ILLAWARRA TUTORING

This worksheet will help you learn to calculate the length of an arc when using radian measure. Recall that the formula for the length of an arc is $l = r\theta$, where r is the radius and θ is the central angle in radians.

Easy Questions

1. Compute the arc length of a circle with radius 5 and central angle $\frac{\pi}{3}$ in radians.
2. Compute the arc length of a circle with radius 10 and central angle $\frac{\pi}{6}$ in radians.
3. Compute the arc length of a circle with radius 7 and central angle $\frac{\pi}{2}$ in radians.
4. Find the arc length of a semicircular arc where the radius is 8. (Hint: A semicircle subtends an angle of π radians.)
5. Find the arc length of a quarter circle with radius 12. (Remember: A quarter circle subtends an angle of $\frac{\pi}{2}$ radians.)

Intermediate Questions

6. A circle has radius 9 and an arc with a central angle of 1.2 radians. Calculate the arc length.
7. Convert $45°$ to radians and then calculate the arc length of a circle with radius 10. (Recall: θ (radians) $= \theta° \times \frac{\pi}{180}$.)
8. An arc has length 7 and a central angle of 1 radian. Determine the radius of the circle.
9. A circle with radius 15 has an arc subtended by a central angle of 0.5 radians. Calculate the arc length.
10. For a circle with radius 3 and central angle 2 radians, find the arc length.
11. A circular track has a radius of 20. If a runner covers an arc corresponding to a central angle of 2.5 radians, find the distance the runner has run.
12. Find the arc length for a circle with radius 6 and central angle 1.8 radians.
13. An arc length is 12 and the corresponding central angle is 2 radians. Determine the radius of the circle.

14. A sector of a circle has an arc length of 10 and a radius of 8. Find the measure of the central angle in radians.

15. Calculate the arc length for a circle with radius 11 and a central angle of 1.1 radians.

16. A circle with radius 14 has an arc with a length of 21. Determine the central angle in radians.

17. For a circle with radius 7 and central angle 1.4 radians, compute the arc length.

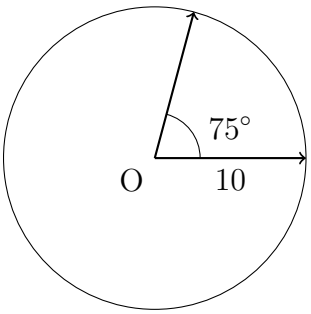
18. In a circle with radius 5, if the arc length is 3.5, find the central angle in radians.

19. A circle of radius 16 has an arc length of 12.8. Determine the central angle in radians.

20. Find the arc length of a circle with radius 4.5 and central angle 2.2 radians.

Hard Questions

21. Using the diagram provided, calculate the length of the arc.



22. A circular arc has a length of 11.25. Given that the radius is 15, determine the central angle in radians (round your answer to two decimal places).

23. Convert 120° to radians and then calculate the arc length of a circle with radius 14.

24. A circular arc of a circle with radius 18 has a length of 9. (a) Find the central angle in radians. (b) Convert this angle to degrees.

25. A circular ribbon fits exactly along the arc of a circle with radius 12 and central angle 0.9 radians. If the ribbon is 10% longer than the arc, determine the length of the ribbon.

26. A circle with radius 5 has two arcs with central angles of 0.6 and 1.2 radians respectively. Calculate both arc lengths and verify that doubling the angle doubles the arc length.

27. In a circle of radius 21, an arc has a length of 15.75. Determine the central angle in radians.

28. In a circle with radius 9, if an arc with a central angle of 0.5 radians has a certain length, find the arc length of an arc with an angle three times larger.

29. A circular pool has an arc walkway along its circumference. If the arc length is 31.4 and the corresponding central angle is 2 radians, determine the full circumference of the pool.

30. A circle has an arc whose length is 5.6 radians long, and this arc represents 70% of the entire circumference. Calculate the radius of the circle.