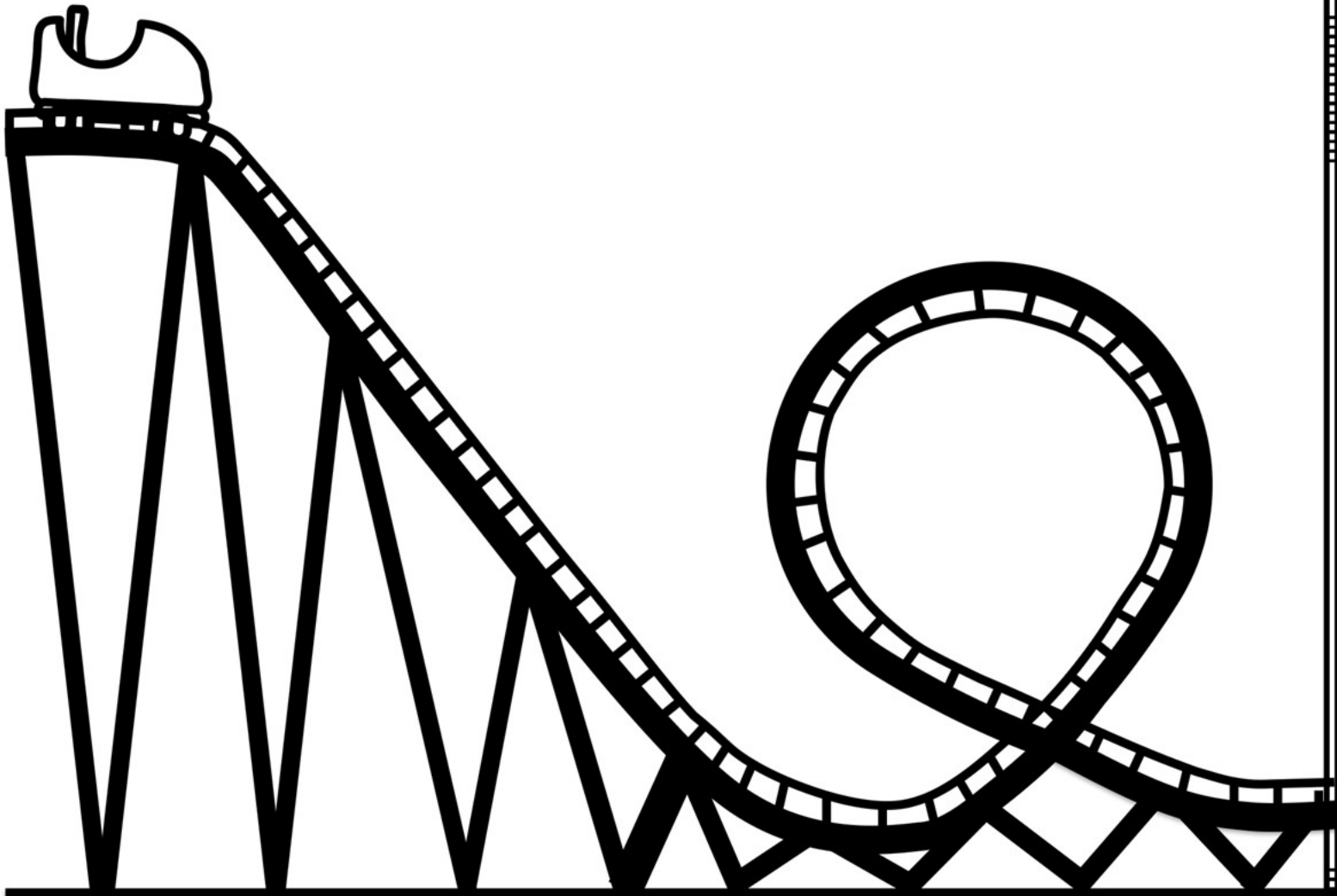


# Student Worksheet



Name: \_\_\_\_\_  
 Period: \_\_\_\_\_

Date: \_\_\_\_\_

## Kinetic Energy

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

Directions: Fill out everything for each problem. Write neatly!

- 1) A unicorn suddenly ran through the school at 5.6 m/s and it has a mass of 450 kg. What is the unicorn's kinetic energy?

Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		



- 2) The sloth is one of the slowest creatures on Earth. Despite being slow, they are really good swimmers! How fast must the sloth swim if they have a mass of 7.2 kg and 0.051 Joules of kinetic energy?

Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		

- 3) Usain Bolt is wicked fast. In fact, he is the fastest human in the world and ran at a crazy 10.1 m/s in the Olympic Games. What is his mass if he had 4,640 Joules of kinetic energy in that race? (Usain's fastest is a little over 22 mph!)



Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		

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



- 4) The world's fastest insect is the horse fly. A horse fly can top out at 90 mph! Find its velocity if it has a mass of  $1.2 \times 10^{-5}$  kg. The kinetic energy of the house fly is 0.019 Joules.

Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		



- 5) Quarter Horses are typically faster than Thoroughbreds over short distances. A racehorse can run at 18 m/s and has 195,000 Joules of kinetic energy. What is this racehorse's mass?

Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		

- 6) Santa's sleigh flies at 3 times the speed of sound. That's a whopping  $1.04 \times 10^6$  m/s. Santa's sleigh actually makes a Sonic Boom when it surpasses the speed of sound! (keep your ears open for that on Christmas Eve!). How much kinetic energy must Santa's sleigh have if its mass is 7,500 kg? (Let us assume he is not carrying ALL 7.5 billion presents at once!)



Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		

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

- 7) The Blue Whale is the largest animal to have ever lived. As an adult it is as long as three school buses added together. A 170,000 kg Blue Whale cruises along at a modest pace. If it has 890,000 Joules of kinetic energy, what is its cruising speed?



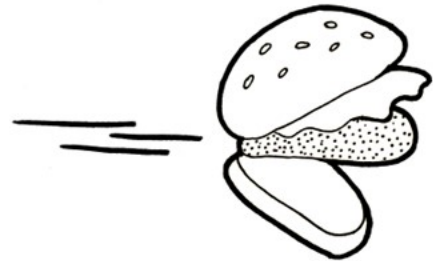
Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		



- 8) An octopus spots its favorite meal ahead!, a lobster! (Me, too, boo. Me, too) What is the octopus' mass if it darts at 12 m/s (an octopus is faster than Michael Phelps!) and has 3,168 Joules of kinetic energy?

Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		

- 9) Food Fight! Someone throws a perfectly good hamburger across the cafeteria. What velocity does it experience if it has a mass of 0.35 kg and has 79 Joules of kinetic energy?



Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		

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



- 10) A boy is hit with a piece of cake. The cake has a mass of 0.56 kg and hit the boy at a speed of 17 m/s. What kinetic energy did the piece of cake have?

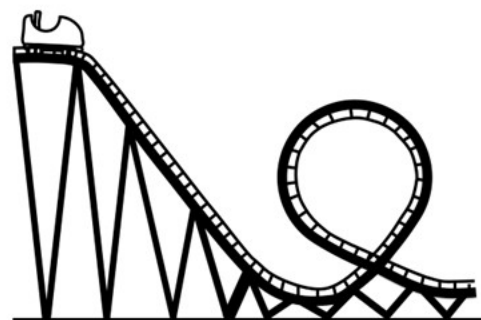
Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		



- 11) SuperChicken! isn't just any ol' superhero. No, this chicken has a mass of 81 kg, is 6 feet tall, and can outrun a racehorse at 32 m/s. What is SuperChicken's! kinetic energy?

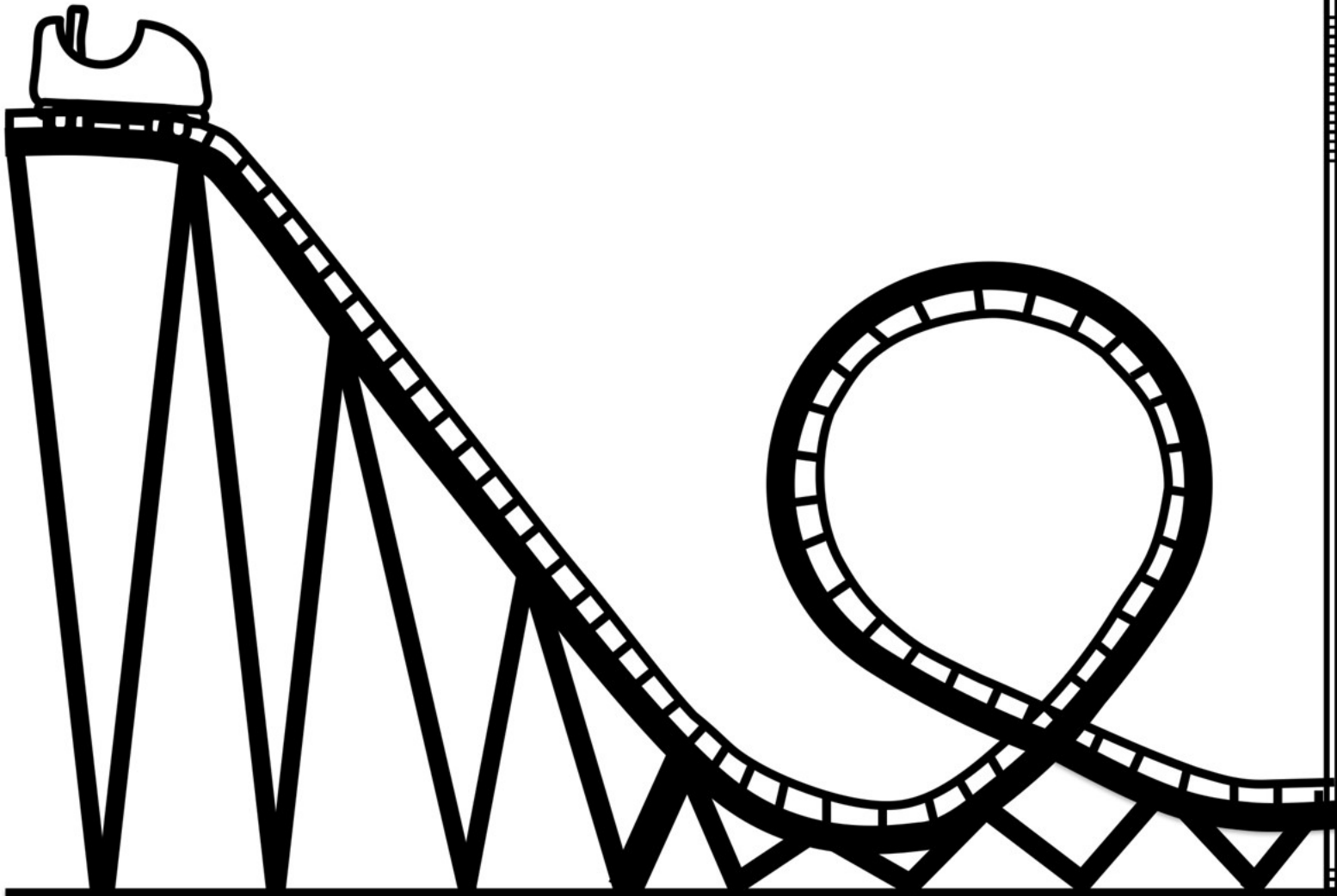
Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		

- 12) In order to make the loop successfully (and not lose any passengers), a rollercoaster has to hit a critical speed before the loop. What is the velocity of a rollercoaster car if it has a mass of 7,600 kg and 4,750,000 Joules of kinetic energy?



Define Variables	Write equation and show work	Answer w/ units
KE = m = v =		

# Answer Key





Name: \_\_\_\_\_  
 Period: \_\_\_\_\_

Date: \_\_\_\_\_

## Kinetic Energy

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

Directions: Fill out everything for each problem. Write neatly!

- 1) A unicorn suddenly ran through the school at 5.6 m/s and it has a mass of 450 kg. What is the unicorn's kinetic energy?

Define Variables	Write equation and show work	Answer w/ units
$KE = ?$ $m = 450 \text{ kg}$ $v = 5.6 \text{ m/s}$	$KE = \frac{1}{2} mv^2$ $KE = \frac{1}{2} (450) (5.6)^2$ $KE = 7056$	$KE = 7100 \text{ J}$



- 2) The sloth is one of the slowest creatures on Earth. Despite being slow, they are really good swimmers! How fast must the sloth swim if they have a mass of 7.2 kg and 0.051 Joules of kinetic energy?

Define Variables	Write equation and show work	Answer w/ units
$KE = 0.051 \text{ J}$ $m = 7.2 \text{ kg}$ $v = ?$	$KE = \frac{1}{2} mv^2$ $0.051 = \frac{1}{2} (7.2) (v^2)$ $0.051 = 3.6 v^2$ $v^2 = 0.0141666$ $v = 0.1190238$	$v = 0.12 \text{ m/s}$

- 3) Usain Bolt is wicked fast. In fact, he is the fastest human in the world and ran at a crazy 10.1 m/s in the Olympic Games. What is his mass if he had 4,640 Joules of kinetic energy in that race? (Usain's fastest is a little over 22 mph!)



Define Variables	Write equation and show work	Answer w/ units
$KE = 4640 \text{ J}$ $m = ?$ $v = 10.1 \text{ m/s}$	$KE = \frac{1}{2} mv^2$ $4640 = \frac{1}{2} (m) (10.1^2)$ $4640 = 51.005 (m)$ $m = 90.97147$	$m = 91 \text{ kg}$

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



- 4) The world's fastest insect is the horse fly. A horse fly can top out at 90 mph! Find its velocity if it has a mass of  $1.2 \times 10^{-5}$  kg. The kinetic energy of the house fly is 0.019 Joules.

Define Variables	Write equation and show work	Answer w/ units
$KE = 0.019 \text{ J}$ $m = 1.2 \times 10^{-5} \text{ kg}$ $v = ?$	$KE = \frac{1}{2} mv^2$ $0.019 = \frac{1}{2} (1.2 \times 10^{-5}) (v^2)$ $0.019 = 6 \times 10^{-6} (v^2)$ $v^2 = 3166.67$ $v = 56.2731$	$v = 56 \text{ m/s}$



- 5) Quarter Horses are typically faster than Thoroughbreds over short distances. A racehorse can run at 18 m/s and has 195,000 Joules of kinetic energy. What is this racehorse's mass?

Define Variables	Write equation and show work	Answer w/ units
$KE = 195,000 \text{ J}$ $m = ?$ $v = 18 \text{ m/s}$	$KE = \frac{1}{2} mv^2$ $195,000 = \frac{1}{2} (m) (18^2)$ $195,000 = 162 (m)$ $m = 1203.704$	$m = 1200 \text{ kg}$

- 6) Santa's sleigh flies at 3 times the speed of sound. That's a whopping  $1.04 \times 10^6$  m/s. Santa's sleigh actually makes a Sonic Boom when it surpasses the speed of sound! (keep your ears open for that on Christmas Eve!). How much kinetic energy must Santa's sleigh have if its mass is 7,500 kg? (Let us assume he is not carrying ALL 7.5 billion presents at once!)



Define Variables	Write equation and show work	Answer w/ units
$KE = ?$ $m = 7,500 \text{ kg}$ $v = 1.04 \times 10^6 \text{ m/s}$	$KE = \frac{1}{2} mv^2$ $KE = \frac{1}{2} (7500) (1.04 \times 10^6)^2$ $KE = 4.056 \times 10^{15} \text{ J}$	$KE = 4.1 \times 10^{15} \text{ J}$



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

- 7) The Blue Whale is the largest animal to have ever lived. As an adult it is as long as three school buses added together. A 170,000 kg Blue Whale cruises along at a modest pace. If it has 890,000 Joules of kinetic energy, what is its cruising speed?



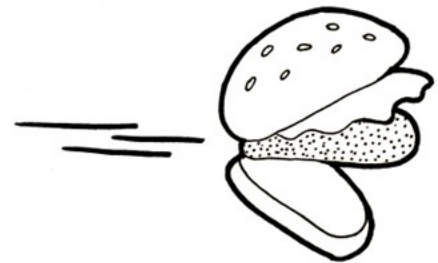
Define Variables	Write equation and show work	Answer w/ units
$KE = 890,000 \text{ J}$ $m = 170,000 \text{ kg}$ $v = ?$	$KE = \frac{1}{2} mv^2$ $890,000 = \frac{1}{2} (170,000) v^2$ $890,000 = 85,000 v^2$ $v^2 = 10.47058824$ $v = 3.235828833$	$v = 3.2 \text{ m/s}$



- 8) An octopus spots its favorite meal ahead!, a lobster! (Me, too, boo. Me, too) What is the octopus' mass if it darts at 12 m/s (an octopus is faster than Michael Phelps!) and has 3,168 Joules of kinetic energy?

Define Variables	Write equation and show work	Answer w/ units
$KE = 3,168 \text{ J}$ $m = ?$ $v = 12 \text{ m/s}$	$KE = \frac{1}{2} mv^2$ $3168 = \frac{1}{2} (m) (12^2)$ $3168 = 72 (m)$ $m = 44$	$m = 44 \text{ kg}$

- 9) Food Fight! Someone throws a perfectly good hamburger across the cafeteria. What velocity does it experience if it has a mass of 0.35 kg and has 79 Joules of kinetic energy?



Define Variables	Write equation and show work	Answer w/ units
$KE = 79 \text{ J}$ $m = 0.35 \text{ kg}$ $v = ?$	$KE = \frac{1}{2} mv^2$ $79 = \frac{1}{2} (0.35) (v^2)$ $79 = 0.175 (v^2)$ $v^2 = 451.4285714$ $v = 21.24684851$	$v = 21 \text{ m/s}$

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



- 10) A boy is hit with a piece of cake. The cake has a mass of 0.56 kg and hit the boy at a speed of 17 m/s. What kinetic energy did the piece of cake have?

Define Variables	Write equation and show work	Answer w/ units
$KE = ?$ $m = 0.56 \text{ kg}$ $v = 17 \text{ m/s}$	$KE = \frac{1}{2} mv^2$ $KE = \frac{1}{2} (0.56) (17^2)$ $KE = 80.92$	$KE = 81 \text{ J}$



- 11) SuperChicken! isn't just any ol' superhero. No, this chicken has a mass of 81 kg, is 6 feet tall, and can outrun a racehorse at 32 m/s. What is SuperChicken's! kinetic energy?

Define Variables	Write equation and show work	Answer w/ units
$KE = ?$ $m = 81 \text{ kg}$ $v = 32 \text{ m/s}$	$KE = \frac{1}{2} mv^2$ $KE = \frac{1}{2} (81) (32^2)$ $KE = 41,472$	$KE = 41,000 \text{ J}$

- 12) In order to make the loop successfully (and not lose any passengers), a rollercoaster has to hit a critical speed before the loop. What is the velocity of a rollercoaster car if it has a mass of 7,600 kg and 4,750,000 Joules of kinetic energy?



Define Variables	Write equation and show work	Answer w/ units
$KE = 4,750,000 \text{ J}$ $m = 7,600 \text{ kg}$ $v = ?$	$KE = \frac{1}{2} mv^2$ $4750000 = \frac{1}{2} (7600) v^2$ $4750000 = 3800 v^2$ $v^2 = 1250$ $v = 35.35533906$	$v = 35 \text{ m/s}$