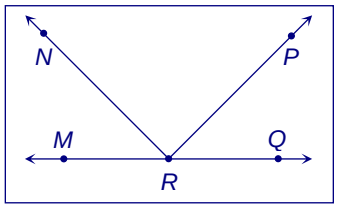
Understanding Math

Southern Nevada
Regional Professional Development Program

Geometric Notation

One of the branches of mathematics where notation is used extensively is in geometry. The sheer quantity of the various symbols used is sometimes overwhelming, especially to students. Because elementary mathematics lays the foundation for concepts studied in greater depth at the middle school, it is essential that notation be used properly from day one. In this issue of *Understanding Math*, we will examine some common geometric notation used in the middle school and introduced in the intermediate grades.

Examine the figure at right and describe what the following mean: $\overleftrightarrow{MQ}$, $\overrightarrow{MQ}$, $\overline{MQ}$, and MQ.



The first, $\overleftrightarrow{MQ}$ (read, "line M-Q"), is the *line* passing through the points M and Q. The line continues infinitely in both directions, and can also be written $\overleftrightarrow{QM}$ (read, "line Q-M").

The second, $\overrightarrow{MQ}$ ("ray M-Q"), is the *ray* whose *initial point* / *endpoint* is at M and continues on infinitely, through Q, in only one direction. The first point listed is the endpoint and the second point listed as any other point through which the ray passes. Thus, $\overrightarrow{MQ}$ and $\overrightarrow{MR}$ are the same ray, but $\overrightarrow{QM}$ is not and neither is $\overrightarrow{RQ}$. The "arrow" is always written pointing to the right, thus the ray that begins at Q and passes through R is written $\overrightarrow{QR}$, not $\overleftarrow{RQ}$.

The third, $\overline{MQ}$ ("segment M-Q"), is that part of the line $\overleftrightarrow{MQ}$ consisting of the points between M and Q, inclusive. Like the notation for line, $\overline{MQ}$ could also be written as $\overline{QM}$.

The last, MQ ("M-Q"), represents the *distance* between the points M and Q, or the *length* of segment $\overline{MQ}$. Consequently, MQ is a number; $\overline{MQ}$ is a set of points.

Now that we've dealt with lines, rays, and segments, let's examine angles. Look at the figure again and describe the angle formed by rays $\overrightarrow{RM}$ and $\overrightarrow{RN}$. The correct notation is $\angle MRN$ ("angle M-R-N") or $\angle NRM$ —either is correct. However, $\angle R$ is not correct for the figure above, as it is not clear which angle is referenced. Is it $\angle NRM$ or $\angle NRP$ or $\angle NRQ$? There are several choices.

Only if there is no ambiguity as to what specific angle is referenced may a single letter be used. An example of this is shown in the triangle at right where $\angle ABC$ can also be referred to as $\angle B$. There is also no ambiguity when we refer to $\angle A$ or $\angle C$.