

9.1  
Degrees and Radians

Convert each degree measure into radians.

1)  $255^\circ \cdot \frac{\pi}{180} = \boxed{\frac{17\pi}{12}}$

2)  $-225^\circ \cdot \frac{\pi}{180} = \boxed{-\frac{5\pi}{4}}$  68

Convert each radian measure into degrees.

3)  $-\frac{17\pi}{6} \cdot \frac{180}{\pi} = \boxed{-510^\circ}$

4)  $\frac{5\pi}{3} \cdot \frac{180}{\pi} = \boxed{300^\circ}$

Convert each degree measure into radians and each radian measure into degrees.

5)  $-50^\circ \cdot \frac{\pi}{180} = \boxed{-\frac{5\pi}{18}}$

6)  $\frac{19\pi}{4} \cdot \frac{180}{\pi} = \boxed{855^\circ}$

7)  $390^\circ \cdot \frac{\pi}{180} = \boxed{\frac{13\pi}{6}}$

8)  $-\frac{7\pi}{6} \cdot \frac{180}{\pi} = \boxed{-210^\circ}$


$\frac{\pi}{2}$	I
 $\frac{3\pi}{2}$  | IV

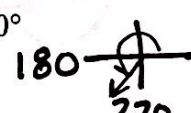
State the quadrant in which the terminal side of each angle lies.


9)  $\frac{5\pi}{4}$    $\boxed{\text{III}}$

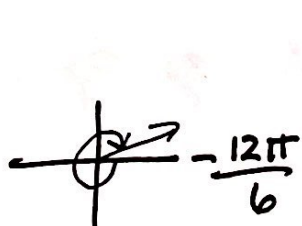
10)  $\frac{5\pi}{9}$    $\boxed{\text{II}}$

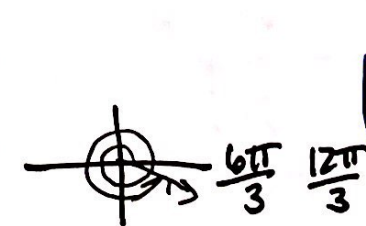
11)  $-\frac{\pi}{3}$    $\boxed{\text{IV}}$

12)  $-120^\circ$   
 $-180$    $\boxed{\text{III}}$   
 $-90$

13)  $260^\circ$    $\boxed{\text{III}}$

14)  $560^\circ$    $\boxed{\text{III}}$

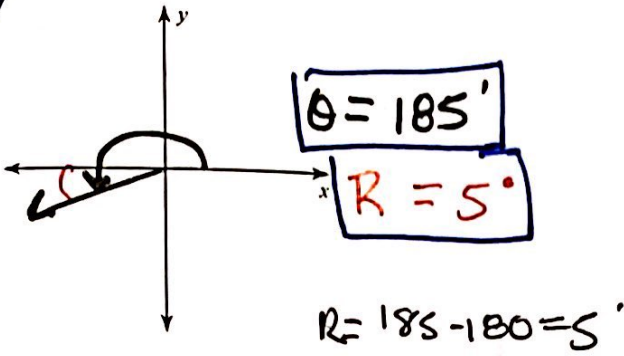
15)  $-\frac{11\pi}{6}$    $\boxed{\text{I}}$

16)  $\frac{11\pi}{3}$    $\boxed{\text{IV}}$

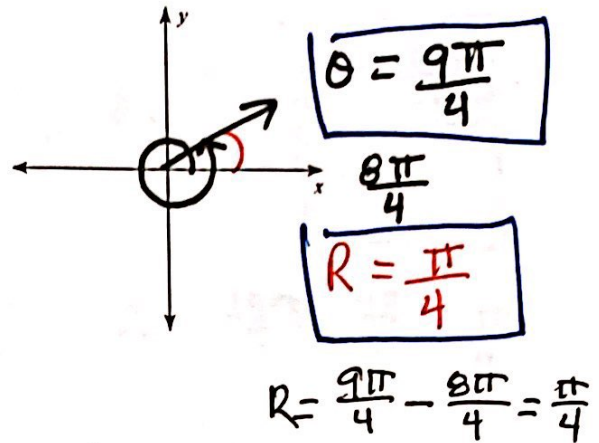
Draw an angle with the given measure in standard position and find the reference angle.

2pt each  
Drawn angle  
Ref. angle

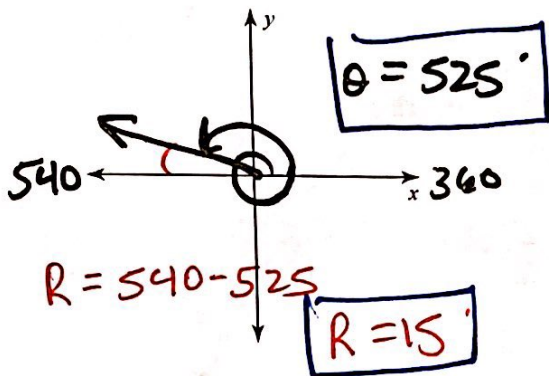
17)  $185^\circ$



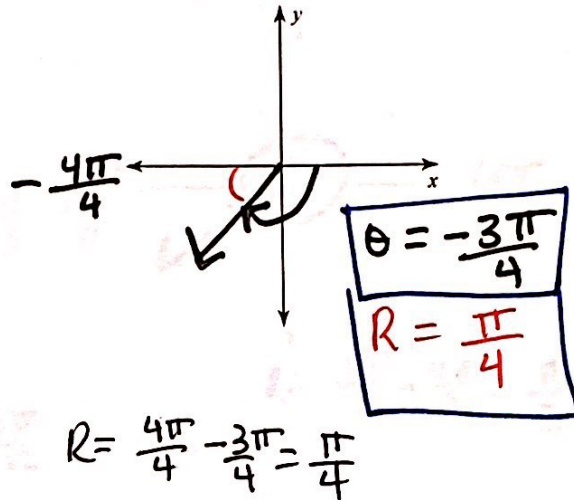
18)  $\frac{9\pi}{4}$  or



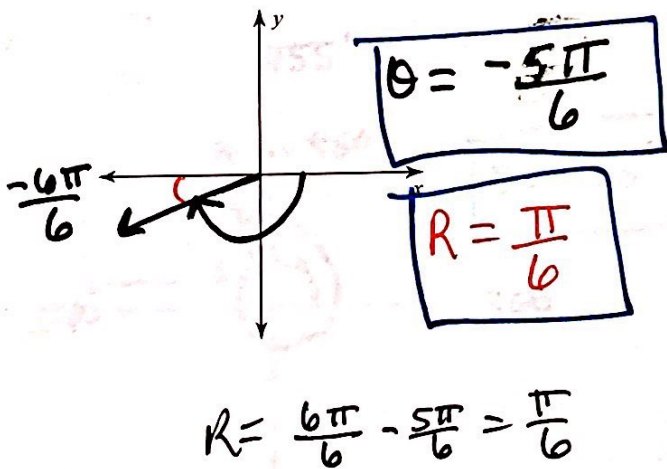
19)  $525^\circ$



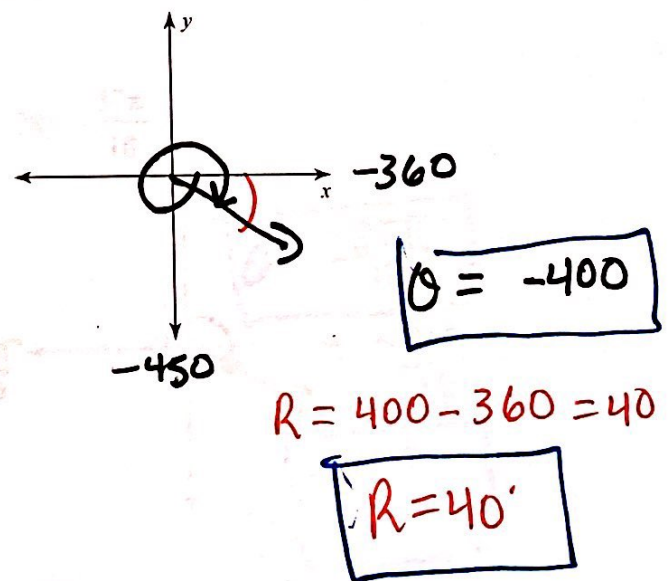
20)  $-\frac{3\pi}{4}$

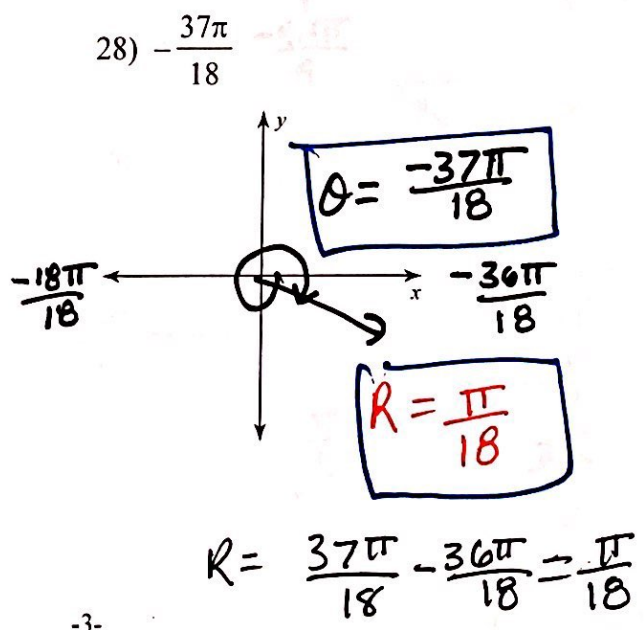
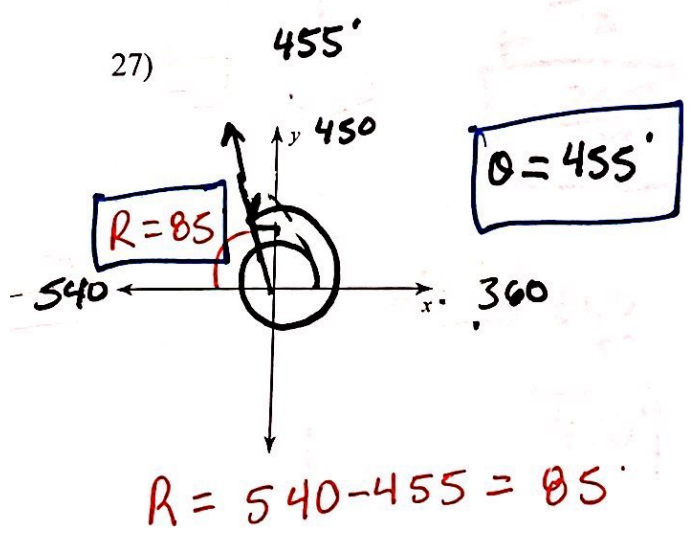
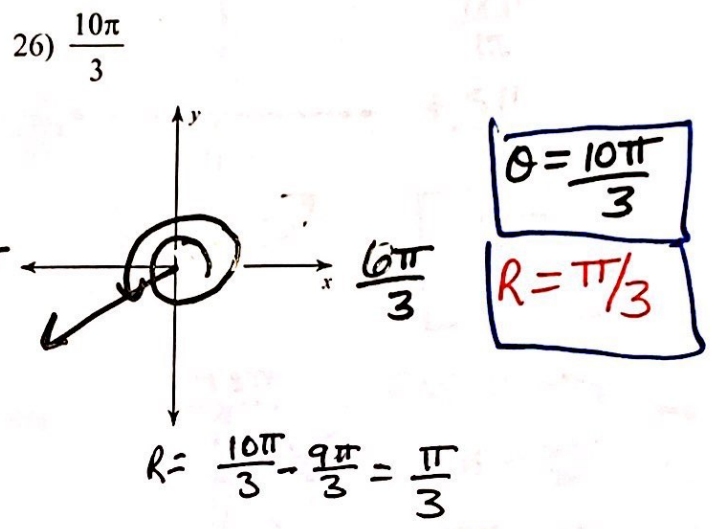
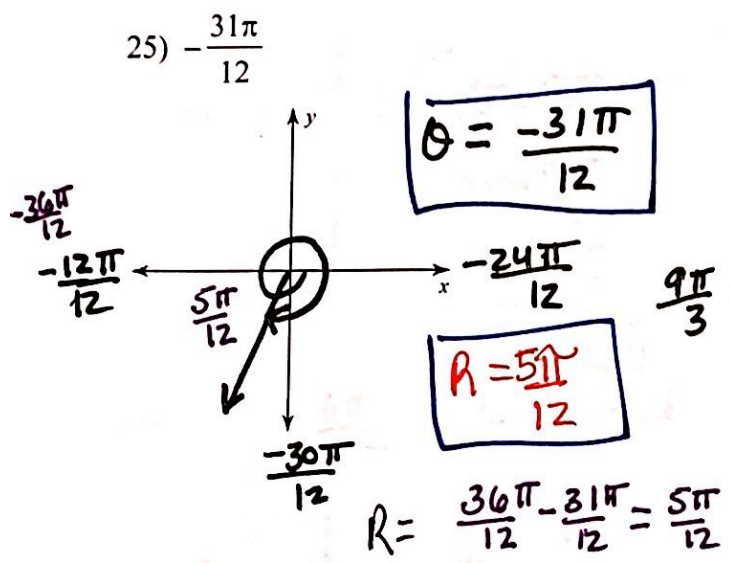
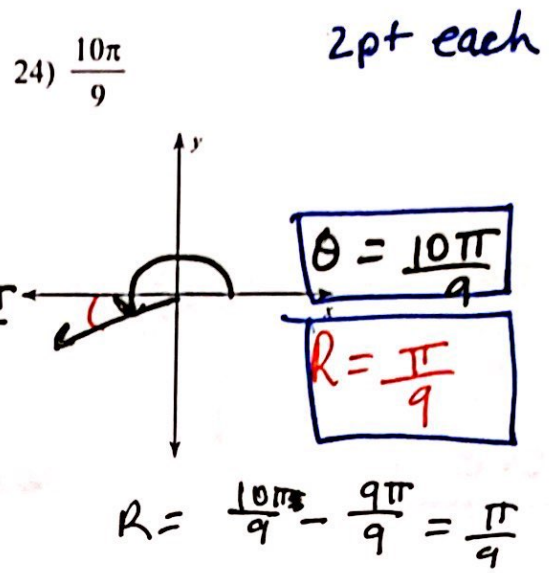
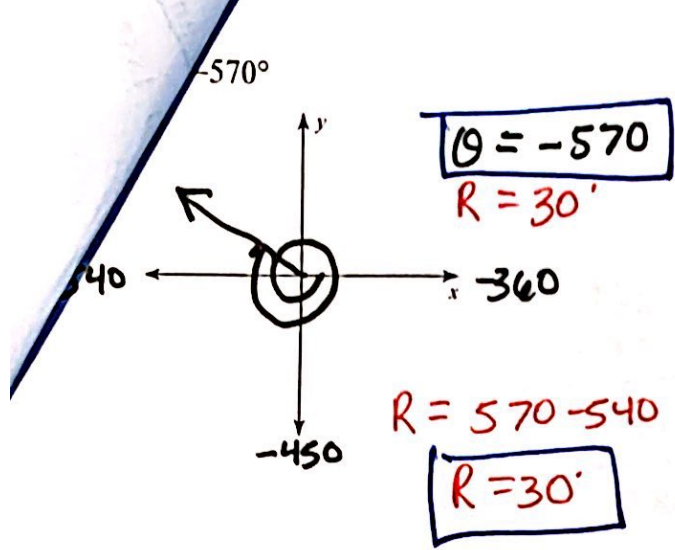


21)  $-\frac{5\pi}{6}$



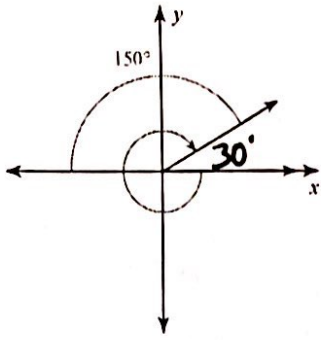
22)  $-400^\circ$





the measure of each angle.

29)

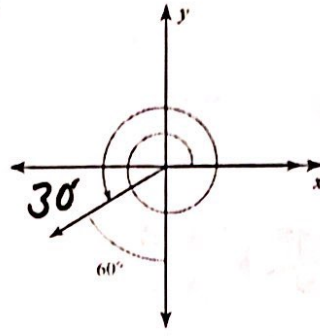


$$\begin{array}{r} 360 \\ - 30 \\ \hline \end{array}$$

$$\boxed{-330^\circ}$$

negative since clockwise

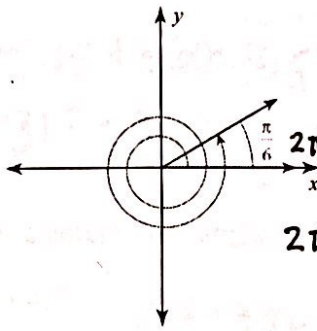
30)



$$\begin{array}{r} 360 \\ 180 \\ 30 \\ \hline \end{array}$$

$$\boxed{570^\circ}$$

31)



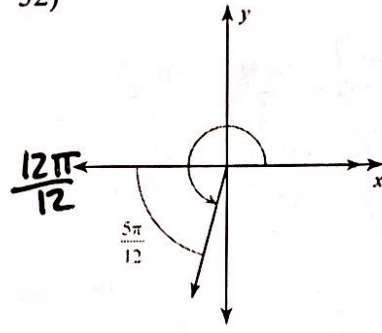
$$2\pi \text{ or } \frac{12\pi}{6}$$

$$2\pi \text{ or } \frac{12\pi}{6}$$

$$+ \frac{\pi}{6}$$

$$\boxed{\frac{25\pi}{6}}$$

32)

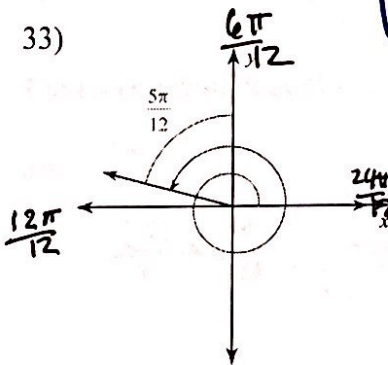


$$\frac{12\pi}{12}$$

$$+ \frac{5\pi}{12}$$

$$\boxed{\frac{17\pi}{12}}$$

33)



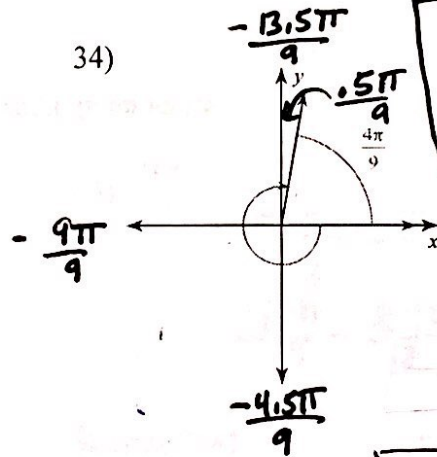
$$\frac{24\pi}{12}$$

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

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

$$\boxed{\frac{35\pi}{12}}$$

34)



Easiest way  
 $2\pi - \frac{4\pi}{9}$   
 $\frac{18\pi}{9} - \frac{4\pi}{9} = \frac{14\pi}{9}$   
 negative clockwise

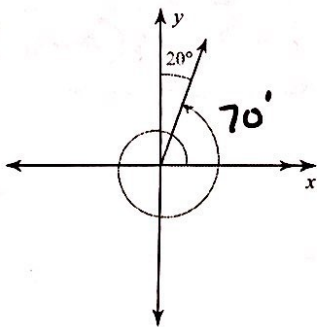
OR Harder way

$$\frac{13.5}{9} + \frac{0.5}{9} = \frac{14\pi}{9}$$

By subtraction:  $2\pi + 2\pi - \frac{\pi}{4}$

Harder By addition:  $\frac{8\pi}{4} + \frac{8\pi}{4} - \frac{\pi}{4} = \frac{15\pi}{4}$   
 Easier

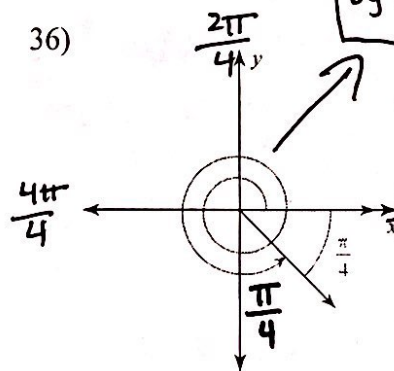
35)



$$\begin{array}{r} 360 \\ 70 \\ \hline \end{array}$$

$$\boxed{430^\circ}$$

36)



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

$$\frac{4\pi}{4}$$

$$\frac{2\pi}{4}$$

$$\frac{\pi}{4}$$

$$\boxed{\frac{15\pi}{4}}$$

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

7)  $332^\circ$   
 $332 - 360 = \boxed{-28^\circ}$   
 $332 + 360 = \boxed{692^\circ}$

38)  $90^\circ$   
 $90 + 360 = \boxed{450^\circ}$   
 $90 - 360 = \boxed{-270^\circ}$

39)  $\frac{31\pi}{18}$   
 $\frac{31\pi}{18} + \frac{36\pi}{18} = \boxed{\frac{67\pi}{18}}$   
 $\frac{31\pi}{18} - \frac{36\pi}{18} = \boxed{-\frac{5\pi}{18}}$

40)  $\frac{47\pi}{45}$   
 $\frac{47\pi}{45} + \frac{90\pi}{45} = \boxed{\frac{137\pi}{45}}$   
 $\frac{47\pi}{45} - \frac{90\pi}{45} = \boxed{-\frac{43\pi}{45}}$

41)  $-315^\circ$   
 $-315 + 360 = \boxed{45^\circ}$   
 $-315 - 360 = \boxed{-675^\circ}$

42)  $-\frac{16\pi}{9}$   
 $-\frac{16\pi}{9} + \frac{18\pi}{9} = \boxed{\frac{2\pi}{9}}$   
 $-\frac{16\pi}{9} - \frac{18\pi}{9} = \boxed{-\frac{34\pi}{9}}$

Find a coterminal angle between  $0^\circ$  and  $360^\circ$ .

43)  $647^\circ$   
 $647 - 360 = \boxed{287^\circ}$

44)  $-75^\circ$   
 $-75 + 360 = \boxed{285^\circ}$

Find a coterminal angle between  $0$  and  $2\pi$  for each given angle.

45)  $-\frac{3\pi}{4}$   
 $-\frac{3\pi}{4} + \frac{8\pi}{4} = \boxed{\frac{5\pi}{4}}$

46)  $\frac{71\pi}{12}$   
 $\frac{71\pi}{12} - \frac{24\pi}{12} = \frac{47\pi}{12}$  ← bigger than  $2\pi$   
 $\frac{47\pi}{12} - \frac{24\pi}{12} = \boxed{\frac{23\pi}{12}}$

Factor each completely.

Short cut  
 47)  $v^2 - 4v - 45$   
 $\begin{array}{r} x \\ -45 \quad -4 \\ \hline -9 \quad 5 \end{array}$   
 $\boxed{(v-9)(v+5)}$

Grouping  
 48)  $7x^2 + 53x - 90$   
 $\begin{array}{r} x \quad + \\ 630 \quad 53 \\ \hline 63 \quad -10 \end{array}$   
 $7x^2 + 63x - 10x - 90$   
 $7x(x+9) - 10(x+9)$   
 $\boxed{(7x-10)(x+9)}$

GCF + Grouping

49)  $15p^2 - 140p + 45$   
 $5(3p^2 - 28p + 9)$   
 $5[3p^2 - 27p - p + 9]$   
 $5[3p(p-9) - 1(p-9)]$   
 $\boxed{15(3p-1)(p-9)}$   
 $\begin{array}{r} x \quad + \\ 27 \quad -28 \\ \hline -27 \quad -1 \end{array}$

GCF  
 50)  $30x^2 - 12x$   
 $\boxed{6x(5x-2)}$