1. A moose is running at 10 m/s. It sees a car ahead and decelerates at 5 m/s^2 until it comes to a stop. How far does it travel?
2. A person drops their pencil off of a table. The pencil falls from rest. It hits the ground in 2 seconds. How high is the table?
3. A basketball is launched at an angle of 45 with an initial velocity of 5 m/s. What is the amount of time it stays in the air for?
4. A basketball is launched at an angle of 45 with an initial velocity of 5 m/s. How far does it go?
5. A baseball player is trying to hit a ball 100 m so that he gets a home run. He hits the ball at a 15 degree angle. What initial velocity is required?
6. Given the same scenario as problem 7. If a 1 kg baseball comes towards the bat at 50 m/s and the collision takes 0.1 s, what is the force required?
7. A 10 kg block sits on a 60 degree incline. What is the normal force?
8. A 10 kg block sits on a 60 degree incline. What does the coefficient of friction need to be in order to keep the block at rest?
9. In tug of war, both teams pull on the rope with a force F. What is the tension in the rope?
10. There are 2 blocks next to each other. Block A is 1 kg, Block B is 2 kg. You push both of them with 6 N. What is the force of Block B on Block A?
11. There is a pulley with a 1 kg and 2 kg hanging off of each side. What is the acceleration of the blocks?
12. A race car is going around a circular track of radius 10 m at 40 m/s. What is the centripetal acceleration that the driver feels?
13. A roller coaster is going around a loop with a radius of 10 m. What is the minimum velocity it needs to have at the top of the loop so that it doesn't fall off?
14. A 1 kg block is at rest. A person pushes it with 5 N for 2 m. What is the block's final speed?
15. A skier starts on a 10 m high slope and skis down. What is the skier's speed at the bottom?
16. A block is traveling at 20 m/s. But, there is friction, with a coefficient of friction of 0.1. How far does the block travel before coming to a stop?
17. A horizontal spring launcher with a spring constant of 10 N/m is compressed by 1 m. How fast does a 1 kg particle get launched out?

18. A 1 kg block moving at 3 m/s collides and sticks to a 2 kg at rest. After the collision, how fast do they move?

19. A 5 kg block is at rest. A person pushes it with 5 N for 10 seconds. What is the block's final speed?

20. A merry-go-round is spinning at an angular velocity of 5 rad/s. Alice is at a radius of 1 m from the center, and Bob is at a radius of 2 m from the center. Who is going faster?

21. A CD player has to spin the disk from rest to an angular velocity of 10 rad/s in 1 second. What is the angular acceleration of the CD?

22. A CD player has to decelerate the disk at 5 rad/s^2 from 10 rad/s to rest. How far does the disk spin before it stops?

23. What is harder to spin: a hollow sphere or solid sphere of the same mass and radius?

24. If a 5 m long rod has a moment of inertia of 10 kgm^2, and you apply a force of 2 N at its tip, what is its angular acceleration?

25. Bob, who is 10 kg, sits on a seesaw 1 m from the point of rotation. If Alice is 5 kg, how far does she have to sit from the point of rotation?

26. A figure skater holds her arms out 1 m from her body and spins at 5 rad/s. What distance does she need to hold her arms from her body so that she spins at 10 rad/s?

27. A spring with spring constant 3 N/m is attached to a 1 kg block. What is the angular frequency of the spring?

28. Given the same spring setup in question 27, what is the period of oscillation?

Answer key:

1. 10 m
2. 19.6 m
3. 0.72 s
4. 2.55 m
5. 44.27 m/s
6. 942.7 N
7. 49 N
8. 1.73
9. F
10. 4 N
11. 3.27 m/s^2
12. 160 m/s^2
13. 9.9 m/s
14. 4.47 m/s
15. 14 m/s
16. 204.08 m
17. 3.16 m/s
18. 1 m/s
19. 10 m/s
20. Bob
21. 10 rad/s^2
22. 10 rad
23. Hollow sphere
24. 1 rad/s^2
25. 2 m
26. 0.71 m
27. 1.73 rad/s
28. 3.63 s