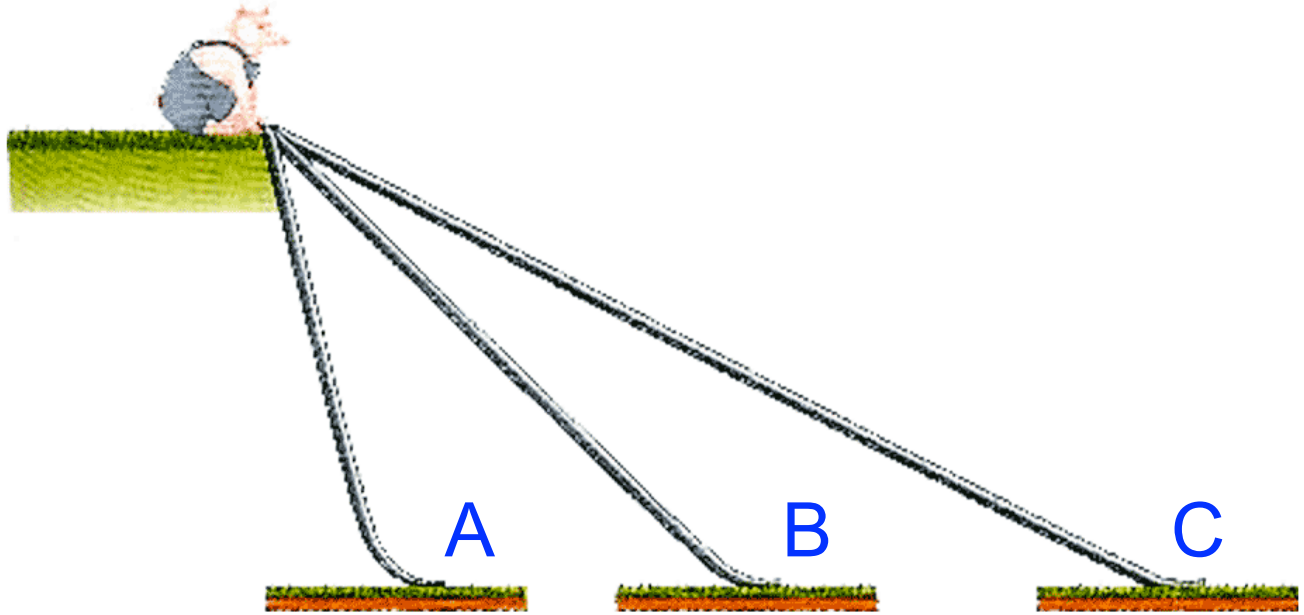
Rate of work done by gravity

The piglet has a choice of three frictionless slides to descend. Along which slide is the rate of work done by gravity on the piglet the highest?



D. Same rate for all.

E. Need more information.

Exam #1

- Thursday, March 3. 5-7pm. CR 306
- Chapters 1-5
- Closed book. Calculators are allowed.
- 1 page of notes allowed (single-sided)
- **Review Session:** Wed 3/2 5-7pm

Lab This Week

- Bring a BLUE bubble sheet (FCI post-test)
- Turn in Lab 3
- Pre-lab for Lab 4 is due Wed/Thu

Ch 6.3-4

PHYS 1210 - Prof. Jang-Condell

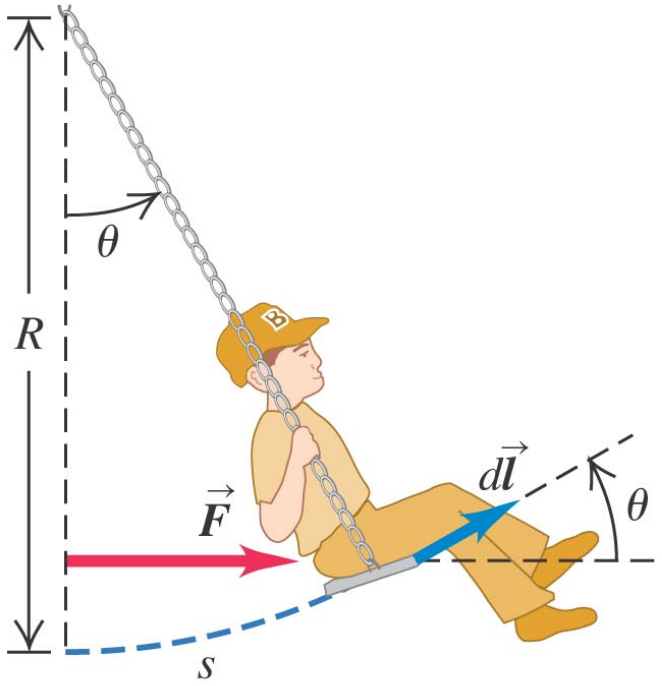
Goals for Chapter 6

- 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

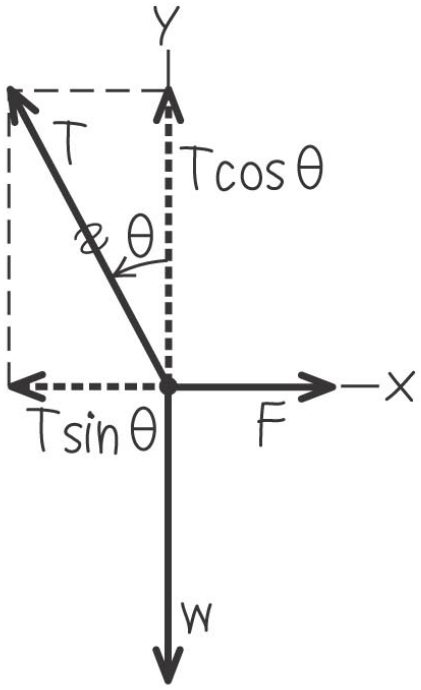
Motion on a curved path—Example 6.8

- A child on a swing moves along a curved path.

(a)



(b) Free-body diagram for Throckmorton (neglecting the weight of the chains and seat)



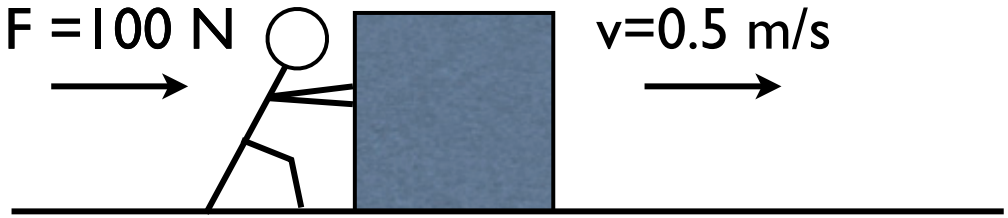
$$\text{Power} = \frac{\text{Work}}{\text{Time}}$$

- Average Power = $\Delta W/\Delta t$
- Instantaneous Power = dW/dt
- Units: (1 Joule)/(1 second) = 1 Watt
- (other units: horsepower, kilowatt)


Yoda uses The Force to lift a 5,600 kg X-wing fighter out of a swamp to a height of 1.4 m in 3.6 seconds. How much Force power can Yoda generate?

https://what-if.xkcd.com/3/

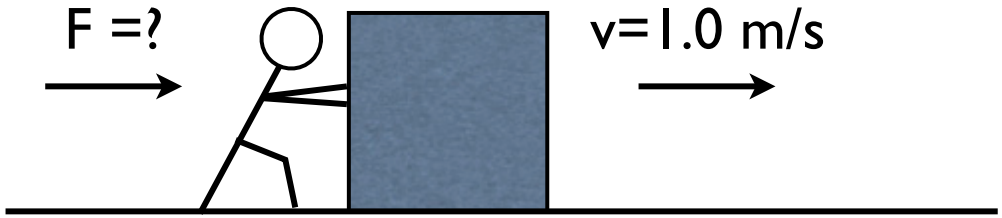
You push on a box with 100 N of force. The coefficient of kinetic friction is such that the box moves at a constant speed of 0.5 m/s. How much power are you exerting on the box?



F. 0.5 watts
G. 50 watts
H. 100 watts
I. 200 watts
J. Need more information

Text your answer to 22333

You double your speed to 1.0 m/s.
How does this change the force you exert?
How does this change the power?



K. No change
L. Double the power
M. Half the power
N. Need more information

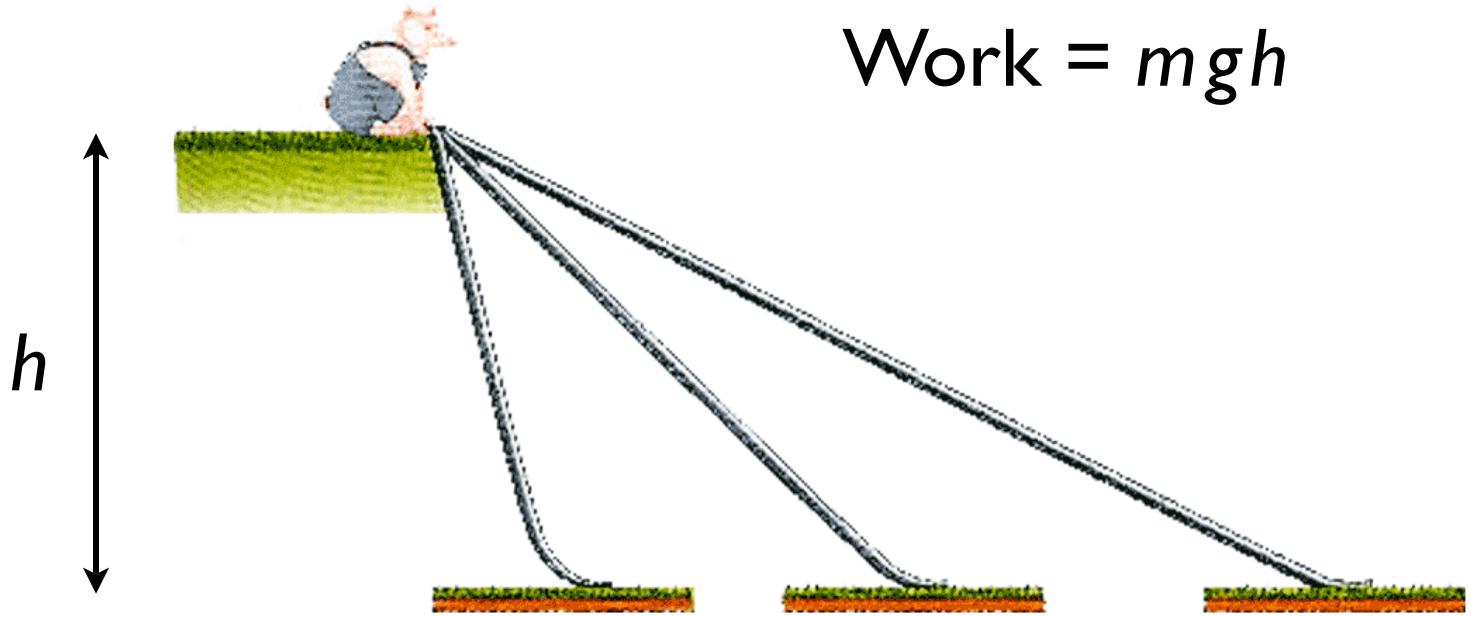
Text your answer to 22333

Potential Energy

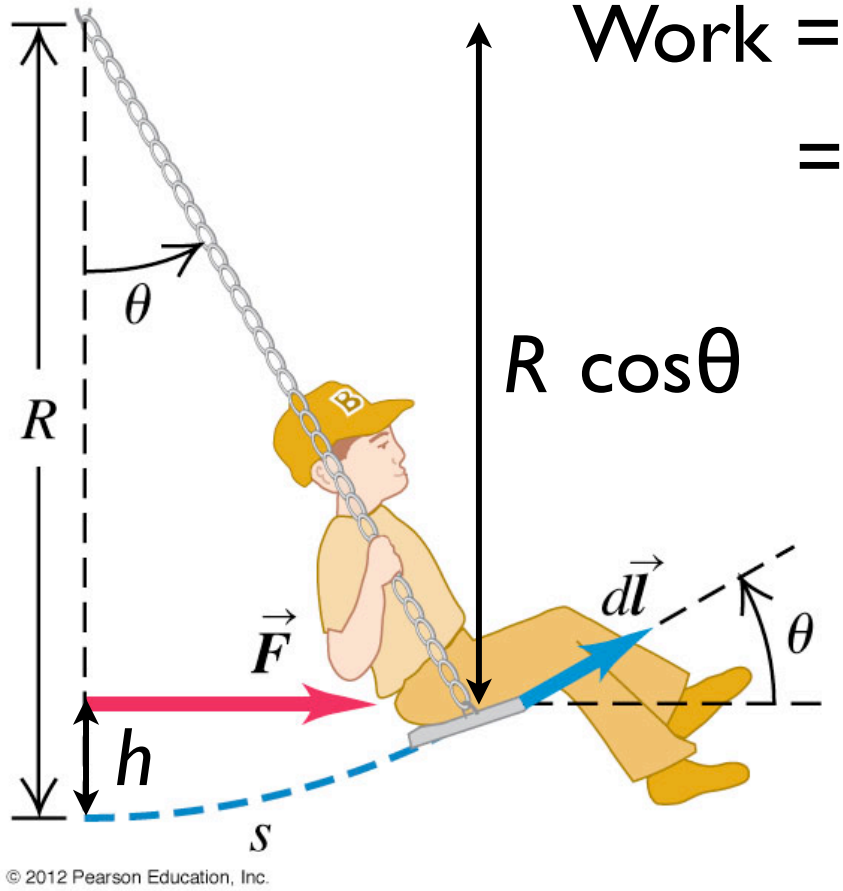
- Energy based on the relative position between two objects
  - gravity
  - springs
  - electric charges
  - chemical bonds

Work done by gravity

Work = mgh



Work done by gravity



Work = $mgR(1-\cos\theta)$

$= mgh$

Gravitational potential energy

- Energy associated with position is called *potential energy*.
- *Gravitational potential energy* is $U_{grav} = mgy$.
- Figure 7.2 at the right shows how the change in gravitational potential energy is related to the work done by gravity.