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| **Exam 3 study guide** |
| **Chapter 7**

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| 1. An average force of 100 N acts for a time interval of 0.02 second on a golf ball that is initially at rest. Calculate1. the impulse acting on the golf ball.
2. the change in momentum of the golf ball.

2. A force of 500 N acts for a time interval of 0.001 second on an object of mass 0.20 kg that was initially at rest. Calculate the speed of the object after the force acts.    3. A lump of clay of mass 0.1 kg is thrown with a speed of 9 m / s against a rigid wall where it comes to rest. Calculate the change in momentum of the lump of clay.    4. Calculate the momentum of a golf ball of mass 0.045 kg that moves at a speed of 40 m / s.    5. If the golf ball in the previous problem strikes a tree and rebounds with the same speed it had before the collision but in the opposite direction, calculate the change in momentum6. The collision of the golf ball with the tree described in the previous problem occurred over 0.01s. Calculate the force that the tree exerted on the golf ball during the collision.    7. A freight car of mass 120,000 kg rolling down the track at 3 m / s collides with an identical freight car that was initially at rest. The two cars couple together and move off together. Calculate the speed of the combination of two cars.    8. A football player of mass 100 kg with a speed of 3.0 m / s collides head-on with another football player of mass 85 kg who was initially moving in the opposite direction with a speed of 5.0 m / s. The second player tackles the first and they become entangled into the equivalent of a single mass. Determine the direction and the magnitude of the velocity of the two players after the collision.    9. Two persons on roller skates stand facing each other, and then push each other away. One has a mass of 50 kg and is observed to move with a speed of 3 m / s immediately after they separate. If the other person has a mass of 80 kg, determine the direction and magnitude of his velocity. 10. A 2000 kg car collides with a 1500 kg car that was initially at rest. The two cars lock together and move off after the collision at a speed of 6 m / s. Calculate the speed of the 2000 kg car before the collision.    |

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**Chapter 8**

1. A right angle has 90o. Express this angle in radians.

2. An automobile engine is described as operating at 5000 rpm, meaning its crankshaft completes 5000 revolutions per minute. Express this angular velocity in radians per second.

3. An object that starts from rest experiences a constant angular acceleration of 2.0 rad / s2. What is its angular velocity after 5 seconds expressed in rad / s and in rev / s?

4. A force of 20 N is applied perpendicular to the end of a bar of length 0.5 m. Calculate the torque produced by the force.

5. A child of mass 20 kg is located 2.5 m from the fulcrum or pivot point of a seesaw. Where must a child of mass 30 kg sit on the seesaw in order to provide balance?

6. A torque of 30 N m is applied to a disk that has a moment of inertia of 5.0 kg m2. What is the resulting angular acceleration of the disk?

7. A mass of 2.0 kg, which may be considered to be a point mass, is attached to a string of length 0.3 m and is rotated at 8.0 rad / s. Calculate the moment of inertia of the mass about the axis and calculate its angular momentum.

8. A rotating toy of moment of inertia 2.0 kg m2 is rotating with an angular velocity of 3.0 rad / s when its moment of inertia is suddenly changed to 1.5 kg m2 because some of the mass is moved closer to the axis. Calculate the new angular velocity.

9. An object attached to a string of length 1.5 m rotates at an angular velocity of 3.0 rev / s. Calculate its linear velocity tangent to the circle in which it moves.

10. A force of 5.0 N is applied tangent to the edge of a disk of radius 0.8 m and mass 3.0 kg. Calculate the torque produced by this force and the resulting angular acceleration of the disk.