**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_**

Wheel and Axle Practice

Answer the following questions:

|  |  |
| --- | --- |
|  |  |
| re= | re= |
| rr= | rr= |
| IMA= | IMA= |
| If the Actual MA is 10, how wide does the wheel need to be? (Remember, the width will be equal to re + re) | If the Actual MA is 3, how wide does the axle need to be? (Remember, the width will be equal to rr + rr) |
|  |  |
| re= | re= |
| rr= | rr= |
| IMA= | IMA= |
| If the Actual MA is 2.5, how wide does the wheel need to be? (Remember, the width will be equal to re + re) | If the Actual MA is 2, how much wider does the axle need to be (HINT: you will need to subtract at the end) |

Answer the following questions below:

1. Draw a wheel and axle with a mechanical advantage of 5.
2. What is the mechanical advantage of a wheel and axle that uses 50 N of force to move a resistance of 2550 N? (HINT: Pick your triangle carefully, you have forces not lengths!)
3. The mechanical advantage of an automobile’s wheel and axle is 8.93 x 10-2. If the wheel’s output force is 2.22 x 103 N. What is the input force that turns the axle?
4. What does the radius of the axle of a wheel need to be if it has a mechanical advantage of 3.9 and the wheel has a radius of 18 inches?
5. The diameter of a steering wheel in Allyson’s car is 15 inches. The steering column (or the axle of the steering wheel) has a radius of 1.75 inches. What is the mechanical advantage provided by this simple machine? (BE SURE TO CONVERT DIAMETER TO RADIUS by dividing the diameter by 2)
6. An industrial water shutoff valve is designed to operate with 40 lb of effort force. The valve with encounter 250 lb of resistance force when applied to a 1.25 in axle radius.
   1. What is the mechanical advantage of the system (HINT: use forces)
   2. What is the required wheel radius to overcome the resistance force? (HINT: use answer from part A)