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| **CPB: Unit 9: Energy, Work, Power - Work Packet** |

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour: \_\_\_\_\_\_\_

In order to be successful in high school science classes it is imperative that you practice your science skills during class and outside of class time. All of the activities in this packet are designed to guide you in your practice. It is expected that you will complete all of the activities in the timeframe alloted, and then correct each of these activities during class.

To complete each activity you will need to ***refer back to the notes and practice problems*** that we do during class time.

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| **Daily Response Questions** |

As soon as you enter the classroom each day you will immediately pull out your note packet and work packet for the current unit. You will copy down the warm-up question from the board and answer it using your knowledge and notes. When we review the question as a class it is your responsibility to correct your answer. If you are absent it is your responsibility get the warm-up and correct answer from a classmate.

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| Date: \_\_\_\_\_\_\_\_ |
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| Date: \_\_\_\_\_\_\_\_ |
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**Directions:** Using your note packet as a resource, you will complete each section in this packet for homework. Each homework section will be checked daily at the start of the hour for completion. Be sure to show all work and use complete sentences when necessary.

**Section 9.1 – Work pgs.144-146**

1. What do we call the quantity of force x distance, and what quantity can this change? This question has two parts, be sure to answer both.
2. Work is required to lift a barbell. How many times more work is required to loft the barbell three times as high? Support your answer with an explanation sentence or use the work equation to prove it.
3. Which requires more work, lifting a 10-kg load a vertical distance of 2m or lifting a 5-kg load a vertical distance of 4m? Explain your answer using completed sentences.
4. How many joules of work are done on an object when a force of 10N pushes it a distance of 10m? Show all necessary work for solving.

**Section 9.1 – Work pgs.144-146**

1. Calculate the work done when a force of 1N moves a book 2m. **Answer: 2J**
2. Calculate the work done when a 20 N force pushes a cart 3.5m. **Answer: 70J**
3. Calculate the amount of force applied to move a box a distance of 1m if the work done is equal to 215 Newton meters. **Answer: 215 N**
4. Calculate how high a box is lifted for the box has 500 Newton meters of work done on it and it weighs 62.5N. Hint: What does “weight” tell you? **Answer: 8m**
5. Which requires more work: stretching a strong spring a certain distance or stretching a weak spring the same distance? Defend your answer.

**Section 9.2 – Power** **pgs. 146-147**

1. How much power is required to do 100J of work in a time of 0.5s? How much power is required of the same work is done in 1s? **Answers: 200 W, 100W**
2. Calculate the watts of power expended when a force of 1N moves a book 2m in a time interval of 1s? **Answer: 2W**
3. Calculate the power expended when a 20N force pushes a cart 3.5m in a time of 0.5s. **Answer: 140W**
4. Two people who weigh the same amount climb a flight of stairs. The first person climbs them in 30s and the second person climbs them in 40s. Which person does more work? Which person uses more power? Explain your reasoning.

**9.3-9.5: Mechanical Energy, Potential Energy and Kinetic Energy**

1. What are the two main forms of mechanical energy? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. How many joules of potential energy does a 1-kg book gain when it is elevated 4m? When it is elevated 8m? Using your answers, describe what happens to the potential energy when height is doubled. **Answer: 40J, 80J**
3. Calculate the number of joules of kinetic energy a 1-kg book has when tossed across the room t 2 m/s**. Answer: 2J**
4. If you do 100J of work to elevate a bucket of water, what is its gravitational potential energy relative to the starting position? What would be the gravitational potential energy if the bucket were raised twice as high? **Answers: 100J, 200J**
5. A boulder is raised above the ground so its potential energy relative to the ground is 200J. Then it is dropped. What is the kinetic energy just before it hits the ground? **Answer: 200J**
6. A roller coaster ride starts with the car at rest at point A.
	1. Rank from greatest to least the car’s speed at each point. \_\_\_\_\_\_\_,\_\_\_\_\_\_\_,\_\_\_\_\_\_\_,\_\_\_\_\_\_\_
	2. Rank from greatest to least the car’s kinetic energy at each point. \_\_\_\_,\_\_\_\_\_,\_\_\_\_\_,\_\_\_\_\_,\_\_\_\_\_\_
	3. Rank from greatest to least the car’s potential energy at each point. \_\_\_\_,\_\_\_\_\_,\_\_\_\_\_,\_\_\_\_\_,\_\_\_\_\_\_
7. A hammer falls off of a roof and strikes the ground with a certain kinetic energy. If it fell from a rooftop that was four times higher, how would its kinetic energy of impact compare? Its speed of impact?

**9.6 Work-Energy Theorem pgs.151-152**

1. Suppose you know the amount of work the brakes of a car must do to stop the car at a given speed. How much work must they do to stop the car that is moving with four times as fast? How will the stopping distance compare?
2. How does speed affect the friction between a road surface and a skidding tire?

**9.7 Conservation of Energy pgs. 153-154**

1. What will be the KE of an arrow having a PE of 50J after it is shot from a bow? Defend your answer.
2. What does it mean to say that in any “system” the total energy stays the same?
3. In what sense is energy from coal actually solar energy?
4. A physics teacher demonstrates energy conservation by releasing a heavy pendulum bob as shown, allowing it to swing to and fro. What would happen if gave the bob a slight shove as it left his nose? What did his shove add to the “system”?
5. A stuntman on a cliff has a potential energy equal to 10,000J. Show that when his potential energy 2000J, his kinetic energy is 8000J.

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| The product of the net force on an object and the distance through which the object is moved. | Watt | Energy | It is equal to half the mass times the square of the speed |
| Energy that is stored and held in readiness is called... | Lever | Law of Conservation of Energy | The resulting unit of work is the newton meter, which is also called the... |
| Mechanical Advantage | Power | Whenever work is done, energy changes | Mechanical Energy |
| Machine | Efficiency |  |  |
| Refers to an allele that will be expressed only if the individual has two copies. | Refers to a trait that has more than three different types of alleles that exist within a population. |  |  |