Solution for Saxon "Advanced Math" Lesson 30 Problem #27

The key to solving this problem is to remember that an inscribed angle is half the intercepted arc (see lesson 11.B). You need to use some other facts about angles as well, and solve parts until you have enough information to solve it. Basically, keep finding out more facts, given your current facts, until you solve the whole thing. There are actually *many* ways to solve this; here's one (in this table, m$\overset{\frown}{CD}$ means the length of the arc from C to D):

Step	Statement	Justification
1	m∠BAC=40º, m∠BCA=30º, m$\overset{\frown}{CD}$=70º	Given
2	m∠ABC=180º-40º-30º=110º	Sum of angles in a triangle is 180º
3	m∠CAD= m$\overset{\frown}{CD}$/2 = 70º/2 = 35º	An inscribed angle is 1/2 the intercepted arc. See lesson 11.B. We were given the intercepted arc length, so we can find the inscribed angle.
4	m∠ABC= m$\overset{\frown}{ADC}$/2 so 110º = m$\overset{\frown}{ADC}$/2 so m$\overset{\frown}{ADC}$ = 220º	An inscribed angle is 1/2 the intercepted arc. This time we're going the other way; we know the inscribed angle, so we can find the intercepted arc length.
5	m$\overset{\frown}{ABC}$ = 360º – m$\overset{\frown}{ADC}$ = 360º – 220º = 140º	Total arc around a circle is 360º. We already know m$\overset{\frown}{ADC}$ from the previous step, and since m$\overset{\frown}{ABC}$ is what is left in the circle, we can find its value.
6	x = m∠ADC = m$\overset{\frown}{ABC}$/2 = 140º/2 = 70º	An inscribed angle is 1/2 the intercepted arc; we know the intercepted arc from the last step, so we can now solve for x.
7	360º = x + y + 30º + 110º + 40º + 35º	Sum of interior angles of a quadrilaterial is 360º; this is the set of angles in the quadrilateral ABCD.
8	360º = y + 285º	Simplify step 7 by substituting x=70º (see step 6) and adding up the rest
9	y = 75º	Simplify step 8 by solving for y.

So x=70º, y = 75º.