

Show "K-U-E-S" where necessary, otherwise answer completely. All work needs to be done on your own paper to use on the CPQ- quiz

You may not use this worksheet on the CPQ-quiz only your answer sheet.

CPQ Quiz: Oct. 22rd

TEST- Oct. 24th

Work Problems: (Oct. 16th)

1. A force sets an object in motion. When the force is multiplied by the time of its application, we call the quantity *impulse*, which changes the momentum of that object. What do we call the quantity *force · displacement*, and what quantity does this change?
2. How much work is done in lifting a 300 Newton rock 10 meters off the ground? *3,000 J*
3. A force of 200 Newtons is needed in order to push a wheelbarrow that weighs 1000 Newtons. If the wheelbarrow is pushed 30 meters, how much work is done on the wheelbarrow? *6,000 J*
4. Work is required to lift a barbell. How many times more work is required to lift the barbell three times high?
5. Which, if either, requires more work, lifting a 10 kg load a vertical distance of 2 m or lifting a 5 kg load a vertical distance of 4 m?
6. A tennis player carries their tennis bag weighing 100N a horizontal distance of 40.0m. How much work is done on the tennis bag?

Simple Machines (Oct. 17-20th)

7. In what two ways can a machine alter an input force?
8. What does it mean to say that a machine has a certain mechanical advantage?
9. In which type of lever is the output force smaller than the input force? What benefit is this?
10. A lever is used to lift a heavy load. A 50 N force pushes one end of the lever down 1.2 m and the load rises 0.2 m. Calculate in weight of the load. Neglect friction. *300 N*
11. Peter used a stick 1.8 meters long to push aside a large rock in the yard. The fulcrum was 0.3 meters from the resistance. What is the ideal mechanical advantage of the stick? *5*
12. Karen was helping her father repair the roof of their house. They needed to bring a variety of tools and materials up to the roof. Karen suggested constructing a pulley. The heaviest load weighed about 400 N. Karen wanted to exert a minimum force of 100 Newtons. Ideally, how many strings should Karen's pulley have? *4*
13. Carol wanted to put a 250 Newton box up on a shelf that was 0.75 meters above the floor. She set up a board 2.00 meters long to use as an inclined plane. Neglecting friction, calculate the amount of force Carol needed to exert while sliding the box up to the shelf using the inclined plane. *94 N*
14. A car jack has an effort arm of 45 centimeters and a resistance arm of 7.3 cm. What is the ideal mechanical advantage? *6.2*

15. What is the ideal mechanical advantage of an inclined plane that is 40 meters long and 8 meters high? 5

16. A bolt is used to hold two pieces of metal together. After it has been started into the top piece of metal the head of the bolt is 2.54 cm above the surface of the metal. The bolt is then turned 10 complete times. The head of the bolt is now 1.90 cm from the surface of the metal. The diameter of the bolt is 1.10 cm. What is the ideal mechanical advantage of the bolt? 54

17. A bus steering wheel has a diameter of about 50.8 cm. It turns the steering column, which has a diameter of about 7.6 cm. If the driver applies 22.3 N of force to turn the wheel how much force does the steering column exert to steer the bus? 150N

Efficiency (Oct. 21-22th)

18. Distinguish between ideal mechanical advantage and mechanical advantage. How would these compare if a machine were 100% efficient?

19. (a) When moving a 5000 N piano with a pulley system, the workers note that for every 2 m of rope pulled down, the piano rises 0.4 m. Ideally how much force is required to lift the piano? (b) The workers actually pull with 2500 N of force to lift the piano 2m, what is the efficiency of the pulley system? 100 N 40 %

20. (a) Calculate the work needed to lift a 90.0 N block of ice a vertical distance of 3.0 m. What PE does it have? (b) When the same block of ice is raised the same vertical distance by pushing it up a 5.0 m long ramp, only 54.0 N of pushing force are required. Calculate the work done to push the block up the plane. What PE does it have? (c) Is this ramp ideal or not? Explain how you know. 270 J 270 J

21. How efficient is a pulley system if it enables you to lift a 700.0 Newton engine 0.550 meters if you exerted 35.7 Newtons of force while pulling 11.43 meters of rope? 94.4 %

22. In what way is a machine subject to the law of energy conservation? Is it possible for a machine to multiply energy or work input?

23. What is the efficiency of a machine that requires 100.0 J of input energy to do 35 J of useful work? 35 %

Power (Oct. 21-22th)

24. If 8.00×10^6 kg of water flows over Niagara Falls each second, calculate the power available at the bottom of the falls. 3.92×10^9 W

25. What is the power of a machine that can do 50,000 joules of work in 50 seconds? 1,000 W

26. If you lifted a 600 N box to a height of 3 meters, in 10 seconds. How much power did you expend? 180 W

27. How much power is required to do 100.0 J of work on an object in a time of 0.50 s? How much power is required if the same work is done in 1.0s? 2.0×10^2 W 1.0×10^2 W

28. Calculate the power expended when a 500.0 N barbell is lifted 2.2m in 2.0 s. 550 W