The Weekly Rigor

No. 254 "A mathematician is a machine for turning coffee into theorems." May 4, 2019

15 Problems Concerning Reference Angles (Part 2 of 2)

(Part 1)

PROBLEMS

Give the reference angle for each of the following angles. Show how you found your answer, including a picture of the angles in the *x*-*y* plane.

1. $\frac{2\pi}{3}$

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

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

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

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

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

7. $\frac{11\pi}{6}$

8. $\frac{\pi}{4}$

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

10. $\frac{5\pi}{4}$

11. $\frac{5\pi}{3}$

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

13. What four angles in standard position between $[0,2\pi)$ correspond to the reference angle $\frac{\pi}{6}$? Include a drawing of the four angles in the *x-y* plane.

14. What four angles in standard position between $[0,2\pi)$ correspond to the reference angle $\frac{\pi}{3}$? Include a drawing of the four angles in the *x-y* plane.

15. What four angles in standard position between $[0,2\pi)$ correspond to the reference angle $\frac{\pi}{4}$? Include a drawing of the four angles in the *x-y* plane.

ANSWERS

1. $\frac{\pi}{3}$	2. $\frac{\pi}{6}$
3. $\frac{\pi}{4}$	4. $\frac{\pi}{3}$
5. $\frac{\pi}{6}$	6. $\frac{\pi}{3}$
7. $\frac{\pi}{6}$	8. $\frac{\pi}{4}$
9. $\frac{\pi}{4}$	10. $\frac{\pi}{4}$
11. $\frac{\pi}{3}$	12. $\frac{\pi}{6}$
13. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$	14. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$
15. $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$	