

Angle Bisectors and Perpendicular Lines

5.2

NEW SKILLS: WORKING WITH ANGLE BISECTORS

To bisect something is to cut it into two equal parts. An angle is bisected by a ray that divides it into two angles of equal measure. The ray that divides the angle is called an **angle bisector**.

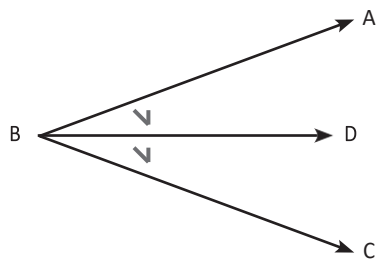
Perpendicular lines are two lines that form a right angle. A right angle (90°) can be thought of as a bisected straight (180°) angle. The process used to draw perpendicular lines is the same as drawing angle bisectors because a perpendicular line bisects a straight angle.

For more details, see page 187 of *MathWorks 10*.

angle bisector: a segment, ray, or line that separates two halves of a bisected angle



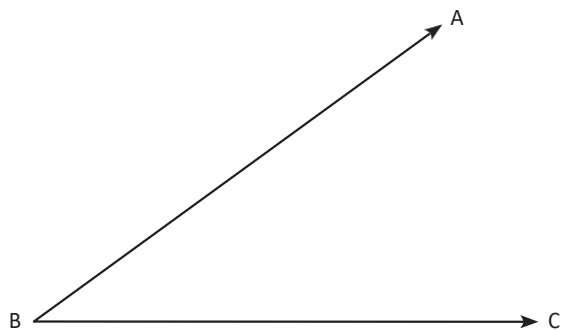
Point C bisects AB if AC is equal to CB.



Ray BD bisects $\angle ABC$ if $\angle ABD$ is equal to $\angle DBC$.

Example 1

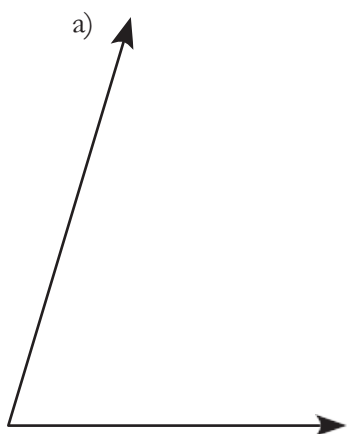
Bisect $\angle ABC$ using a straight edge and compass. Measure the angle and draw one half that size.



BUIL YOU SKILL

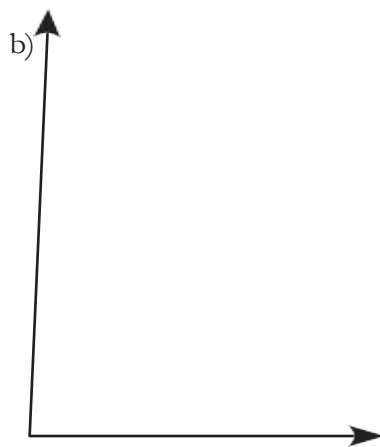
1. If a right angle is bisected, what is the size of each angle?

2. Bisect the given angles using a straight edge and compass. State the measure of each.



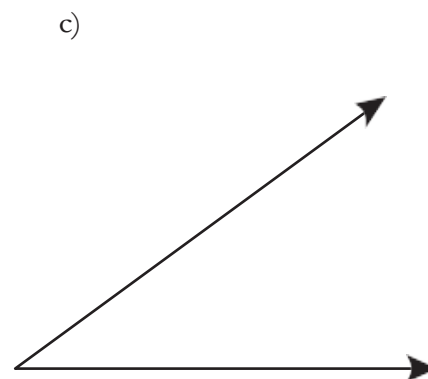
Angle: _____

Bisector: _____



Angle: _____

Bisector : _____



Angle: _____

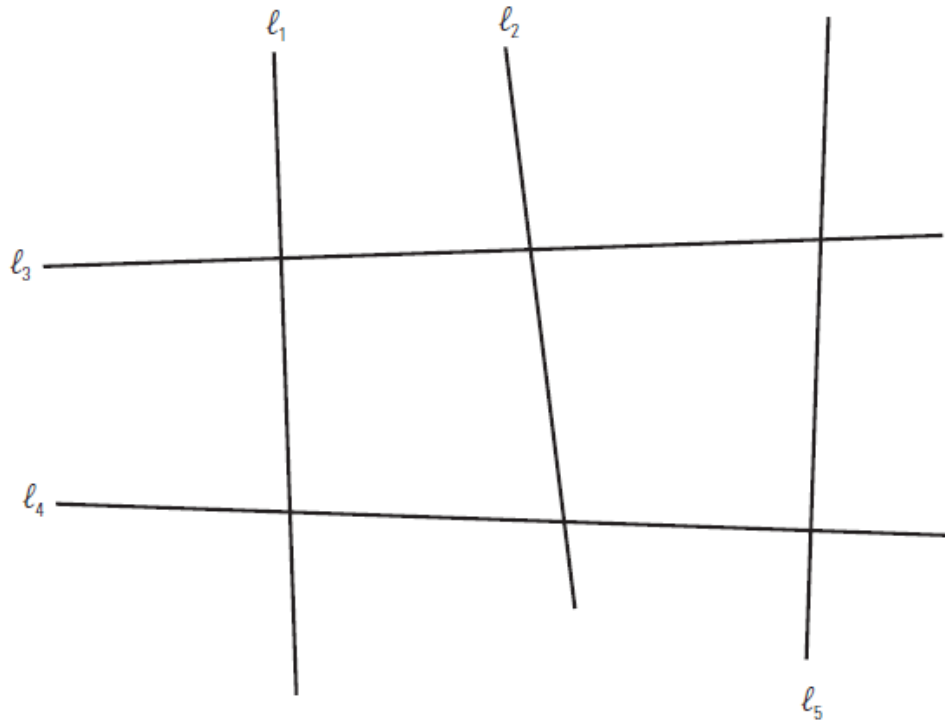
Bisector: _____

3. An angle is bisected. Each resulting angle is 78° . How big was the original angle?

4. The size of one resulting angle after the original angle is bisected is equal to the supplement of the original angle. What is the measure of the original angle?

Example 2

Using a protractor, determine which of the following lines are perpendicular.



In the workplace, carpenters often use framing squares and levels to ensure that they have right angles. A framing square is a tool that is a right angle.

SOLUTION

The angles formed between l_1 and l_3 are 90° , so l_1 and l_3 **are** perpendicular.

The angles formed between l_1 and l_4 are _____, so l_1 and l_4 _____ perpendicular.

The angles formed between l_2 and l_3 are _____, so l_2 and l_3 _____ perpendicular.

The angles formed between l_2 and l_4 are _____, so l_2 and l_4 _____ perpendicular.

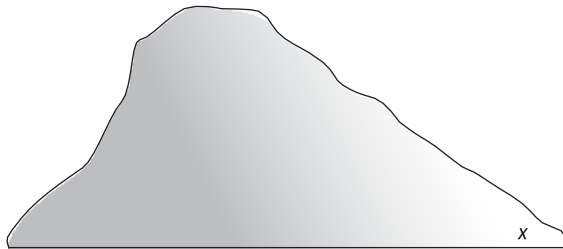
The angles formed between l_5 and l_3 are _____, so l_5 and l_3 _____ perpendicular.

The angles formed between l_5 and l_4 are _____, so l_5 and l_4 _____ perpendicular.

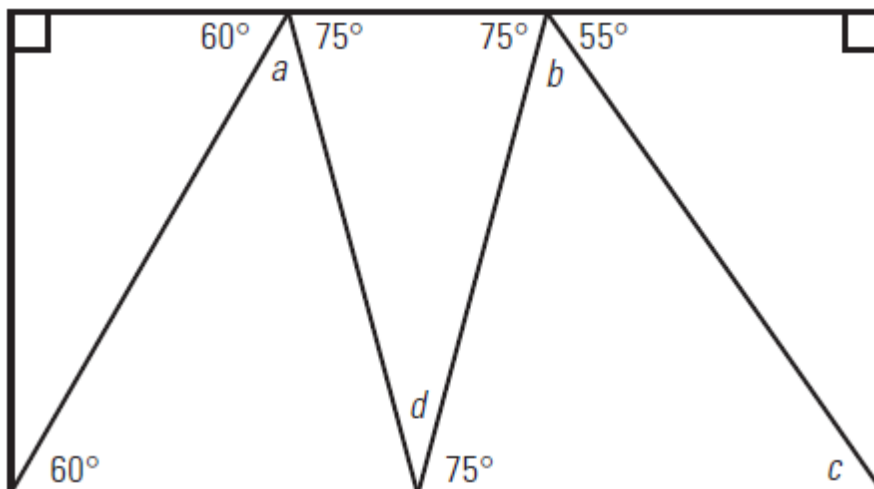
BUILD YOUR SKILLS

5. A crooked table leg makes an angle of 86.7° with the tabletop. How much must the carpenter move the leg so that it is perpendicular to the tabletop?

6. At what approximate angle does the hill incline from the horizontal?

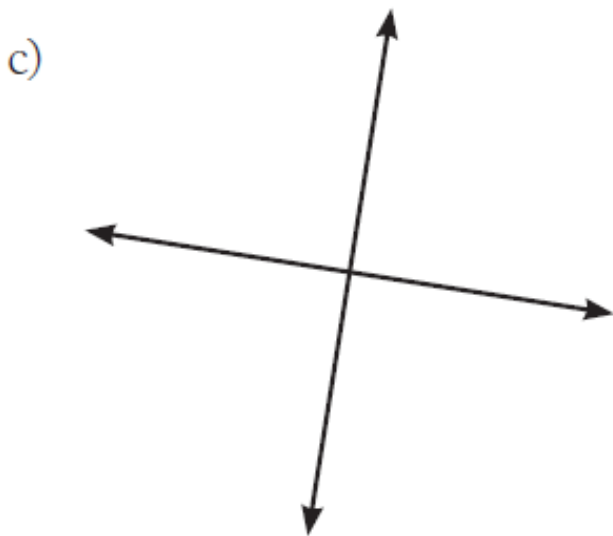
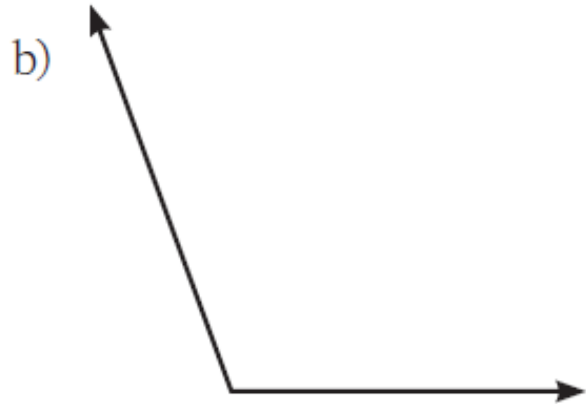
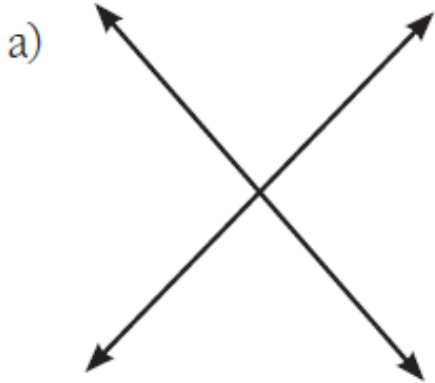


7. A carpenter is inlaying different types of wood on a tabletop. What must be the size of angles a , b , c , and d ?



PRACTISE YOUR NEW SKILL

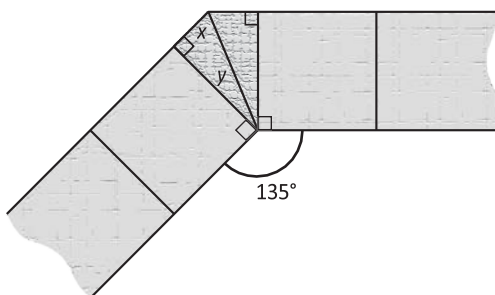
1. Use a protractor to determine whether these lines are perpendicular.



2. Complete the following table.

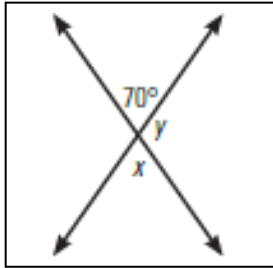
ANGLE CALCULATIONS			
Angle	Complement	Supplement	Resulting angle measure after the angle is bisected
	12°		
15°			
		132°	
90°			
			34°
	49°		
			68°
		100°	
			127°

3. Kaleb is edging a garden bed with square tiles. In the corner shown below, he wants two congruent tiles. At what angle must he cut the tiles so that they fit?

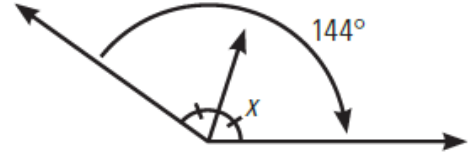


4. Calculate the size of the indicated angles. Name as many pairs of complementary and supplementary angles as possible.

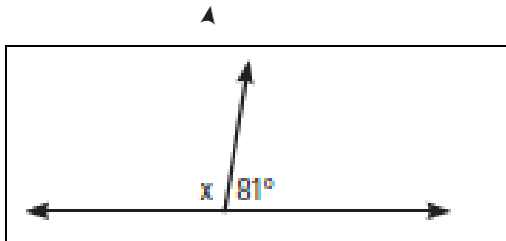
a)



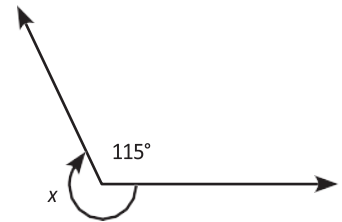
b)



c)



d)



- d) The angle at the peak of a roof is 135° . Calculate the measure of the angle formed by the rafter and the king post.

