In this worksheet, you will understand the radian as a measure of angles and learn how to convert between degrees and radians.

Easy Questions

1. Define a radian.
2. Convert π radians to degrees.
3. Convert $\frac{\pi}{2}$ radians to degrees.
4. Convert 180° to radians.
5. State the relationship between the arc length s, the radius r and the angle in radians θ.

Intermediate Questions

6. Convert 60° to radians.
7. Convert 45° to radians.
8. Convert 30° to radians.
9. Convert 90° to radians.
10. Convert 270° to radians.
11. Convert $\frac{\pi}{4}$ radians to degrees.
12. Convert $\frac{\pi}{3}$ radians to degrees.
13. Convert $\frac{2\pi}{3}$ radians to degrees.
14. An angle measures 1.2 radians. Convert this angle to degrees.
15. Find the degree measure of an angle whose measure is $\frac{5\pi}{6}$ radians.
16. A wheel rotates through an angle of 0.8 radians. Determine its equivalent in degrees.
17. State the conversion factor used when converting from degrees to radians.

18. Express 0° in radians.

19. Express 360° in radians.

20. An angle measures 3π radians. What is its measure in degrees?

Hard Questions

21. Derive the formula for converting an angle measured in degrees to radians. Show that $\theta_{\text{radians}} = \theta_{\text{degrees}} \times \dfrac{\pi}{180}$.

22. If an angle measures 2.5 radians, find its measure in degrees.

23. A sector of a circle has an arc length of 10 cm and a radius of 4 cm. Using the formula $s = r\theta$, determine the angle θ in radians.

24. A circle has a circumference of 20π cm. An arc on this circle has a length of 5π cm. Find the radian measure of the central angle that intercepts this arc.

25. Convert $\dfrac{7\pi}{8}$ radians to degrees, showing all your work.

26. Determine an expression in general form for the radian measure of an angle whose degree measure is an odd multiple of 15°.

27. A pendulum swings through an angle of 0.35 radians. Calculate its equivalent in degrees, rounding to two decimal places.

28. A geographer records an angle of 1.57 radians. Convert this angle to degrees, rounding to the nearest whole number.

29. Given $\theta = \dfrac{11\pi}{12}$ radians, convert this angle to degrees and simplify your answer.

30. Prove that the conversion factor from degrees to radians is consistent with a full rotation being 2π radians or 360° by showing that $360^\circ \times \dfrac{\pi}{180} = 2\pi$.