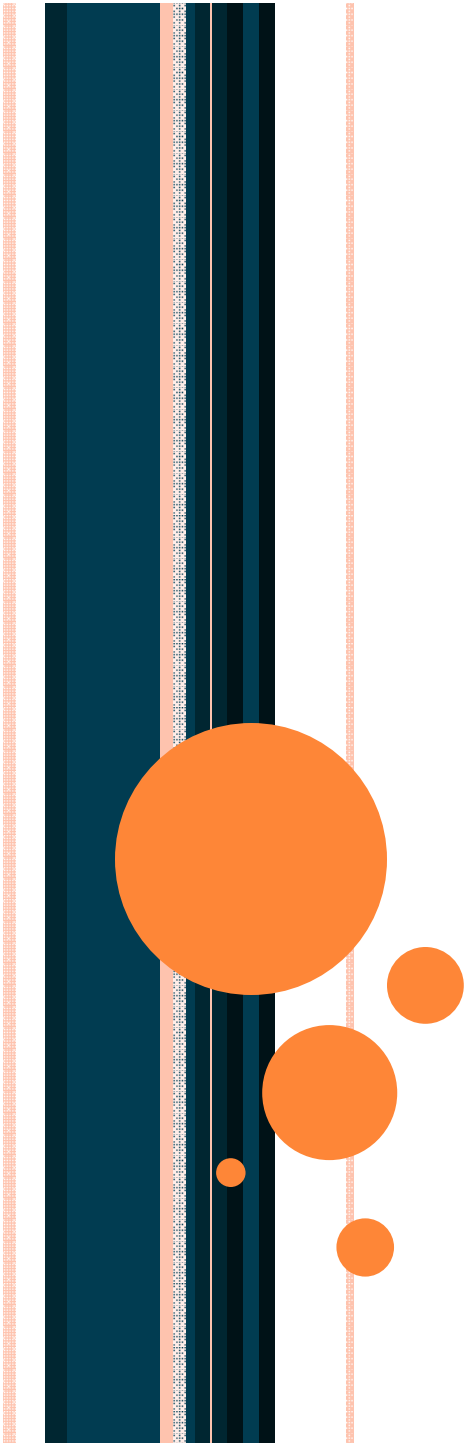
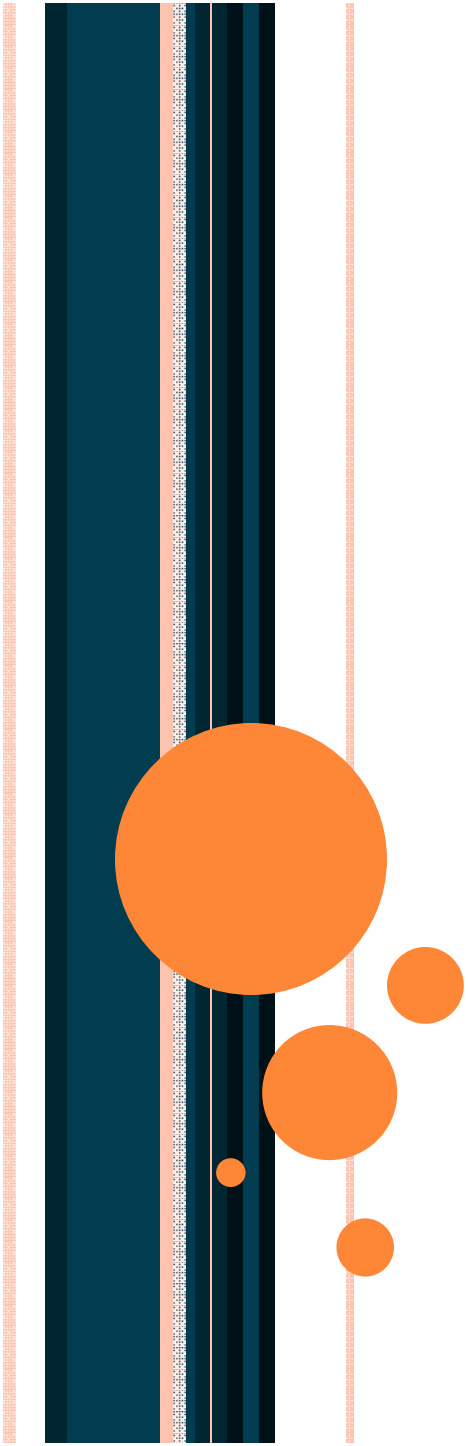


Chapter 1

Reasoning in Geometry



1.1

Patterns and Inductive Reasoning

EXAMPLE

- Find the next three terms of each sequence.
  - 11.2, 9.2, 7.2, …
  - 6, 12, 24, …

1-1 Patterns and Inductive Reasoning

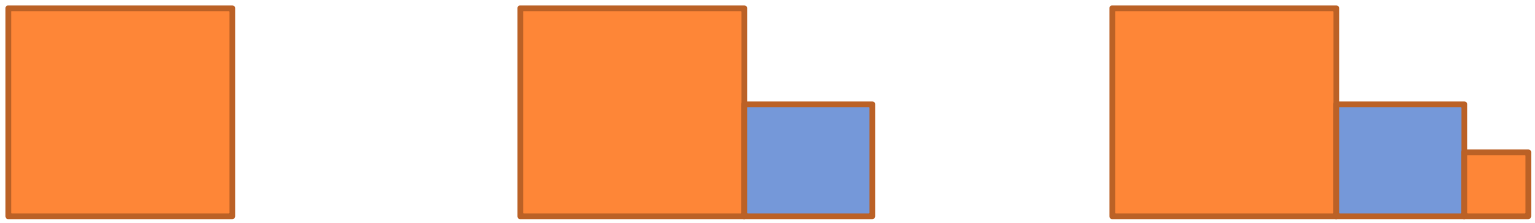
- Inductive Reasoning –
  - Making a conclusion based on a pattern of examples or past events
  - Ex. Terms in a sequence
  - Ex. The mustangs won the last ten times they've played Rossville, so they should win the next time

EXAMPLE

- Find the next three terms of the sequence
  - 101, 102, 105, 110, 117, …

EXAMPLE

- Draw the next figure in the pattern.



CONJECTURE

- A conclusion reached by using inductive reasoning
- Sometimes true – Sometimes false
- Decide if false by finding an example that doesn't fit the conjecture
- Counterexample – a false example

EXAMPLE

- Minowa studied the data below and made the following conjecture.

- Multiplying a number by -1 produces a product that is less than -1.

5(-1) = -5 and -5 < 1

15(-1) = -15 and -15 < 1

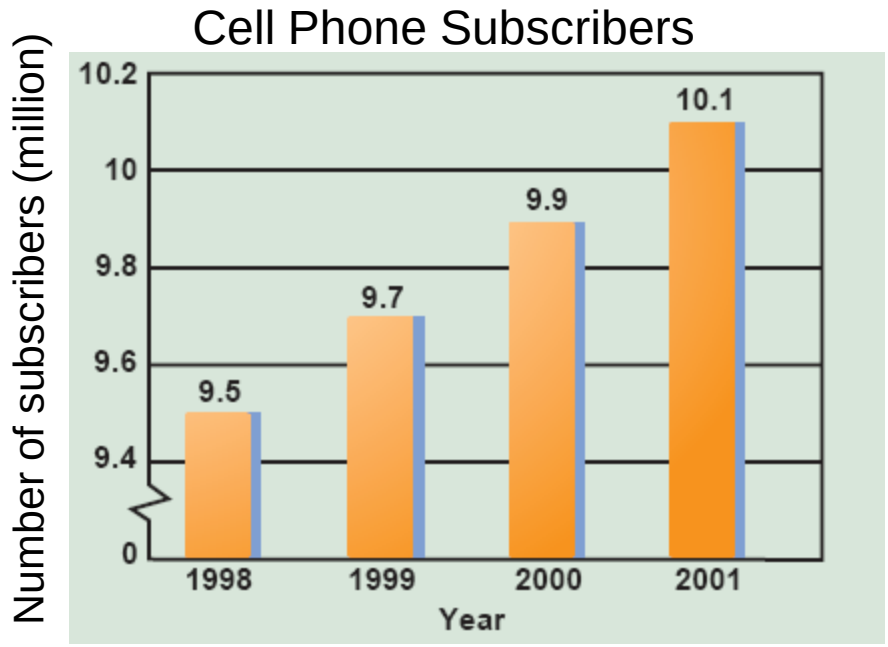
100(-1) = -100 and -100 < 1

300(-1) = -300 and -300 < 1

- Find a counterexample for her conjecture.

EXAMPLE

- Study the graph on U.S. cellular phone subscribers. Make a conjecture about whether the rate of increase will continue forever. Explain your reasoning.



Assignment

- Remember Criteria for Credit!
- P7: 1, 2, 4 – 14, 16 – 32 even, 33 – 36, 39

Think about it!

Each term in a sequence is twice the term preceding it. If the fifth term of the sequence is 56, what is the first term?

Ch 1 Assessments

- Quiz A: 1.1 – 1.2
- Mid-Ch Test: 1.1 – 1.3
- Quiz B: 1.3 – 1.6

Chapter 1 Investigation
To Grandmother's House We Go!

- Complete the "investigation" 1 – 5 on one side of a piece of white paper
- Complete the assigned "extension" on the other side of the paper
  - Shade multiples of 3, 4, 5, 6
  - Describe the pattern created in a few sentences.

1.2

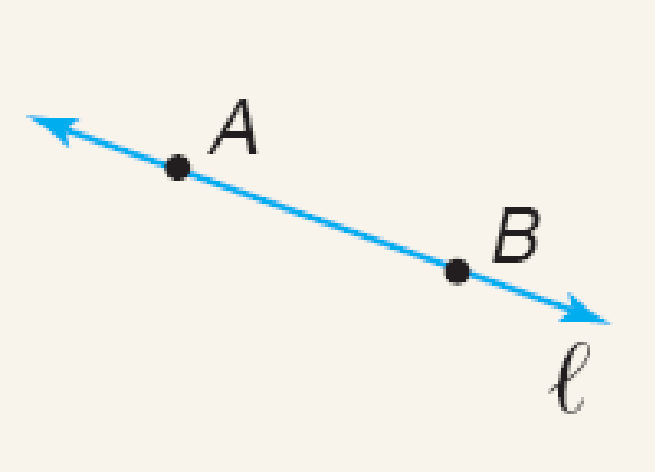
Points, Lines, and Planes

Point

- Has no size
- Named using capital letters

LINE

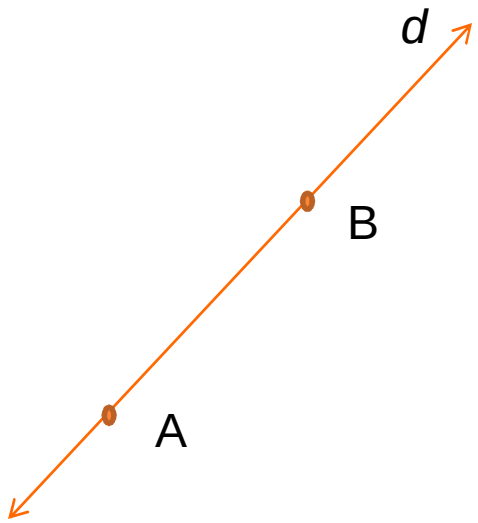
- Made up of infinite number of points
- Arrows show that the line extends without end in both directions
- Named by a single lowercase script letter or by two points on the line



EXAMPLE

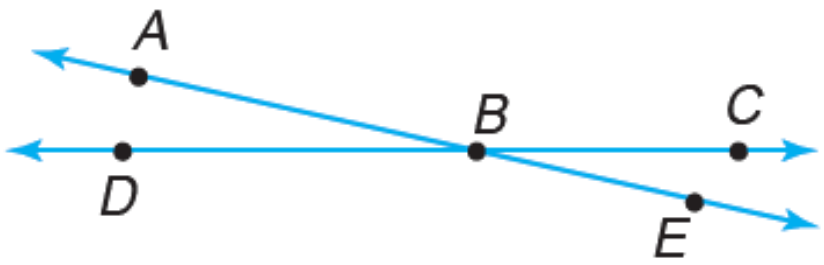
- Name two points on the line.

- Give three names for the line.



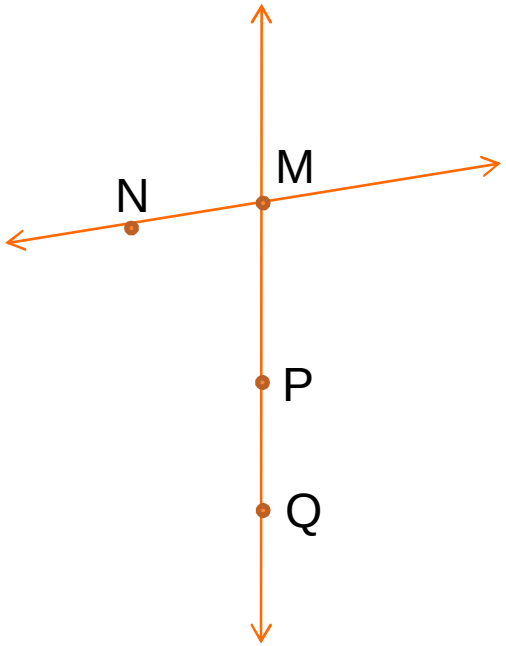
Collinear and Noncollinear

- Collinear –
  - Points that lie on the same line
- Noncollinear –
  - Points that do not lie on the same line



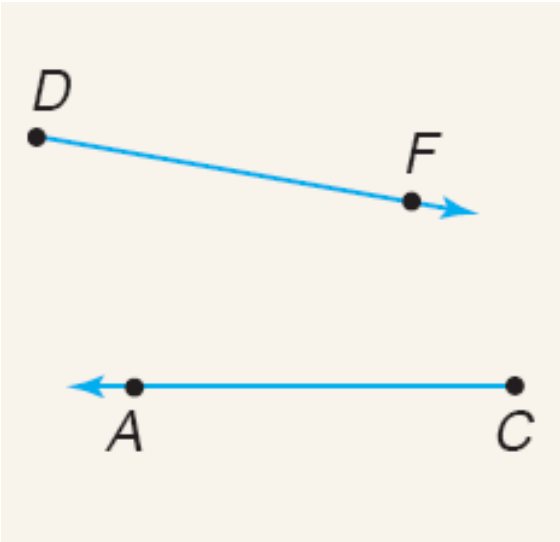
EXAMPLE

- Name three points that are collinear and three points that are noncollinear.



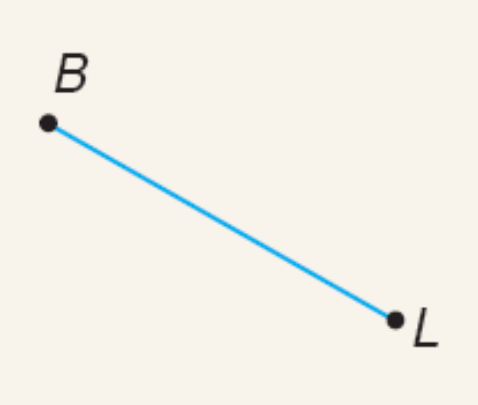
RAY

- Has a definite starting point and extends without end in one direction
- Starting point is called endpoint
- Named using endpoint first, then another point on the ray



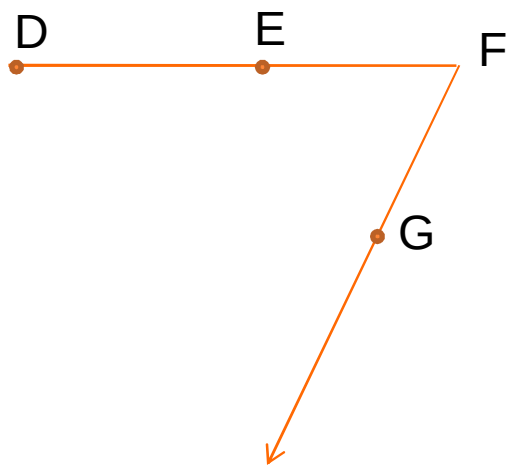
Line Segment

- Has a definite beginning and end
- Contains two endpoints and all of the points between them
- Named using its endpoints



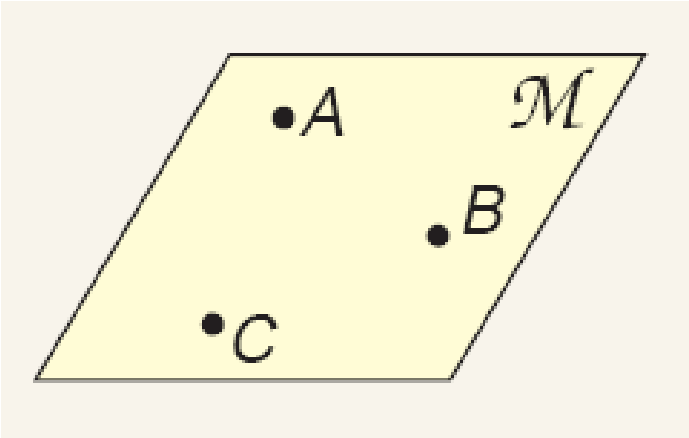
EXAMPLE

- Name three segments and one ray.



PLANE

- Flat surface that extends without end in all directions
- For any three noncollinear points, there is only one plane that contains all three points
- Named with a single uppercase script letter or by three noncollinear points



Coplanar and Noncoplanar

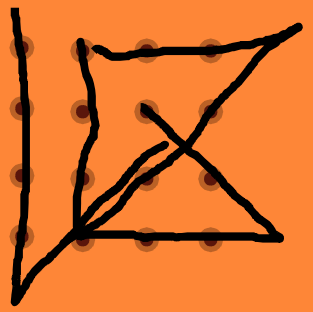
- Coplanar –
  - Points that lie on the same plane
- Noncoplanar –
  - Points that do not lie on the same plane

Assignment

- Remember Criteria!
- P15: 1 – 30, 34, 36, 38

Think about it!

Draw six segments that pass through every dot in the figure without taking your pencil off the paper.



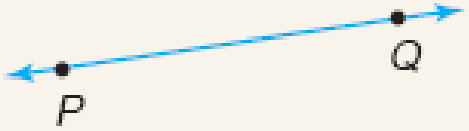
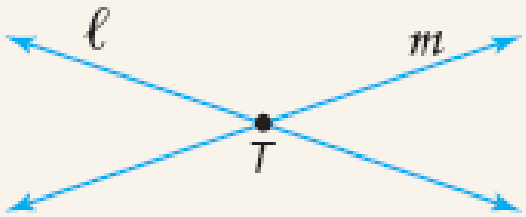
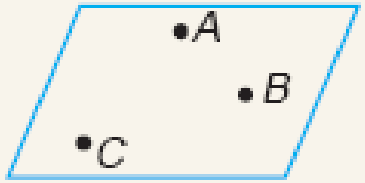
1.3

Postulates

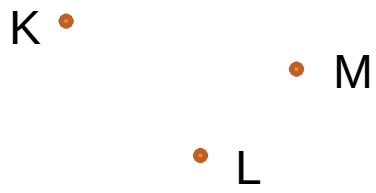
POSTULATES

- Postulate –
  - Statements that are accepted as true
  - Also called axioms

Postulates

Postulate	Words	Models
1–1	Two points determine a unique line. *There is only one line that contains points P and Q.*	
1–2	If two distinct lines intersect, then their intersection is a point. *Lines ℓ and m intersect at point T.*	
1–3	Three noncollinear points determine a unique plane. *There is only one plane that contains points A, B, and C.*	

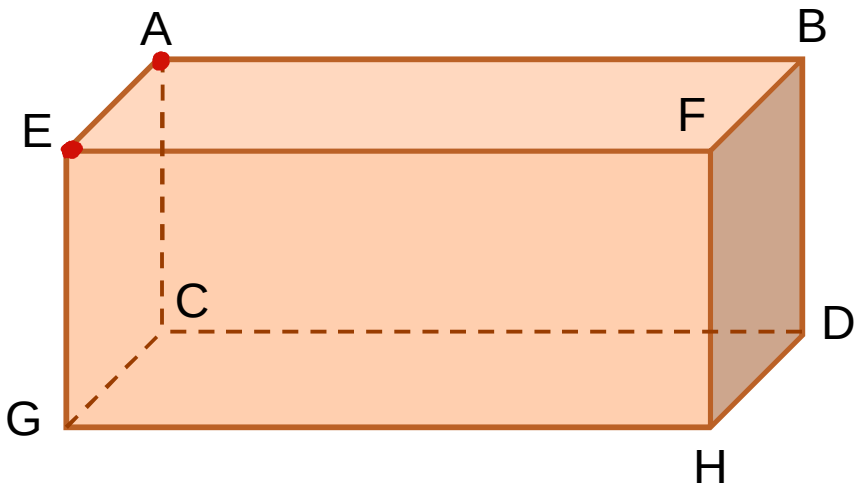
EXAMPLES



- As shown, points K, L and M are noncollinear.
  - Name all of the different lines that can be drawn through these points.
  - Name the intersection of $\overleftrightarrow{KL}$ and $\overleftrightarrow{KM}$.

EXAMPLE

- Name all of the planes that are represented in the prism.

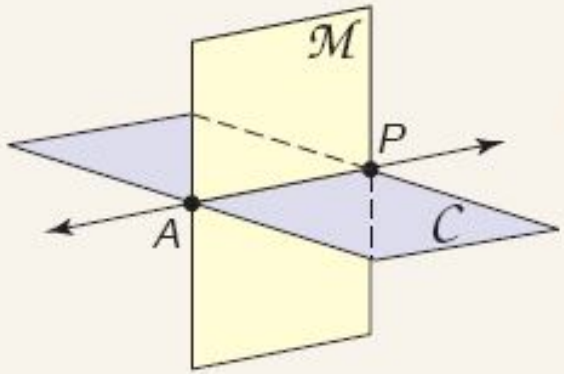


POSTULATE

Postulate 1–4

Words: If two distinct planes intersect, then their intersection is a line.

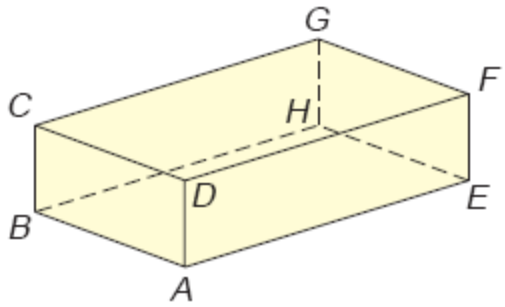
Model:



Plane M and plane C intersect in line AP.

EXAMPLE

- Name the intersection of plane ABC and plane DEF.



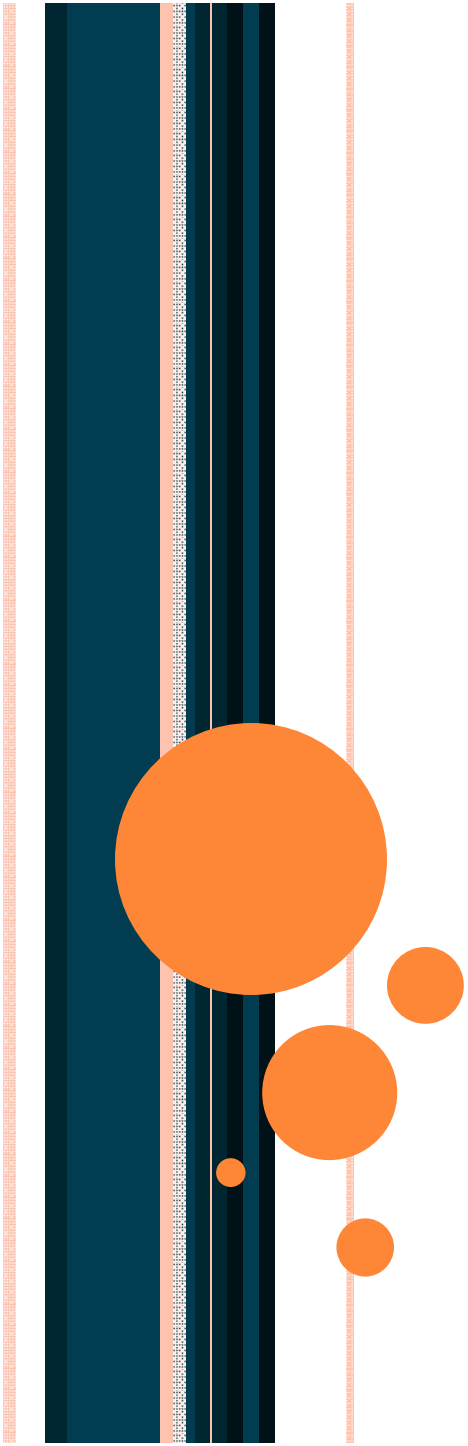
- Name two planes that intersect line DF.

Assignment

- P20: 1, 2, 4 – 30, 32, 33, 37
- Read page 23, complete #1.

Hands-On Geometry

- P19
  - Use two note cards to construct two intersecting planes as shown.
  - Do “Try These” 1 – 3



1.4

Conditional Statements and Their Converses

Conditional Statement

- If-Then Statements –
  - Two statements joined based on a conclusion
- Conditional Statements –
  - A statement written in if-then form
  - With a hypothesis after the if
  - And a conclusion after the then
- Hypothesis –
  - An assumption of what will happen
- Conclusion –
  - A condition given the hypothesis happens

EXAMPLE

- Identify the hypothesis and conclusion in this statement:

  If it is raining, then we will read a book.

EXAMPLE

- Write two other forms of this statement:

If two lines are parallel, then they never intersect.

Converse

- Converse –
  - Formed by exchanging the hypothesis and the conclusion in the conditional statement

EXAMPLE

- Write the converse of this statement:

  If today is Saturday, then there is no school.

EXAMPLE

- Write the following statement in if-then form, then write its converse.

Every member of the jazz band must attend the rehearsal on Saturday.

Assignment

- P26: 1, 2, 4 – 15, 17, 18, 22 – 28, 31 – 37

1.5

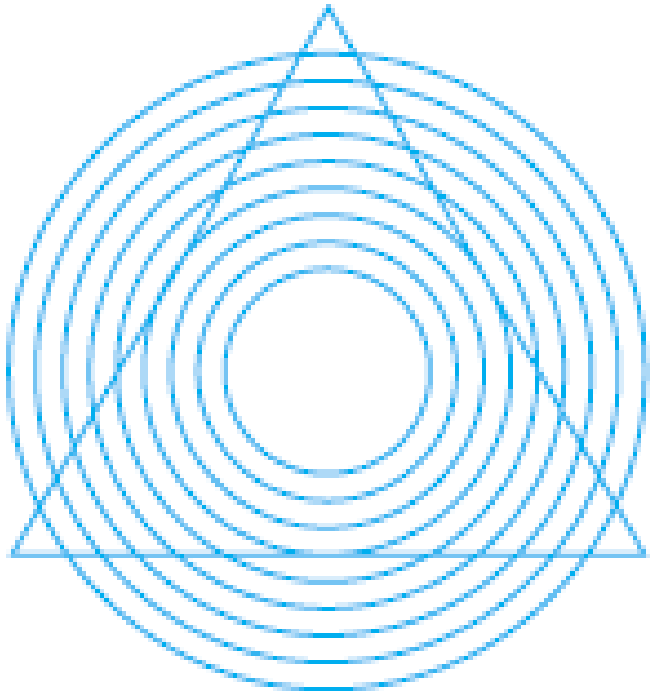
Tools of the Trade

Tools of the Trade

- Straightedge –
  - Any object used to draw a straight line
- Compass –
  - A tool to draw arcs and circles

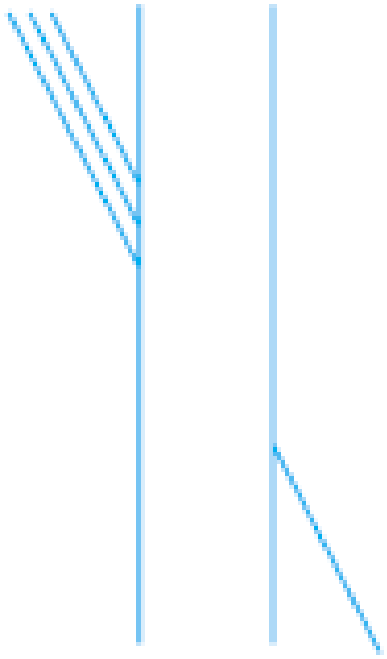
EXAMPLE

- Determine whether the sides of the triangle are straight.



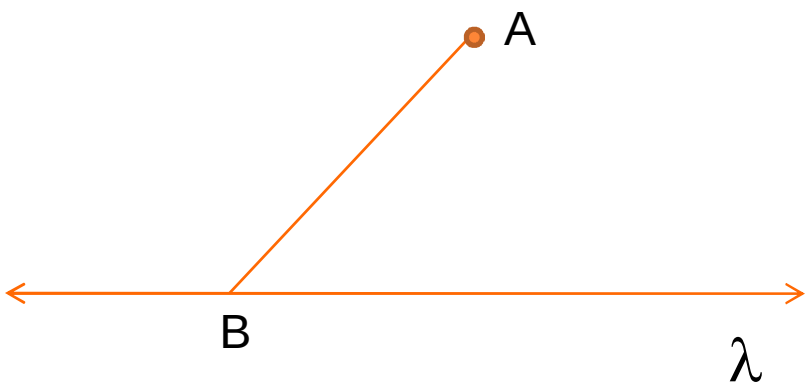
EXAMPLE

- Determine which of the three segments forms a straight line with the lower segment.



EXAMPLE

- Draw a figure similar to the one shown below. Mark a point C on line l that you judge will create BC that is the same length as AB. Then measure to determine how accurate your guess was.



CONSTRUCTIONS

- Construction –
  - Drawing figures using only a compass and a straightedge
  - So, when it says “construct”, those are the only materials you can use!

EXAMPLE

- Use a compass and straightedge to construct a six-sided figure.
  - Draw a point to be center of circle.
  - Use the compass to draw a circle.
  - With same setting, draw a point on circle and an arc on circle.
  - Move compass around drawing arcs on circle with previous arc as center.
  - Use straightedge to connect points.

EXAMPLE

- Use a compass and a straightedge to construct a six-pointed star.

Midpoint

- Midpoint –
  - A point in the middle of a segment.

EXAMPLE

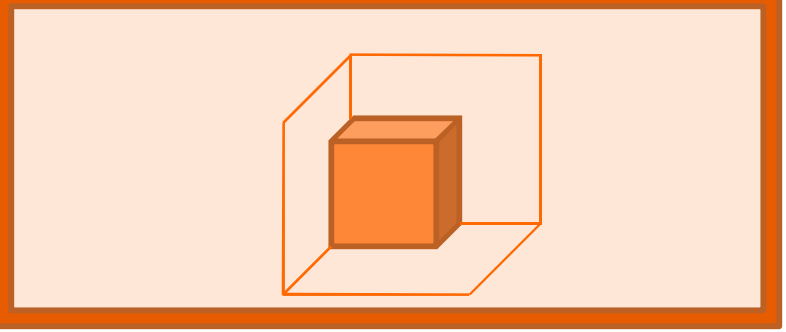
- Use a straightedge and a compass to construct the midpoint of a segment.
  - Draw a segment with two endpoints
  - Make the compass longer than half the segment
  - With the point of the compass on each endpoint in turn, make an arc above and below the segment so that the arcs from both endpoint overlap
  - Use the straightedge to connect the overlapping arcs and find the midpoint of the segment

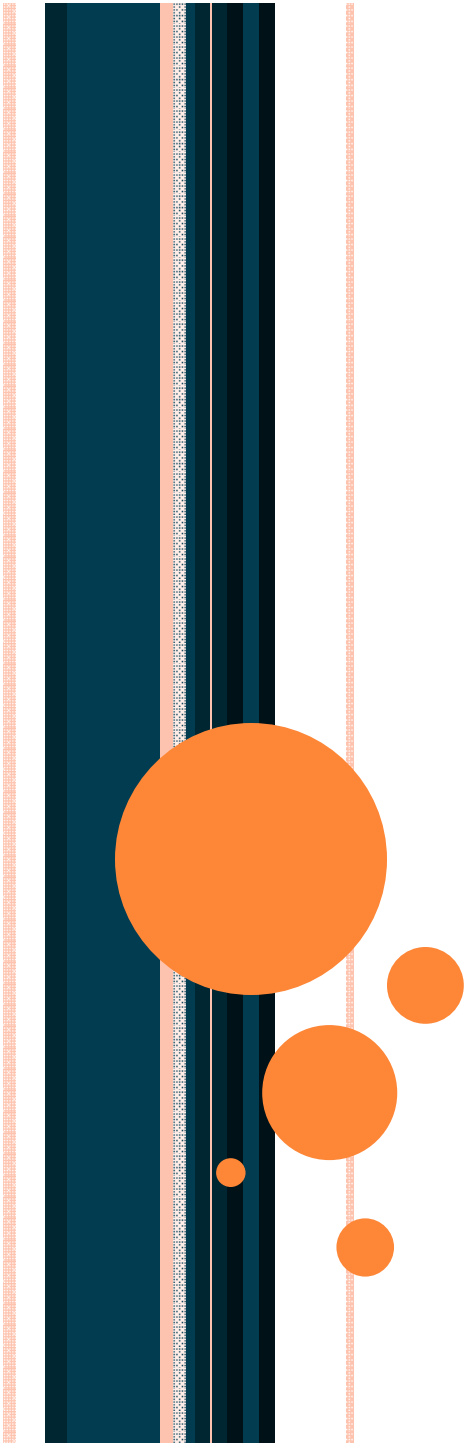
Assignment

- P32: 1, 3, 4 – 13, 15 – 19
  - Do NOT use a ruler to measure segments, use your compass!
  - Need compass for #6 and #11

Think about it!

Describe each of the different ways the figure could be interpreted.





1.6

A Plan for Problem Solving

Useful Measurements

- Perimeter –
  - The distance around a figure
- Area –
  - The number of square units needed to cover its surface
- Formula –
  - An equation that shows how certain quantities are related

Perimeter of a Rectangle

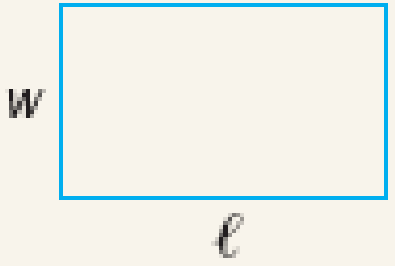
Perimeter of a Rectangle

Words: The perimeter P of a rectangle is the sum of the measures of its sides. It can also be expressed as two times the length ℓ plus two times the width w.

Symbols: $P = \ell + w + \ell + w$

$P = 2\ell + 2w$

Model:



EXAMPLE

- Find the perimeter of a rectangle with length 12 cm and width 3 cm.

- Find the perimeter of a square with sides 10 ft. long.

Area of a Rectangle

Area of a Rectangle

Words: The area A of a rectangle is the product of the length ℓ and the width w.

Symbols: $A = \ell w$

Model:

EXAMPLE

- Find the area of a rectangle with length 12 km and width 3 km.

- Find the area of a square with sides 10 yds long.

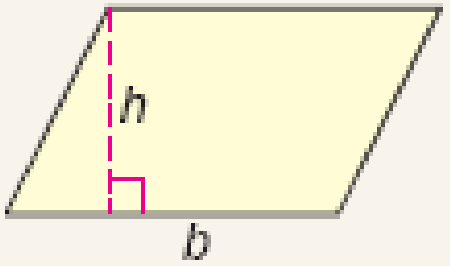
Area of a Parallelogram

Area of a Parallelogram

Words: The area A of a parallelogram is the product of the base b and the height h.

Symbols: $A = bh$

Model:



EXAMPLE

- Find the area of a parallelogram with a height of 4 m and a base of 5.5 m.

Four-Step Plan

- Explore the problem
- Plan the solution
- Solve the problem
- Examine the solution

EXAMPLE

- A door is 3 ft wide and 6.5 ft tall. Chad wants to paint the front and back of the door. A 1-pint can of paint will cover about 15 sq ft. Will two 1-pint cans of paint be enough?

Assignment

- P38: 2, 4 – 31, 34 – 37
- Read P41. Identify three other ways that Real Estate Agents use math.

Think about it!

A cardboard cube has length, width, and height of 2 feet. You want to paint the entire outside of the cube. How many square feet of surface will you be painting?