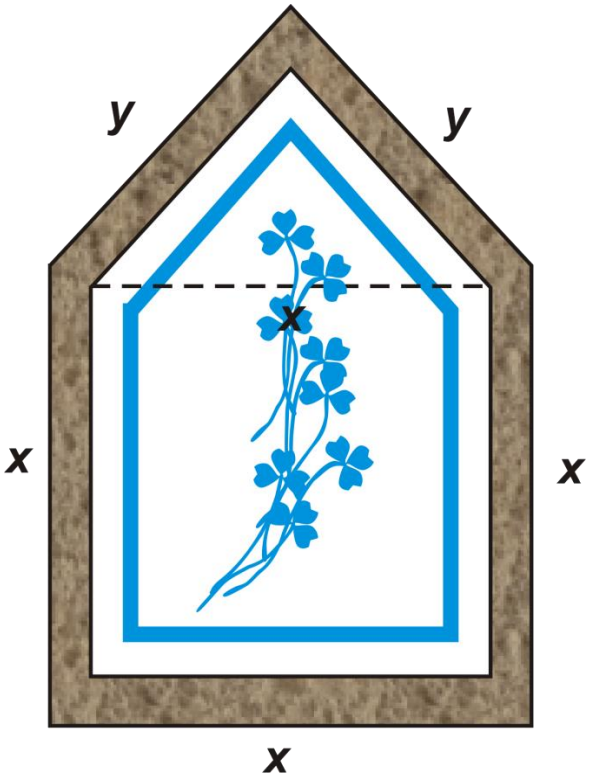
Libby is making a window frame for etched glass. The frame will be for a window that is square on the bottom with an isosceles triangle on top. The perimeter of the window must be no more than 15 feet. What are some possible dimensions of the window?



1. Let *x* represent the length of each side of the square, and let *y* represent the length of one of the two congruent sides of the isosceles triangle.

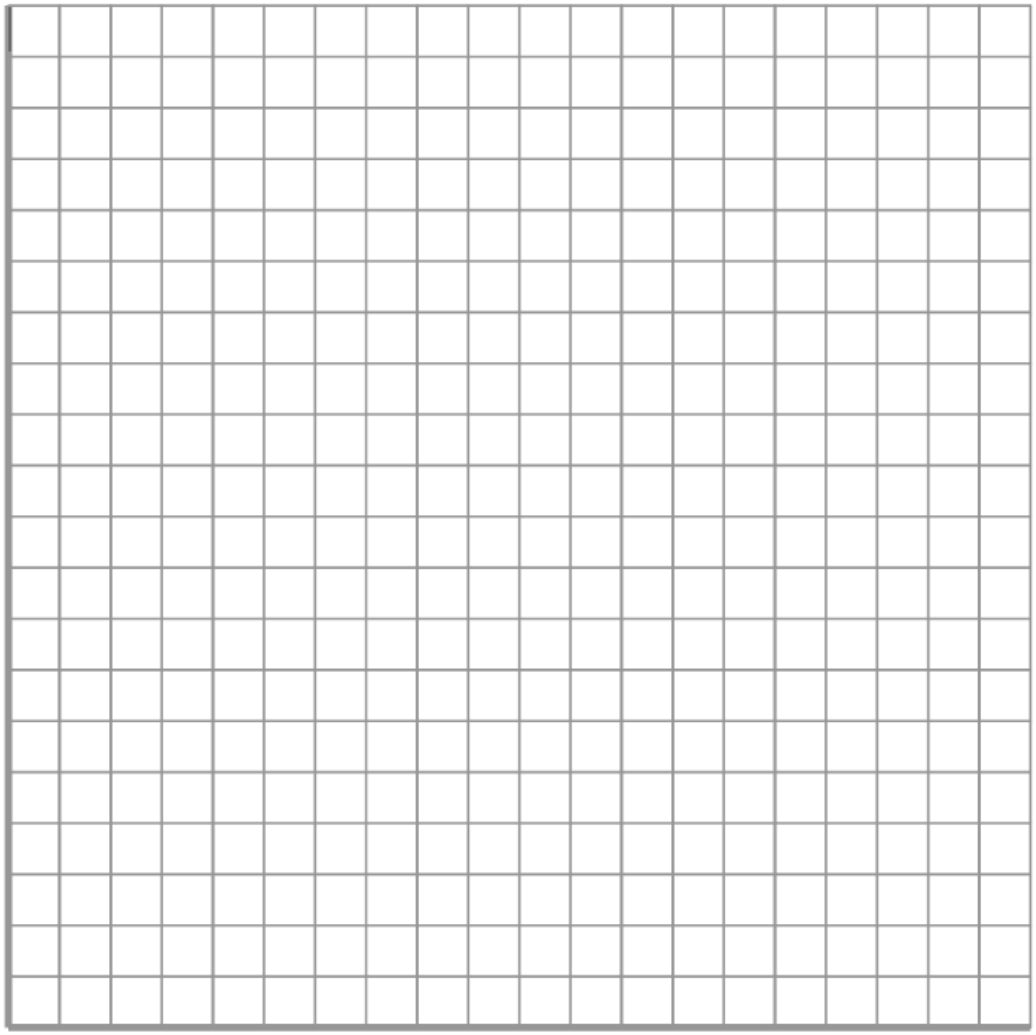
2. The perimeter of the window must be no more than 15 feet. Write an inequality for the perimeter using the variables *x* and *y*.

3. The sum of two sides of a triangle is always greater than the third side. Use this fact to write the second inequality.

4. Write the system of inequalities. Solve each inequality for *y*.

Recall that you can use a graph to find the solutions. All of the points that lie in the solution region of both inequalities are in the solution of the system. Remember that the dimensions of the windows must be positive, so the reasonable domain and range are contained in the first quadrant.

5. Graph the boundary lines. Is one or both of the boundary lines solid or dashed? Why?



6. Notice that the boundary lines divide the first quadrant into four regions. Points A, B, C and D are each placed in one of these four regions. In the following table the coordinates of each point in both inequalities, and complete the table.

Point	$3x + 2y \leq 15$ Is the inequality true?	$2y > x$ Is the inequality true?	Are both inequalities true?
A (3 , 1)	$3(3) + 2(1) \leq 15; Yes$	$2(1) > 3; No$	*No*
B (2 , 2)			
C (4 , 4)			
D (6 , 1)			

7. On your graph, shade the region containing the point that makes both inequalities true. Do either of the boundary lines contain points that are solutions to this system of linear inequalities? Explain.

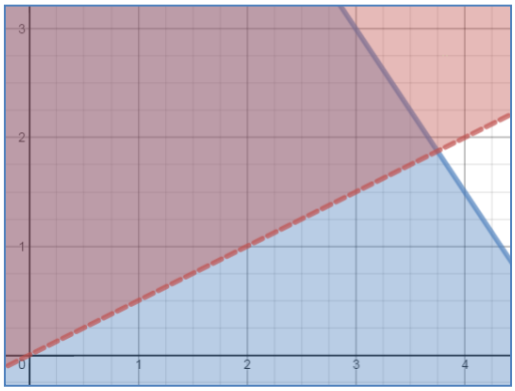
Answer Key

1.

2. $3x + 2y \leq 15$

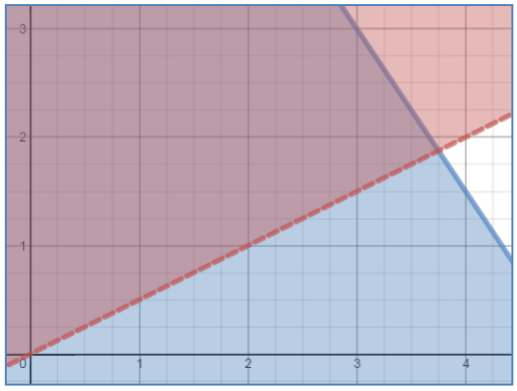
3. $2y > x$

4. $\begin{cases} 3x + 2y \leq 15 \\ \mathbf{2y} > x \end{cases}$

5. 

6.

Point	$3x + 2y \leq 15$ Is the inequality true?	$2y > x$ Is the inequality true?	Are both inequalities true?
A (3 , 1)	$3(3) + 2(1) \leq 15; Yes$	$2(1) > 3; No$	*No*
B (2 , 2)	$3(2) + 2(2) \leq 15; Yes$	$2(2) > 2; yes$	Yes
C (4 , 4)	$3(4) + 2(4) \leq 15; No$	$2(4) > 4; yes$	No
D (6 , 1)	$3(6) + 2(1) \leq 15; No$	$2(1) > 6; No$	No

7. 

The line $3x + 2y \leq 15$ contains points that are solutions to the system because of the (≤) equal.