39. $i^{263} = \boxed{-i}$

$$\begin{array}{r} 65 \\ 4\overline{)263} \\ -24 \\ \hline 23 \\ -20 \\ \hline R\,3 \end{array}$$

40. $3-5i$

$\sqrt{3^2+(-5)^2}$

$\sqrt{9+25}$

$\boxed{\sqrt{34}}$

41. $3-3i$ IN TRIG FORM

$r = \sqrt{\underset{9}{3^2} \underset{+9}{+(-3)^2}}$ $\quad r=\sqrt{18}$

$r = 3\sqrt{2}$

$\tan^{-1}\left(\frac{-3}{3}\right) = \tan^{-1}(-1) = -45^\circ$

$$\begin{array}{r} 360 \\ -45 \\ \hline 315^\circ \end{array}$$

$\boxed{3\sqrt{2}\,\text{cis}\ 315^\circ}$

42. $0-6i$

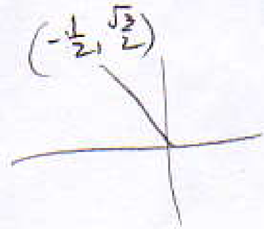
$r = \sqrt{0^2+(-6)^2}$

$r = 6$

$\tan^{-1}\left(\frac{-6}{0}\right)$

$\theta = -90^\circ$ OR 270°

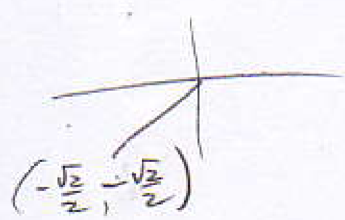
$\boxed{6\ \text{cis}\ 270^\circ}$



43. $4(\cos 120^\circ + i \sin 120^\circ)$

$4\left(-\frac{1}{2} + i\left(\frac{\sqrt{3}}{2}\right)\right)$

$\boxed{-2+2i\sqrt{3}}$



44. $5(\cos 225^\circ + i \sin 225^\circ)$

$5\left(-\frac{\sqrt{2}}{2} + i\left(-\frac{\sqrt{2}}{2}\right)\right)$

$\boxed{\frac{-5\sqrt{2}}{2} - \frac{5\sqrt{2}}{2}i}$

45. $3(\cos 28^\circ + i \sin 28^\circ) \cdot 4(\cos 17^\circ + i \sin 17^\circ)$

$12(\cos 28+17 + i \sin 28+17)$

$12(\cos 45^\circ + i \sin 45^\circ)$

$12\left(\frac{\sqrt{2}}{2} + i\frac{\sqrt{2}}{2}\right) = \boxed{6\sqrt{2} + 6i\sqrt{2}}$

46. $5(\cos 115 + i \sin 115^\circ) \cdot 4(\cos 10^\circ + i \sin 10^\circ)$

$20(\cos 115+10 + i \sin 115+10)$

$20(\cos 125 + i \sin 125)$

$20(-.5736 + .8192i)$

$\boxed{-11.472 + 16.38i}$

47. $\dfrac{24(\cos 258 + i \sin 258)}{6(\cos 78^\circ + i \sin 78^\circ)}$

$4(\cos 258-78 + i \sin 258-78)$

$4(\underbrace{\cancel{\cos 180}}_{-1} + i \underbrace{\cancel{\sin 180}}_{0})$

$\boxed{-4}$

48. $\dfrac{18(\cos 50 + i \sin 50)}{3(\cos 140^\circ + i \sin 140^\circ)}$

$6(\cos 50-140 + i \sin 50-140)$

$6(\cos -90^\circ + i \sin -90^\circ)$

$6(\overset{0}{\cancel{\cos 270^\circ}} + i \overset{-1}{\cancel{\sin 270^\circ}}) = \boxed{-6i}$

49. $(2 - 2i\sqrt{3})^8$

$\theta = \tan^{-1} \frac{-2\sqrt{3}}{2}$

$\tan^{-1} = -\sqrt{3}$

$\theta = -60^\circ$

OR 300°

This should be 4^8 → $4^8(\cos 300 \cdot 8 + i \sin 300 \cdot 8)$

$\sqrt{2^2 + (-2\sqrt{3})^2}$

$4 + 4 \cdot 3$

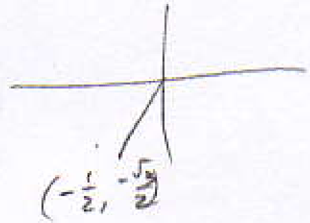
$4 + 12$

$\sqrt{16}$

4

$65536(\cos 2400 + i \sin 2400)$

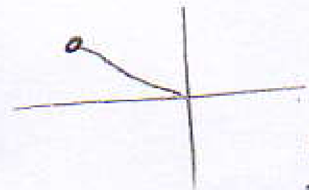
$65536(\cos 240 + i \sin 240)$



$65536\left(-\frac{1}{2} + i\left(-\frac{\sqrt{3}}{2}\right)\right)$

$-32768 - 32768i\sqrt{3}$

50. 3 CUBE ROOTS $-1 + i\sqrt{3}$



$r = \sqrt{(-1)^2 + (\sqrt{3})^2}$

$1 + 3$

$\sqrt{4}$

$r = 2$

$\theta = \tan^{-1} \frac{\sqrt{3}}{-1}$

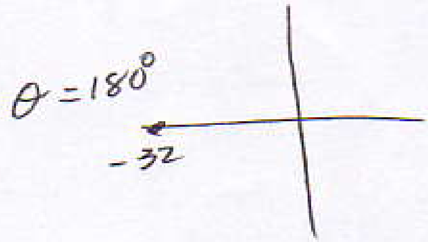
$\theta = \tan^{-1} -\sqrt{3} = -60$

180
-60
120

$2^{\frac{1}{3}}\left(\cos \frac{120 + 360(0)}{3} + i \sin \frac{120 + 360(0)}{3}\right)$

$$\boxed{\begin{array}{l} 2^{\frac{1}{3}}(\text{cis } 40^\circ) \\ 2^{\frac{1}{3}}(\text{cis } 160^\circ) \\ 2^{\frac{1}{3}}(\text{cis } 280^\circ) \end{array}}$$

51. 5 5^{TH} ROOTS OF -32



$$(32)^{\frac{1}{5}}\left(\cos\frac{180^\circ+360(0)}{5}+i\sin\ldots\right.$$

$$\sqrt{(-32)^2+(0)^2}$$

$$\sqrt{32^2}=32=r$$

$$\boxed{\begin{array}{l}2\ \text{cis}\ 36\\ 2\ \text{cis}\ 108\\ 2\ \text{cis}\ 180\\ 2\ \text{cis}\ 252\\ 2\ \text{cis}\ 324\end{array}}$$

$\boxed{\text{CHAPTER 6}}$

52. $8x^2+5xy+2y^2-10x+5y+4=0$

B^2-4AC

$5^2-4\cdot8\cdot2$

$25-64$

$-39<0$

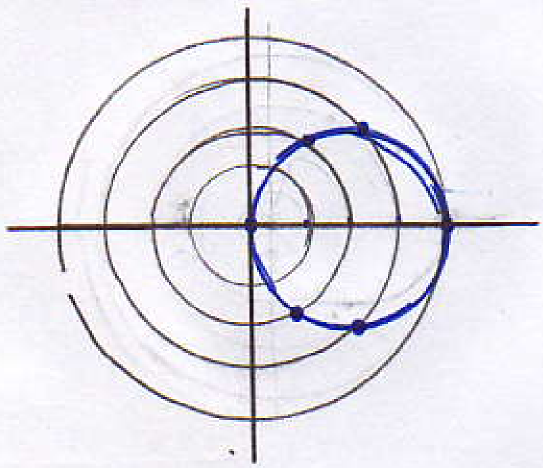
$\boxed{\text{CIRCLE OR ELLIPSE}}$

53. $$\frac{\tan^{-1}\frac{B}{A-C}}{2}=\frac{\tan^{-1}\frac{5}{8-2}}{2}=\frac{\tan^{-1}\frac{5}{6}}{2}$$

$$=\frac{39.8^\circ}{2}=\boxed{19.9^\circ}$$

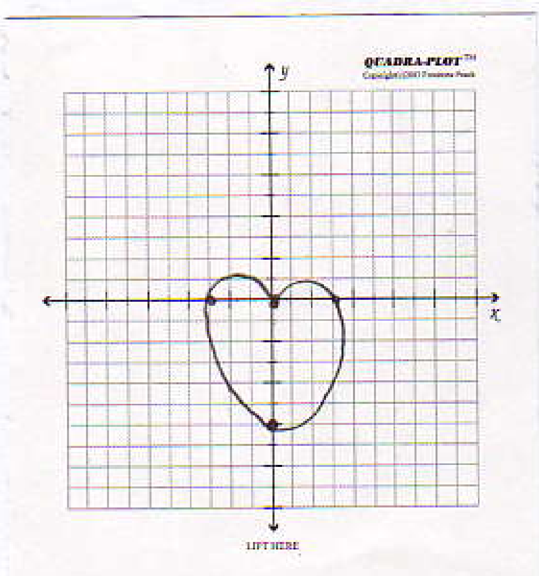
54. $r = 4\cos\theta$

θ	0	30	90	135	180	270	300	360
r	4	$2\sqrt{3}$ 3.46	0	$-2\sqrt{2}$ -2.83	-4	0	2	4



55. $r = 3(1 - \sin\theta)$

$r = 3 - 3\sin\theta$



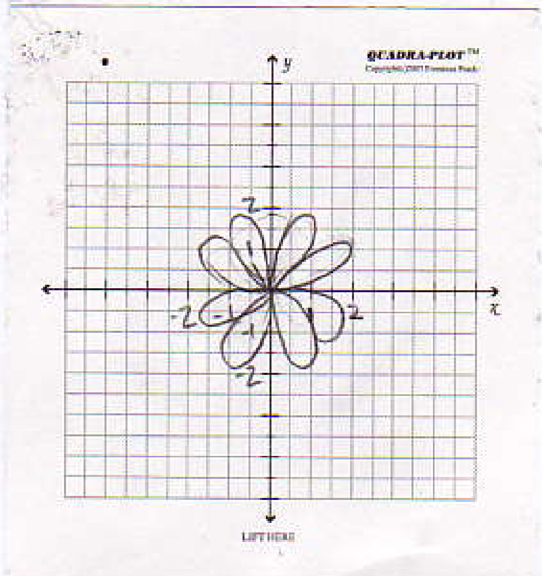
56.

$r = 2\sin 4\theta$

4 is even

$4 \cdot 2 = 8$ petals

WITH A RADIUS OF 2 FOR EACH PEDEL



57. $\left(\overset{r}{5}, \overset{\theta}{\frac{7\pi}{3}}\right)$

$x = r\cos\theta$

$y = r\sin\theta$

$x = 5\cos\frac{7\pi}{3}$ OR $\frac{\pi}{3}$

$y = 5\sin\frac{7\pi}{3}$ OR $\frac{\pi}{3}$

$x = 5\left(\frac{1}{2}\right)$

$y = 5\left(\frac{\sqrt{3}}{2}\right)$

$$\boxed{\left(\frac{5}{2}, \frac{5\sqrt{3}}{2}\right)}$$

58. $r - r\cos\theta = 4$

$\downarrow$

$\sqrt{x^2+y^2} - \cancel{x} = 4 + x$

$\cancel{+x}$

$\left(\sqrt{x^2+y^2}\right)^2 = (4+x)^2$

$\cancel{x^2} + y^2 = 16 + 8x + \cancel{x^2}$

$-x^2 \qquad -x^2$

$$\boxed{y^2 - 8x - 16 = 0}$$

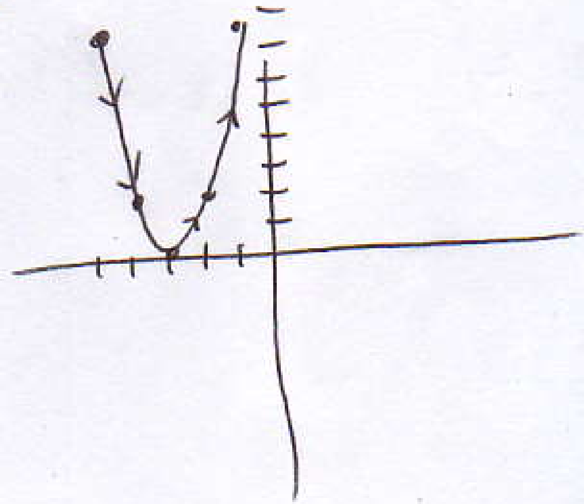
59. POLAR FORM OF $y = 5$

$$\frac{r\cancel{\sin\theta}}{\cancel{\sin\theta}} = \frac{5}{\sin\theta}$$

$$\boxed{r = 5\csc\theta}$$

60. $x = t - 3 \qquad y = 2t^2$

t	x	y
-2	-5	8
-1	-4	2
0	-3	0
1	-2	2
2	-1	8



$x = t - 3$
$+3 \qquad +3$

$x + 3 = t$

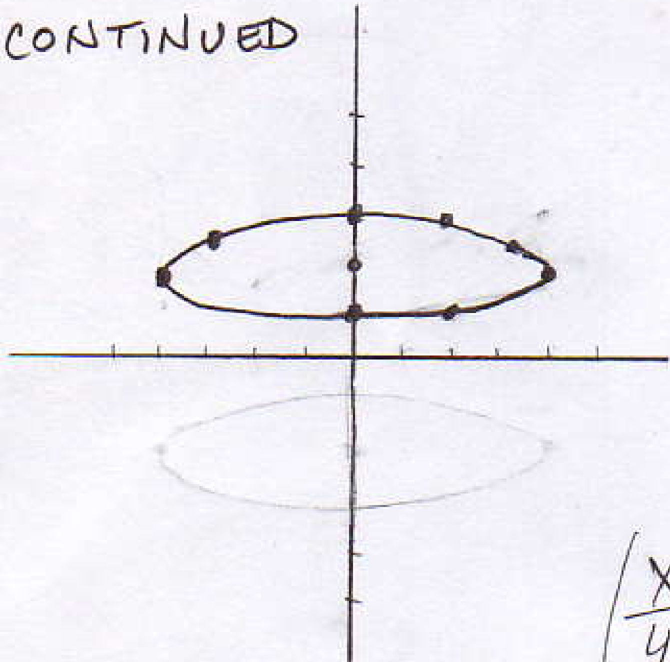
$y = 2(x+3)^2$

$$\boxed{y = 2(x+3)^2}$$

61. $x = 4\sin\theta \qquad y = \cos\theta + 2$

θ	0	30	45	60	90	150	180	270	300	360
x	0	2	$2\sqrt{2}$	$2\sqrt{3}$	4	2	0	-4	$-2\sqrt{3}$	0
y	3	$\frac{\sqrt{3}}{2}+2$	$\frac{\sqrt{2}}{2}+2$	3	2	$-\frac{\sqrt{3}}{2}+2$	1	2	2.5	3

61. CONTINUED



$$\left(\frac{x}{4}\right)^2 = (\sin\theta)^2$$

$$(y-2)^2 = \cos^2\theta$$

$$\frac{x^2}{16} = \sin^2\theta$$

$$+\ (y-2)^2 = +\cos^2\theta$$

$$\frac{x^2}{16} + \frac{(y-2)^2}{1} = 1$$

$a=4$ $b=1$

ELLIPSE

CENTER $(0,2)$