

Part A: Mass, Speed, and KE

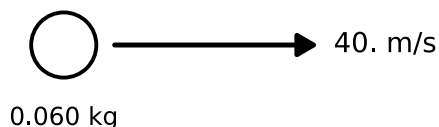
Answer without a calculator by thinking about $KE = \frac{1}{2}mv^2$.

1. A rolling cart has 200 J of kinetic energy. Find its new kinetic energy if:
 - a. its mass is doubled (same speed)
 - b. its speed is doubled (same mass)
 - c. its speed is tripled (same mass)
 - d. its speed is cut in half (same mass)
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2. Two identical soccer balls roll at 6 m/s, one to the left and one to the right. Which one has more kinetic energy? Can an object ever have negative kinetic energy? Explain both answers.

Part B: Calculating KE

Show knowns, equation, substitution with units, and answer.

3. A tennis serve sends the ball across the court as shown. What is the ball's kinetic energy?



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4. A bowling ball rolls down the lane at 4.0 m/s with 56 J of kinetic energy. What is its mass?

5. Lucia and her scooter have a combined mass of 50. kg and 900 J of kinetic energy. How fast is she going?

Part C: The Work-Energy Theorem

Use $W_{\text{net}} = KE_f - KE_i$.

6. A car merges onto a highway, speeding up as shown.



- Find the car's kinetic energy before and after.
 - How much net work was done on the car?
 - Later, the driver brakes from 15 m/s to a stop. How much net work do the brakes do? Why is the sign negative?
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7. Owen pulls a 40. kg sled that is already sliding at 2.0 m/s. His pull does 240 J of net work on the sled in the direction of motion. What is the sled's new speed?