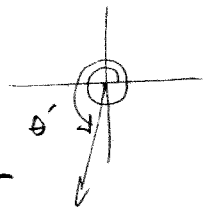
PreCalculus
Reference Angles & Coterminal Angles

Name Tristan

Find each reference angle, if it exists.

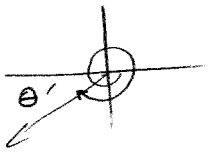
1) $\frac{31\pi}{9}$



$\frac{31\pi}{9} - 3\pi$

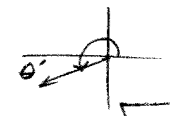
$\frac{31\pi - 27\pi}{9} = \boxed{\frac{4\pi}{9}}$

2) $-527°$



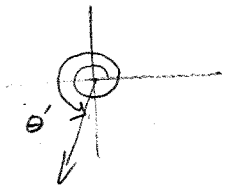
540
−527
13°

3) $\frac{13\pi}{12}$



$\frac{13\pi}{12} - \frac{12\pi}{12} = \boxed{\frac{\pi}{12}}$

4) $623°$

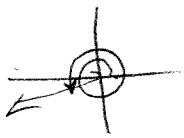


623
−540
83°

5) $-\frac{19\pi}{15}$

$\frac{19\pi}{15} - \frac{15\pi}{15} = \boxed{\frac{4\pi}{15}}$

6) $\frac{25\pi}{8}$



$\frac{25\pi}{8} - \frac{24\pi}{8} = \boxed{\frac{\pi}{8}}$

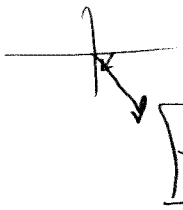
7) $-250°$

250°
−180°
70°

8) $\frac{32\pi}{7}$

$\frac{7 \cdot 5\pi}{7} - \frac{32\pi}{7} = \boxed{\frac{3\pi}{7}}$

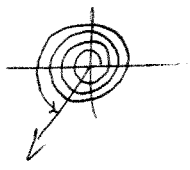
9) $-\frac{2\pi}{5}$



$\boxed{\frac{2\pi}{5}}$

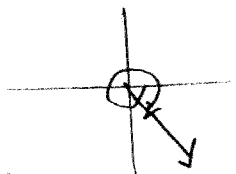
10) $450°$ N/A
(Quadrantal)

11) $\frac{22\pi}{3}$



$\frac{22\pi}{3} - \frac{7 \cdot 3\pi}{3} = \boxed{\frac{\pi}{3}}$

12) $-\frac{12\pi}{5}$



$\frac{12\pi}{5} - \frac{10\pi}{5} = \boxed{\frac{2\pi}{5}}$

State if the given angles are coterminal. Show work to support your answer!

13) 240°, 600°

$240 + 360 = 600°$ YES

14) $\frac{15\pi}{8}, \frac{47\pi}{8}$

$\frac{15\pi}{8} + \frac{16\pi}{8} = \frac{31\pi}{8} + \frac{16\pi}{8} = \frac{47\pi}{8}$ YES

Find a coterminal angle between 0° and 360°.

15) 640°

$640 - 360 = 280°$

16) −442°

$-442 + 360 = -82$

$-82 + 360 = 278°$

Find a coterminal angle between 0 and 2π.

17) $-\frac{33\pi}{18} + \frac{36\pi}{18} = \frac{3\pi}{18} = \frac{\pi}{6}$

18) $\frac{23\pi}{4} - \frac{8\pi}{4} = \frac{15\pi}{4} - \frac{8\pi}{4} = \frac{7\pi}{4}$

Find a positive and a negative coterminal angle for each given angle.

19) $-\frac{7\pi}{6}$

$-\frac{7\pi}{6} + \frac{12\pi}{6} = \frac{5\pi}{6}$

$-\frac{7\pi}{6} - \frac{12\pi}{6} = -\frac{19\pi}{6}$

20) $\frac{29\pi}{45}$

$\frac{29\pi}{45} + \frac{90\pi}{45} = \frac{119\pi}{45}$

$\frac{29\pi}{45} - \frac{90\pi}{45} = -\frac{61\pi}{45}$