

26E

1-2) $XY = -12$

X	Y
2	-6
3	-4
6	-2
-2	6
-3	4
-6	2

see graph

3-4) $XY = 3$

X	Y
1/2	6
1	3
3	1
-1/2	-6
-1	-3
-3	-1

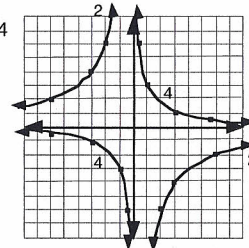
see graph

5-6) $3X^2 - 2Y^2 = 6$

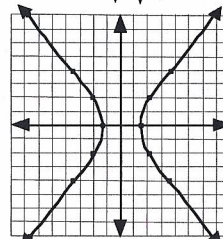
X	Y
$\approx \pm 1.4$	0
$\approx \pm 2.2$	± 2
$\approx \pm 3.6$	± 4
$\approx \pm 6.7$	± 8

see graph

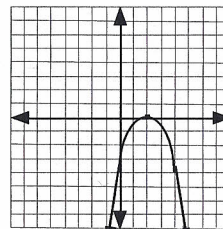
#2-4



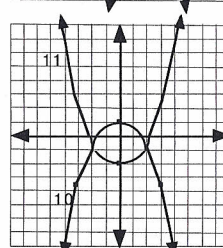
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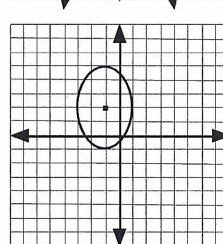
#9



#10-11



#20



7) $\frac{-4}{2(-1)} = 2$

8) $Y = -(2)^2 + 4(2) - 4 = 0$

9) on the graph

10) $Y = -1/2 X^2 + 1$

11) $[1/4 Y = 1/8 X^2 - 1/2] \cdot 4$
 $Y = 1/2 X^2 - 2$

12) $[1/2 (X+2)^2 + (Y-3)^2 = 32] \cdot 2$
 $(X+2)^2 + (Y-3)^2 = 64$ or 8^2
 $C = (-2, 3)$ $R = 8$

13) $(X+2)^2 + (Y+2)^2 = 5^2$

14-15) $[4X^2 - 32X + 64 + 4Y^2 - 24Y = 0] \div 4$
 $X^2 - 8X + 16 + Y^2 - 6Y + 9 = 9$
 $(X-4)^2 + (Y-3)^2 = 3^2$
 $C = (4, 3)$ $R = 3$

16) $CD^2 = [-2-4]^2 + [-2-(-4)]^2 = 36 + 4 = 40$
 $CD = 2\sqrt{10}$

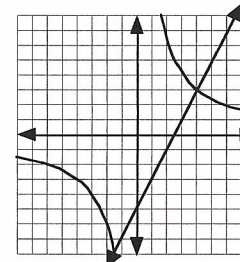
17) $\left(\frac{-2+4}{2}, \frac{-2-4}{2}\right) = (1, -3)$

18) $Y = 1/3 X - 3 \Rightarrow m = 1/3$
 $(1) = 1/3(4) + b$
 $-1/3 = b$ $Y = 1/3 X - 1/3$

19) $C = (-1, 2)$
 $Y = \pm 3$ from center of ellipse
 $X = \pm 2$

20) on the graph

27A



1) $XY = 12$

$Y = 2X - 5$

Solutions: $(-1.5, -8), (4, 3)$

$X(2X-5) = 12$

$2X^2 - 5X - 12 = 0$

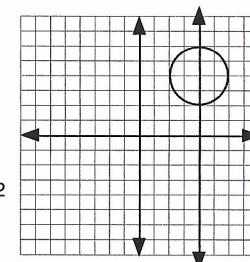
$(2X+3)(X-4) = 0$

$2X+3=0$ $X-4=0$

$X = -3/2$ $X = 4$

$(-3/2)Y = 12$ $(4)Y = 12$

$Y = -8$ $Y = 3$



2) $(X-4)^2 + (Y-4)^2 = 4$

$5X = 20$

$X = 4$

Solutions: $(4, 2), (4, 6)$

$(Y-4)^2 = 4$

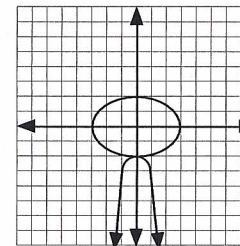
$Y^2 - 8Y + 16 = 4$

$Y^2 - 8Y + 12 = 0$

$(Y-2)(Y-6) = 0$

$Y-2=0$ $Y-6=0$

$Y = 2$ $Y = 6$



3) $4X^2 + 9Y^2 = 36$

$Y = -X^2 - 2 \Rightarrow -4X^2 - 4Y - 8 = 0$

Solution: $(0, -2)$

$4X^2 + 9Y^2 - 36 = 0$

$-4X^2 - 4Y - 8 = 0$

$9Y^2 - 4Y - 44 = 0$

$\frac{(-4) \pm \sqrt{(-4)^2 - 4(9)(-44)}}{2(9)}$

$Y \approx 2.44, -2$

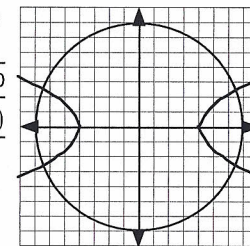
$(-2) = -X^2 - 2$

$X = 0$

$(2.44) = -X^2 - 2$

$-4.44 = X^2 \Rightarrow$

no real solution



$X^2 + Y^2 = 49$

$-X^2 + 4Y^2 = -16$

$5Y^2 = 33$

$Y \approx \pm 2.57$

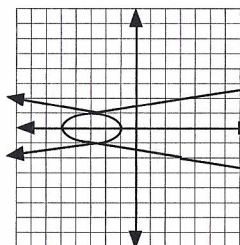
$X^2 + (\pm 2.57)^2 = 49$

$X^2 = 42.4$

$X \approx \pm 6.5$

4) $X^2 - 4Y^2 = 16 \Rightarrow -X^2 + 4Y^2 = -16$

$X^2 + Y^2 = 49$

Solutions: $(6.5, 2.57), (6.5, -2.57), (-6.5, 2.57), (-6.5, -2.57)$ 

5) $X = 2Y^2 - 5$

$X = -2Y^2 - 1$

Solutions: $(-3, 1), (-3, -1)$

$X = 2Y^2 - 5$

$X = -2Y^2 - 1$

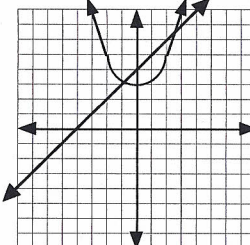
$2X = -6$

$X = -3$

$(-3) = -2Y^2 - 1$

$3 = 2Y^2 + 1$

$Y = \pm 1$



6) $Y = 1/2 X^2 + 3$

$Y = X + 4$

Solutions: $(2.73, 6.73), (-7.3, 3.27)$

$(X+4) = 1/2 X^2 + 3$

$1/2 X^2 - X - 1 = 0$

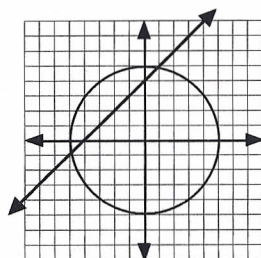
$\frac{(-1) \pm \sqrt{(-1)^2 - 4(1/2)(-1)}}{2(1/2)}$

$X \approx 2.73, -7.3$

$Y = 2.73 + 4 = 6.73$

$Y = -7.3 + 4 = 3.27$

27B

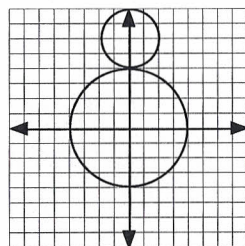


$$\begin{aligned} X^2 + (X + 4)^2 &= 25 \\ X^2 + X^2 + 8X + 16 &= 25 \\ 2X^2 + 8X - 9 &= 0 \\ \frac{-(8) \pm \sqrt{(8)^2 - 4(2)(-9)}}{2(2)} \\ X &\approx .92, -4.92 \\ Y &= (.92) + 4 = 4.92 \\ Y &= (-4.92) + 4 = -.92 \end{aligned}$$

1) $Y = X + 4$

$X^2 + Y^2 = 25$

Solutions: (.92, 4.92), (-4.92, -.92)

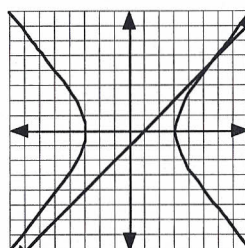


$$\begin{aligned} X^2 + Y^2 - 12Y + 36 &= 4 \\ X^2 + Y^2 - 12Y + 32 &= 0 \\ -X^2 - Y^2 &= -16 \\ -12Y + 32 &= -16 \\ -12Y &= -48 \\ Y &= 4 \\ X^2 + (4)^2 &= 16 \\ X &= 0 \end{aligned}$$

3) $X^2 + Y^2 = 16$

$X^2 + (Y - 6)^2 = 16$

Solution: (0, 4)

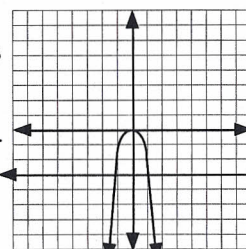


$$\begin{aligned} 4X^2 - 4(X - 1)^2 &= 36 \\ 4X^2 - 4(X^2 - 2X + 1) &= 36 \\ 4X^2 - 4X^2 + 8X - 4 &= 36 \\ 8X - 4 &= 36 \\ 8X &= 40 \\ X &= 5 \\ Y &= (5) - 1 \\ Y &= 4 \end{aligned}$$

5) $4X^2 - 4Y^2 = 36$

$Y = X - 1$

Solution: (5, 4)

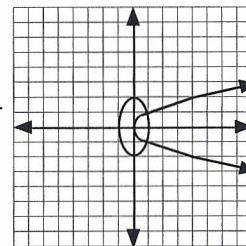


$$\begin{aligned} (-3) &= -2X^2 \\ 2X^2 - 3 &= 0 \\ \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-3)}}{2(2)} \\ X &\approx 1.22, -1.22 \\ \text{or} \\ 2X^2 - 3 &= 0 \\ X^2 &= 3/2 \\ X &= \pm 1.22 \end{aligned}$$

2) $Y = -3$

$Y = -2X^2$

Solutions: (1.22, -3), (-1.22, -3)

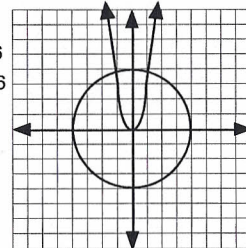


$$\begin{aligned} 4X^2 + (X) &= 4 \\ 4X^2 + X - 4 &= 0 \\ \frac{-(1) \pm \sqrt{(1)^2 - 4(4)(-4)}}{2(4)} \\ X &\approx .88, -1.13 \\ (.88) &= Y^2 \approx \pm .94 \\ (-1.13) &= Y^2 \Rightarrow \\ \text{no real solution} \end{aligned}$$

4) $4X^2 + Y^2 = 4$

$X = Y^2$

Solutions: (.88, .94), (.88, -.94)



$$\begin{aligned} 3X^2 - Y &= 0 \\ -3X^2 - 3Y^2 + 48 &= 0 \\ -3Y^2 - Y + 48 &= 0 \\ \frac{-(-1) \pm \sqrt{(-1)^2 - 4(-3)(48)}}{2(-3)} \\ Y &\approx -4.17, 3.84 \\ (3.84) &= 3X^2 \approx \pm 1.13 \\ X &\approx \pm 1.13 \\ (-4.17) &= 3X^2 \Rightarrow \\ \text{no real solution} \end{aligned}$$

6) $Y = 3X^2$

$X^2 + Y^2 = 16 \Rightarrow$

$-3X^2 - 3Y^2 + 48 = 0$

Solutions: (1.13, 3.84), (-1.13, 3.84)

27C

X	Y
1	8
2	4
4	2
8	1
-1	-8
-2	-4
-4	-2
-8	-1

1) hyperbola and line

2) on the graph

$$\begin{aligned} 3) \quad X(1/2X - 2) &= 8 \Rightarrow 1/2 X^2 - 2X - 8 = 0 \\ X^2 - 4X - 16 &= 0 \end{aligned}$$

4) use quadratic formula

$$\begin{aligned} X &= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-16)}}{2(1)} \\ X &= \frac{4 \pm \sqrt{80}}{2} = \frac{4 \pm 4\sqrt{5}}{2} = 2 \pm 2\sqrt{5} \end{aligned}$$

5) $Y_1 = 1/2(2 + 2\sqrt{5}) - 2 = 1 + \sqrt{5} - 2 \approx 1.25$

$Y_2 = 1/2(2 - 2\sqrt{5}) - 2 = 1 - \sqrt{5} - 2 \approx -3.25$

6) (6.5, 1.25), (-2.5, -3.25)

7) parabola, line

8) on the graph

9) $X = 1$

10) $Y = -2(1)^2 + 3 = -2 + 3 = 1$

11) $Y = 1$

12) (1, 1)

13) circle and line

14) on the graph

$$\begin{aligned} 15) \quad [75 = 3X^2 + 3Y^2] \div 3 &\Rightarrow 25 = X^2 + Y^2 \\ X^2 + (-2X + 4)^2 &= 25 \end{aligned}$$

16) $X^2 + (4X^2 - 16X + 16) - 25 = 0$

$5X^2 - 16X - 9 = 0$

$$X = \frac{-(-16) \pm \sqrt{(-16)^2 - 4(5)(-9)}}{2(5)}$$

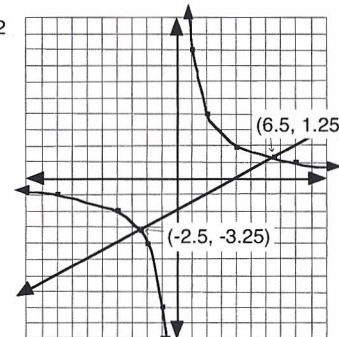
$$X = \frac{16 \pm \sqrt{436}}{10} = \frac{16 + 21}{10}, \frac{16 - 21}{10} \approx (3.7, -.5)$$

 $\sqrt{436}$ is approximately 21

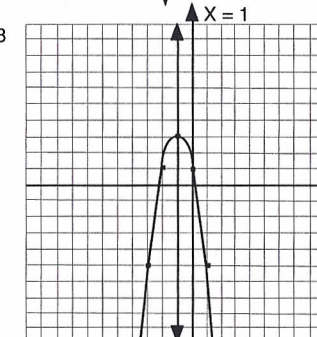
17) $Y = -2(3.7) + 4 = -3.4, Y = -2(-.5) + 4 = 5$

18) (3.7, -3.4), (-.5, 5)

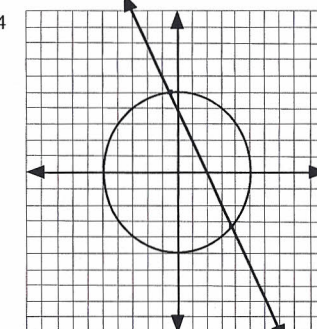
#2



#8



#14



19) $AB^2 = (-5 - 0)^2 + (0 - 3)^2 =$

$25 + 9 = 34 \Rightarrow AB = \sqrt{34}$

20) $(\frac{-5 + 3}{2}, \frac{0 - 2}{2}) = (-1, -1)$

27D

- 1) hyperbola $3\sqrt{2} \approx 4.2$
 circle $C = (0, 0) \quad R = 4\sqrt{2} \approx 5.7$

X	Y
± 4.2	0
± 6	≈ 4
± 9	≈ 8

- 2) on the graph

3) $X^2 - Y^2 = 18$

$$\frac{X^2 + Y^2 = 32}{2X^2} = 50$$

4) $X = 25 \Rightarrow X = \pm 5$

5) $(5)^2 + Y^2 = 32$

$$Y^2 = 7 \Rightarrow Y = \pm\sqrt{7} \approx \pm 2.65$$

6) $(5, \sqrt{7}) (5, -\sqrt{7}) (-5, \sqrt{7}) (-5, -\sqrt{7})$

- 7) parabola, line

- 8) on the graph

$$\frac{-2}{2(-1)} = 1 \quad \text{axis of symmetry}$$

$$Y = -(1)^2 + 2(1) = 1 \quad \text{vertex } (1, 1)$$

9) $Y = -3$

10 & 11) $-3 = -X^2 + 2X$

$$X^2 = 2X + 3 \Rightarrow X^2 - 2X - 3 = 0$$

$$X = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-3)}}{2(1)} = \frac{2 \pm \sqrt{16}}{2}$$

$$X = 3 \text{ or } -1$$

12) $(3, -3) (-1, -3)$

13) hyperbola and line $(Y = -1/3 X + 1)$

- 14) on the graph

15) $X = -3Y + 3$

$$(-3Y + 3)^2 - Y^2 = 4 \Rightarrow 8Y^2 - 18Y + 5 = 0$$

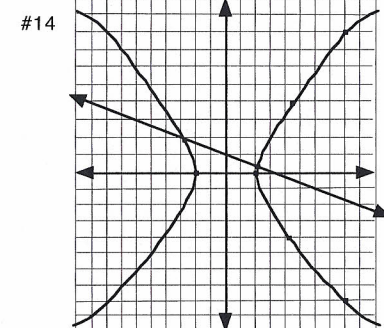
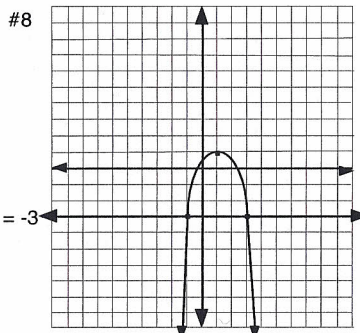
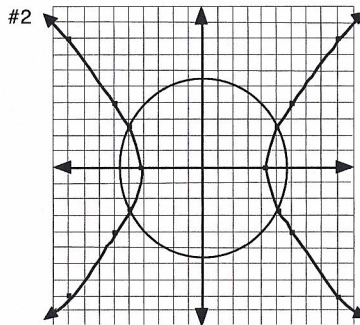
16) $Y = \frac{-(-18) \pm \sqrt{(-18)^2 - 4(8)(5)}}{2(8)}$

$$Y = \frac{18 \pm \sqrt{164}}{16} = \frac{18 \pm \sqrt{164}}{16} \quad (\sqrt{164} \approx 13)$$

$$Y \approx \frac{31}{16}, \approx \frac{5}{16}$$

17) $X = -3(\frac{31}{16}) + 3, \quad X = -3(\frac{5}{16}) + 3$

18) $(-2 \frac{3}{4}, 31/16), (-33/16, 5/16)$



19) $BD^2 = (-2 - 0)^2 + (-4 - 3)^2 = 4 + 49 = 53 \Rightarrow BD = \sqrt{53}$

20) $(\frac{-2+0}{2}, \frac{-4+3}{2}) = (-1, -1/2)$

27E

- 1) hyperbola and line

- 2) on the graph

3) $X(X + 4) = 3 \Rightarrow X^2 + 4X - 3 = 0$

$$X = \frac{-4 \pm \sqrt{4^2 - 4(1)(-3)}}{2(1)}$$

$$X = \frac{-4 \pm 2\sqrt{7}}{2} = -2 \pm \sqrt{7}$$

$$(\sqrt{7} \approx 2.65)$$

5) $Y_1 = (-2 + \sqrt{7}) + 4 = 2 + \sqrt{7}$

$$Y_2 = (-2 - \sqrt{7}) + 4 = 2 - \sqrt{7}$$

6) $(-2 + \sqrt{7}, 2 + \sqrt{7}) (-2 - \sqrt{7}, 2 - \sqrt{7})$ for graphing: $(.65, 4.65)$

- 7) parabola, parabola

- 8) on the graph

9) $-Y + X^2 = 1$

$$\frac{Y + 1/2 X^2 = 3}{3/2 X^2 = 4} \quad X^2 = 8/3$$

10) $X = \pm\sqrt{8/3} = \frac{\sqrt{8}}{\sqrt{3}} = \frac{2\sqrt{2}\sqrt{3}}{\sqrt{3}\sqrt{3}} = \frac{\pm 2\sqrt{6}}{3}$

11) $Y = X^2 - 1 = (\frac{2\sqrt{6}}{3})^2 - 1 = 1 - \frac{2}{3}$

12) $(\frac{2\sqrt{6}}{3}, \frac{5}{3}) (-\frac{2\sqrt{6}}{3}, \frac{5}{3}) \quad \frac{2\sqrt{6}}{3} \approx 1.6$

- 13) circle, circle

- 14) on the graph

15) $-X^2 - Y^2 = -16$

$$\frac{X^2 + (Y + 6)^2 = 9}{(Y + 6)^2 - Y^2 = -7}$$

16) $Y^2 + 12Y + 36 - Y^2 = -7$

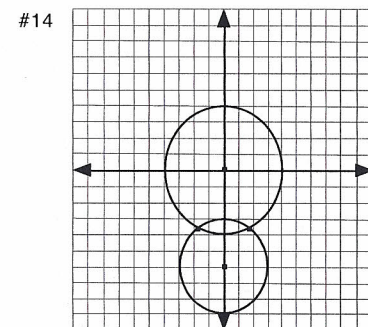
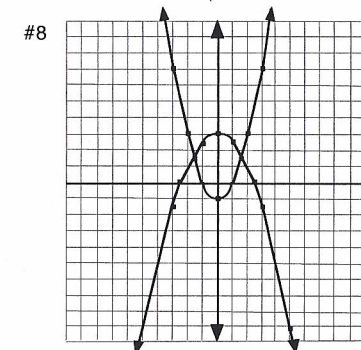
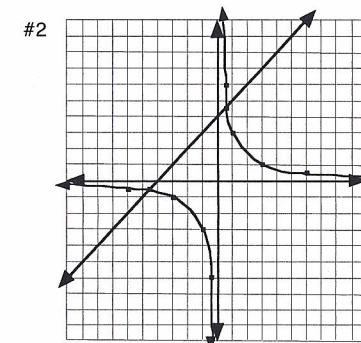
$$12Y = -43 \quad Y = -3 \frac{7}{12}$$

17) $X^2 + (-3 \frac{7}{12})^2 = 16 \Rightarrow X^2 = \frac{455}{144}$

$$X = \sqrt{\frac{455}{144}} \quad X = \pm \sqrt{\frac{455}{144}}$$

18) $(\frac{\sqrt{455}}{12}, -3 \frac{7}{12}) (-\frac{\sqrt{455}}{12}, -3 \frac{7}{12})$

X	Y
$1/2$	6
1	3
3	1
6	$1/2$



19) $AC^2 = (-5 - 3)^2 + (0 - (-2))^2 = 64 + 4 = 68 \Rightarrow AC = 2\sqrt{17}$

20) $(\frac{-5+3}{2}, \frac{0-2}{2}) = (-1, -1)$