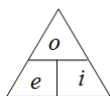


5.1 - Jambalette!!! - Work, Power, Force

Name _____

Efficiency: $e = \frac{o}{i}$



1) A heater consumes 1210 J of energy from natural gas, and puts out 1150 J of heat into the home. What is its **efficiency**?

2) An electric motor is 91.0 % efficient. What is its **power output** if it consumes 832 W of electrical power?

3) A car is 23.0 % efficient. If it does 13,200 J of work, what **energy** in fuel does it consume? If it consumes 4,230 J of fuel, what **work** does it do?

Power: $P = \frac{W}{t}$



4) A heater puts out 340. J of heat in 2.40 s. What is its **power**?

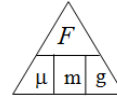
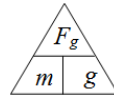
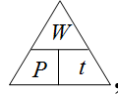
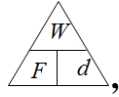
5) A 210. W motor does 4,520 J of work in what **time**?

6) A 40.0 W light bulb consumes what **energy** in a minute (60 s)?

1) 0.950 or 95.0 %, 2) 757 W, 3) 57,391 J, 972.9 J, 4) 142 W, 5) 21.5 s, 6) 2400 J

Jambalaya!!

$$W = Fd, \quad P = \frac{W}{t}, \quad F = mg \text{ or } F = \mu mg$$



Two step problems:

7) What **work** is it to drag a 12.0 kg box 17.0 m across the floor where the coefficient of friction is 0.210?

8) A winch does 732 J of work lifting what **mass** to a height of 3.20 m?

9) Sled dogs do 11,300 J of work dragging a 117 kg sled 75.8 m. What is the **coefficient of friction**?

Three Step:

10) A survivor contestant drags a 125 kg box 214 m across a surface with a coefficient of friction of 0.170 in 145 s. What is their **power** output?

11) What is the minimum **time** a 746 W motor can lift a 2130 kg Land Rover 3.20 m?

12) A sled dog team has a power output of 895. W. In what **time** can it drag a 141 kg sled 1,320 m across a frozen lake where the coefficient of friction is 0.110?

13) An elevator motor must lift a 3,210 kg elevator 18.3 m in 13.0 s. What is its minimum **power** rating?

7) 419.8 J, 8) 23.3 kg, 9) 0.130, 10) 307 W, 11) 89.5 s, 12) 224 s, 13) 44,283 W

Name _____

Favorite TV series _____

Show your work, and circle your answers to receive full credit.

1. Rilla Fordable does 312 J of work exerting 54.0 N of force for what distance?

2. Lee V. Mialone exerts what force for 43.8 m to do 5430 J of work?

3. What speed must a 0.458 kg hammer go to have 60.0 J of kinetic energy?

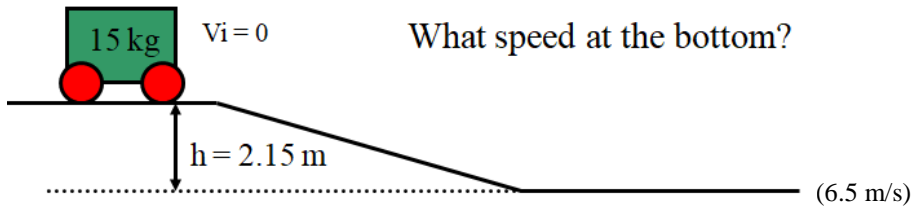
4. What is the potential energy of a 2.60 kg clock weight that is 1.45 m above its lowest point?

5. What is the kinetic energy of a 0.145 kg baseball going 40.0 m/s?

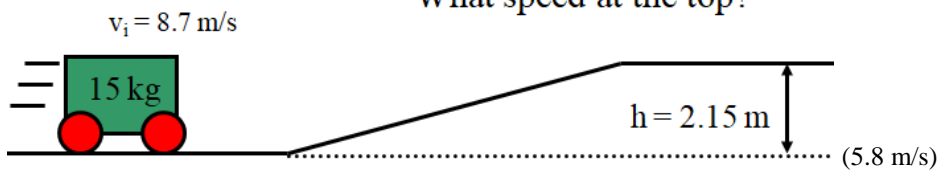
Quizlette 5.2.1 - Conservation of Energy with Pictures Name _____

$$Fd + mgh + \frac{1}{2}mv^2 = Fd + mgh + \frac{1}{2}mv^2$$

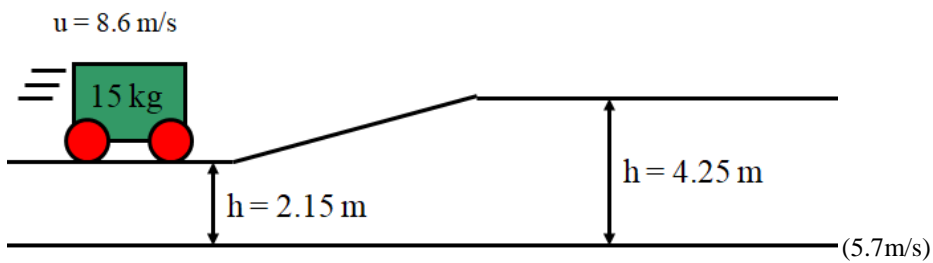
What speed at the bottom?



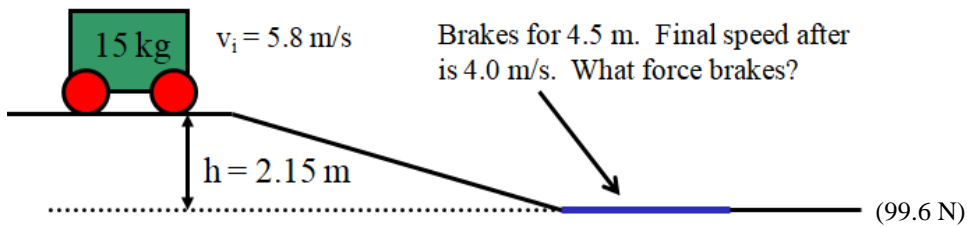
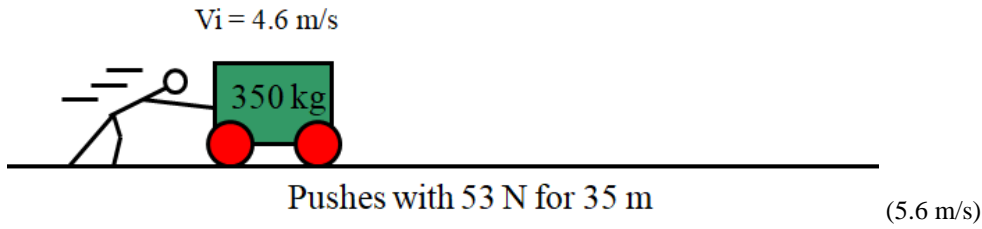
What speed at the top?



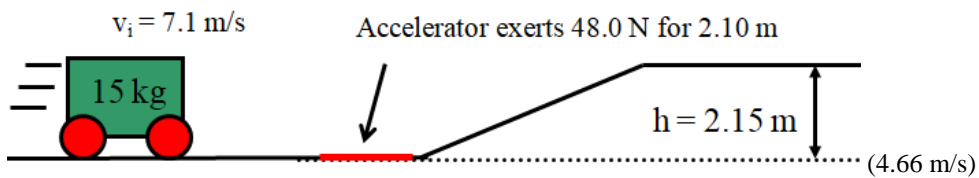
What speed at the top?



What final velocity?



What speed at the top?



Quizlette 5.2.2 - Conservation of Energy with Words Name _____

$$Fd + mgh + \frac{1}{2}mv^2 = Fd + mgh + \frac{1}{2}mv^2$$

1 → 1 problems:

1) If you exert 15.0 N vertically upward a distance of 0.850 m on a 0.145 kg baseball, to what height above the starting point will it rise? Neglect friction, and assume the baseball was initially motionless.

2) A 2130 kg car coasts from rest down a small hill that is 2.40 m tall. What is the velocity of the car at the bottom? Neglect friction

3) A 0.440 kg hammer going 9.60 m/s horizontally strikes a nail, driving it into a wall 2.70 mm (0.00270 m) What force did it exert on the nail?

2 → 1 or 1 → 2 problems:

4) A 23.0 kg cart is going 5.70 m/s at the top of a 1.70 m tall hill. What speed does it have at the bottom? Neglect friction

5) A 53.0 kg cart already going 4.20 m/s is given a forward push with a force of 82.0 N for a distance of 11.0 m. It then rolls up a hill. To what height will it roll before stopping? Neglect friction

6) A 0.113 kg pine cone falls from a height of 5.60 m. It strikes the ground at 8.10 m/s. What was the average force of air friction slowing the pine cone as it fell?

1) 8.97 m, 2) 6.86 m/s, 3) 7509 N, 4) 8.11 m/s, 5) 2.64 m, 6) 0.445 N

$$Fd + mgh + \frac{1}{2}mv^2 = Fd + mgh + \frac{1}{2}mv^2$$

2 → 2 problems:

7) A 12.0 kg cart is going 3.50 m/s on top of a 4.50 m tall hill. What is its speed on top of a 2.30 m tall hill? Neglect friction

7) 7.44 m/s, 8) 7.32 m/s, 9) 723 N

8) A 26.0 kg kid sledding down a 2.70 m tall hill from rest gets a push of 78.0 N for 3.70 m. What is their speed when they are at an elevation of 1.10 m? Neglect friction

9) A 45.0 kg cart going 6.20 m/s on the top of a 4.10 m tall hill is slowed at the bottom with by a braking force over a distance of 2.30 m until it is going only 6.70 m/s. What is the braking force?

In the space below, draw a cartoon of Mr. Duggan and Mr. Osborn firing air rockets from hip level at a hapless Mr. Jukkula dressed as a happy clown.

