

Chapter 7

- Centripetal acceleration
and Torque

Centripetal Acceleration

- Acceleration that is directed toward the center of a circular path is called centripetal acceleration.
- $a_c = V_t^2/r$
- $a_c = r\omega^2$

Practice 7G

- #1. A girl sits on a tire swing. She has a centripetal acceleration of 3 m/s^2 . If the rope is 2.1 m , what is the tangential speed?
- Known?
- Unknown?
- Equation?

Centripetal Force

- $F_c = (mv_t^2)/r$

- $F_c = mr\omega^2$

Practice 7H

- #1. A girl is on a tire swing on a 2.1 m long rope. The dad pushes with a tangential speed of 2.5 m/s. If the force is 88N, what is the girl's mass?
- Known?
- Unknown?
- Equation?

Gravitational Force

- The mutual force of attraction between particles of matter is gravitational force.
- $F_g = G (m_1 m_2 / r^2)$
- $G = 6.673 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$

Practice 7i

- #2. Mars has a mass of 6.4×10^{23} kg and its moon has a mass of 9.6×10^{15} kg. The F_g between them is 4.6×10^{15} . How far apart are they?
- Known?
- Unknown?
- Equation?

Torque

- Torque is the quantity that measures the ability of a force to rotate an object around some axis. Units - Nm
- Lever arm is the perpendicular distance from the axis of rotation to a line drawn along the direction of the force.
- Torque depends on Force and the length of the lever arm.
- $\text{Torque} = \text{Force} \times \text{distance (lever arm)}$

Torque and Angle

- Forces do not have to act perpendicular to the object. If they are at an angle, use this formula:
- $\text{Torque} = Fd(\sin\theta)$

Practice 8A

- #1. Find the torque produced by a 3 N force applied to a door at a perpendicular distance of .25 m from the hinge.
- Known?
- Unknown?
- Equation?

Assignnments

- Unit 7

Worksheet