Warm up

- 1) An 8 N force is applied to a toy horse so that it moves 7 m. how much work was done on the toy? 56 J → W = F × d
- 2) 7890 J of work were done on a piece of pie, how much did the energy of the pie change?
- 3) 65 J of work are done in 5 s. How much power was used in this process?

$$P = \frac{W}{t} = \frac{65\,J}{5\,s} = 13\,W$$

LESSON BACKGROUNDS

Conservation of energy

- The total energy in a closed system is constant
  - unless an outside force does work on it
- Total Energy = Kinetic Energy + Potential Energy
  - TE = KE + PE

LESSON BACKGROUNDS

Total energy - Example

- If a car has 2500 J of kinetic energy and 1000 J of potential energy, how much total energy does it have?

KE PE

TE = KE + PE

3500J = (2500J) + (1000J)

- If a balloon has 25 J of kinetic energy and 400 J of potential energy, how much total energy does it have?

25 + 400 = 425 J

LESSON BACKGROUNDS

Total energy - Together

- If a car has 1300 J of kinetic energy and 1700 J of potential energy, how much total energy does it have?

3000J

- If a baboon has 125 J of kinetic energy and 300 J of potential energy, how much total energy does it have?

425 J

LESSON BACKGROUNDS

Total energy - Practice

- If a car has 600 J of kinetic energy and 100 J of potential energy, how much total energy does it have?

- If a balloon has 500 J of kinetic energy and 300 J of potential energy, how much total energy does it have?

LESSON BACKGROUNDS

$g = 10\ m/s^2$ (Always)

Example

- A 10 kg (m) dog is running at a speed of 5 m/s (v), on a ledge which is 3 m above the ground.
  - A) How much kinetic energy does the dog have? $K = \frac{1}{2}mv^2 = \frac{1}{2}(10)(5)^2$ = 125 J
  - B) How much potential energy does the dog have? $PE = mgh = (10)(10)(3)$ = 300 J
  - C) How much total energy does the dog have?

$TE = KE + PE$

$425\ J = 125 + 300$

LESSON BACKGROUNDS

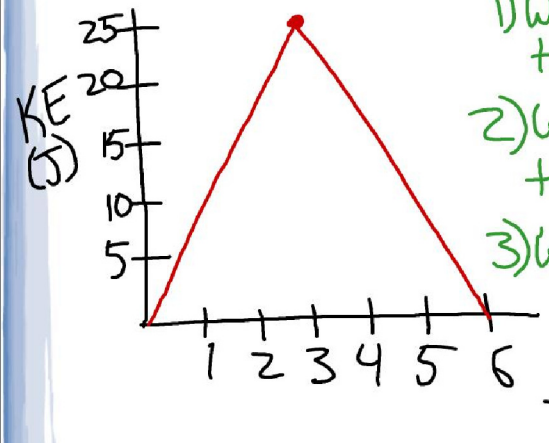
Practice

- A 7 kg dog is running at a speed of 3 m/s, on a ledge which is 4 m above the ground.
  - A) How much kinetic energy does the dog have? 31.5 J
  - B) How much potential energy does the dog have? 280 J
  - C) How much total energy does the dog have? 311.5 J

LESSON BACKGROUNDS

Energy Graphs

A bungee jumping tiger has 25 J of Total energy.

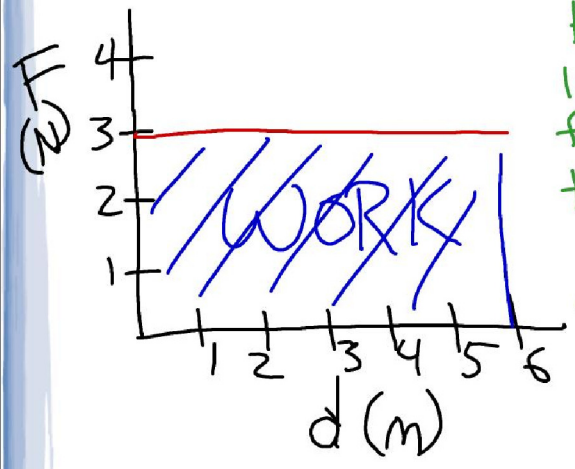


At t = 3 s

1) What is the KE of the tiger? 25 J
2) What is the PE of the tiger? 0 J
3) When is the tiger not moving? 0 & 6 s

LESSON BACKGROUNDS

F vs. d Graphs



How much work is done by this force, to move the object 6m?

18 J → b/c work is AREA under a F vs. d graph

F vs. d Graphs

Roller Coaster Cutting

Roller Coaster Cutting