LESSON MAKER PRO

Energy in Motion

Calculate energy from mass, height, and speed.

HIGH SCHOOL · PHS.7.3

PHS.7.3 "Using mathematical and computational analysis, calculate potential and kinetic energy based on given data. Use equations such as PE=mgh and KE=½ mv2."

NAME _____ DATE _____

TWO KINDS OF ENERGY

Gravitational potential energy depends on mass and height: PE = mgh. Kinetic energy depends on mass and speed: KE = 1/2 mv^2. Use mass in kilograms, height in meters, speed in meters per second, and g = 10 m/s^2. Both energies are measured in joules (J).

WORKED EXAMPLE

Find the potential energy of a 7 kg object that is 11 m above the ground.

1. Choose PE = mgh.
2. Substitute: PE = (7)(10)(11) J.
3. Multiply: PE = 770 J.

Answer: 770 J

PRACTICE 6 problems

1 Find the potential energy of a 2 kg object that is 5 m above the ground.

ANSWER _____

2 Find the kinetic energy of a 4 kg object moving at 6 m/s.

ANSWER _____

3 Find the potential energy of an 8 kg object that is 4 m above the ground.

ANSWER _____

4 Find the kinetic energy of a 6 kg object moving at 2 m/s.

ANSWER _____

5 Find the potential energy of a 9 kg object that is 2 m above the ground.

ANSWER _____

6 Find the kinetic energy of a 5 kg object moving at 4 m/s.

ANSWER _____

APPLY IT Show your work

1 A skateboarder and board have a combined mass of 50 kg. At the top of a ramp, they are 2 m above the ground. What is their potential energy relative to the ground?

WORK SPACE

ANSWER _____

2 An electric scooter and its rider have a combined mass of 60 kg. They are moving at 5 m/s. What is their kinetic energy?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A snowboarder has a mass of 40 kg. At one moment, the snowboarder is 5 m above the ground and moving at 3 m/s. Find the total of the snowboarder's potential and kinetic energy at that moment.

WORK SPACE AND ANSWER

Energy in Motion

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the potential energy of a 2 kg object that is 5 m above the ground.	**100 J**
2	Find the kinetic energy of a 4 kg object moving at 6 m/s.	**72 J**
3	Find the potential energy of an 8 kg object that is 4 m above the ground.	**320 J**
4	Find the kinetic energy of a 6 kg object moving at 2 m/s.	**12 J**
5	Find the potential energy of a 9 kg object that is 2 m above the ground.	**180 J**
6	Find the kinetic energy of a 5 kg object moving at 4 m/s.	**40 J**

PART 2 · APPLY IT

1. **1,000 J** Use PE = mgh. Calculate (50)(10)(2) = 1,000 J.
2. **750 J** Use KE = 1/2 mv^2. Calculate (1/2)(60)(5^2) = 750 J.

CHALLENGE

2,180 J

For the challenge, PE = 2,000 J and KE = 180 J, so the total is 2,180 J. Accept answers with or without a comma in the number.