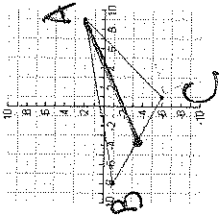


KEY

GAT FINAL EXAM REVIEW
Here are some problems to help direct your studying!

- 1 and 2 Given $\triangle ABC$ A(9,2) B(-8,-1) C(1,-6)



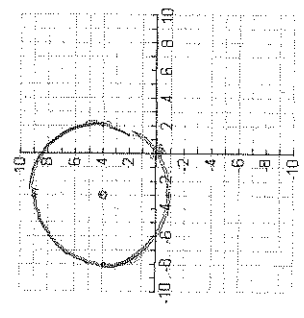
1. Write the equation of the median from A to \overline{BC}

$y + 3.5 = \frac{11}{25}(x + 3.5)$
OR $y - 2 = \frac{11}{25}(x - 9)$

2. Write the equation of the altitude from A to \overline{BC}

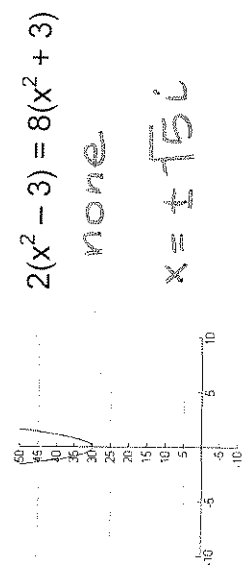
$y - 2 = \frac{9}{5}(x - 9)$

3. Given: $(x + 3)^2 + (y - 4)^2 = 25$ Graph and find the x and y intercepts algebraically.



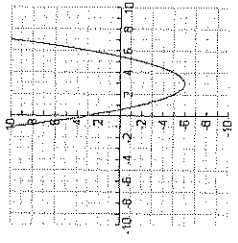
x int: $(-8, 0)$ $(2, 0)$
y int: $(0, 8)$ $(0, 0)$

4. How many real roots does this curve have? Solve the equation for x.



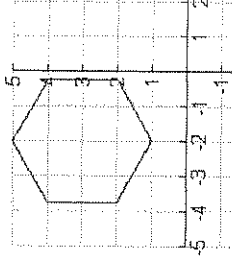
$2(x^2 - 3) = 8(x^2 + 3)$
none
 $x = \pm \sqrt{15}i$

5. How many real roots does this curve have? Solve the equation for x.



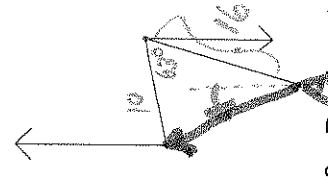
$2(x - 3)^2 = 8(x - 3)^2 - 36$
two
 $x = 3 \pm \sqrt{6}$

6. In parametric mode, how do you get this picture?



$X_{T1} = 2 \cos T - 2$ $T_{min} = 90^\circ$
 $Y_{T1} = 2 \sin T + 3$ $T_{max} = 450^\circ$
 $T_{step} = 60^\circ$

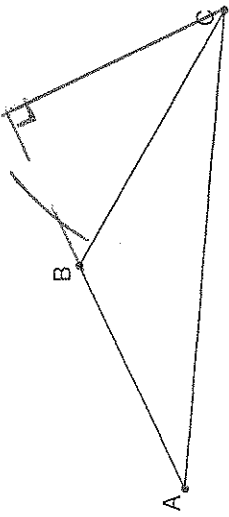
8. Find the heading and the distance you are from where you started. First you went N 78° E for 10 miles and then S 15° W for 16 miles.



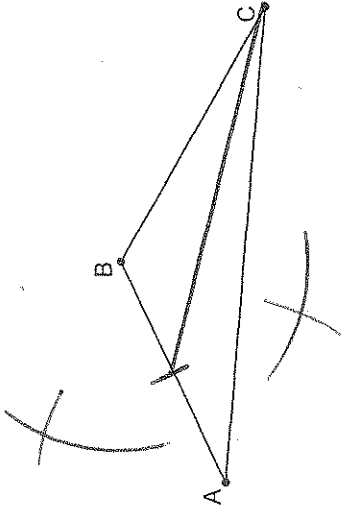
14.5 mi
N 22.9° W

9. Do the given constructions

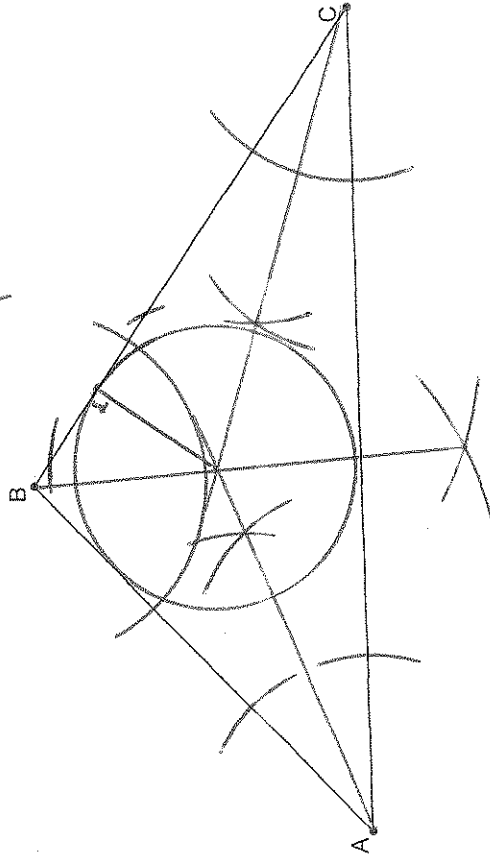
A. Construct the altitude in $\triangle ABC$
From C to the line containing side AB



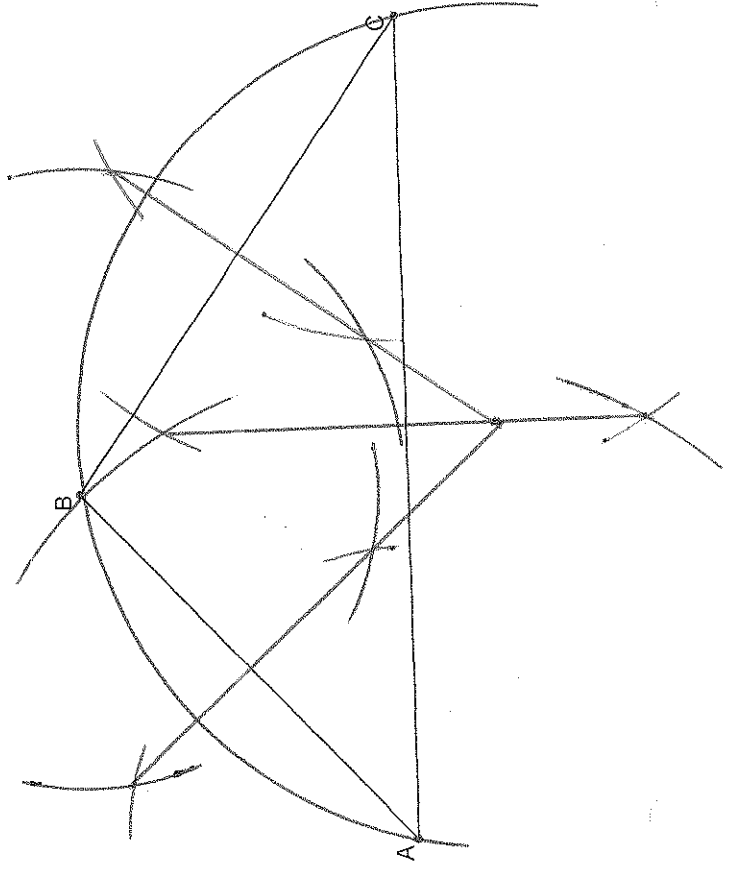
B. Construct the median in $\triangle ABC$
From C to side AB



C. Construct the inscribed circle of $\triangle ABC$
(intersection of angle bisectors)

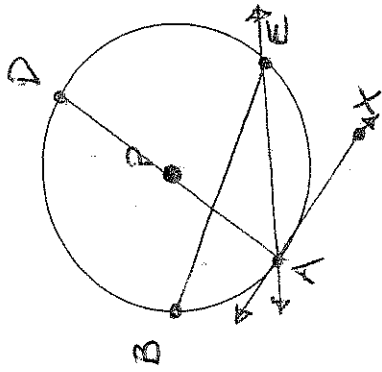


D. Construct the circumscribed circle of $\triangle ABC$
(intersection of perpendicular bisectors)



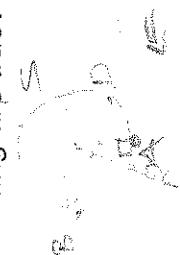
10. Given a circle with center P

- A. BE is a CHORD
- B. AD is a DIAMETER
- C. AE is a SECANT
- D. PA is a RADIUS
- E. AX is a TANGENT
- F. ED is a MINOR arc
- G. ADE is a MAJOR arc
- H. $\angle BEA$ is an inscribed \angle
- I. $\angle EPD$ is a central \angle

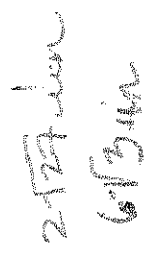


11. Plane E is tangent to sphere S at A. R is the midpoint of chord BD, and P-R-A. Which of the following are true?

- A. PB is a chord of the sphere
- B. $PA \cong BD$
- C. $BD \parallel$ plane E
- D. AD is a chord of the sphere
- E. Any line in E that contains A is tangent to S
- F. PD is a radial segment of the sphere
- G. Except for A, every point of E is in the exterior of the sphere



12. P is the center of circle C, $PE \perp AB$, $PE = 3$, $PB = 6$. Find AB



diameter

13. AB is a diameter chord of the circle with center P. $AF \cong PH$, $m\angle A = 55$. Find $m\angle BH$ and $m\angle AFH$



$50^\circ, 70^\circ$

14. Find the center and radius of the circle whose equation is

$$x^2 - 8x + y^2 + 4y = 5$$

center: $(4, -2)$
 $r = 5$

16. Which of the following are true?

- A. If a diameter chord of a circle bisects a chord that is not a diameter, then the diameter chord is perpendicular to the other chord. **T**
- B. If the measure of an angle inscribed in a circle is 90 degrees, then the measure of its intercepted arc is 45 degrees. **F**
- C. In a circle two inscribed angles that intercept the same arc are congruent. **T**
- D. Two concentric circles have at least one point in common. **F**
- E. Any angle inscribed in a semicircle is a right angle. **F**
- F. If the interiors of two spheres both contain a given point, then the intersection of the spheres is a circle. **F**
- H. If two arcs of different circles have the same measure, then their chords are congruent. **F**
- I. Two concentric circles have at most one point in common. **F**

17. AE is a diameter chord of the circle with center A. BA and BD are tangent to the circle. $m\angle GM = 84$, $m\angle GF = 58$, and $m\angle DE = 60$. Find the measure of the numbered angles.

- $m\angle 1 = 30^\circ$
- $m\angle 2 = 48^\circ$
- $m\angle 3 = 84^\circ$
- $m\angle 4 = 96^\circ$
- $m\angle 5 = 42^\circ$
- $m\angle 6 = 71^\circ$
- $m\angle 7 = 19^\circ$

18. A. $x^2 + y^2 = 4$
 B. $x^2 + y^2 = 4$
 $2^2 + 3^2 \neq 4$
 Not on \odot
 C. $(\sqrt{2})^2 + (\sqrt{2})^2 = 4$
 $2 + 2 = 4$
 on \odot

19. P(-4, -3) Q(-1, 1)
 $r = \sqrt{3^2 + 4^2} = 5$
 $(x+4)^2 + (y+3)^2 = 25$
 $r = 5$

20. Circle
 $x^2 - 12x + 36 + y^2 + 14y + 49 = -4 + 36 + 49$
 $(x-6)^2 + (y+7)^2 = 81$
 Center (6, -7) $r = 9$

21. $V = A_B h$
 $V = \pi \cdot 5^2 \cdot 16$
 $V = 400\pi \text{ m}^3$

3

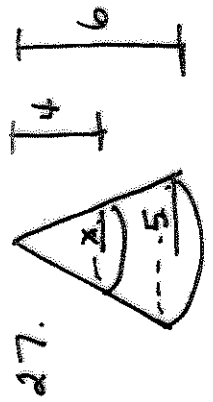
22. $V = A_B h$
 $600\pi = \pi r^2 \cdot 3$
 $200 = r^2$
 $\sqrt{200} = r$
 Diameter $2\sqrt{200} \text{ m}$

23. $V = \frac{1}{3} A_B h$
 $500\pi = \frac{1}{3} \cdot 25\pi \cdot h$
 $1500\pi = 25\pi h$
 $60 \text{ m} = h$

24. $V_{\text{shell}} = V_B - V_L$
 $\frac{4}{3}\pi (2.5)^3 - \frac{4}{3}\pi (1)^3$
 $19.5\pi \text{ cm}^3$

25. $V_{\text{remains}} = V_{\text{can}} - V_{\text{sphere}}$
 $= \pi \cdot 12^2 \cdot 20 - \frac{4}{3}\pi \cdot 9^3$
 $V_{\text{remains}} = 1908\pi$
 $\pi \cdot 12^2 \cdot h = 1908\pi$
 $h = 13.25 \text{ cm}$

26. $V = \frac{4}{3}\pi 6^3$ $SA = 4\pi 6^2$
 $V = 288\pi \text{ cm}^3$ $SA = 144\pi \text{ cm}^2$



$$\frac{10}{6} = \frac{x}{5}$$

$$20 = 6x$$

$$\frac{10}{3} = x$$

33. $x=0$

34. $y = \frac{4}{3}x$

35. $y+7 = -3(x-3)$

28. $(1, -1, 3)$ to $(5, 2, -1)$

$$\sqrt{4^2 + 3^2 + 4^2}$$

$$\sqrt{41}$$

29. $r = \sqrt{2^2 + 1^2 + 1^2}$

$$r = \sqrt{6}$$

$$x^2 + y^2 + z^2 = 6$$

30. $(x-1)^2 + (y+1)^2 + (z-2)^2 = 64$

31. $-3y = -5x + 23$

$$y = \frac{5}{3}x - \frac{23}{3}$$

$$y+7 = \frac{-3}{5}(x-1)$$

32. $(-2, 3)$ $(5, 8)$

$$m = \frac{5}{7}$$

$$y-9 = \frac{5}{7}(x-5)$$

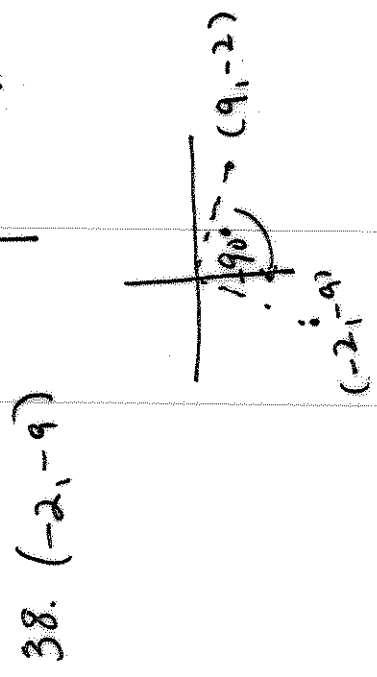
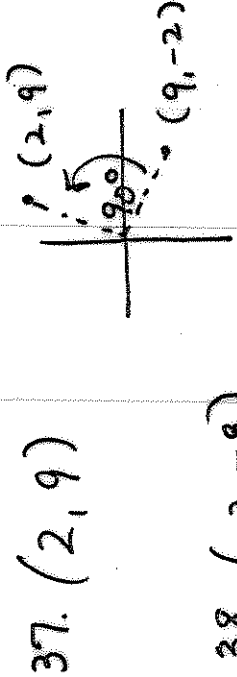
4

36.

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} \begin{bmatrix} -13 & 56 \\ 85 & -43 \\ -37 & 45 \end{bmatrix} = \begin{bmatrix} 965 \\ 563 \\ 342 \end{bmatrix}$$

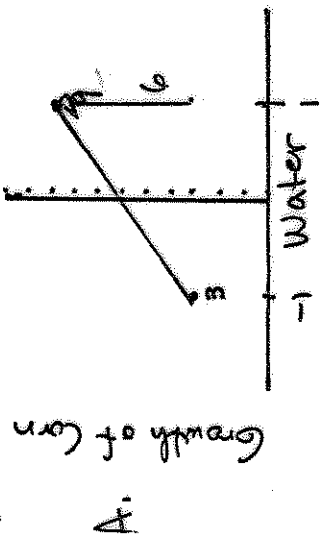
$$[A]^{-1}[A] \begin{bmatrix} x \\ y \\ z \end{bmatrix} = [A]^{-1} \begin{bmatrix} 965 \\ 563 \\ 342 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} \approx \begin{bmatrix} 2.575 \\ 15.617 \\ 19.754 \end{bmatrix}$$

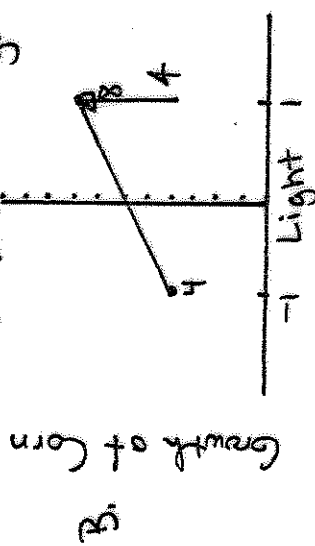


39. A. $\frac{1}{2}\sqrt{2}$ B. $\frac{1}{2}\sqrt{3}$ C. $-\frac{1}{2}\sqrt{3}$
 D. -1 E. $\frac{1}{2}\sqrt{2}$ F. $-\frac{1}{2}$

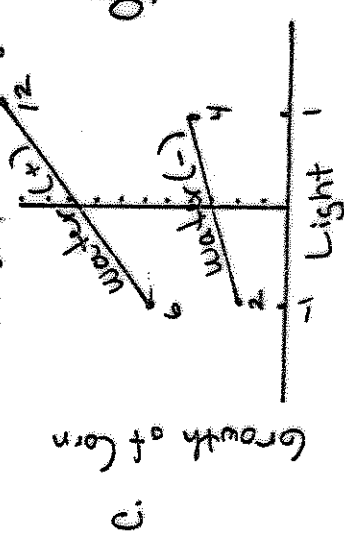
40. Effect of Water



Effect of Light



Effect Water vs Light

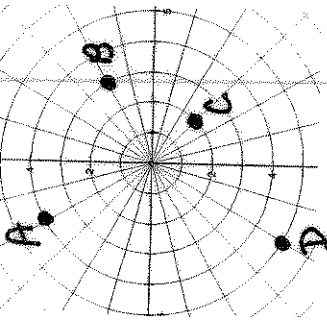


D. Slope(+) - Slope(-)
 $\frac{3-1}{2} - \frac{4-2}{2}$

Slope-Slope
 $\frac{4-2}{2}$

41. A. $[3, 480^\circ]$ C. $[-3, 300^\circ]$
 B. $[3, -240^\circ]$ D. $[-3, -60^\circ]$

42. Graph these points



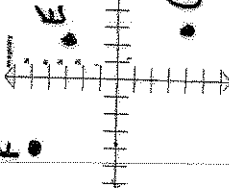
A. $[4, 120^\circ]$

B. $[-3, 210^\circ]$

C. $[2, -45^\circ]$

D. $[-5, -300^\circ]$

F.

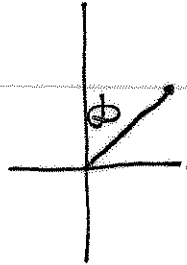


E. $2+3i$

F. $-4+5i$

G. $3-4i$

43.



$$r = \sqrt{3^2 + 4^2} = 5$$

$$r = 5$$

$$\tan \theta = \frac{4}{3}$$

$$\theta = \tan^{-1}\left(\frac{4}{3}\right)$$

$$\theta = 53.13^\circ$$

$$[5, -53.13^\circ]$$

44. $(-6 \cos 70^\circ, -6 \sin 70^\circ)$

$(-2.052, -5.638)$

45. $[3, 90^\circ] + [5, 180^\circ]$
 $(0, 3) + (-5, 0)$
 $(-5, 3)$

46. A. 5 B. 3

C. 5 D. $\sqrt{2^2+3^2}$ E. 3
 $\sqrt{13}$

47. A. $-\frac{1}{2} + \frac{\sqrt{3}}{2}i$ B. $-\frac{1}{2} + \frac{\sqrt{3}}{2}i$

C. $12-15i+8i-10i^2$
 $22-7i$

48. $(3, -2) + (-1, 4)$
 $(2, 2)$
 $2+2i$

49. $[4, 20^\circ] [1.5, 80^\circ]$
 $[6, 100^\circ]$

50. $a^2 = b^2 + c^2 - 2bc \cos \angle A$ (W)
 $20^2 = 14^2 + 8^2 - 2(14)(8) \cos \angle A$
 $20^2 - 14^2 - 8^2 = -224 \cos \angle A$
 $140 = -224 \cos \angle A$
 $\frac{140}{-224} = \cos \angle A$

$m\angle A = \cos^{-1}\left(\frac{140}{-224}\right) = \underline{\underline{128.68^\circ}}$

51. $a^2 = b^2 + c^2 - 2bc \cos \angle A$
 $a^2 = 16^2 + 12^2 - 2(16)(12) \cos 40^\circ$
 $a^2 = 105.83$
 $a = \underline{\underline{10.288}}$

52. $\frac{a \sin 80^\circ}{a} = \frac{\sin 40^\circ}{16}$

$a \sin 40^\circ = 16 \sin 80^\circ$
 $a = \frac{16 \sin 80^\circ}{\sin 40^\circ}$

$a = 24.513$

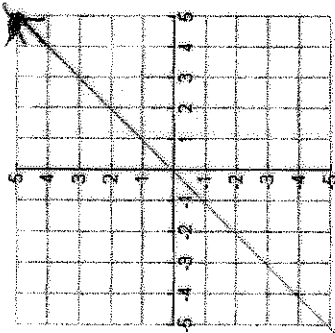
53. A. $-i^3$ B. $33 - (6-10i+3i-5i^2)$
 i $33 - (11-7i)$
 $22+7i$

C. $(2+3i)^2$
 $4+6i+6i+9i^2$
 $-5+12i$

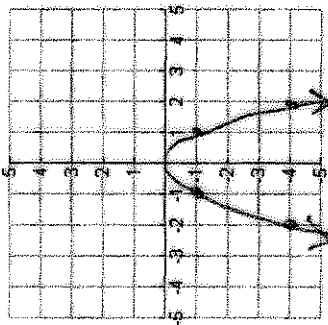
D. $(-5+12i)(2+3i)$
 $-10-15i+24i+36i^2$
 $-46+9i$

54. Graph the following parent functions

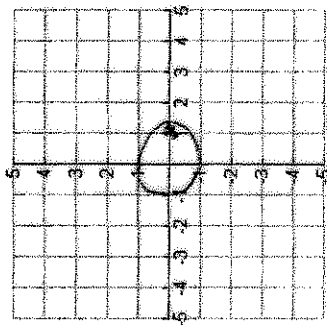
A. $y = x$



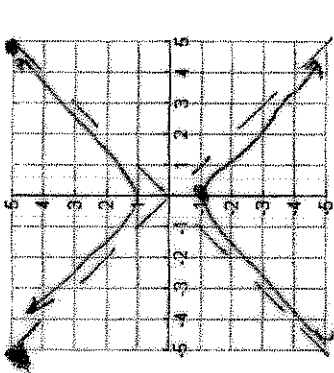
B. $y = -x^2$



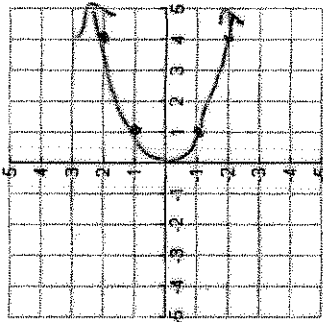
C. $x^2 + y^2 = 1$



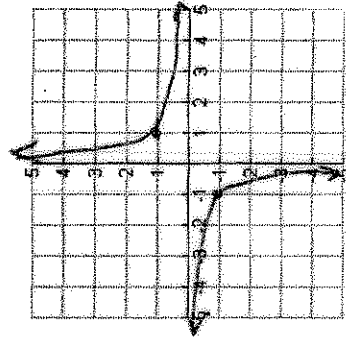
D. $y^2 - x^2 = 1$



E. $x = y^2$

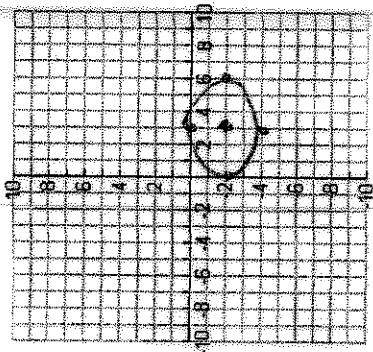


F. $xy = 1$

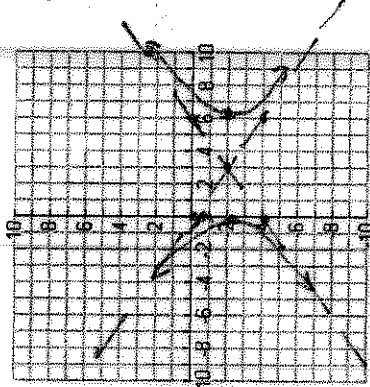


55. Graph these equations

A. $\frac{(x-3)^2}{9} + \frac{(y+2)^2}{4} = 1$



B. $\frac{(x-3)^2}{9} - \frac{(y+2)^2}{4} = 1$



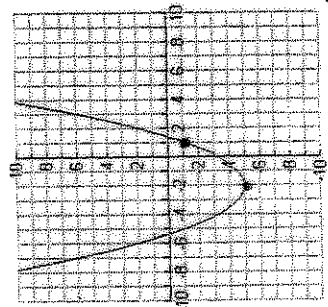
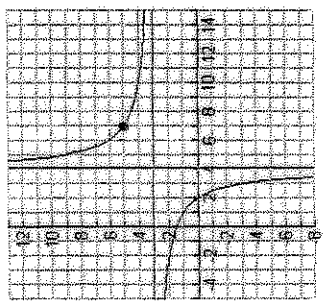
$y + 2 = \frac{2}{3}(x - 3)$

$y + 2 = -\frac{2}{3}(x - 3)$

8

56. Write the equations for these graphs

$xy = 1$
 $S(3x, 2y)$
 $T(x+4, y+3)$
 $(x-4)(y-3) = 6$



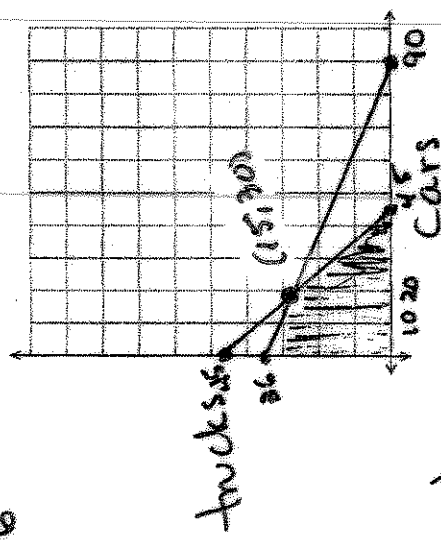
$y = x^2$
 $(3x, 4y)$
 $T(x-2, y-5)$
 $\frac{1}{4}(y+5) = \frac{1}{9}(x+2)^2$

57. General Dynamics operates a plant that assembles and finishes both cars and trucks. It takes 5 man-days to assemble a truck, and 2 man-days to assemble a car; the finishing process requires 3 man-days for each car and truck that is produced. Because of manpower limitations, assembling can take no more than 180 man-days per week, and finishing no more than 135 man-days per week. If the profit on each truck is \$300 and \$200 on each car, how many of each should be produced to maximize profit.

$$\begin{bmatrix} 2 & 5 \\ 3 & 3 \end{bmatrix} \begin{bmatrix} C \\ T \end{bmatrix} = \begin{bmatrix} 180 \\ 135 \end{bmatrix}$$

$$[A]^{-1}[A] \begin{bmatrix} C \\ T \end{bmatrix} = [A]^{-1}[B]$$

$2C + 5T \leq 180$
 $3C + 3T \leq 135$



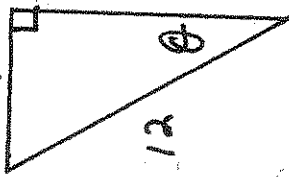
Assemble	2	3
Finish	5	3
	≤ 180	≤ 135

$P = 300T + 200C$
 Check
 $(0, 36)$ 10800
 $(15, 30)$ 12,000 X
 $(45, 0)$ 9000

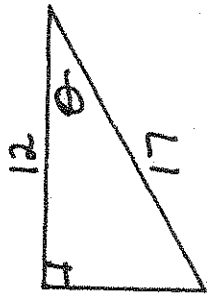
Make 15 CARS
30 TRUCKS

58 Find the missing part using trig ratios

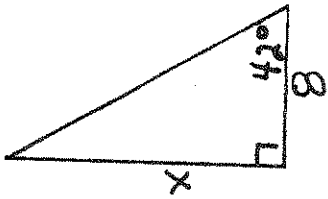
4



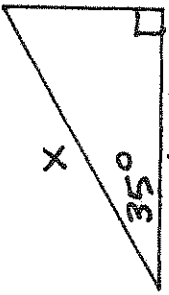
$\sin \theta = \frac{4}{17}$
 $\theta = 19^\circ$



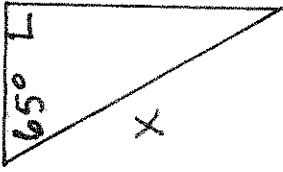
$\cos \theta = \frac{12}{17}$
 $\theta = 45^\circ$



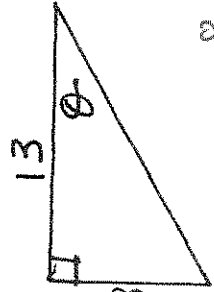
$\tan 42^\circ = \frac{x}{8}$
 $x = 7.2$



$\cos 35^\circ = \frac{12}{x}$
 $x = 14.6$

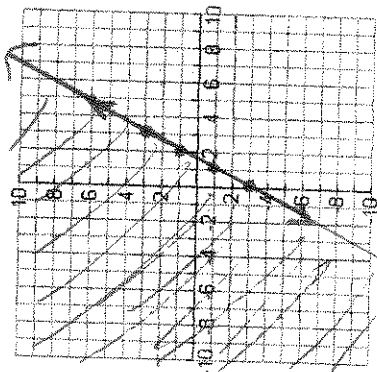


$\sin 65^\circ = \frac{12}{x}$
 $x = 13.2$

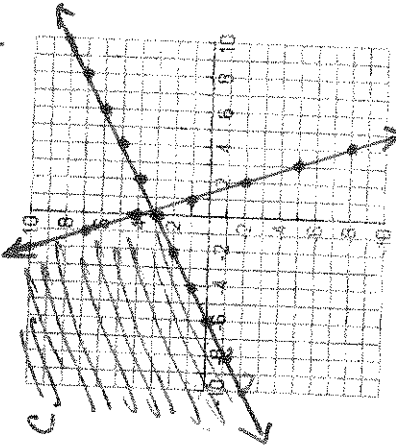


$\tan \theta = \frac{8}{13}$
 $\theta = 32^\circ$

59. Graph these inequalities



$y > 2x - 3$

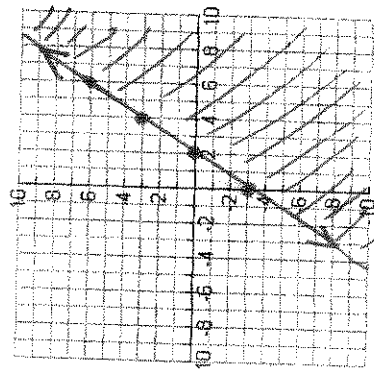


$y > \frac{1}{2}x + 3$ AND $y < -3x + 4$

60/ Rotate (4, -5) 78 degrees around the origin

$$\begin{bmatrix} \cos 78^\circ & -\sin 78^\circ \\ \sin 78^\circ & \cos 78^\circ \end{bmatrix} \begin{bmatrix} 4 \\ -5 \end{bmatrix} = \begin{bmatrix} 5.7 \\ 2.9 \end{bmatrix}$$

$(5.7, 2.9)$



$3x - 2y > 6$ $y < \frac{3}{2}x - 3$

63. Give the identity for multiplication in the real number system |

64. Define inverse

Element through an operation with its inverses produces the identity

65. Give the additive inverse of $\frac{3}{4}$

$-\frac{3}{4}$

66. Give the multiplicative inverse of $\frac{3}{4}$

$\frac{4}{3}$

61. Give the Identity for addition in the real number system

0

62. Define identity

Element through an operation with its identity you produce the original element