Name _____

Describing Rotational Motion (p. 197 – 200)

I. Describing Rotational Motion

1. **Define the term radian.**

Radian – ½ π of a revolution (fraction of a revolution)

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About 1/6 of a revolution

2. **What is the abbreviation of a radian?**

= rad

1 revolution = 2π (rad)

2πr = distance traveled from radius on edge of an object for one revolution.

1 rad = 360° / 2π ≈ 57.3°

II. Angular Displacement

1. **Which Greek letter is used to abbreviate an angle of revolution?**

θ (theta)

2. **Which of the following directions produces positive rotation?**

Circle One : Clockwise Counterclockwise

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3. **Define the term angular displacement.**

Angular Displacement – the change in angle as an object rotates

Conversion

Angles (degrees) into angles (radians)

4. **What is the rotation of the Earth equal to after :**

24 hours : 2 π rad

12 hours : π rad (½ a day)

6 hours : π/2 rad (¼ a day)

$\theta_{rad} = \left(\frac{2\pi}{360°}\right)(\theta_{deg.})$

No degrees symbol needed!

5. **When viewed from the South Pole, the Earth rotates in a _____ direction.**

Circle One : Positive Negative

North Pole = Positive

Counterclockwise

6. **How is distance determined for rotational movement?**

$d = r\theta$ (measured in meters)

↑ radians not degrees

$\theta = \frac{d}{r} = \frac{\text{rise}}{\text{run}}$

7. **Radians indicate the ratio between *d* and *r*.**

Circle One : True False

(Not m or rad)

III. Angular Velocity

1. **Define the term angular velocity.**

Combination of linear velocity + centripetal acceleration

Angular Velocity – angular displacement divided by the time taken to make the displacement

2. **Which Greek letter is used to abbreviate an angular velocity?**

ω (omega)

Name _____

3. **Write out the formula to determine angular velocity.**

$\omega = \frac{\Delta \theta}{\Delta t}$ Instantaneous

Linear Velocity = $\frac{\Delta d}{\Delta t}$

4. **~~Average~~ angular velocity is equal to the slope of an angular position time graph.**

Circle One : True (False)

5. **What units are used to measure angular velocity?**

rad/s

Earth = 7.27×10^{-5} rad/s

6. **Which of the following directions produces positive angular velocity?**

Circle One : Clockwise (Counterclockwise)

Absence of centripetal acceleration.

7. **How is linear velocity determined for an object from the axis of rotation?**

$v = r\omega$

Earth = 464 m/s

8. **All parts of a rigid body rotate at the same rate.**

Circle One : (True) False

Not true for Sun → Differential Rotation

IV. Angular Acceleration

1. **Define the term angular acceleration.**

Angular Acceleration – change in angular velocity divided by time required to make the change

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2. **Write out the formula to determine angular acceleration of an object.**

$\alpha = \frac{\Delta \omega}{\Delta t}$

Linear acceleration = $\frac{\Delta v}{\Delta t}$

3. **What units are used to measure angular acceleration?**

rad/s^2

4. **Which of the following directions produces positive angular acceleration?**

Circle One : Clockwise (Counterclockwise)

5. **How is linear acceleration determined from the axis of an object with angular acceleration?**

$a = r\alpha$

6. **Define the term angular frequency.**

Angular Frequency – number of complete revolutions made by an object in 1 sec.

7. **Write out the formula to determine angular frequency.**

$f = \frac{\omega}{2\pi} = \frac{\text{speed}}{\text{distance}}$

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