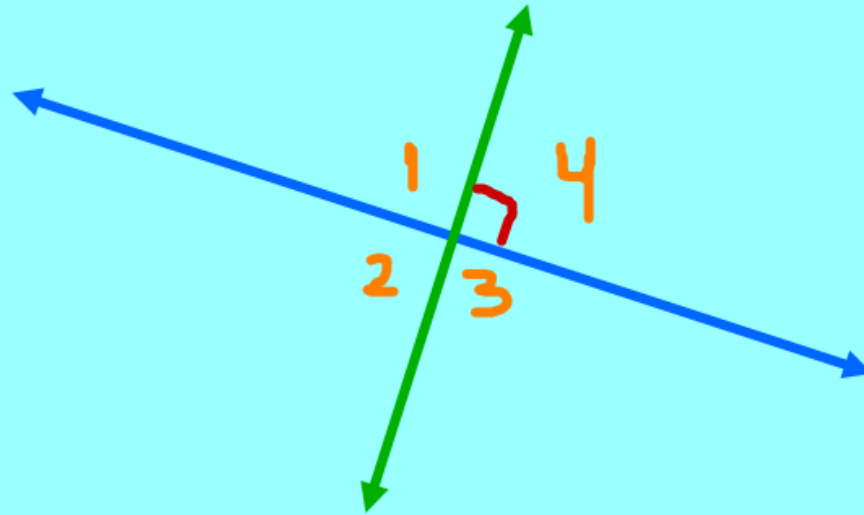


3.6 Prove Theorems About Perpendicular Lines



What do we know about the angles?

THEOREMS

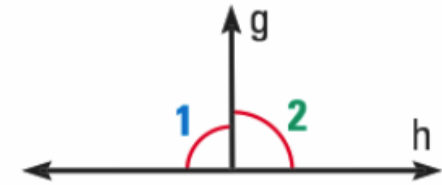
For Your Notebook

THEOREM 3.8

If two lines intersect to form a linear pair of congruent angles, then the lines are perpendicular.

If $\angle 1 \cong \angle 2$, then $g \perp h$.

Proof: Ex. 31, p. 196

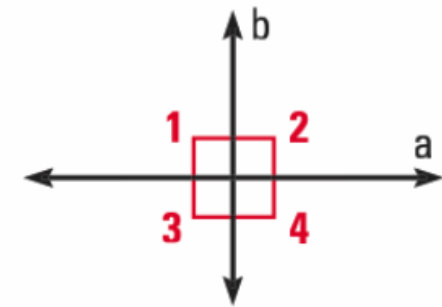


THEOREM 3.9

If two lines are perpendicular, then they intersect to form four right angles.

If $a \perp b$, then $\angle 1$, $\angle 2$, $\angle 3$, $\angle 4$ are right angles.

Proof: Ex. 32, p. 196

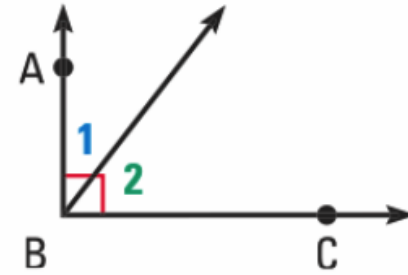


THEOREM*For Your Notebook***THEOREM 3.10**

If two sides of two adjacent acute angles are perpendicular, then the angles are complementary.

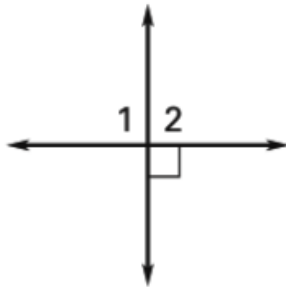
If $\overleftrightarrow{BA} \perp \overleftrightarrow{BC}$, then $\angle 1$ and $\angle 2$ are complementary.

Proof: Example 2, below

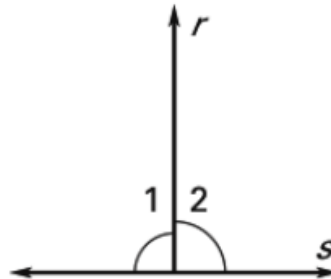


Write the theorem that justifies the statement.

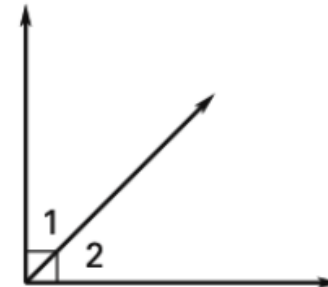
1. $\angle 1$ and $\angle 2$ are right angles.



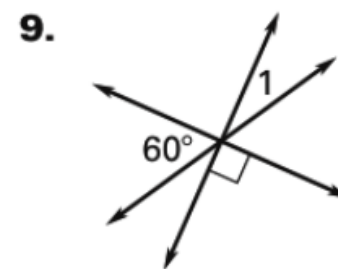
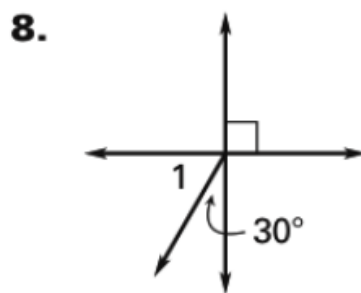
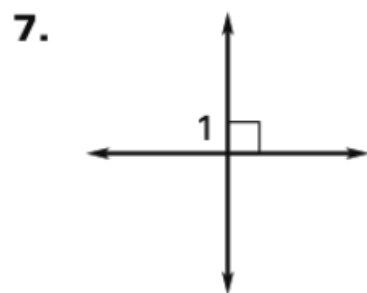
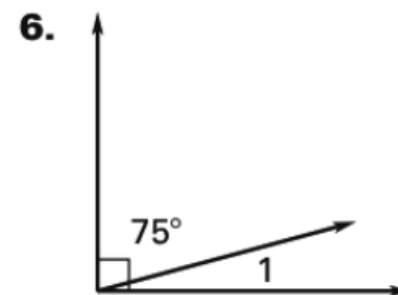
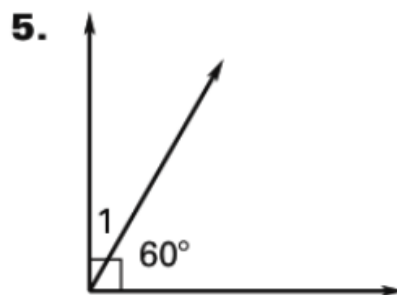
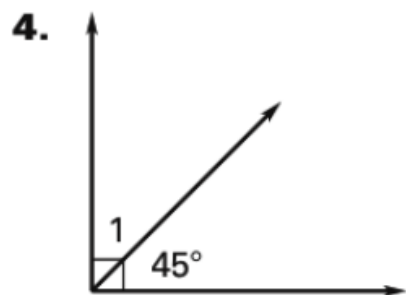
2. $r \perp s$



3. $\angle 1$ and $\angle 2$ are complementary.



Find $m\angle 1$.



Find the measure of the indicated angle.

10. $\angle 1$

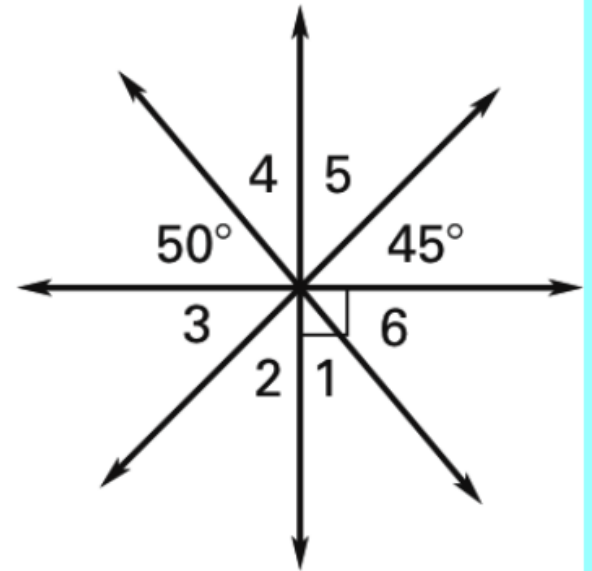
11. $\angle 2$

12. $\angle 3$

13. $\angle 4$

14. $\angle 5$

15. $\angle 6$

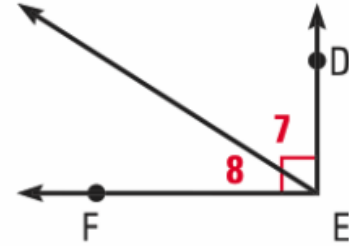


EXAMPLE 2 Prove Theorem 3.10

Prove that if two sides of two adjacent acute angles are perpendicular, then the angles are complementary.

GIVEN ▶ $\overrightarrow{ED} \perp \overrightarrow{EF}$

PROVE ▶ $\angle 7$ and $\angle 8$ are complementary.



STATEMENTS

REASONS

THEOREMS

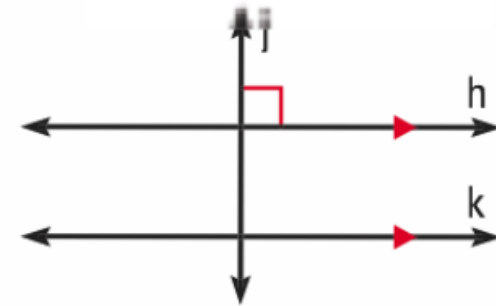
For Your Notebook

THEOREM 3.11 Perpendicular Transversal Theorem

If a transversal is perpendicular to one of two parallel lines, then it is perpendicular to the other.

If $h \parallel k$ and $j \perp h$, then $j \perp k$.

Proof: Ex. 42, p. 160; Ex. 33, p. 196

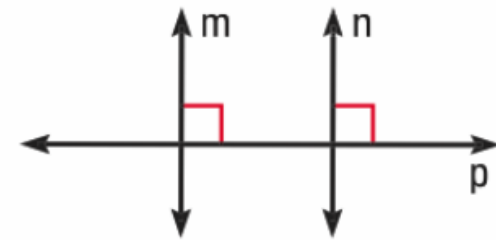


THEOREM 3.12 Lines Perpendicular to a Transversal Theorem

In a plane, if two lines are perpendicular to the same line, then they are parallel to each other.

If $m \perp p$ and $n \perp p$, then $m \parallel n$.

Proof: Ex. 34, p. 196

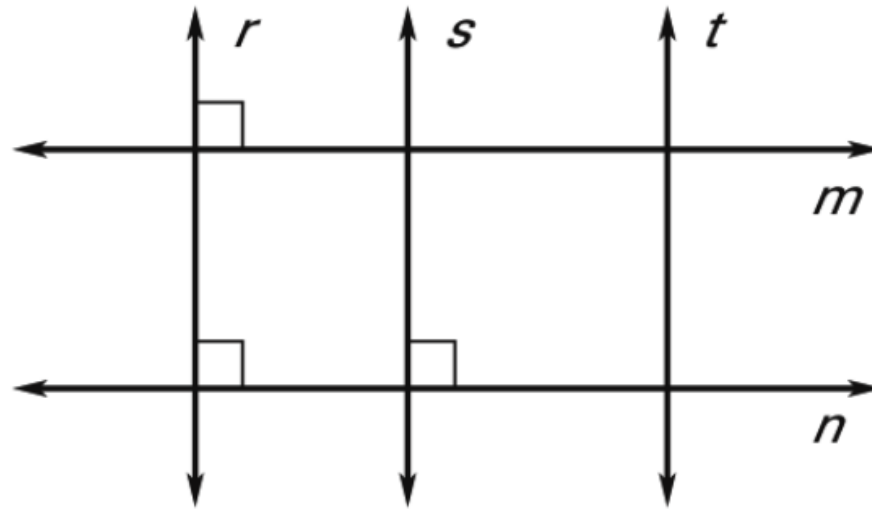


In Exercises 16–18, use the diagram.

16. Is $r \parallel s$?

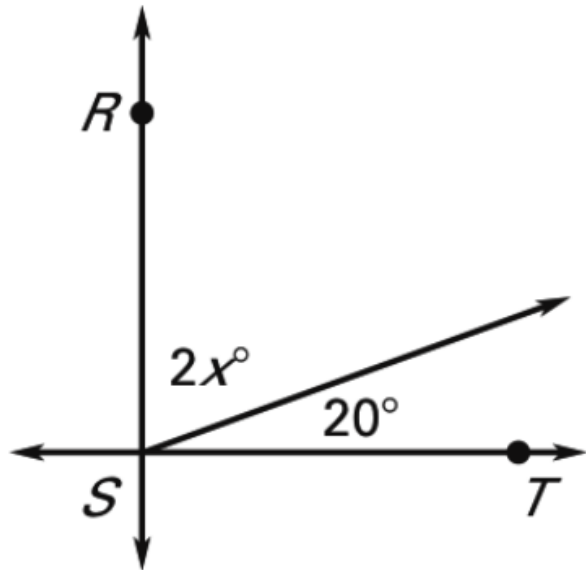
17. Is $m \parallel n$?

18. Is $r \parallel t$?

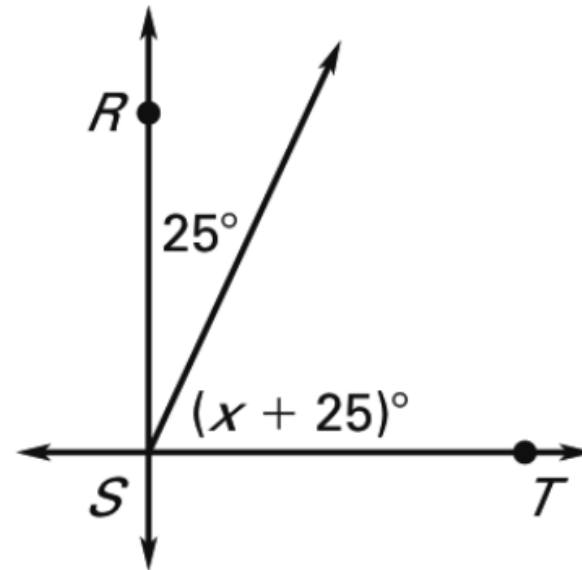


In the diagram, $\overleftrightarrow{RS} \perp \overleftrightarrow{ST}$. Find the value of x .

19.



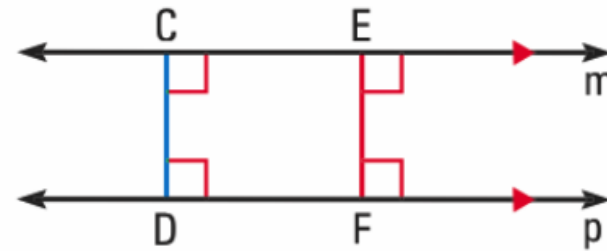
20.



DISTANCE FROM A LINE The **distance from a point to a line** is the length of the perpendicular segment from the point to the line. This perpendicular segment is the shortest distance between the point and the line. For example, the distance between point A and line k is AB . You will prove this in Chapter 5.



Distance from a point to a line



Distance between two parallel lines

The *distance between two parallel lines* is the length of any perpendicular segment joining the two lines. For example, the distance between line p and line m above is CD or EF .

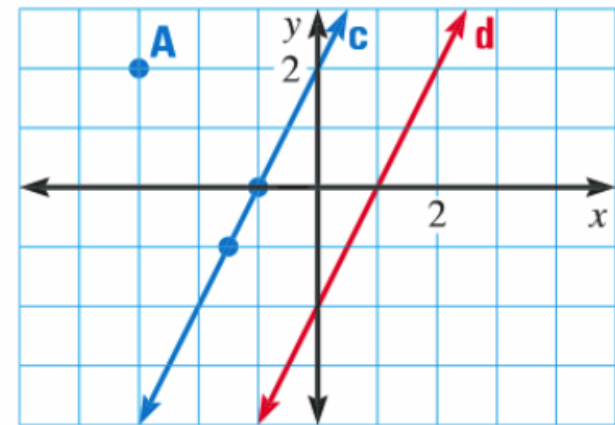
"The shortest distance between two points is
a STRAIGHT LINE"

We obtain this distance by using what we know about
perpendicular lines!!

We have to find that straight line by forming two perpendicular
lines.

Use the graph at the right for Exercises 5 and 6.

5. What is the distance from point A to line c ?
6. What is the distance from line c to line d ?



Day 1 Assignment:

3.6 WS

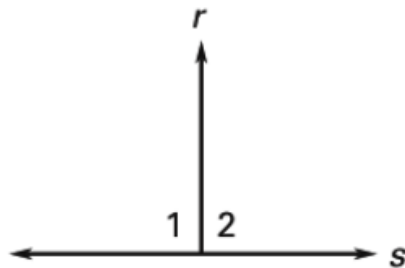
LESSON
3.6

Practice B

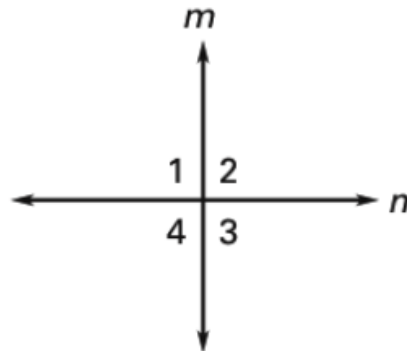
For use with pages 190–197

What can you conclude from the given information? State the reason for your conclusion.

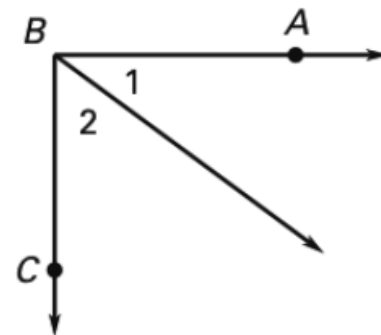
1. $\angle 1 \cong \angle 2$



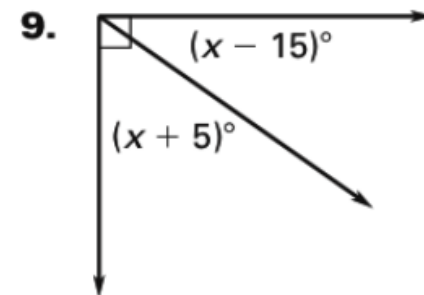
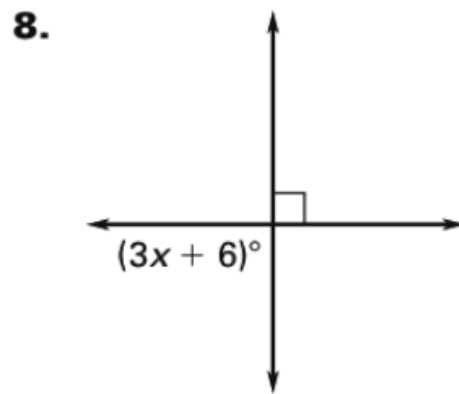
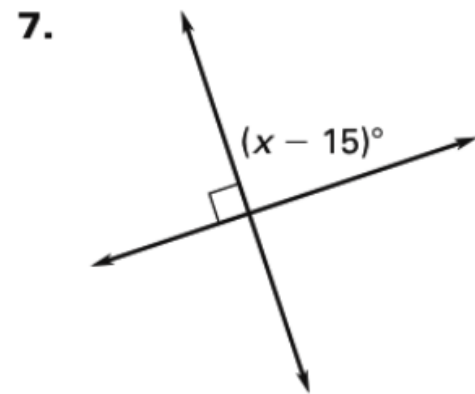
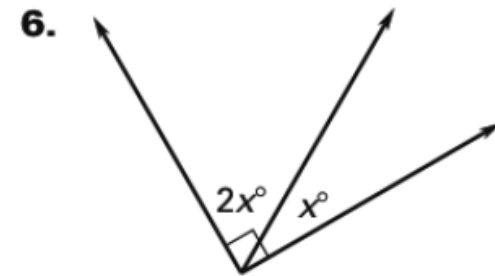
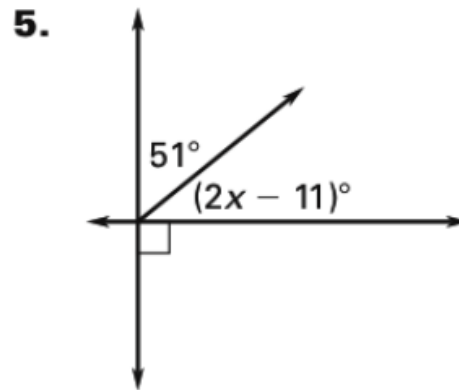
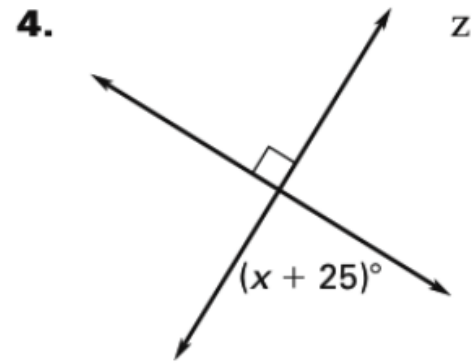
2. $n \perp m$



3. $\overrightarrow{BA} \perp \overrightarrow{BC}$



Find the value of x .



Find the measure of the indicated angle.

10. $\angle 1$

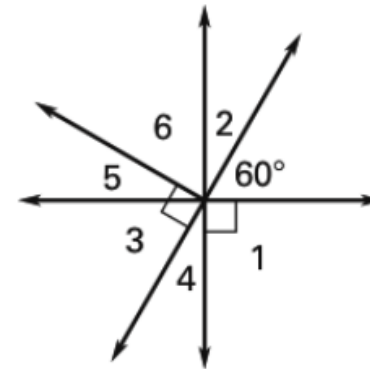
11. $\angle 2$

12. $\angle 3$

13. $\angle 4$

14. $\angle 5$

15. $\angle 6$

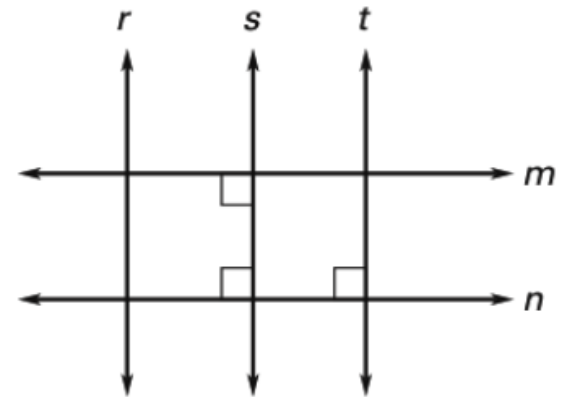


In Exercises 16–18, use the diagram.

16. Is $r \parallel s$?

17. Is $m \parallel n$?

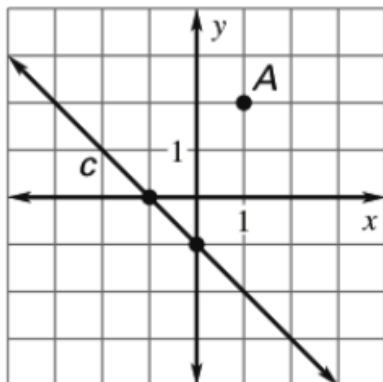
18. Is $s \parallel t$?



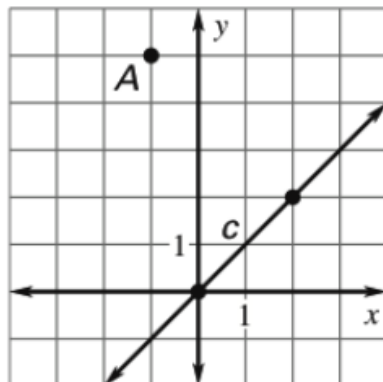
LESSON
3.6
Practice B *continued*
 For use with pages 190–197

Find the distance from point A to line c . Round your answers to the nearest tenth.

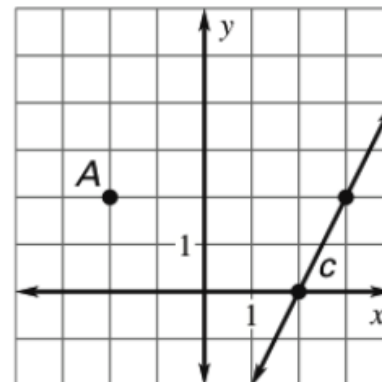
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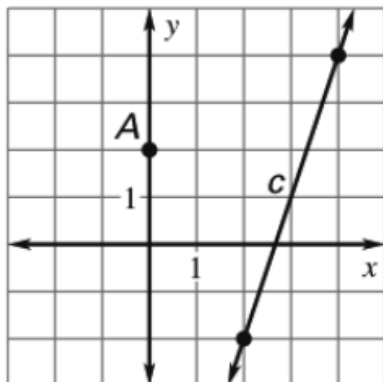
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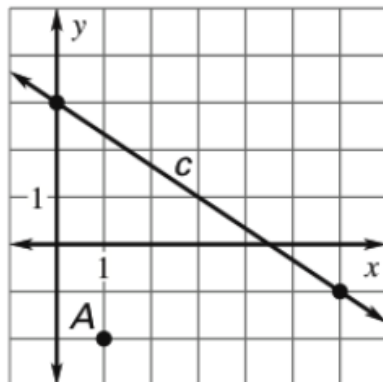
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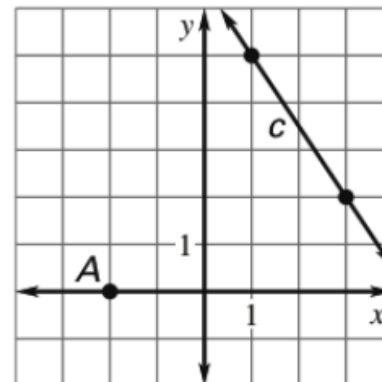
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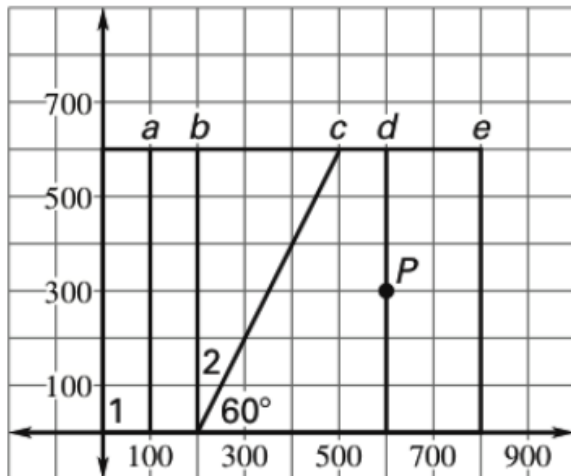
23.



24.



- 25. Maps** A map of a neighborhood is drawn on a graph where units are measured in feet.



- Find $m\angle 1$.
- Find $m\angle 2$.
- Find the distance from point P to line a .
- Find the distance from point P to line c . Round your answer to the nearest foot.

Assignment Day 2:

p. 194 (1-10, 13-23, 39-47)