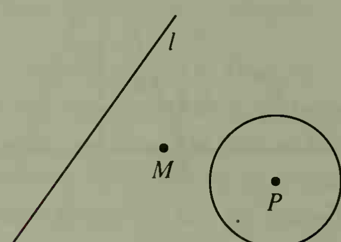
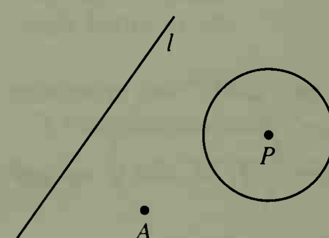
Exercises

Carefully draw a *large* $\triangle RST$ and construct its centroid G, its orthocenter H, and its circumcenter C.

1. G, H, and C should be collinear. Are they?
2. Measure the lengths of $\overline{HG}$ and $\overline{GC}$ and find the ratio $HG:GC$. Does your result agree with what you would expect if you were using the dilation $D_{G,\,-\frac{1}{2}}$?
3. Draw $\triangle R'S'T'$, the image of $\triangle RST$ by the dilation $D_{G,\,-\frac{1}{2}}$. What is the ratio of the areas of these two triangles?
4. Locate Q, the midpoint of $\overline{HC}$. Put the point of your compass on Q and draw a circle through R'. This is the famous *nine-point circle*. See page 414.
5. Draw a sketch that shows the locus of points in the coordinate plane whose distance to the x-axis and distance to the y-axis have a sum of 10.
6. Given line l, $\odot P$ and point M, construct a segment $\overline{XY}$ with X on $\odot P$, Y on l, and M as the midpoint of $\overline{XY}$. (*Hint:* Consider a half-turn.) You may find two answers.



7. Construct an isosceles right $\triangle ABC$ with B on $\odot P$, C on line l, and right angle at A. (*Hint:* Consider a rotation. What will be the magnitude and center of the rotation?) You may find two answers.



8–16. Work Exercises 21, 22 on page 580; Exercises 18, 20, 21 on page 587; Exercises 31, 38, 39 on pages 591–592; and Exercise 24 on page 597.

Areas (Chapter 11)

Objective: Calculate complex areas by dividing them into portions and using transformations to rearrange the pieces into simpler shapes. (Requires understanding of Lessons 14-1 through 14-5.)

The proof of Theorem 11-2 uses a translation of a triangular portion of a parallelogram to show that a parallelogram and a rectangle have the same area if they have the same base and height. Other transformations, such as rotation, can be used to find areas that would be more difficult without transformations.