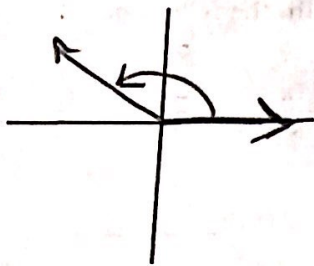
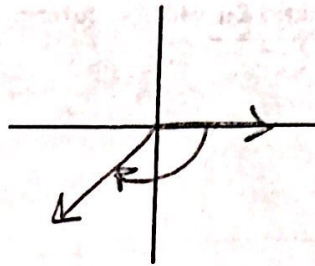


I. Sketch each of the following angles in standard position.

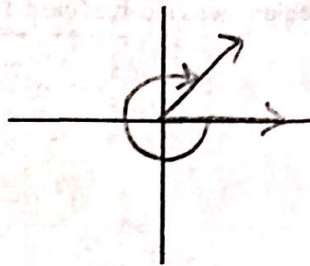
1. 150°



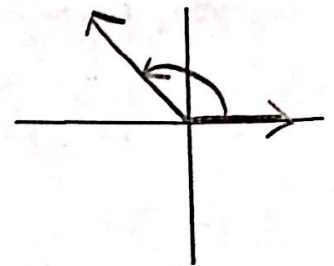
2. -120°



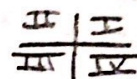
3. $-\frac{7\pi}{4} = -1.75\pi$



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



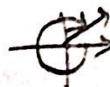
II. Determine the quadrant in which the terminal side of the angle lies.



5. 130° II



6. -336° I



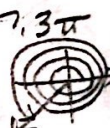
7. 285° IV



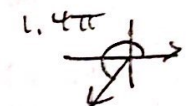
8. -260° II



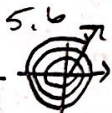
9. $\frac{22\pi}{3}$ III



10. $\frac{7\pi}{5}$ III



11. $-\frac{17\pi}{3}$ I



12. $-\frac{\pi}{12}$ IV



13. 3.5 III $(3.5) \cdot \frac{180}{\pi} = 200.5$

↑ Radians
(No Degree symbol)

14. -1 IV $(-1) \cdot \frac{180}{\pi} = -57.3^\circ$

↑ Radians

III. Give 2 coterminal angles, one positive and one negative for each of the following

$\pm 360, \pm 2\pi$

15. 34° 394° -326°

16. -45° 315° -405°
 $-45+360$
 $-45-360$

17. -120° 240° -480°

18. 420° 60° -300°
 660° or
 $420-360$
 $60-360$

19. $\frac{4\pi}{3}$ $\frac{10\pi}{3}$ $-\frac{2\pi}{3}$
 $\frac{4\pi}{3} + \frac{6\pi}{3}$
 $\frac{4\pi}{3} - \frac{6\pi}{3}$

20. $\frac{11\pi}{6}$ $\frac{23\pi}{6}$ $-\frac{\pi}{6}$
 $\frac{11\pi}{6} + \frac{12\pi}{6}$
 $\frac{11\pi}{6} - \frac{12\pi}{6}$

21. $-\frac{7\pi}{6}$ $\frac{5\pi}{6}$ $-\frac{19\pi}{6}$
 $-\frac{7\pi}{6} + \frac{12\pi}{6}$
 $-\frac{7\pi}{6} - \frac{12\pi}{6}$

22. $-\frac{11\pi}{4}$ $\frac{5\pi}{4}$ $-\frac{3\pi}{4}$
 $-\frac{11\pi}{4} + \frac{8\pi}{4}$
 $-\frac{3\pi}{4} + \frac{8\pi}{4}$

IV. Express each of the following in radian measure. Leave your answer in terms of π .

$r = d \cdot \frac{\pi}{180}$

23. 150° $\frac{5\pi}{6}$ $150 \cdot \frac{\pi}{180}$

24. 315° $\frac{7\pi}{4}$ $315 \cdot \frac{\pi}{180}$

25. -240° $-\frac{4\pi}{3}$ $-240 \cdot \frac{\pi}{180}$

26. 115° $\frac{23\pi}{36}$ $115 \cdot \frac{\pi}{180}$

27. 345° $\frac{23\pi}{12}$ $345 \cdot \frac{\pi}{180}$

28. -216° $-\frac{6\pi}{5}$ $-216 \cdot \frac{\pi}{180}$


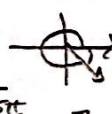

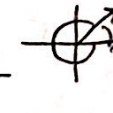
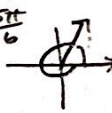
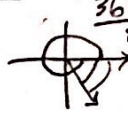
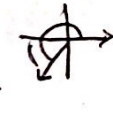
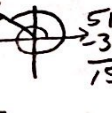
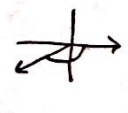

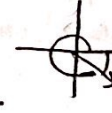
V. Express each of the following in degree measure. $d = r \cdot \frac{180}{\pi}$

29. $\frac{5\pi}{9}$ $\underline{100^\circ}$ $\frac{5\pi}{9} \cdot \frac{180}{\pi}$ 30. $-\frac{7\pi}{12}$ $\underline{-105^\circ}$ $-\frac{7\pi}{12} \cdot \frac{180}{\pi}$ 31. $\frac{11\pi}{5}$ $\underline{396^\circ}$ $\frac{11\pi}{5} \cdot \frac{180}{\pi}$

VI. Find the angle in radian measure between 0 and 2π which is coterminal with the following. $\pm 2\pi$

32. $\frac{11\pi}{4}$ $\underline{\frac{3\pi}{4}}$ $\frac{11\pi}{4} - \frac{8\pi}{4} = \frac{3\pi}{4}$
 $\frac{40\pi}{3} - \frac{6\pi}{3} - \frac{6\pi}{3} - \frac{6\pi}{3} = \frac{22\pi}{3}$
 33. $\frac{23\pi}{4}$ $\underline{\frac{7\pi}{4}}$ $\frac{23\pi}{4} - \frac{8\pi}{4} - \frac{8\pi}{4} = \frac{7\pi}{4}$
 $-\frac{19\pi}{3} + \frac{6\pi}{3} + \frac{6\pi}{3} + \frac{6\pi}{3} + \frac{6\pi}{3} = \frac{5\pi}{3}$
 34. $\frac{31\pi}{6}$ $\underline{\frac{7\pi}{6}}$ $\frac{31\pi}{6} - \frac{12\pi}{6} - \frac{12\pi}{6} = \frac{7\pi}{6}$
 35. $\frac{40\pi}{3}$ $\underline{\frac{4\pi}{3}}$ $\frac{40\pi}{3} - \frac{36\pi}{3} = \frac{4\pi}{3}$
 36. $\frac{19\pi}{3}$ $\underline{\frac{5\pi}{3}}$ $\frac{19\pi}{3} - \frac{14\pi}{3} = \frac{5\pi}{3}$
 37. 121π $\underline{\pi}$ $\frac{121\pi}{2} = 60.5$
 $121\pi - 60(2\pi) = \pi$
 38. $\frac{62\pi}{5}$ $\underline{\frac{2\pi}{5}}$ $\frac{62\pi}{5} - \frac{10\pi}{5} - \frac{10\pi}{5} - \frac{10\pi}{5} - \frac{10\pi}{5} - \frac{10\pi}{5} - \frac{10\pi}{5} = \frac{2\pi}{5}$

VII. Find the reference angle for each of the following. Positive Acute Angle

39. 208° $\underline{28^\circ}$ $360 - 292$ 
 40. $\frac{7\pi}{4}$ $\underline{\frac{\pi}{4}}$ 1.75π 
 41. $\frac{14\pi}{5}$ $\underline{\frac{\pi}{5}}$ 2.8π 
 42. -292° $\underline{68^\circ}$ 
 43. $\frac{1.6\pi}{3}$ $\underline{\frac{\pi}{3}}$ $\frac{1.6\pi}{3} - \frac{0.6\pi}{3} = \frac{1\pi}{3}$ 
 44. -445° $\underline{85^\circ}$ $180 - 165$ 
 45. $\frac{13\pi}{9}$ $\underline{\frac{4\pi}{9}}$ 1.4π $\frac{13\pi}{9} - \frac{9\pi}{9} = \frac{4\pi}{9}$ 
 46. 517° $\underline{23^\circ}$ $360 - 322$ 
 47. -165° $\underline{15^\circ}$ $180 - 165$ 
 48. $\frac{17\pi}{6}$ $\underline{\frac{\pi}{6}}$ 2.8π $\frac{17\pi}{6} - \frac{16\pi}{6} = \frac{\pi}{6}$ 
 49. 322° $\underline{38^\circ}$ 
 50. $\frac{12\pi}{7}$ $\underline{\frac{2\pi}{7}}$ 1.7π $\frac{12\pi}{7} - \frac{10\pi}{7} = \frac{2\pi}{7}$ 