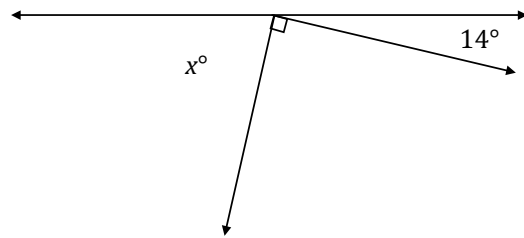


## Lesson 11: Angle Problems and Solving Equations

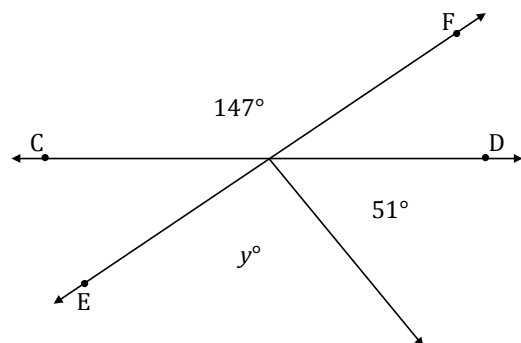
### Classwork

#### Opening Exercise

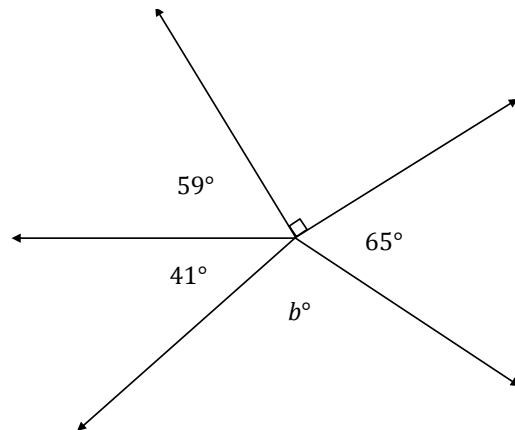
- a. In a complete sentence, describe the angle relationship in the diagram. Write an equation for the angle relationship shown in the figure and solve for  $x$ . Confirm your answers by measuring the angle with a protractor.



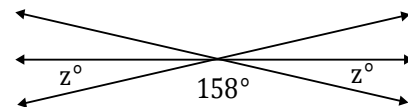
- b.  $CD$  and  $EF$  are intersecting lines. In a complete sentence, describe the angle relationship in the diagram. Write an equation for the angle relationship shown in the figure and solve for  $y$ . Confirm your answers by measuring the angle with a protractor.



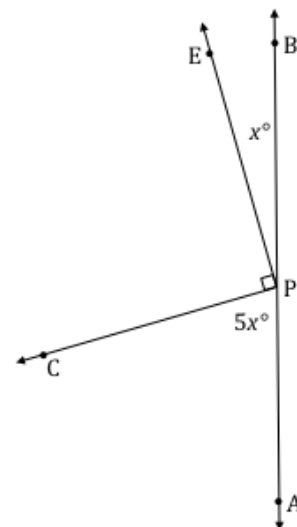
- c. In a complete sentence, describe the angle relationship in the diagram. Write an equation for the angle relationship shown in the figure and solve for  $b$ . Confirm your answers by measuring the angle with a protractor.



- d. The following figure shows three lines intersecting at a point. In a complete sentence, describe the angle relationship in the diagram. Write an equation for the angle relationship shown in the figure and solve for  $z$ . Confirm your answers by measuring the angle with a protractor.

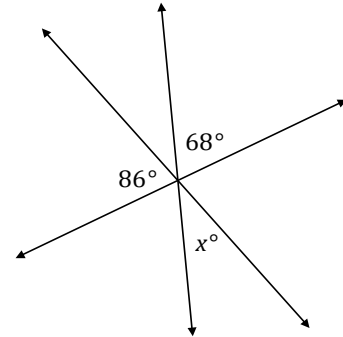


- e. Write an equation for the angle relationship shown in the figure and solve for  $x$ . In a complete sentence, describe the angle relationship in the diagram. Find the measurements of  $\angle EPB$  and  $\angle CPA$ . Confirm your answers by measuring the angle with a protractor.



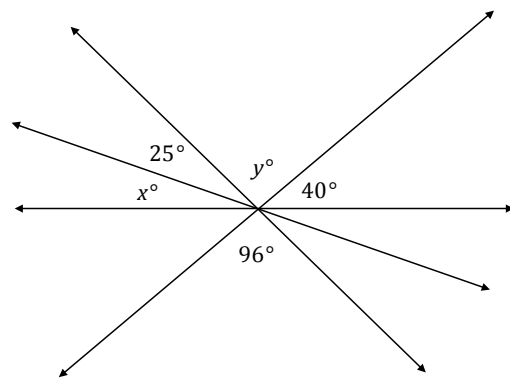
**Example 1**

The following figure shows three lines intersecting at a point. In a complete sentence, describe the angle relationship in the diagram. Write an equation for the angle relationship shown in the figure and solve for  $x$ . Confirm your answers by measuring the angle with a protractor.



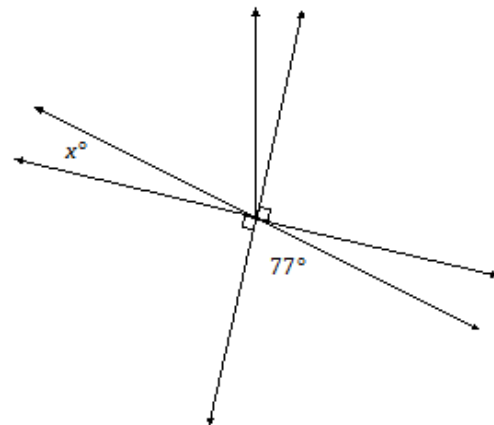
**Exercise 1**

The following figure shows four lines intersecting at a point. In a complete sentence, describe the angle relationships in the diagram. Write an equation for the angle relationship shown in the figure and solve for  $x$  and  $y$ . Confirm your answers by measuring the angle with a protractor.



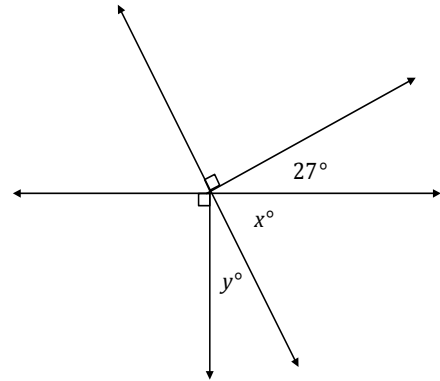
**Example 2**

In a complete sentence, describe the angle relationships in the diagram. You may label the diagram to help describe the angle relationships. Write an equation for the angle relationship shown in the figure and solve for  $x$ . Confirm your answers by measuring the angle with a protractor.



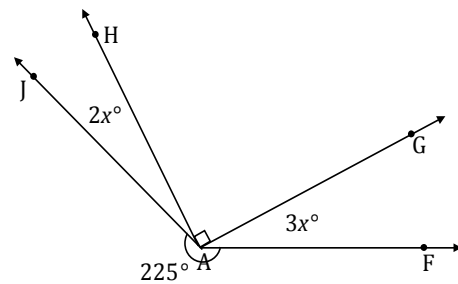
**Exercise 2**

In a complete sentence, describe the angle relationships in the diagram. Write an equation for the angle relationship shown in the figure and solve for  $x$  and  $y$ . Confirm your answers by measuring the angle with a protractor.



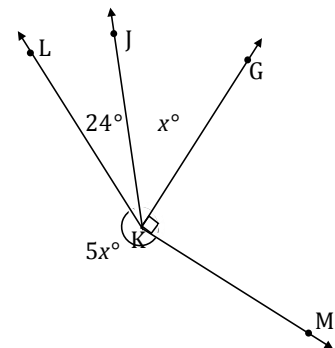
**Example 3**

In a complete sentence, describe the angle relationships in the diagram. Write an equation for the angle relationship shown in the figure and solve for  $x$ . Find the measures of  $\angle JAH$  and  $\angle GAF$ . Confirm your answers by measuring the angle with a protractor.



**Exercise 3**

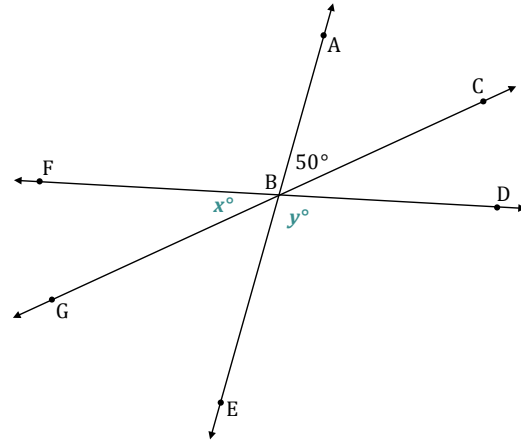
In a complete sentence, describe the angle relationships in the diagram. Write an equation for the angle relationship shown in the figure and solve for  $x$ . Find the measures of  $\angle JAH$  and  $\angle GAF$ . Confirm your answers by measuring the angle with a protractor.



**Example 4**

In the accompanying diagram,  $\angle DBE$  is four times the measure of  $\angle FBG$ .

- a. Label  $\angle DBE$  as  $y^\circ$  and  $\angle FBG$  as  $x^\circ$ . Write an equation that describes the relationship between  $\angle DBE$  and  $\angle FBG$ .



- b. Find the value of  $x$ .

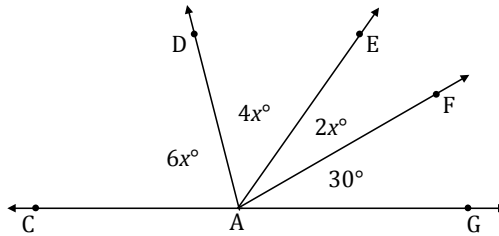
- c. Find the measures of  $\angle FBG$ ,  $\angle CBD$ ,  $\angle ABF$ ,  $\angle GBE$ , and  $\angle DBE$ .

- d. What is the measure of  $\angle ABG$ ? Identify the angle relationship used to get your answer.

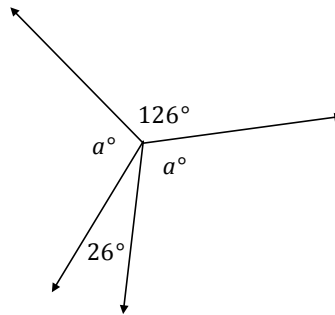
**Problem Set**

In a complete sentence, describe the angle relationships in each diagram. Write an equation for the angle relationship(s) shown in the figure, and solve for the indicated unknown angle. You can check your answers by measuring each angle with a protractor.

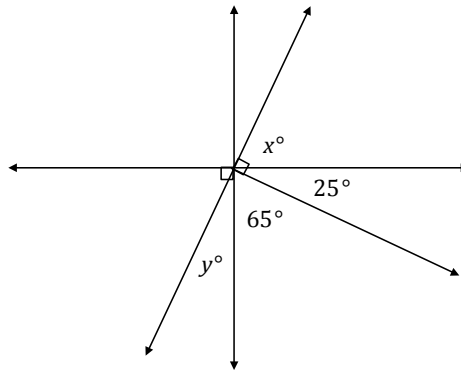
- Find the measures of  $\angle EAF$ ,  $\angle DAE$ , and  $\angle CAD$ .



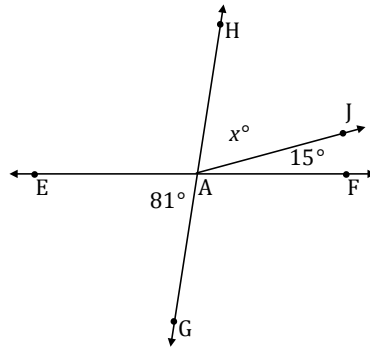
- Find the measure of  $a$ .



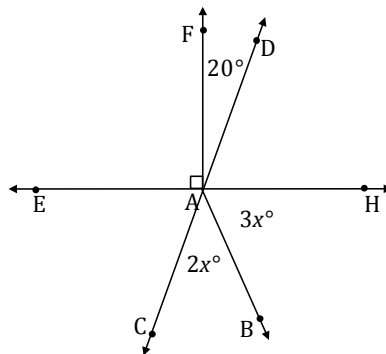
- Find the measures of  $x$  and  $y$ .



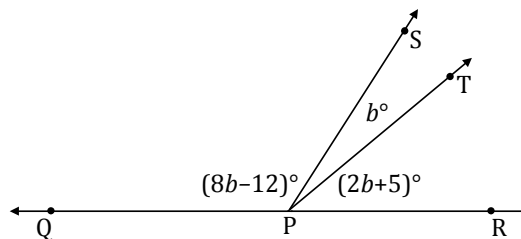
4. Find the measure of  $\angle HAJ$ .



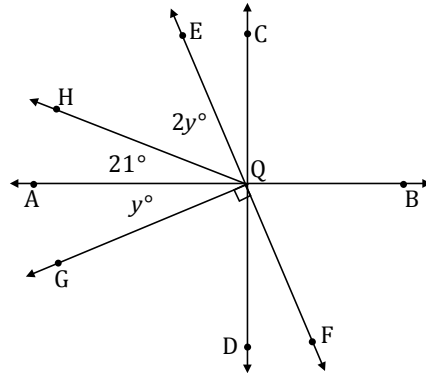
5. Find the measures of  $\angle HAB$  and  $\angle CAB$ .



6. The measure of  $\angle SPT = b^\circ$ . The measure of  $\angle TPR$  is five more than two times  $\angle SPT$ . The measure of  $\angle QPS$  is twelve less than eight times  $\angle SPT$ . Find the measures of  $\angle SPT$ ,  $\angle TPR$ , and  $\angle QPS$ .



7. Find the measures of  $\angle HQE$  and  $\angle AQG$ .



8. The measures of three angles at a point are in the ratio of 2 : 3 : 5. Find the measures of the angles.
9. The sum of the measures of two adjacent angles is  $72^\circ$ . The ratio of the smaller angle to the larger angle is 1 : 3. Find the measures of each angle.
10. Find the measures of  $\angle CQA$  and  $\angle EQB$ .

