

arc & Sector Worksheet

I. Given the radian measure of a central angle, find the length of its intercepted arc in terms of π in a circle of radius 10 cm.

1. $\frac{\pi}{6}$
2. $\frac{\pi}{3}$
3. $\frac{\pi}{2}$
4. $\frac{\pi}{3}$
5. $\frac{3\pi}{5}$
6. $\frac{2\pi}{7}$
7. $\frac{\pi}{12}$
8. $\frac{\pi}{24}$

II. Given the measurement of a central angle, find the length of its intercepted arc in terms of π in a circle of diameter 60 in. $r = 30$ in

9. $10^\circ = \frac{10}{360} \cdot 2\pi(30) = \frac{10}{360} \cdot 60\pi = \frac{1}{3} \cdot 60\pi = 20\pi$
10. $60^\circ = \frac{60}{360} \cdot 2\pi(30) = \frac{1}{6} \cdot 60\pi = 10\pi$
11. $42^\circ = \frac{42}{360} \cdot 2\pi(30) = \frac{42}{360} \cdot 60\pi = \frac{2520\pi}{360} = 7\pi$
12. $50^\circ = \frac{50}{360} \cdot 2\pi(30) = \frac{3000\pi}{360} = \frac{25\pi}{3}$
13. $72^\circ = \frac{72}{360} \cdot 2\pi(30) = \frac{4320\pi}{360} = 12\pi$
14. $110^\circ = \frac{110}{360} \cdot 2\pi(30) = \frac{6600\pi}{360} = \frac{55\pi}{3}$
15. $35^\circ = \frac{35}{360} \cdot 2\pi(30) = \frac{2100\pi}{360} = \frac{35\pi}{6}$
16. $65^\circ = \frac{65}{360} \cdot 2\pi(30) = \frac{3900\pi}{360} = \frac{65\pi}{6}$

III. Given the length of an arc, find the degree measure to the nearest tenth of the central angle if subtends in a circle of radius 16 cm.

17. 87: $\frac{x}{360} = \frac{87}{2\pi(16)} \Rightarrow x = \frac{31320}{32\pi} \approx 311.7^\circ$
18. 5.6: $\frac{x}{360} = \frac{5.6}{2\pi(16)} \Rightarrow x = \frac{2016}{32\pi} \approx 20.1^\circ$
19. 12: $\frac{x}{360} = \frac{12}{2\pi(16)} \Rightarrow x = \frac{4320}{32\pi} \approx 43.0^\circ$
20. 25: $\frac{x}{360} = \frac{25}{32\pi} \Rightarrow x = \frac{9000}{32\pi} \approx 89.6^\circ$
21. 10.24: $\frac{x}{360} = \frac{10.24}{32\pi} \Rightarrow x = \frac{3686.4}{32\pi} \approx 36.7^\circ$
22. 7.9: $\frac{x}{360} = \frac{7.9}{32\pi} \Rightarrow x = \frac{2844}{32\pi} \approx 28.3^\circ$
23. 11: $\frac{x}{360} = \frac{11}{32\pi} \Rightarrow x = \frac{3960}{32\pi} \approx 39.4^\circ$
24. 6: $\frac{x}{360} = \frac{6}{32\pi} \Rightarrow x = \frac{2160}{32\pi} \approx 21.5^\circ$

IV. Find the area of each sector to the nearest tenth, given its central angle, and the radius of the circle.

25. $\theta = \frac{\pi}{4}, r = 14$ cm
26. $\theta = \frac{\pi}{6}, r = 12$ ft.
27. $\theta = \frac{5\pi}{12}, r = 10$ ft.
28. $\theta = 54^\circ, r = 6$ in: $\frac{54}{360} \cdot \pi(6)^2 = \frac{1944\pi}{360} = \frac{27\pi}{5}$
29. $\theta = 82^\circ, r = 7.3$ km: $\frac{82}{360} \cdot \pi(7.3)^2 = \frac{4369.78\pi}{360} \approx 12.1\pi$
30. $\theta = 45^\circ, r = 9.75$ mm: $\frac{45}{360} \cdot \pi(9.75)^2 = \frac{4277.8125\pi}{360} = \frac{1521\pi}{128}$

HONORS: (round answers to nearest tenth)

31. A sector has arc length of 6 cm and a central angle measuring 1.2 radians. Find the radius of the circle and the area of the sector.

32. A sector has arc length of 10 in and a central angle measuring 50° . Find the radius of the circle and the area of the sector.