PreCalculus
Reference Angles & Coterminal Angles

Name _____

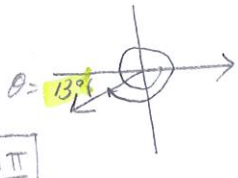
Find each reference angle, if it exists.

1) $\frac{31\pi}{9} = 3\frac{4\pi}{9}$

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

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

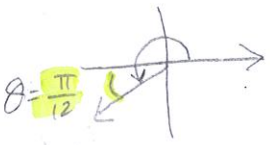
2) $-527°$



$527 - 360 = 167$

$180 - 167 = 13°$

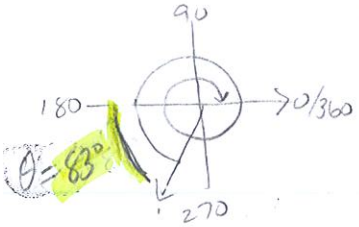
3) $\frac{13\pi}{12} = 1\frac{1\pi}{12}$



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

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

4) $623°$



$623 - 360 = 263$

$263 - 180 = \boxed{83}$

5) $-\frac{19\pi}{15} = -1.26\pi$

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

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

6) $\frac{25\pi}{8} = 3.125\pi$

$\frac{25\pi}{8} - 3\pi$

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

$= \boxed{\frac{\pi}{8}}$

7) $-250°$

$250 - 180 = 70°$

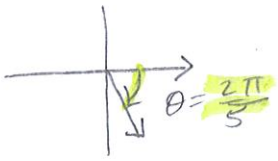
8) $\frac{32\pi}{7} \approx 4.57\pi$

$5\pi - \frac{32\pi}{7}$

$\frac{35\pi}{7} - \frac{32\pi}{7}$

$\boxed{\frac{3\pi}{7}}$

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

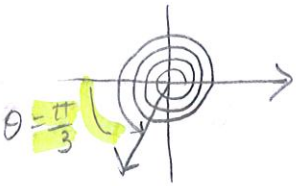


10) $450°$

$450° - 360° = 90°$

None

11) $\frac{22\pi}{3} = 7.3\pi$



$\frac{22\pi}{3} - 7\pi$

$\frac{22\pi}{3} - \frac{21\pi}{3}$

$\boxed{\frac{\pi}{3}}$

12) $-\frac{12\pi}{5} = 2.4\pi$

$\frac{12\pi}{5} - 2\pi$

$\frac{12\pi}{5} - \frac{10\pi}{5}$

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