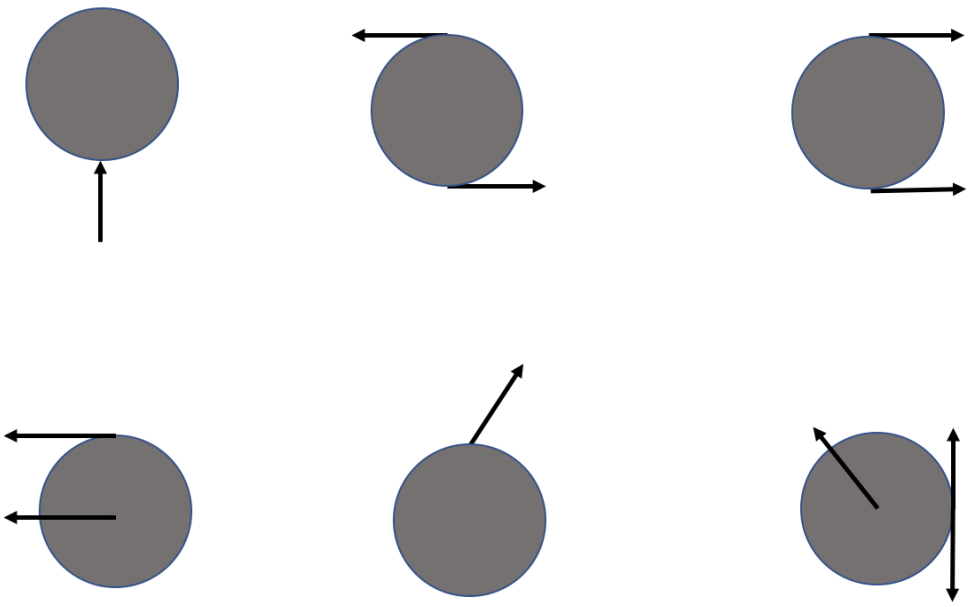
Name _____

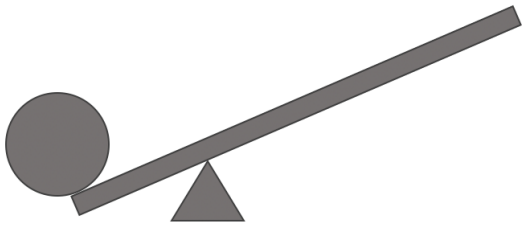
Static Equilibrium: $F_{net} = 0$ (object doesn't move) AND $\tau_{net} = 0$ (object doesn't rotate)

$\tau = rF\sin\theta$

1. The forces acting on the disk are the same magnitude. In each case, indicate whether the disk will accelerate ($F_{net} \neq 0$) and if so, draw the direction in which it will accelerate. Also indicate whether the object will rotate ($\tau_{net} \neq 0$) and if so, indicate whether it will rotate clockwise (-) or counterclockwise (+). **A**: $\tau_{net} = 0$, $F_{net} = 0$, **B**: $\tau_{net} \neq 0$, $F_{net} = 0$, **C**: $\tau_{net} = 0$, $F_{net} \neq 0$, **D**: $\tau_{net} \neq 0$, $F_{net} \neq 0$,



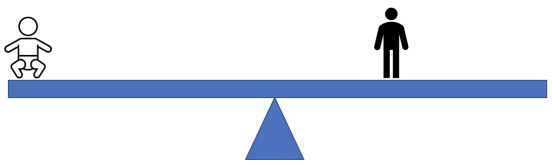
2. If you want to move a heavy object, like a boulder, you can get a long piece of wood and something to pivot the wood. Suppose the boulder weighs 2000N, the wood is 2m long, and you place the pivot point 0.2m from the boulder. What is the minimum force would you need to apply in order to just barely move the boulder? In which direction would you want to apply your force?



3. If I pivot a meter stick at the center and place a mass at one end, how far from the center should I place a mass that is double, such that the meter stick is balanced?
   A: same distance, **B**: twice the distance, **C**: half the distance, **D**: one fourth the distance

4. If I pivot a meter stick at the center and place a $500g$ mass 10cm from the middle, where should I place a $200g$ mass such that the meter stick is balanced?

5. If a kid ($m = 20kg$) sits on the end of a see-saw that has a total length of $3m$, how far from the center should the dad ($m = 70kg$) sit so that the see-saw doesn't move?



6. Certain types of dinosaurs were bipedal (walked on two legs). Why did these creatures have long tails if they had long necks?

7. A ladder is at rest with its upper end against a wall and its lower end on the ground. A worker is about to climb it. When is the ladder more likely to slip, when the worker is near the bottom or near the top of the ladder?
   A: Equally likely, **B**: Near the top, **C**: Near the bottom