1. Define the impulse-momentum theorem and give an example of how it is used in the real world.

↑ time ↓ Force Airbag

2. Name and define the 2 types of collisions and tell what happens to the energy in each.

elastic - bounces off

inelastic - sticks together

3. Define angular force and angular acceleration using a drawing

4. Define torque and list what torque depends on.

force to rotate - length

5. A 30 kg child is riding a 4.2 kg bike with a velocity of 6.5 m/s to the northwest.
P=mv; Momentum = mass x velocity

a. What is the momentum of the bike?

$4.2 \cdot 6.5 =$ ▱

b. What is the momentum of the child?

$30 \cdot 6.5 =$ ▱

c. What is the total momentum of the child and the bike?

$(30 + 4.2) \cdot 6.5 =$ ▱

6. A .3 kg football is thrown with a velocity of 12 m/s to the right. A stationary receiver (Vf = 0) catches the ball and brings it to a rest in 9 seconds. What is the force exerted on the receiver?
Force (time) = Mass (final velocity) – Mass(initial velocity)

$Force(9) = .3(0) - .3(12)$

7. A 2500 kg car traveling to the north is slowed down uniformly from an initial velocity of 40 m/s by a 4000 N braking force acting opposite the car's motion. Use the impulse-momentum theorem to answer the following questions:
a. What is the car's final velocity after 1.3 seconds?
Force (time) = Mass (final velocity) – Mass (initial velocity)

$4000(1.3) = 2500(vf) - 2500(40)$

8. A dog sits 3.4 m from the center of a merry-go-round. If the dog undergoes a centripetal acceleration of 2.3 m/s², what is the dog's tangential velocity? What is the angular speed of the merry-go-round?
Centripetal Acceleration = Tangential Velocity² / radius

$2.3 = \dfrac{v^2}{3.4}$

9. A girl sits in a tire that is attached to an overhanging tree limb by a rope 3.2 m in length. The girl's father pushes her with a tangential velocity of 4.5 m/s. If the force that maintains her circular motion is 56 N, what is the girl's mass?
Centripetal Force = (mass x Tangential Velocity²) / radius

$56 = \dfrac{(mass \cdot 4.5^2)}{3.2}$