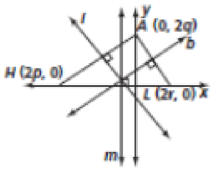
Name ______________________ Class ____________ Date ____________

Practice 6-7

Proofs Using Coordinate Geometry

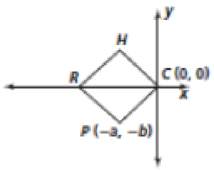
1. Given $\triangle HAL$ with perpendicular bisectors ℓ, b, and m, complete the following to show that ℓ, b, and m intersect in a point.



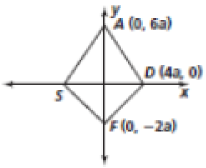
   a. The slope of $\overline{HA}$ is $\frac{-q}{p}$. What is the slope of line ℓ?
   b. The midpoint of $\overline{HA}$ is (p, q). Show that the equation of line ℓ is $y = \frac{p}{q}x + q - \frac{p^2}{q}$.
   c. The midpoint of $\overline{HL}$ is $(r + p, 0)$. What is the equation of line m?
   d. Show that lines ℓ and m intersect at $(r + p, \frac{rp}{q} + q)$.
   e. The slope of $\overline{AL}$ is $\frac{-q}{r}$. What is the slope of line b?
   f. What is the midpoint of $\overline{AL}$?
   g. Show that the equation of line b is $y = \frac{r}{q}x + q - \frac{r^2}{q}$.
   h. Show that lines b and m intersect at $(r + p, \frac{rp}{q} + q)$.
   i. Give the coordinates for the point of intersection of ℓ, b, and m.

Complete Exercises 2 and 3 without using any new variables.

2. *RHCP* is a rhombus.
   a. Determine the coordinates of *R*.
   b. Determine the coordinates of *H*.
   c. Find the midpoint of $\overline{RH}$.
   d. Find the slope of $\overline{RH}$.

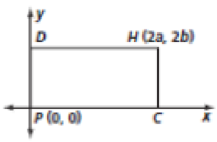


3. *ADFS* is a kite.
   a. Determine the coordinates of *S*.
   b. Find the midpoint of $\overline{AS}$.
   c. Find the slope of $\overline{AS}$.
   d. Find the midpoint of $\overline{DF}$.
   e. Find the slope of $\overline{DF}$.



4. Complete the coordinates for rectangle *DHCP*. Then use coordinate geometry to prove the following statement: The diagonals of a rectangle are congruent (Theorem 6-11).

   Given: rectangle *DHCP*
   Prove: $\overline{DC} \cong \overline{HP}$



Practice 6-7

1a. $\frac{p}{q}$ **1b.** $y = mx + b; q = \frac{p}{q}(p) + b; b + q - \frac{p^2}{q};$
$y = \frac{p}{q}x + q - \frac{p^2}{q}$ **1c.** $x = r + p$ **1d.** $y = \frac{p}{q}(r + p)$
$+ q - \frac{p^2}{q}; y = \frac{rp}{q} + \frac{p^2}{q} + q - \frac{p^2}{q}; y = \frac{rp}{q} + q;$
intersection at $(r + p, \frac{rp}{q} + q)$ **1e.** $\frac{r}{q}$ **1f.** (r, q)
1g. $y = mx + b; q = \frac{r}{q}(r) + b; b = q - \frac{r^2}{q};$
$y = \frac{r}{q}x + q - \frac{r^2}{q}$ **1h.** $y = \frac{r}{q}(r + p) + q - \frac{r^2}{q};$
$y = \frac{r^2}{q} + \frac{rp}{q} + q - \frac{r^2}{q}; y = \frac{rp}{q} + q;$ intersection at
$(r + p, \frac{rp}{q} + q)$ **1i.** $(r + p, \frac{rp}{q} + q)$ **2a.** $(-2a, 0)$
2b. $(-a, b)$ **2c.** $(-\frac{3a}{2}, \frac{b}{2})$ **2d.** $\frac{b}{a}$
3a. $(-4a, 0)$ **3b.** $(-2a, 3a)$ **3c.** $\frac{3}{2}$ **3d.** $(2a, -a)$
3e. $\frac{1}{2}$ **4.** The coordinates for D are $(0, 2b)$. The coordinates for C are $(2a, 0)$. Given these coordinates, the lengths of $\overline{DC}$ and $\overline{HP}$ can be determined:
$DC = \sqrt{(2a - 0)^2 + (0 - 2b)^2} = \sqrt{4a^2 + 4b^2};$
$HP = \sqrt{(0 - 2a)^2 + (0 - 2b)^2} = \sqrt{4a^2 + 4b^2};$
$DC = HP$, so $\overline{DC} \cong \overline{HP}$.