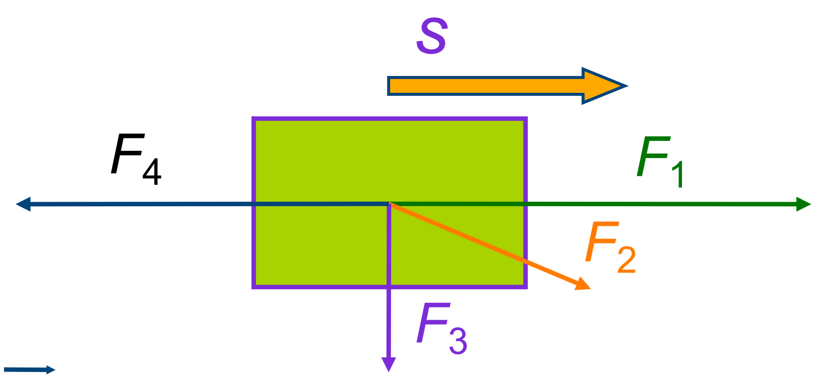


T. Same work for all.

U. Need more information.

Total (Net) Work

If several forces act on a moving object:



- $W = (\sum \vec{F}) \cdot \vec{s}$

  or

- $W = \sum (\vec{F} \cdot \vec{s})$

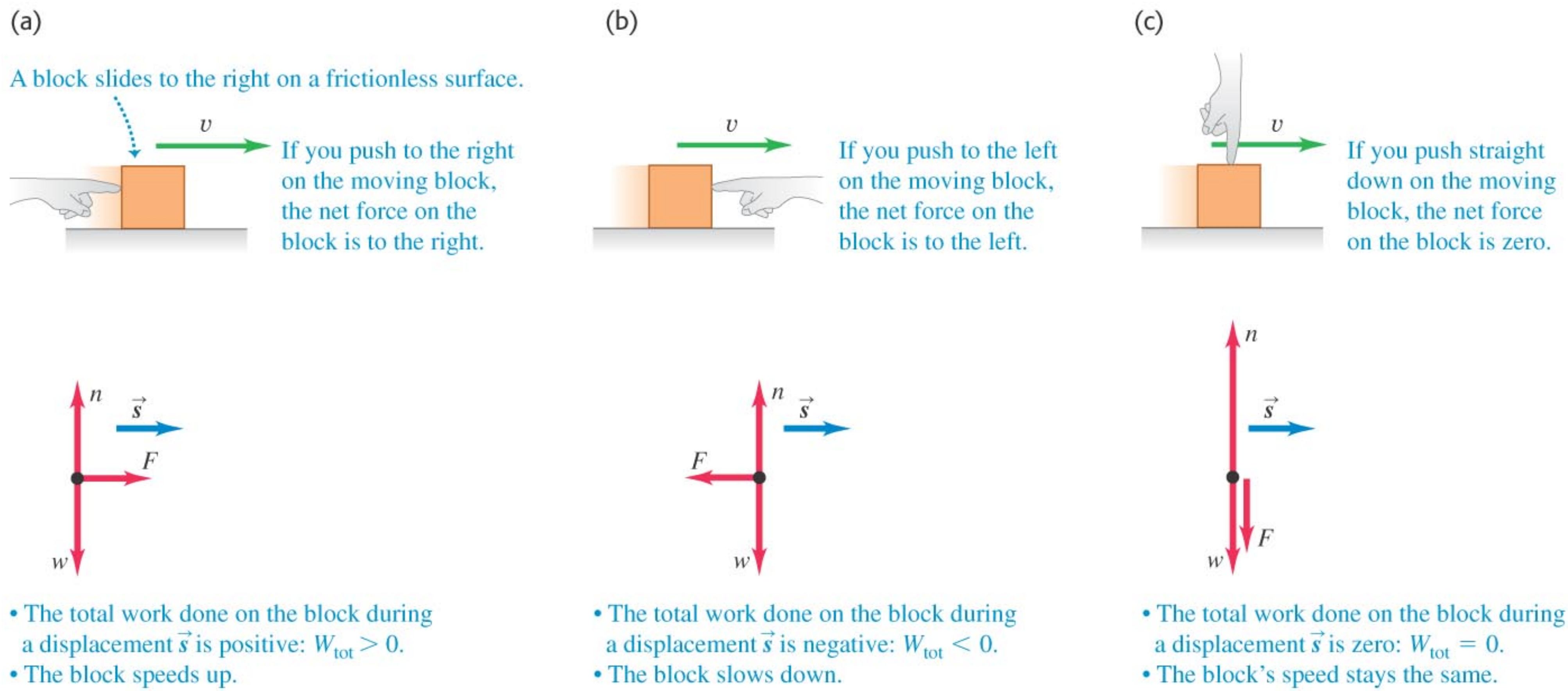
The Work-Energy Theorem

Kinetic Energy

$$K = \frac{1}{2}mv^2$$

Kinetic energy

- The *kinetic energy* of a particle is $K = 1/2\ mv^2$.
- The net work on a body changes its speed and therefore its kinetic energy, as shown in Figure 6.8 below.



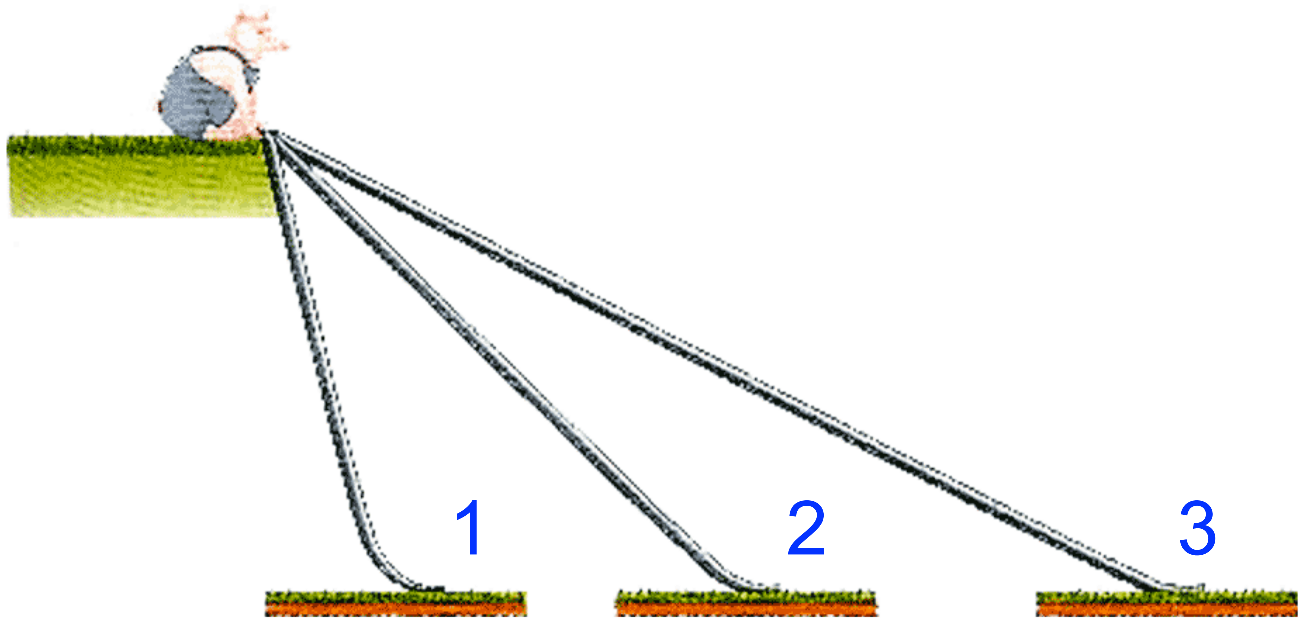
The Work-Energy Theorem

- The work done by the net force on an object equals the change in the object's kinetic energy.

$$W_{\text{tot}} = K_2 - K_1 = \Delta K$$

Concept Question

The piglet has a choice of three frictionless slides to descend. Along which slide would the piglet finish with the highest speed?



4. The final speed is the same for all.