

## Kinetic Energy of a Marble Skill Builder

What is the kinetic energy of an 80-kg man traveling 4 m/s?

Because we know the man's mass and velocity we can use the kinetic energy equation to find his kinetic energy:

$$KE = \frac{1}{2}mv^2 = \frac{1}{2}(80kg)\left(4\frac{m}{s}\right)^2 = \frac{1}{2}(80kg)\left(16\frac{m^2}{s^2}\right) = 640 J$$

1. This is the kinetic energy equation. What does each of the variables represent?

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2. Explain how kinetic energy is related to mass and velocity. Which affects the kinetic energy the most? What happens to the kinetic energy when one of the factors is changed?

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3. Does kinetic energy or potential energy depend on the location of the object? Explain.

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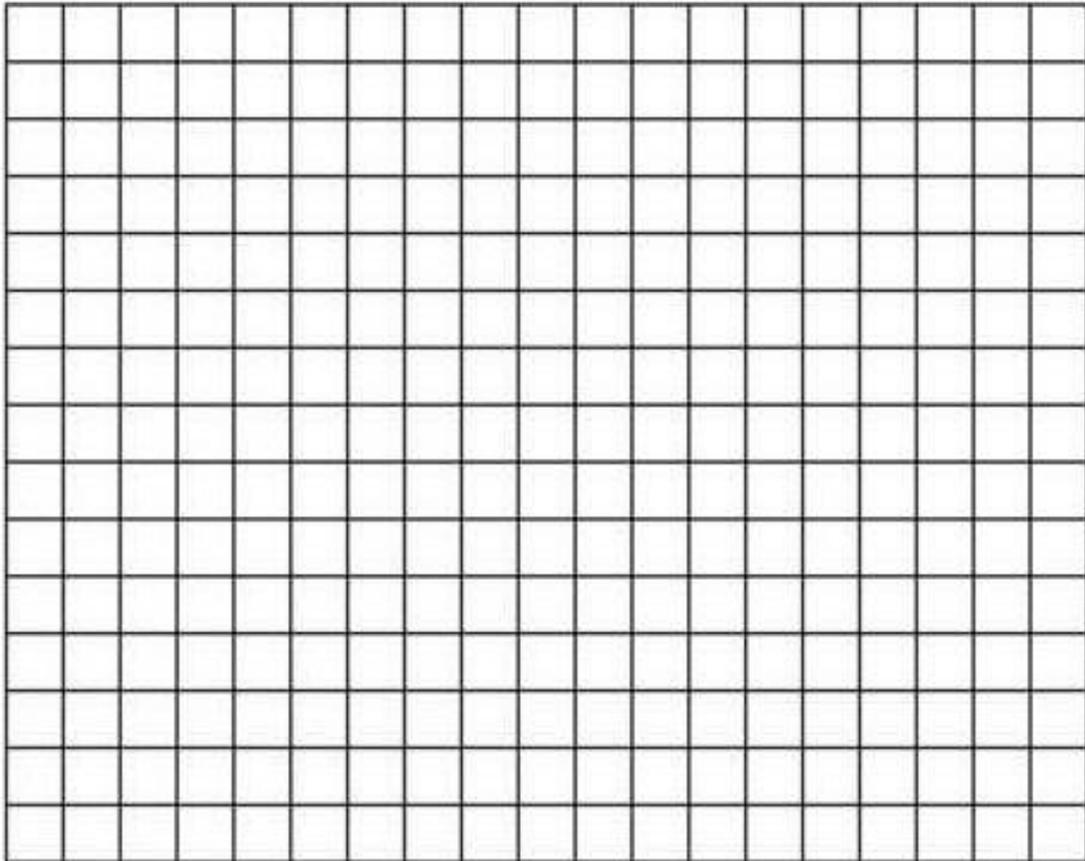
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4. A baseball has a mass of 0.15 kg and a basketball has a mass of 0.63 kg. The baseball is thrown straight up with a velocity of 25 m/s and the basketball is thrown up with a velocity of 18 m/s. What is the kinetic energy of each ball? Which ball had more kinetic energy and by what factor?

5. A skier (+ skis) has a mass 50 kg and a snowboarder (+ snowboard and bad attitude) has a mass of 40 kg. The skier leaves the end of a jump at a velocity of 15 m/s and the snowboarder at 20 m/s. What is the kinetic energy of each rider? Which rider had more kinetic energy?

6. During the Kinetic Energy of a Marble lab, you used the change in potential energy equation to calculate the kinetic energy of the marble. This is OK because of the Law of Conservation of Energy. Your class measured the velocity of the marble as it is released from different heights on the ramp. Use the velocities recorded in the data table to do the following:
- Use the equation for kinetic energy (KE) to calculate the KE for the marble from 5, 10, 15, 20, 25, 30, and 35 cm.
  - Create a graph similar the one you did for the lab. The x-axis is velocity and the y-axis is the hypothetical KE.
  - Compare the two graphs.



Similarities between the two graphs

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Differences?

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Should they be the same? \_\_\_\_\_ Explain \_\_\_\_\_

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