LESSON 170

1. $P(5, 2)$ and $Q(-1, -2)$

$PQ = \sqrt{(-1-5)^2 + (-2-2)^2} = 2\sqrt{13}$

2. center = midpoint between (8, 0) and (−2, 4)

$= \left(\frac{8-2}{2}, \frac{0+4}{2}\right) = (3, 2)$

3. $AB = 13 - 3 = 10$

$P = A + 2/5$ of $AB = 3 + (2/5)(10) = 7$

So, P is at 7.

4. You need to move right and down to find P.

x-length of $\overline{AB} = 15 - 3 = 12$

x of $P = x$ of $A + (1/4)(x\text{-length}) = 3 + (1/4)(12) = 6$

y-length of $\overline{AB} = 1 - (-3) = 4$

y of $P = y$ of $A - (1/4)(y\text{-length}) = 1 - (1/4)(4) = 0$

So, P is at (6, 0).

5. A) vertical B) vertical
C) horizontal D) slope = 2
E) slope = 1/2 F) slope = 2
G) slope = −2

Parallel lines: A and B, D and F

Perpendicular lines: A and C, B and C, E and G

6. original slope = 3

parallel slope = 3

point-slope form: $y - 2 = 3(x - 0)$

slope-intercept form: $y = 3x + 2$

7. Find a line perpendicular to $\overline{AB}$ and passing through the midpoint of $\overline{AB}$.

slope of $\overline{AB} = -1$

midpoint of $\overline{AB} = (-1, 0)$

perpendicular slope = 1

point-slope form: $y - 0 = (1)(x - (-1))$

slope-intercept form: $y = x + 1$

8. Subtract eq2 from eq1 to get $3y = 3$ and $y = 1$.

Plug y into eq1 to get $x - 1 = 5$ and $x = 6$.

So, the lines intersect at (6, 1).

9. a. Find the line perpendicular to $x + 3y = 6$ passing through (2, −2).

original slope = −1/3

perpendicular slope = 3

point-slope form: $y - (-2) = 3(x - 2)$

slope-intercept form: $y = 3x - 8$

b. Find the Intersection between $x + 3y = 6$ and $y = 3x - 8$.

$x + 3(3x - 8) = 6$; $x = 3$

$y = 3(3) - 8 = 1$

The lines intersect at (3, 1).

c. Find the distance between (2, −2) and (3, 1).

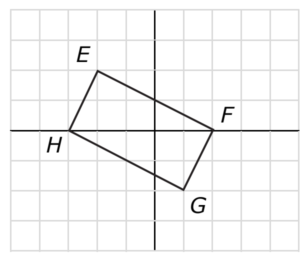
$d = \sqrt{(3-2)^2 + (1-(-2))^2} = \sqrt{10}$

10. Draw $\overline{AC}$ to divide $ABCD$.

area of $ABCD$ = area of $\triangle ABC$ + area of $\triangle ADC$

= (4)(2)/2 + (4)(4)/2 = 12

11.



You can tell from the graph that it is not a rhombus. It looks like a parallelogram or a rectangle. Check the slopes of the sides.

slope of $\overline{EF} = \frac{0-2}{2-(-2)} = -\frac{1}{2}$

slope of $\overline{FG} = \frac{-2-0}{1-2} = 2$

slope of $\overline{GH} = \frac{0-(-2)}{-3-1} = -\frac{1}{2}$

slope of $\overline{EH} = \frac{0-2}{-3-(-2)} = 2$

The product of the slopes of adjacent sides is −1.
Adjacent sides are perpendicular, so it is a rectangle.

12. center: (3, 2), radius = 3

So, the equation is $(x - 3)^2 + (y - 2)^2 = 9$.

13. $\pi r^2 = 25\pi$; $r = 5$

So, the equation is $(x - 2)^2 + (y + 6)^2 = 25$.

14. r = distance between (5, 1) and (3, 7)

$= \sqrt{(3-5)^2 + (7-1)^2} = \sqrt{40}$

So, the equation is $(x - 5)^2 + (y - 1)^2 = 40$.

15. $x^2 + 4x + y^2 = 5$

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

$(x + 2)^2 + y^2 = 9$

So, the circle has center (−2, 0) and radius 3.

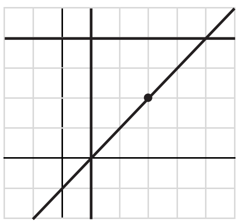
16. The preimage has center (0, −5) and radius 2.
The image has center (0, 5) and radius 2.
So, the equation is $x^2 + (y-5)^2 = 4$.

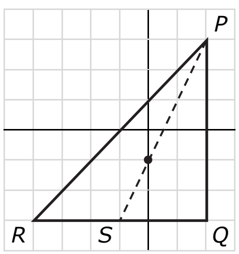
17. A, D, E, F

18. CP = radius = distance between (1, 3) and (2, 0)
$= \sqrt{(2-1)^2 + (0-3)^2} = \sqrt{10}$
CQ = distance between (1, 3) and (−1, 5)
$= \sqrt{(-1-1)^2 + (5-3)^2} = \sqrt{8}$
CQ is less than the radius, Q is inside the circle.

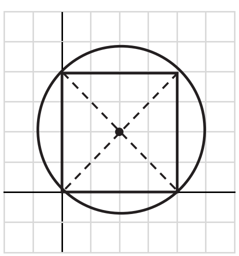
19. $P(x, x)$, $Q(x, -x)$, $R(-x, -x)$, $S(-x, x)$

20. $PR = \sqrt{(-x-x)^2 + (-x-x)^2} = \sqrt{8}x$
$SQ = \sqrt{(x-(-x))^2 + (-x-x)^2} = \sqrt{8}x$
$PR = SQ$, so the diagonals of a square are congruent.

21. 
The circumcenter of a right triangle is the midpoint of the hypotenuse, so the circumcenter is at (3, 2).

22. 

A centroid divides a median in the ratio 2:1.
Th point (0, −1) divides median $\overline{PS}$ in the ratio 2:1, so the centroid is at (0, −1).

23. 
The circumcircle has center (2, 2) and radius $2\sqrt{2}$, so the standard equation is $(x-2)^2 + (y-2)^2 = 8$.