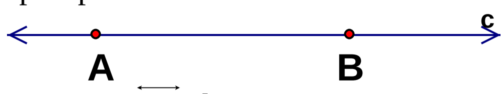
Points, Lines, and Planes
§1.1

Point – a location
ex. • A
write as: A

Line – made up of points and has no thickness or width.
ex.

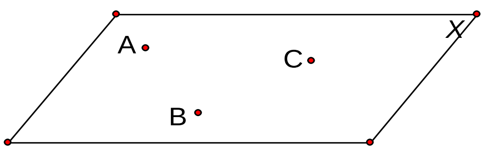


write as: $\overleftrightarrow{AB}$, line c

Collinear – points on the same line.
Noncollinear – points not on the same line.

Plane – flat surface made up of points; has no depth and extends infinitely in all directions.

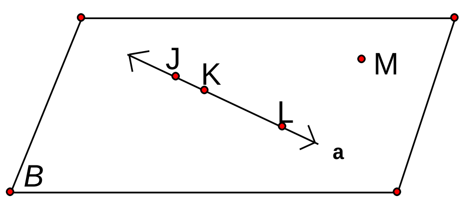
ex.



Write as: plane ABC, plane *X*

Coplanar – points that lie on the same plane.
Noncoplanar – points that do not lie on the same plane.

Example 1
Use the figure to answer.



1a. Name a line containing point K.

b. Name a plane containing point L.

c. Are points J, K, and M collinear?

d. Are points K, L, and M coplanar?

Example 2
Name the geometric shape.

1. The paper you are writing on.

2. The tip of your pencil/pen.

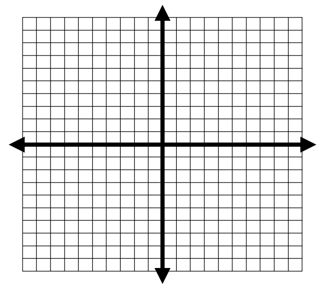
3. The track from the ceiling tile.

Example 3

Draw and label a figure for each.

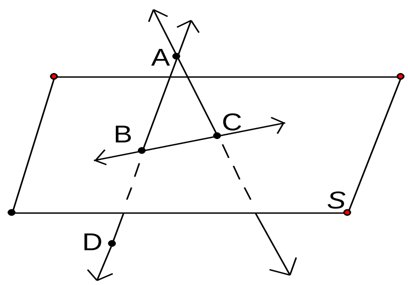
5. Plane R contains lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{DE}$ which intersect at point P. Add point C which is noncollinear to lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{DE}$.

6. $\overleftrightarrow{QR}$ on a coordinate plane contains Q (-2, 4) and R (4, -4). Add point T so that T is collinear with these points.



Example 4

Use the figure to answer.



7. How many planes appear in the figure?

8. Name 3 collinear points.

9. Are points A, B, C, and D coplanar?

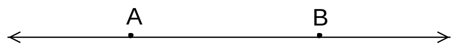
10. Do $\overleftrightarrow{BD}$ and $\overleftrightarrow{AC}$ intersect? If so, where?

Worksheet 1.1

Distance and Midpoints
§1.3

<u>Distance between two points</u>

a. Number Line

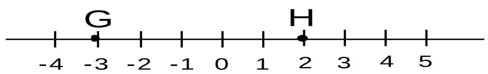


b. Coordinate Plane

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

<u>Example 1</u>

Use the number line to find GH.

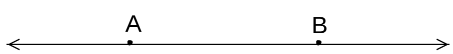


<u>Example 2</u>

Find the distance between E(-4, 1) and F(3, -1).

<u>Midpoint (Segment)</u> – the point on the segment that divides the segment into two congruent segments. If X is the midpoint of AB, then $AX \cong BX$.

a. Number Line



$$\frac{A + B}{2}$$

b. Coordinate Plane

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

<u>Example 3</u>

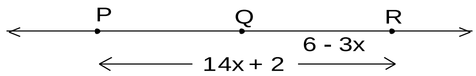
Find the coordinates of the midpoint D if C(-6, 4) and E(8, 1).

<u>Example 4</u>

Find the coordinates of W if X(3, -5) is the midpoint of WY and Y has coordinates of (12, 1).

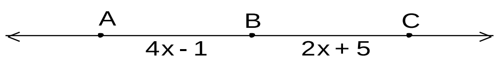
Example 5

What is the measure of PR if Q is the midpoint of PR.

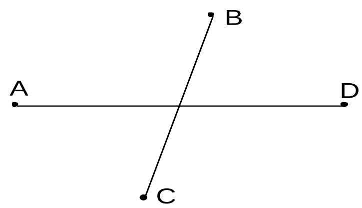


Example 6

What is the measure of AB if B is the midpoint of AC?



Segment Bisector – any segment, line, or plane that intersects a segment at its midpoint.



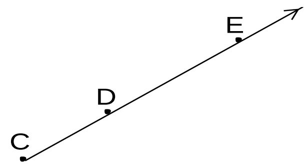
BC bisects AD

Worksheet 1.3

Angle Measure
§1.4

Degree – a unit of measurement used in measuring angles and arcs. An arc of a circle with a measure of 1° is $\frac{1}{360}$ of the entire circle.

Ray – part of a line that has one endpoint and extends infinitely in one direction.

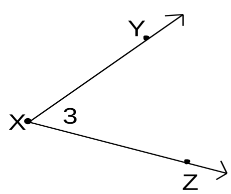


$\overrightarrow{CD}$, $\overrightarrow{CE}$, or $\overrightarrow{DE}$

Two opposite and collinear rays form a line

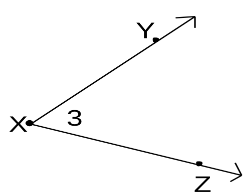
Angle – formed by two noncollinear rays that have a common endpoint.

2 parts:
side – rays
vertex – common endpoint

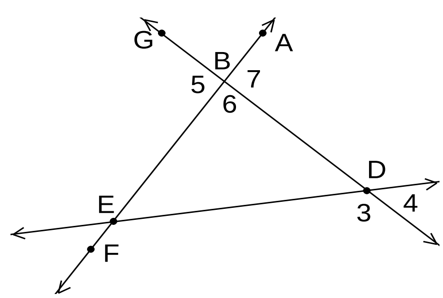


$\angle X$, $\angle YXZ$, $\angle ZXY$, or $\angle 3$

Other distinct parts:



Use the figure to answer.



1. Name all angles that have B as a vertex.

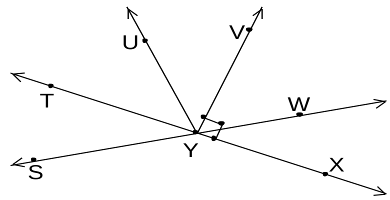
2. Name the sides of $\angle 5$.

3. Write another name for $\angle 6$.

Angle Classifications

1. Right – an angle measuring exactly 90°.
2. Acute – an angle measuring greater than 0° and less than 90°. $0^\circ < x < 90^\circ$
3. Obtuse – an angle measuring greater than 90° and less than 180°. $90^\circ < x < 180^\circ$

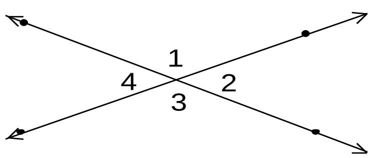
Use the figure to answer.



Approximate each angle and classify.

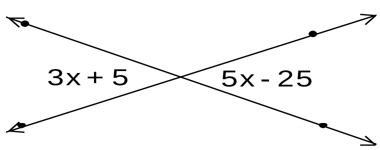
4. ∠TYV 5. ∠WYT 6. ∠TYU

∠ABC ≅ ∠DEF

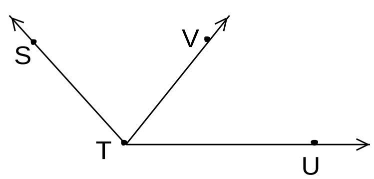


Solve each angle.

7.



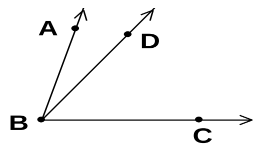
<u>Angle Bisector</u> – a ray that divides an angle into two congruent angles.



Worksheet 1.4

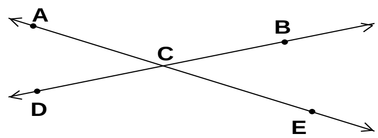
Angle Relationships
§1.5

Adjacent Angles – two angles that lie in the same plane, have a common vertex and a common side, but no common interior points.

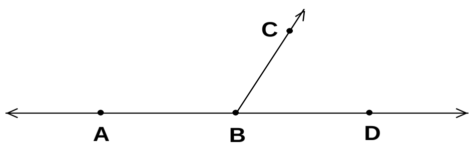


∠ABD and ∠CBD

Vertical Angles – two nonadjacent angles formed by two intersecting lines.



Linear Pair – a pair of adjacent angles with non common sides that are opposite rays.

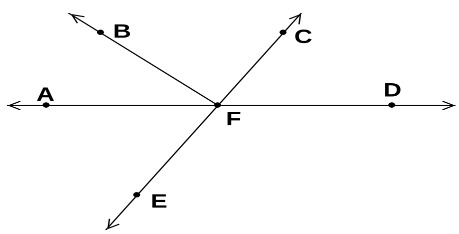


Example 1
Use the figure to answer.

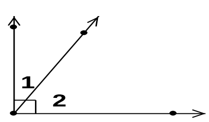
a. Name adjacent angles.

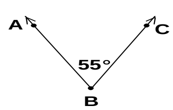
b. Name vertical angles.

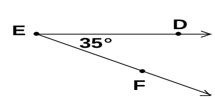
c. Name linear pairs.



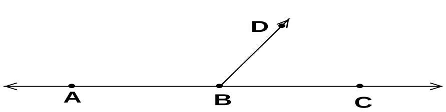
Complementary Angles – two angles with measures that have a sum of $90°$.

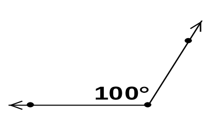


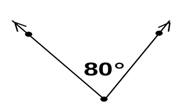




Supplementary Angles – two angles with measures that have a sum of $180°$.



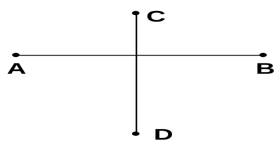




Example 2
Find the measure of two complementary angles if the difference of the two angles is 16.

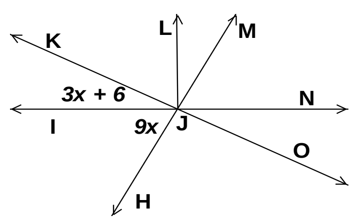
Example 3
Find the measure of two supplementary angles if the measure of one angle is 6 less than 5 times the measure of the other angle.

Perpendicular – lines, segments, or rays that form right angles.



$\overline{AB} \perp \overline{CD}$

Example 4
Find x if $\overline{KO} \perp \overline{HM}$

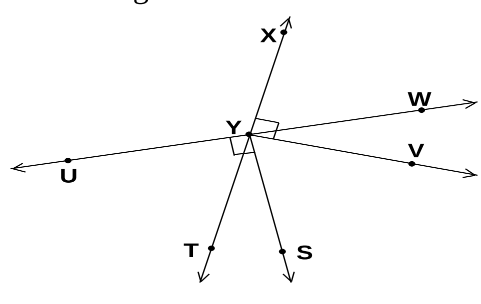


Example 5
Determine if each statement can be justified from the figure.

a. $\angle VYT = 90°$

b. $\angle TYW$ and $\angle TYU$ are supplementary.

c. $\angle VYW$ and $\angle TWS$ are adjacent angles.



Worksheet 1.5

Algebraic Proofs
§2.6

Algebra Properties

Reflexive Property:	a = a	
Symmetric Property:	If a = b, then b = a	
Transitive Property:	If a = b and b = c, then a = c	
Addition/Subtraction:	If a = b, then	a + c = b + c
		a – c = b – c
Multiplication/Division:	If a = b, then	a · c = b · c
		$\frac{a}{c} = \frac{b}{c}$
Substitution Property:	If a = b, then a may be replaced by b	
Distributive Property:	a(b + c) = ab + ac	

Name the property illustrated by each statement.

a. If $5x = 20$, then $x = 4$ A.

b. If $12 = AB$, then $AB = 12$ B.

c. If $AB = BC$, and $BC = CD$, then $AB = CD$. C.

d. If $y = 75$, and $m\angle A = y$, then $m\angle A = 75$ D.

e. If $4x + 2 = 5$, then $4x = 3$. E.

f. If $-4(3x - 4) = -12x + 16$ F.

Solve 2(5 – 3*c*) – 4(*a* + 7) = 92

Statements	Reasons
1. 2(5 – 3*a*) – 4(*a* + 7) = 92	**1.**
2. 10 – 6*a* – 4*a* – 28 = 92	**2.**
3.	**3.**
4.	**4. Addition Property**
5.	**5. Division Property**
6. a = -11	**6.**

2. Write a 2 column proof to show that if $\frac{7d + 3}{4} = 6$, then d = 3.

Statements	Reasons
1.	**1.**
2.	**2.**
3.	**3.**
4.	**4.**
5.	**5.**
6.	**6.**
7.	**7.**
8.	**8.**
9.	**9.**

Segment and Angles are real numbers; therefore properties of real numbers can apply.

3. Given: AB = 16, AB = CD
Prove: CD = 16

Statements	**Reasons**
1.	**1.**
2.	**2.**
3.	**3.**
4.	**4.**
5.	**5.**

Worksheet 2.6

Parallel Lines and Transversals
§3.1

Parallel Lines – coplanar lines that do not intersect.

Skew Lines – lines that do not intersect and are not coplanar.

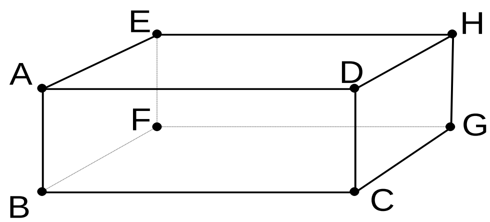
Example 1
Use the figure to answer.

a. Name a plane parallel to plane AEH.

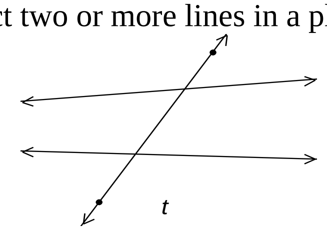
b. Name all segments parallel to CG.

c. Name all segments that intersect BC.

d. Name all segments that are skew to AE.



Transversal – a line that intersect two or more lines in a plane at different points.



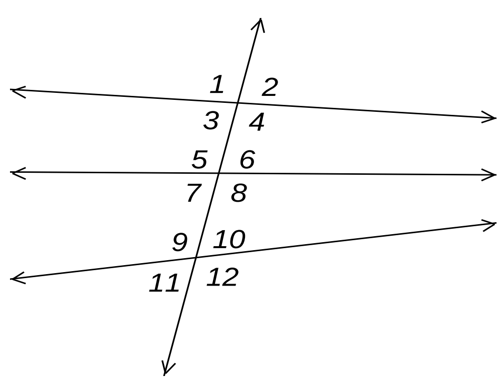
Transversals and Angles

Exterior Angles – angles on the outside of the lines.
Interior Angles – angles on the inside of the lines.
Consecutive Interior Angles – angles on the same side of the transversal and next to each other.
Alternate Interior Angles – interior angles on opposite sides of the transversal and not adjacent.
Alternate Exterior Angles - exterior angles on opposite sides of the transversal and not adjacent.
Corresponding Angles – non-adjacent angles, 1 interior and 1 exterior, on the same side of the transversal.

Example 2
Use the figure to answer.

Identify each pair of angles.

1. $\angle 1$ and $\angle 8$
2. $\angle 8$ and $\angle 12$
3. $\angle 8$ and $\angle 10$
4. $\angle 4$ and $\angle 5$
5. $\angle 1$ and $\angle 5$
6. $\angle 3$ and $\angle 10$



Worksheet 3.1

Angles and Parallel Lines

§3.2

The following postulate and theorems have the same hypothesis, but a different conclusion.

*If two **<u>parallel lines</u>** are cut by a transversal, then*:

<u>Postulate 3.1</u> – *each pair of corresponding angles is congruent*.

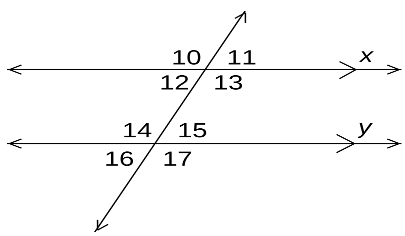
<u>Theorem 3.1</u> – *each pair of alternate interior angles is congruent*.

<u>Theorem 3.2</u> – *each pair of consecutive interior angles is supplementary*.

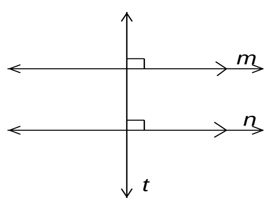
<u>Theorem 3.3</u> – *each pair of alternate exterior angles is congruent*.

<u>Example 1</u>

In the figure $x \parallel y$ and $\angle 11 = 51°$, find $\angle 16$

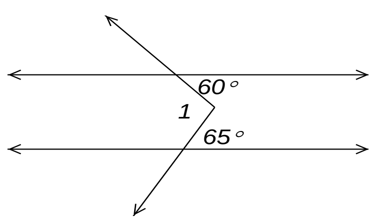


<u>Theorem 3.4</u> – In a plane, if a line is perpendicular to one of two parallel lines, then it is perpendicular to the other.



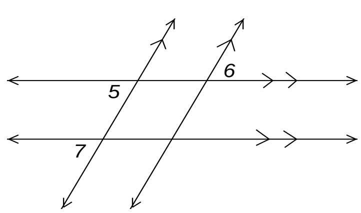
<u>Example 2</u>

What is $m\angle 1$?



<u>Example 3</u>

If $m\angle 5 = 2x - 10$, $m\angle 6 = 4(y - 25)$ and $m\angle 7 = x + 15$, find x and y.



Worksheet 3.2