Exercises

Exercises 1 and 2 refer to Figure 2 on the preceding page.

1. Supply the reason for each key step of the proof that the method given for finding S yields the shortest total length for the pipelines serving A and B.

1. l is the perpendicular bisector of $\overline{BC}$.
2. $SC = SB$
3. $AS + SC = AC$
4. $AS + SB = AC$
5. $XC = XB$
6. $AX + XC > AC$
7. $AX + XB > AS + SB$

2. This method for finding S is sometimes called a *solution by reflection*, since it involves *reflecting* point B in line l. (See Chapter 14 for more on reflections.) Show that $\overline{AS}$ and $\overline{SB}$, like reflected paths of light, make congruent angles with l. That is, prove that $\angle QSA \cong \angle PSB$. (*Hint*: Draw your own diagram, omitting the part of Figure 2 shown in blue.)

Explorations

These exploratory exercises can be done using a computer with a program that draws and measures geometric figures.

Draw several *pairs* of triangles, varying the size of just one side or just one angle. Make charts like the ones below to record your data. Record the lengths of the sides and measures of the angles you give, as well as the measurements you get. Do as many pairs as you need to help you recognize a pattern.

Enter the lengths of all three sides (SSS).

pair 1	
$AB =$ $BC =$ $AC =$	same $AB =$ same $BC =$ longer $AC =$
$m\angle ABC =$	$m\angle ABC =$

What happened to the angle opposite the side you made longer?

Enter the lengths of two sides and the included angle (SAS).

pair 1	
$AB =$ $\angle BAC =$ $AC =$	same $AB =$ larger $\angle BAC =$ same $AC =$
$BC =$	$BC =$

What happened to the side opposite the angle you made larger?