Kinetic Energy Practice

Name: _____ Class: _____ Date: _____

Formula: KE = ½mv²
Units: KE in joules (J), mass m in kilograms (kg), speed v in meters per second (m/s).

Instructions: Write the formula, substitute the values, and show your working. Include a unit in every final answer.

1. Calculate kinetic energy
A ball has a mass of **2 kg** and moves at **3 m/s**. What is its kinetic energy?

2. Calculate kinetic energy
A cart has a mass of **20 kg** and moves at **5 m/s**. What is its kinetic energy?

3. Find the mass
A moving object has a kinetic energy of **96 J** and a speed of **4 m/s**. What is its mass?

4. How fast is it moving
A toy car has a mass of **4 kg** and a kinetic energy of **50 J**. How fast is it moving?

5. How fast is the cyclist moving
A cyclist and bicycle have a total mass of **80 kg** and a total kinetic energy of **1440 J**. How fast are they moving?

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Answers and Working

Useful rearrangements

$KE = \frac{1}{2}mv^2$ $m = 2KE \div v^2$ $v = \sqrt{(2KE \div m)}$

1 Kinetic energy of the ball

$KE = \frac{1}{2}mv^2$

$KE = \frac{1}{2} \times 2 \times 3^2 = \frac{1}{2} \times 2 \times 9$

KE = 9 J

2 Kinetic energy of the cart

$KE = \frac{1}{2}mv^2$

$KE = \frac{1}{2} \times 20 \times 5^2 = \frac{1}{2} \times 20 \times 25$

KE = 250 J

3 Mass of the object

$m = 2KE \div v^2$

$m = (2 \times 96) \div 4^2 = 192 \div 16$

m = 12 kg

4 Speed of the toy car

$v = \sqrt{(2KE \div m)}$

$v = \sqrt{[(2 \times 50) \div 4]} = \sqrt{25}$

v = 5 m/s

5 Speed of the cyclist and bicycle

$v = \sqrt{(2KE \div m)}$

$v = \sqrt{[(2 \times 1440) \div 80]} = \sqrt{36}$

v = 6 m/s

Remember

Square the speed when finding kinetic energy. When finding speed, take the square root after dividing. Use the total moving mass when the question gives a combined system.

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