$\qquad$ Period $\qquad$ Date $\qquad$

## WORKSHEET: KINETIC AND POTENTIAL ENERGY PROBLEMS

1. Stored energy or energy due to position is known as $\qquad$ energy.
2. The formula for calculating potential energy is $\qquad$ .
3. The three factors that determine the amount of potential energy in an object are
$\qquad$ , $\qquad$ and $\qquad$ .
4. Potential energy is measured in units of $\qquad$ -.
5. Mass must be measured in units of $\qquad$ .
6. Gravitational pull must be measured in units of $\qquad$ .
7. Height must be measured in units of $\qquad$ .
8. Calculate the potential energy of a rock with a mass of 55 kg while sitting on a cliff that is 27 m high.
9. What distance is a book from the floor if the book contains 196 Joules of potential energy and has a mass of 5 kg ?
10. An automobile is sitting on a hill which is 20 m higher than ground level. Find the mass of the automobile if it contains $362,600 \mathrm{~J}$ of potential energy.
11. Energy of motion is known as $\qquad$ energy.
12. The formula for calculating kinetic energy is $\qquad$ .
13. The two factors that determine the amount of kinetic energy in an object are
$\qquad$ and $\qquad$ .
14. Kinetic energy is measured in units of $\qquad$ .
15. Mass must be measured in units of $\qquad$ .
16. Velocity must be measured in units of $\qquad$ .
$\qquad$ Period $\qquad$ Date $\qquad$
17. Calculate the kinetic energy of the rock in problem \#8 if the rock rolls down the hill with a velocity of $8 \mathrm{~m} / \mathrm{s}$.
18. Calculate the kinetic energy of a truck that has a mass of 2900 kg and is moving at $55 \mathrm{~m} / \mathrm{s}$.
19. Find the mass of a car that is traveling at a velocity of $60 \mathrm{~m} / \mathrm{s}$ North. The car has 5,040,000 J of kinetic energy.
20. How fast is a ball rolling if it contains 98 J of kinetic energy and has a mass of 4 kg ?
$\qquad$
$\qquad$

## WORKSHEET: POTENTIAL ENERGY PROBLEMS

## Fill in the Blank:

1. Potential energy is the energy matter has as a result of its $\qquad$ or
2. The more mass an object has the (more / less) potential energy it has.
3. The potential energy an object has due to its position is called $\qquad$ potential energy.
4. The formula for calculating gravitational potential energy is $\mathrm{PE}=$ $\qquad$ .
5. The value of the $g$ constant (the acceleration of all objects due to gravity) on earth is $\qquad$ .
6. The SI (metric) unit for energy is $\qquad$ and the symbol is $\qquad$ .

## Sample Problems:

1. $\mathrm{PE}=$ ?
$\mathrm{m}=0.6 \mathrm{~kg}$
$\mathrm{g}=9.8 \mathrm{~m} / \mathrm{s}^{2}$
$\mathrm{h}=35 \mathrm{~m}$
2. $\mathrm{PE}=30 \mathrm{~J}$
$\mathrm{m}=$ ?
$\mathrm{g}=9.8 \mathrm{~m} / \mathrm{s}^{2}$
$\mathrm{h}=10 \mathrm{~m}$
3. $\mathrm{PE}=7.5 \mathrm{~J}$
$\mathrm{m}=1.6 \mathrm{~kg}$
4. $\mathrm{PE}=$ ?
$\mathrm{g}=9.8 \mathrm{~m} / \mathrm{s}^{2}$
$\mathrm{m}=2 \mathrm{~kg}$
$\mathrm{g}=9.8 \mathrm{~m} / \mathrm{s}^{2}$
$\mathrm{h}=22 \mathrm{~m}$
5. A 10 kg mass is lifted to a height of 2 m . What is its potential energy at this position?

Given Formula Substitution Answer (with units)
6. At what height is an object that has a mass of 16 kg , it its gravitational potential energy is 7500 J . Given Formula Substitution

Answer (with units)
$\qquad$
$\qquad$ Period: $\qquad$

## HOMEWORK PROBLEMS:

7. $\begin{aligned} \mathrm{PE} & = \\ \mathrm{m} & =3 \mathrm{~kg} \\ \mathrm{~g} & =9.8 \mathrm{~m} / \mathrm{s}^{2} \\ \mathrm{~h} & =40 \mathrm{~m}\end{aligned}$
8. $\mathrm{PE}=74 \mathrm{~J}$
$\mathrm{m}=3.8 \mathrm{~kg}$
$\mathrm{g}=9.8 \mathrm{~m} / \mathrm{s}^{2}$
$\mathrm{h}=$ ?
9. $\mathrm{PE}=52 \mathrm{~J}$
$\mathrm{m}=$ ?
$\mathrm{g}=9.8 \mathrm{~m} / \mathrm{s}^{2}$
$\mathrm{h}=18 \mathrm{~m}$
10. $\mathrm{PE}=$ ?
$\mathrm{m}=5 \mathrm{~kg}$
$\mathrm{g}=9.8 \mathrm{~m} / \mathrm{s}^{2}$
$\mathrm{h}=22 \mathrm{~m}$
11. What potential energy is acquired by a hammer with a mass of 0.75 kg when raised 0.35 m ?
12. A book with a mass of 1 kg is dropped from a height of 3 m . What is the potential energy of the book when it reaches the floor?
13. At what height is an object that has a mass of 50 kg , if its gravitational potential energy is 9800 J ?
14. What is the mass of an object if its gravitational potential energy is 3822 J and it is 15 m above the ground?
15. An object with a mass of 20 kg and potential energy of 584 J is what distance above the ground?

Name: $\qquad$ Date: $\qquad$ Period: $\qquad$

## Write the equation and units for work:

1. A weight lifter lifts a set of weights a vertical distance of 2 m . If a constant net force of 350 N is exerted on the weights, what is the net work done on the weights?
2. A shopper in a supermarket pushes a cart with a force of 35 N directed at an angle of 25 degrees downward from the horizontal. Find the work done by the shopper on the cart as the shopper moves along a 50 m length of aisle.
3. If 2 J of wok is done in raising a 180 g apple, how far is it lifted?
4. For each of the following cases, indicate whether the work done on the second object in each example will have a positive or a negative value.
a. The road exerts a friction force on a speeding car skidding to a stop.
b. A rope exerts a force on a bucket as the bucket t is raised up a well.
c. Air exerts a force on a parachute as the parachutist falls to Earth.
5. If a neighbor pushes a lawnmower four times as far as you do but exerts only half the force, which one of you does more work and by how much?

Name: $\qquad$ Date: $\qquad$ Period: $\qquad$
6. A worker pushes a 1500 N crate with a horizontal force of 345 N a distance of 24 m . Assume the coefficient of kinetic friction between the crate and the floor is .22 .
a. How much work is done by the worker on the crate?
b. How much work is done by the floor on the crate?
c. What is the net work done on the crate?
7. A .075 kg ball in a kinetic sculpture moves at a constant speed along a motorized vertical conveyor belt. The ball rises 1.32 m above the ground. A constant frictional force of .35 N acts in the direction opposite the conveyor belt's motion. What is the net work done on the ball?
8. For each of the following statements, identify whether the everyday or the scientific meaning of work is intended.
a. Jack had to work against time as the deadline neared.
b. Jill had to work on her homework before she went to bed.
c. Jack did work carrying the pail of water up the hill.
9. Determine whether work is being done in each of the following examples:
a. a train engine pulling a loaded boxcar initially at rest
b. a tug of war that is evenly matched
c. a crane lifting a car
$\qquad$ Period $\qquad$

## Worksheet: Work

Write the equation and units for work:

1. How much work does Bobby perform in pushing a 35 N crate a distance of 4 meters?

| list known values | formula | substitution | answer \& units |
| :--- | :--- | :--- | :--- |
|  |  |  |  |

2. How far will a 70 N crate be moved if 3500 J or work are accomplished?

| list known values | formula | substitution | answer \& units |
| :--- | :--- | :--- | :--- |
|  |  |  |  |
|  |  |  |  |

3. What force is needed to move a barrel $25-\mathrm{m}$ if 225 J of work are accomplished?
4. Peggy uses a force of 40 N to move the grocery basket 18 meters. How much work did she perform?
5. How far will a 150 N crate be moved if 600 J or work are performed?
6. What force is needed to lift a box that weighs 300 N if 15000 J of work are accomplished?
$\qquad$ Period $\qquad$

## Worksheet: Work

7. How far will a 700 N crate be moved if 2800 J or work are accomplished?
8. What force is needed to move a barrel $45-\mathrm{m}$ if 3600 J of work are accomplished?
9. How much work does Billy perform if he pushes the 8000 N stalled car a distance? of 25 meters?
10. Grant stands 3 meters from the check out at the grocery store holding a 20 N bag of potatoes for 10 minutes. How much work does he perform?
