LESSON 140

1. $6\sqrt{2}$ **2.** $(1,2)$ **3.** D **4.** $2\sqrt{10}$

5. 4 **6.** B, D **7.** $1/4$

8. $(0,-1),(3,2)$ **9.** $(1,-2)$

10. $k=2$

Worked-out solutions:

1. $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$=\sqrt{(4-(-2))^2+(9-3)^2}=\sqrt{72}=6\sqrt{2}$

2. $\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)=\left(\frac{4-2}{2},\frac{-3+7}{2}\right)=(1,2)$

4. $(h,k)=$ midpoint between $(2,-1)$ and $(-4,-3)$

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

$r=$ distance between $(-1,-2)$ and $(2,-1)$

$=\sqrt{(2-(-1))^2+(-1-(-2))^2}=\sqrt{10}$

$hkr=(-1)(-2)\left(\sqrt{10}\right)=2\sqrt{10}$

5. Convert to standard form by completing the square.

$x^2+y^2-6x+4y-3=0$

$x^2+y^2-6x+4y=3$

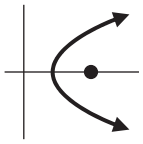
$x^2-6x+y^2+4y=3$

$(x^2-6x+9)+(y^2+4y+4)=3+9+4$

$(x-3)^2+(y+2)^2=16=4^2$

6. A) The focus is right of the directrix, so the parabola opens right.

B) The vertex, the midpoint between the focus and the directrix, is $(2,0)$.



C) The axis of symmetry, the line passing through the focus and the vertex, is $y=0$.

D) $(4,4)$ is equidistant from the focus and the directrix, so it is on the parabola.

7. Let (x,y) be a point on the parabola.

distance to the directrix $=$ distance to the focus

$\sqrt{(x-x)^2+(y+1)^2}=\sqrt{(x-0)^2+(y-1)^2}$

$\sqrt{(y+1)^2}=\sqrt{x^2+(y-1)^2}$ Simplify.

$(y+1)^2=x^2+(y-1)^2$ Square both sides.

$y^2+2y+1=x^2+y^2-2y+1$ Expand.

$y=\frac{1}{4}x^2$ Solve for y.

8. $(x-2)^2+(x-1)^2=5$ Plug eq2 into eq1.

$2x^2-6x=0$ Write in standard form.

$2x(x-3)=0$ Solve for x.

$x=0,x=3$

$y=0-1=-1$ Find y when $x=0$.

$y=3-1=2$ Find y when $x=3$.

Solutions: $(0,-1),(3,2)$

9. $y=x-3$ Solve eq2 for y.

$x-3=x^2-x-2$ Plug eq2 into eq1.

$x^2-2x+1=0$ Write in standard form.

$(x-1)^2=0$ Solve for x.

$x=1$

$y=1-3=-2$ Find y when $x=1$.

Solution: $(1,-2)$

10. The graphs intersect at one point.
$=$ The system has one real solution.

$2x+3=(x+1)^2+k$ Plug eq2 into eq1.

$x^2+k-2=0$

The discriminant, b^2-4ac, must be zero.

$0^2-4(1)(k-2)=0$ Set discriminant $=0$.

$k=2$ Solve for k.