

Reference Angles

A reference angle is an acute angle formed by the terminal side of an angle in standard position and the x-axis. It is always between 0 and 90 degrees regardless of the quadrant the terminal side lies in.

Procedure

1. Determine the quadrant the terminal side lies in
2. Find the angle measurement by subtracting from the x-axis.

Example 1: Find the reference angle for an angle whose measure is 150°

Terminal side is in the 2nd quadrant, measuring from the x-axis which is 180° , $180 - 150 = 30^\circ$. The reference angle is 30°

Example 2: Find the reference angle for an angle whose measure is 200°

Terminal side is in the 3rd quadrant, measuring from the x-axis which is 180° , $200 - 180 = 20^\circ$. The reference angle is 20°

Example 3: Find the reference angle for angle whose measure is $7\pi/4$.

Terminal side is in 4th quadrant, measuring from the x-axis which is 2π , $2\pi - 7\pi/4 = \pi/4$. The reference angle is $\pi/4$

Find the reference angles for the following:

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|-----------------|----------------|
| 1. 110° | 1a. $3\pi/4$ |
| 2. 145° | 2a. $5\pi/3$ |
| 3. 350° | 3a. $5\pi/6$ |
| 4. 240° | 4a. $7\pi/4$ |
| 5. 260° | 5a. $5\pi/4$ |
| 6. 150° | 6a. $13\pi/10$ |
| 7. 300° | 7a. $11\pi/6$ |
| 8. 160° | 8a. $15\pi/8$ |
| 9. 200° | 9a. $4\pi/3$ |
| 10. 310° | 10a. $7\pi/4$ |