

ROTATIONAL POSITION & DISPLACEMENT

- Rotational Motion is motion around a _____ point, that is, in a _____ path.

$x \rightarrow$ _____

- The rotational equivalent of linear POSITION (_____) is Rotational/Angular position (_____).

LINEAR POSITION	ROTATIONAL POSITION
- How far you are from the _____. - Measured in _____. - Origin is where _____. - Origin is _____. - Direction (+/-) is _____.	- How far you are from the _____. - Measured in _____. - Origin is where _____. - Origin is _____: - Always at the _____. - Direction (+/-) is _____: CW  CCW 

- The rotational equivalent of linear DISPLACEMENT (_____) is Rotational Displacement (_____).

$\Delta x \rightarrow$ _____

- These two quantities are “LINKED” by an equation (and $r = \text{radial distance}$, “radius”):

$\Delta x =$ _____

- This equation “speaks” _____. Input must be in radians. Output will be in radians.

(_____)

- One radian is approximately 57°. $\rightarrow$ To convert between radians and degrees, use:

_____ = _____

EXAMPLE: An object moves along a circle of radius 10 m from 30° above the positive x-axis to 120° above the +x-axis. Calculate the object's (a) angular displacement, and (b) linear displacement.

DISPLACEMENT IN MULTIPLE REVOLUTIONS

- If you make one full **revolution** around a circle: $\Delta\theta = \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \rightarrow \Delta X = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$.
- If you make **N** full revolutions: $\Delta\theta = \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \rightarrow \Delta X = \underline{\hspace{1cm}}$.
- To find out how many revolutions you go through, simply divide $\Delta\theta$ by $\underline{\hspace{1cm}}$ or $\underline{\hspace{1cm}}$.
- To find out how far from 0° you end up after many revolutions, subtract by 360° until $\theta < 360^\circ$ (or $\theta < 2\pi$).

EXAMPLE: Starting from 0° , you make two 2.2 revolutions around a circular path of radius 20 m. **(a)** What is your rotational displacement, in degrees? **(b)** How many degrees away from 0° are you? **(c)** What is your linear displacement?

PRACTICE: ROTATIONAL DISPLACEMENT

PRACTICE: While you drive, your tires, all of radius 0.40 m, rotate 10,000 times. How far did you drive, in meters?

PRACTICE: ROTATIONAL DISPLACEMENT

PRACTICE: An object moves a total distance of 1,000 m around a circle of radius 30 m.

How many degrees does the object go through? → BONUS: How many complete revolutions does it make?

PRACTICE: ROTATIONAL DISPLACEMENT

PRACTICE: A car travels a total of 2,000 m and 1140° around a circular path, starting from 0° .

What is the radius of the circular path?

→ BONUS: How far (in degrees) from 0° does the car end up?