

## Torque Worksheet #1

Name: \_\_\_\_\_

Torque = Force x distance

Balanced Torque: Torque (left) = Torque (right)

*Show your work and circle your answer.*

1. Mary the Mechanic has to loosen a bolt on a tire. She applies a perpendicular force of 30 N on the wrench that is 0.5 m long. How much Torque is she applying?

2. Mary the Mechanic gets distracted and when she tries to loosen the next bolt she applies the same force but parallel to the wrench. What happens?

3. A mover has to lift a heavy box. He wedges a crowbar underneath it and applies a perpendicular force of 300 N. How long is the crowbar if the Torque he applies is 450 Newton-meters?

4. Which is better for prying open a stuck cover from a can of paint -- a screwdriver with a thick handle or one with a long handle?

5. Two students sit on a see-saw. Archie is a hulking football player with a mass of 120 kg. Clementine is a dainty cheerleader with a mass of 40 kg. The see-saw is 3.5 m in total length with the fulcrum at the center. If Clementine sits at the end on one side, where must Archie sit relative to the center to keep the see-saw balanced?

6. An elephant of weight 4000 N is on a seesaw with a mouse of weight 5 N. If the elephant is 0.5 m away from the center of the seesaw, how far away would the mouse have to be to balance?

7. Matching:

Term:

\_\_\_\_\_ rotation

a. Distance from a turning axis to the point of contact

\_\_\_\_\_ torque

b. Produced by a torque

\_\_\_\_\_ lever arm

c. produces rotational acceleration

8. Circle the letter of each statement that is true of torque.

- a. Tends to produce linear acceleration.
- b. Caused by a turning force.
- c. Caused by an applied force acting through a lever arm
- d. Is the same as force.

9. Circle the letter of the description that would produce the greatest torque.

- a. Small force, short lever arm
- b. Small force, long lever arm
- b. Large force, small lever arm
- d. Large force, long lever arm

10. True or False. When thrown end-over-end through the air, no part of a baseball bat follows a parabolic path. If the statement is false, correct it

11. If you throw a banana so that it rotates as it moves through the air, it will wobble about its \_\_\_\_\_.

12. Explain why the center of gravity of the solar system is not at the sun's geometric center.

13. What conditions are necessary so that an object will not topple?

14. Circle the letter of each statement that is true.

- a. Objects with a CG high above their support are easy to balance
- b. No object can ever truly be in balance.
- c. Objects with large support areas are easier to balance.
- d. Only a computer can balance an object like an electric scooter.

15. True or False. A high jumper's CG can pass below the bar as the jumper's body passes over the bar. If the statement is false, correct it.