SOLUTIONS – COORDINATE GEOMETRY
THETA DIVISION
ATLANTA, 2003

A 1. $m = \dfrac{6-(-5)}{-1-(-3)} = \boxed{\dfrac{11}{2}}$

E 2 $x+2y=5 \Rightarrow x+6=5 \Rightarrow \boxed{x=-1}$

B 3. $P(-4,-2) \Rightarrow$ MUST BE PARALLEL TO X–AXIS. $\boxed{y=-2}$

C 4. $\boxed{y=8x-3}$

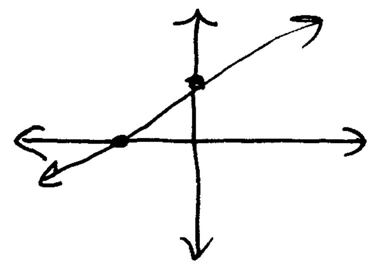
A 5. $x^2-4x+4+y^2+6y+9=12+4+9$
$(x-2)^2+(y+3)^2=25$
$(2,-3)$

D 6 DEFINITION OF A PARABOLA.

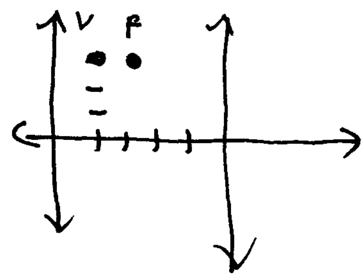
A 7 $\underbrace{3x-6y}=12$
|| lines the $3x-6y$ stays the same.
Plug $(2,3)$ into $3x-6y=12$
yields -12
$3x-6y=-12$ Factor out a 3.
$\boxed{x-2y=-4}$

D 8. $m_L = \dfrac{3-2}{-5-(-1)} = \dfrac{-1}{4}$
$m_m \rightarrow$ negative reciprocals
$\boxed{4}$

9. B



10. D.



$\boxed{x=-5}$

11. A Profit = Revenue − cost
$= 102x - x^2 - (100 - 50x)$
$= 102x - x^2 - 100 - 50x$
$= -x^2 + 52x - 100$
max. occurs at $x = \dfrac{-b}{2a} = \dfrac{-52}{-2} = \boxed{26}$

E 12. $y-6=7(x+4)$
$y-6=7x+28$
$y=7x+\underline{34}$

C 13. $x^2-2x \quad -y^2-4y=4$
$x^2-2x+1-(y^2+4y+4)=1$
$(x-1)^2-(y+2)^2=1$

B 14. $(x-1)^2-(y+1)^2=1$
$C(1,-2)$

C 15. $y=x^2-8x+15$
$y=x^2-8x+16$ $\quad +15-16$
$y=(x-4)^2-1$
$(4,-1)$

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B 16. $T(-2,4)$ $L(4,-8)$

$$M\left(\frac{-2+4}{2}, \frac{4-8}{2}\right) = (1,-2)$$

$$m = \frac{4+8}{-2-4} = -2 \qquad \perp m = \frac{1}{2}$$

$$y - y_1 = m(x - x_1)$$
$$y + 2 = \frac{1}{2}(x-1)$$
$$2y + 4 = x - 1$$
$$5 = x - 2y$$
$$\boxed{x - 2y = 5}$$

D 17. $x = 6\left(y+\frac{5}{12}\right)^2 - 3 - \frac{25}{144}$

$$x = 6\left(y+\frac{5}{12}\right)^2 - \frac{432}{144} - \frac{25}{144}$$
$$x = 6\left(y+\frac{5}{12}\right)^2 - \frac{407}{144}$$

The parabola is opening right.
The axis of symmetry is the k
or $\boxed{y = \frac{-5}{12}}$

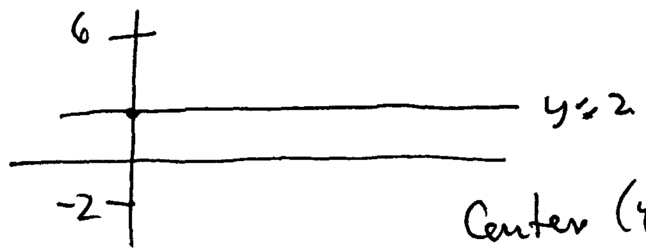
D 18. $9x^2 + 25y^2 - 54x + 50y - 119 = 0$

$$9(x^2 - 54x) + 25(y^2 + 2y) = 119$$
$$9(x^2 - 6x + 9) + 25(y^2 + 2y + 1) = 119 + 81 + 25$$
$$9(x-3)^2 + 25(y+1)^2 = 225$$
$$\frac{(x-3)^2}{25} + \frac{(y+1)^2}{9} = 1$$

radius of circle I $= \sqrt{25} = 5$
radius of circle II $= \sqrt{9} = 3$
$5 + 3 = \boxed{8}$

B 19. $y = -4$ passes through Quadrants III and IV.

20. B $(0,6)$, $(0,-2)$ center on $x = 2y$.



Center $(4,2)$

21. C Since this parabola opens downward use $x^2 = 4p(y-10)$
Since $(10,0)$ is on this parabola
then $10^2 = 4p(0-10)$
$$100 = -40p$$
$$p = \frac{-5}{2}$$
So $x^2 = 4\left(\frac{-5}{2}\right)(y-10)$
when $x=5$ $\quad 5^2 = -10y + 100$
$$10y = 75$$
$$y = 7.5$$
so the height of the arch 5 feet from the center is 7.5 ft.

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22\. C $\quad 64x^2 - 225y^2 - 384x - 900y - 14724 = 0$

$64(x^2 - 6x + 9) - 225(y^2 - 4y + 4) = 14724 + 576 - 900$

$$\frac{(x-3)^2}{225} - \frac{(y-2)^2}{64} = 1$$

CENTER $(3,2)$ FOCI: $\sqrt{225+64} = 17$

Foci: $(3+17, 2), (3-17, 2)$

$(20, 2), (-14, 2)$

$a + b = 20 - 14 = \boxed{6}$

23 E. THE POINT OF INTERSECTION WILL BE THE CENTER $(3,2)$

24\. C $\quad$ CONJUGATE AXIS $\Rightarrow \sqrt{64} = 8$

$2(8) = \boxed{16}$

25\. B $\quad$ PT. $(5,-2)$ LINE: $5x - 12y = -16$

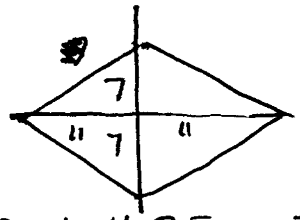
$$\frac{|5x - 12y + 16|}{\sqrt{25+144}} =$$

$$\frac{|5(5) - 12(-2) + 16|}{\sqrt{169}}$$

$$\frac{65}{13}$$

$\boxed{5}$

26
C



TREAT AS A KITE $\quad \frac{1}{2} \cdot d_1 \cdot d_2$

$\frac{1}{2} \cdot 14 \cdot 22$

$11 \cdot 14$

154

27 THE CENTER OF A CIRCLE B LINES ON THE $\perp$ BISECTORS.

$\perp$ bisector for $(5,7), (6,6)$

$y - \frac{13}{2} = 1\left(x - \frac{11}{2}\right) \qquad m = -1$

$2y - 13 = 2x - 11 \qquad \perp m = 1$

$-2 = 2x - 2y$

$\boxed{-1 = x - y}$

$\perp$ bisector for $(-2,0)\ (6,6)$

$M(2,3) \qquad m = \frac{3}{4} \qquad \perp m = -\frac{4}{3}$

$y - 3 = -\frac{4}{3}(x - 2)$

$3y - 9 = -4x + 8$

$\boxed{4x + 3y = 17}$ $\qquad$ Plug $y - 1 = x$ in for x.

$4(y-1) + 3y = 17$

$4y - 4 + 3y = 17$

$7y - 4 = 17$

$7y = 21$

$y = 3$

$\boxed{(2,3)}$

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28. $(2,3)(6,6)$

A

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

$\sqrt{25}$

$\boxed{5}$

29. $(x-10)^2+(y+1)^2=r^2$

D

$(x+2)^2+(y-4)^2=25$

From $(10,-1)$ to $(-2,4)$

$\sqrt{12^2+5^2}=13$

$13-5=\boxed{8}$

30. STATEMENT I. FALSE

THERE IS NO DIFFERENCE

E

BETWEEN THE CENTER & THE FOCUS

II. false $e=1$

III. False $e>1$ non-inclusion.

IV. False $0<e<1$ non-inclus.