

For Problems 1 through 8, tell the *exact* number of degrees in angles corresponding to the given arc lengths of a unit circle:

1.  $\frac{\pi}{3}$

2.  $\frac{\pi}{2}$

3.  $2\pi$

4.  $\frac{7\pi}{3}$

5.  $\frac{\pi}{6}$

6.  $\frac{\pi}{12}$

7.  $\frac{5\pi}{6}$

8.  $\frac{7\pi}{12}$

For Problems 9 through 12, tell the *exact* number of radians corresponding to the given arc lengths of a unit circle.

9.  $\frac{\pi}{3}$

10.  $\pi$

11. 2

12. 1.467

For Problems 13 through 20, find the *exact* values of the function

13.  $\sin \frac{\pi}{3}$

14.  $\cos \frac{\pi}{4}$

15.  $\tan \frac{3\pi}{4}$

16.  $\cot \frac{4\pi}{3}$

17.  $\sec \frac{5\pi}{6}$

18.  $\csc \frac{11\pi}{6}$

19.  $\cot \pi$

20.  $\tan 2\pi$

For Problems 21 through 30, evaluate the expression, leaving the answer in simple radical form

21.  $\sin \frac{\pi}{3} + 6 \cos \frac{\pi}{4}$

22.  $4 \sin \frac{4\pi}{3} \cos \frac{4\pi}{3}$

23.  $\sin \frac{\pi}{6} \cos \frac{\pi}{6}$

24.  $\sin \frac{2\pi}{3} \cos \frac{\pi}{6} + \cos \frac{2\pi}{3} \sin \frac{\pi}{6}$

25.  $\sec \frac{\pi}{3} \cos \frac{\pi}{3} + \tan \frac{\pi}{3} \cot \frac{\pi}{3}$

26.  $\cos^2 \frac{2\pi}{3} + \sin^2 \frac{2\pi}{3}$

27.  $\csc^2 \pi - \tan^2 \pi$

28.  $\sin^2 \frac{7\pi}{6} + \cos^2 \frac{\pi}{4}$

29.  $\frac{\cos \frac{\pi}{4}}{\sec \frac{\pi}{4}}$

30.  $\tan^2 \frac{2\pi}{3} \left( 1 - \tan^2 \frac{7\pi}{6} \right)$

Answers:

1.  $60^\circ$
2.  $90^\circ$
3.  $360^\circ$
4.  $420^\circ$
5.  $30^\circ$
6.  $15^\circ$
7.  $150^\circ$
8.  $105^\circ$
9.  $\frac{\pi}{3}$
10.  $\pi$
11. 2
12. 1.467
13.  $\frac{\sqrt{3}}{2}$
14.  $\frac{\sqrt{2}}{2}$
15.  $-1$
16.  $\frac{\sqrt{3}}{3}$
17.  $-\frac{2\sqrt{3}}{3}$
18.  $-2$
19. undefined
20. 0
21.  $\frac{\sqrt{3}}{2} + 3\sqrt{2}$
22.  $\sqrt{3}$
23.  $\frac{\sqrt{3}}{4}$
24.  $\frac{1}{2}$
25. 2
26. 1
27. undefined
28.  $\frac{3}{4}$
29.  $\frac{1}{2}$
30. 2