

Chapter 7A

Physical Science

Read pages 150 – 155 (blue book).

Show your work on all math problems.

Read pages 129 – 134 (white book)

1. What is mechanical work?
2. What SI unit is used to measure the amount of work done?
3. What is the formula for calculating work?
4. If you push on a brick wall with a force of 50 Newtons for 2 hours, how much work did you do?
5. If you push on a car with a force of 80 Newtons and the car moves 5 meters, how much work did you do?
6. What is power?
7. Write the formula for calculating power.
8. What is the SI unit for power?
9. What is James Watt famous for?
10. A rock climber fell off a cliff. A winch is used to pull him back to the top of the cliff. The winch uses a force of 300 Newtons to pull him up 5 meters.
 - a. How much work did the winch do?
 - b. If the winch took 50 seconds to pull the climber up, how much power was used?
11. How much work does a 100 Watt light bulb do in 60 seconds?
12. List three classifications of simple machines.
13. Why can't a machine be 100% efficient?
14. Gasoline with 1,000,000 Joules of energy is put in a generator. The generator uses up all the gasoline to make 600,000 Joules of energy. What is the efficiency of the generator?
15. What is mechanical advantage?
16. A moving company uses a ramp to get a 360 pound refrigerator into a building. If the moving man pushed the fridge with a force of 90 pounds to get it up the ramp, what is the mechanical advantage of the ramp?
17. Explain the distance principle.



Chapter 7B

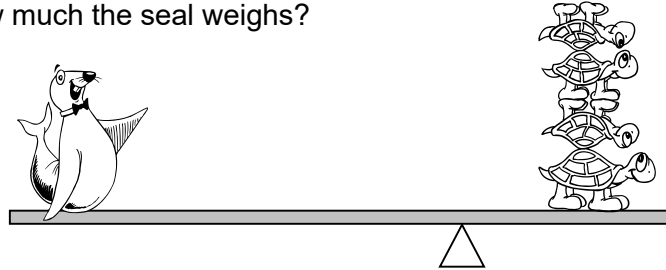
Physical Science

Read pages 156 – 160 (blue book).

Show your work on all math problems.

Read pages 135 – 139 (white book).

1. What is a fulcrum?
2. A seesaw is perfectly balanced and has no tendency to teeter. What is this state called?
3. List two scientific names for a twisting force.
4. At the circus, animals balance on a teeter-totter. One seal sits on the right side 8 feet from the fulcrum. Four turtles (each weighing 100 pounds) sit on the left side 4 feet from the fulcrum. Use the Law of Moments to determine how much the seal weighs?



5. Huey, Dewey and Louie were playing on the seesaw at the park. Huey is larger than Dewey and Louie, so he told Dewey and Louie to sit on the right side of the seesaw and he would sit on the left side.
 - a. Dewey weighs 50 pounds and he sat 6 feet from the fulcrum. What is his torque?
 - b. Louie weighs 60 pounds and he sat 7 feet from the fulcrum. What is his torque?
 - c. How much torque do Dewey and Louie have together?
 - d. If Huey weighs 80 pounds, how far away from the fulcrum should he sit to balance with Dewey and Louie?
6. Draw a picture of each class of lever: 1st class, 2nd class, 3rd class. Label the resistance, effort and fulcrum on each drawing.
7. Classify each of the following levers:
 - a. A hammer pulling nails
 - b. A baseball bat hitting a ball
 - c. A nutcracker
 - d. Your knee bending
 - e. Scissors cutting paper
 - f. Carrying a load of dirt in a wheelbarrow
8. When is it better to use a second-class lever instead of a first-class lever?
9. What is an advantage of using third-class levers?
10. Find 5 things around your house that are levers. List them and indicate what class they each belong to.

Chapter 7C

Physical Science

Read pages 161 – 165 (blue book).

Show your work on all math problems.

Read pages 140 – 144 (white book).

1. List three examples of a wheel and axle system.
2. How is the ideal mechanical advantage of a wheel and axle system determined?
3. A steering wheel has a diameter of 16 inches and the steering column it is attached to has a diameter of 2 inches. What is the mechanical advantage of this system?
4. A wagon wheel has a diameter of 8 inches and its axle has a diameter of 1 inch. If the axle spins at a speed of 40 revolutions per minute, how fast does the wheel spin?
5. What is a gear?
6. How is the ideal mechanical advantage of a pair of gears determined?
7. A bicycle has a pedal sprocket gear and a rear sprocket gear, which is the effort gear and which is the resistance gear?
8. An effort gear has 16 teeth and a resistance gear has 24 teeth.
 - a. What is the mechanical advantage of the system?
 - b. If the effort gear turns 12 times, how many times will the resistance gear turn?
9. What is the mechanical advantage of:
 - a. A single fixed pulley?
 - b. A single movable pulley?
10. A single pulley doesn't reduce effort, so what is it useful for?
11. What is the mechanical advantage of a pulley system with 3 ropes?
12. If a pulley system with 3 ropes is used to lift a 120-pound object, with how many pounds of force would you have to pull on the rope to lift the object?
13. What is a block and tackle?

Chapter 7D

Physical Science

Read page 166 – 169 (blue book).

Show your work on all math problems.

Read pages 145 – 148 (white book).

1. How does an inclined plane reduce the amount of effort you have to use to move an object?
2. Write the formula for calculating the ideal mechanical advantage of an inclined plane.
3. An 800-pound crate needs to be raised to a loading dock that is 6 feet high. If the ramp leading up to the loading dock is 24 feet long,
 - a. What is the mechanical advantage of the ramp?
 - b. How much force do you have to use to move the crate?
 - c. Bonus: What's inside the crate?????
4. A 400-pound box of books needs to be moved to the front steps of the library, 4.2 feet above the ground. If the maximum force with which you can push is 80 pounds, how long of a ramp should you use to move the box?
5. List four examples of wedges you might use.
6. Where is the inclined plane on a screw?
7. How are the threads of US bolts classified?
8. Which bolt has a greater mechanical advantage: one with 6 TPI or one with 10 TPI?
9. How are the threads of metric fasteners classified?
10. One metric bolt has a pitch of 8 and another bolt has a pitch of 12. Which bolt has the greater mechanical advantage?
11. A metric bolt has a pitch of 4 mm. If you turn the bolt 8 times to tighten it, how far will the bolt move?
12. Besides fastening things together, list three ways screws are used.