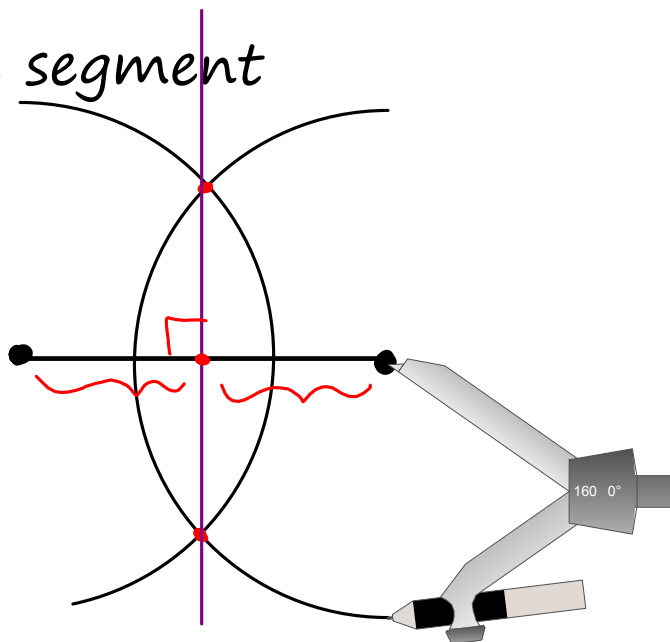


## 1.4 - Compass Constructions

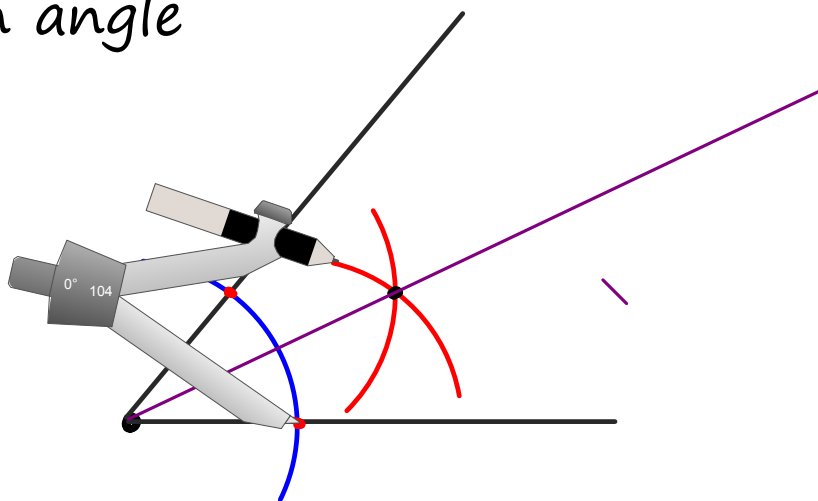
Compass - draw circles & arcs

Straightedge - ruler without the ability to measure distance;  
draw lines through points

bisect a line segment



bisect an angle



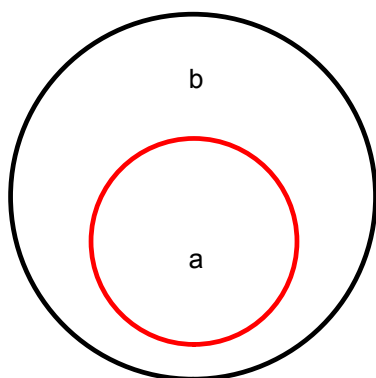
**2.1 – Conditional Statements**

Conditional Statement: “If a, then b.” or “a implies b.”

a = hypothesis

b = conclusion

Euler diagram



$$a \Rightarrow b$$

$$a \rightarrow b$$

2.1 #7-11

"If it is snowing, then it is cold outside."

"If it is cold outside, then it is snowing."

hypothesis	conclusion
it is snowing	it cold outside
it is cold outside	it is snowing

7. Do both statements have the same hypothesis? no

8. Are they both true? Why or why not? no; it can be cold but not snow

9. Do they mean the same thing? no

10. Rewrite the first statement so that the conclusion is stated before the hypothesis.

It is cold outside if it is snowing.

11. Is the statement that you wrote true?

yes

Rewrite the sentences in "if-then" form.

16. "Smokey Bear wouldn't have to do commercials for a living if money grew on trees."

If money grew on trees, then Smokey Bear ... living.

17. "All architects use geometry."

If they are an architect, then they use geometry.

19. "Use the stairs instead of the elevator in case of fire."

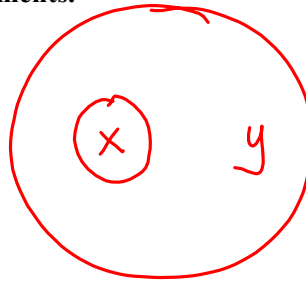
If there is a fire, then use the stairs instead of the elevator

20. "No vampire casts a shadow."

If they are a vampire, then they do not cast a shadow.

27. Draw Euler diagrams to represent the statements.

“If x, then y.”

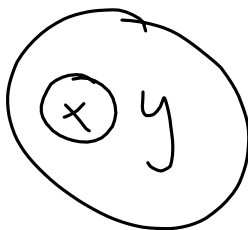


“If y, then x.”



29. Which diagram also illustrates the statement “If not y, then not x”?

contrapositive



$$\sim y \rightarrow \sim x$$

contrapositive of

$$x \rightarrow y$$

**2.2 – Definitions**

When we define a word in mathematics, the word and its definition are understood to have the exact same meaning.

For example, if we define a “triangle” as “a polygon that has three sides,” then both of the following statements are true:

“If a figure is a triangle, then it is a polygon that has three sides.”

If a, then b.  $a \rightarrow b$

“If a figure is a polygon that has three sides, then it is a triangle.”

If b, then a.  $b \rightarrow a$

For statement “If a, then b.”

Its converse is “If b, then a.”

In general, if a statement is true, then its converse is not necessarily true.

If a statement is a definition, then its converse is always true, and the two statements can be combined into an “if and only if” statement.

$$a \leftrightarrow b$$

“A figure is a triangle if and only if it is a polygon that has three sides.”

True statement: If you are an astronaut, you are not more than six feet tall.  $a \rightarrow b$

Hypothesis:  
you are an astronaut.  $a$

Conclusion:  
you are not more than six feet tall  $b$

6. Write the converse of the statement.  $b \rightarrow a$

If you are (not more than six feet tall),  
under six feet tall  
then you are an astronaut.

7. Is the converse true?

no

8. Does it have the same meaning as the original statement? no

contrapositive:  $\sim b \rightarrow \sim a$

If you are over six feet tall, then  
you are not an astronaut. also true

**Definition:** You have arachibutyrophobia iff you have the fear of peanutbutter sticking to the roof of your mouth.

If the definition were represented in symbols as  $a \leftrightarrow b$  and "a" represents "arachibutyrophobia," what does  
if and only if

14.  $\leftrightarrow$  represent? if and only if ( $\rightarrow$  implies)

15. "b" represent?  
the fear of p.b. ... roof of mouth

In words, " $a \rightarrow b$ " for this definition is "If you have arachibutyrophobia, then you are afraid of peanut butter sticking to the roof of your mouth."

16. Write in words, " $b \rightarrow a$ " for this definition.  
If you are afraid of p.b. sticking to ... mouth, then  
you have arachibutyrophobia.

17. Is this sentence necessarily true?  
yes