Lesson Notes 1-3   Venn Diagrams
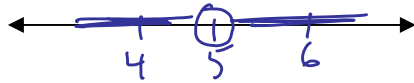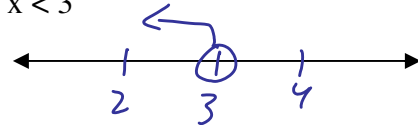
Part A: Using the word "not"

The negation of the statement "I am going to assign homework tonight" would be: "I am not going to assign homework tonight". In Math the symbols for negations are: $\neq, \nleq, \ngeq,$ $<, >$.

Show the following on a number line:
      a) x $\neq$ 5   (b) x < 3

Part B: Using the word "and"

a) List the factors of 12: _1, 2, 3, 4, 6, 12_   List the factors of 18: _1, 2, 3, 6, 9, 18_

      List the factors of 12 and 18: _1, 2, 3, 6_

b) List the multiples of 5: _5, 10, 15, 20, ..._   List the multiples of 2: _2, 4, 6, 8, ..._

      List the first few multiples of 5 and 2: _10, 20, 30, ..._
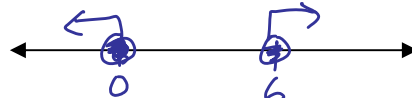
c) Sketch the following on a number line and write an algebraic number statement:
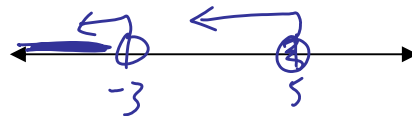   i) x > -2 and x ≤ 4:

      ii) x ≥ 6 and x ≤ 0

      iii) x < -3 and x ≤ 5

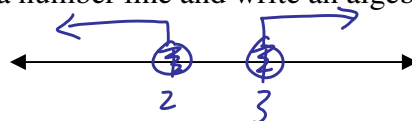**Part C: Using the word "or"**

a) List the factors of 18: _1, 2, 3, 6, 9, 18_   List the factors of 30: _1, 2, 3, 5, 6, 10, 15, 30_

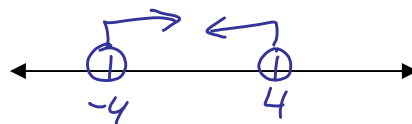   List the factors of 18 or 30: _1, 2, 3, 5, 6, 9, 10, 15, 18, 30_

b) Sketch the following on a number line and write an algebraic number statement:
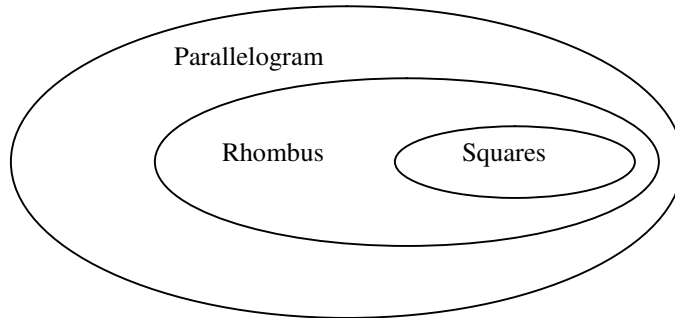   i) x ≥ 3 or x ≤ 2

      ii) x > -4 or x < 4

Part D: Venn Diagrams

A Venn diagram is a diagram where the elements of sets are represented by points within closed loops. It offers a convenient way to demonstrate abstract relationships in a concrete fashion.

**Example 1:**

*a square is a rhombus and a parallelogram

*a rhombus is a parallelogram, but not a square

Example 2: The following Venn diagram displays the results of a survey of 100 families regarding technology in their homes.
C represents the number of families with a computer
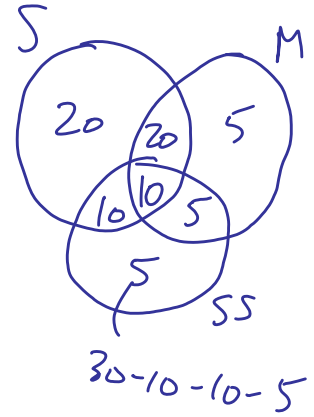D represents the number of families with a DVD player
F represents the number of families with a fax machine
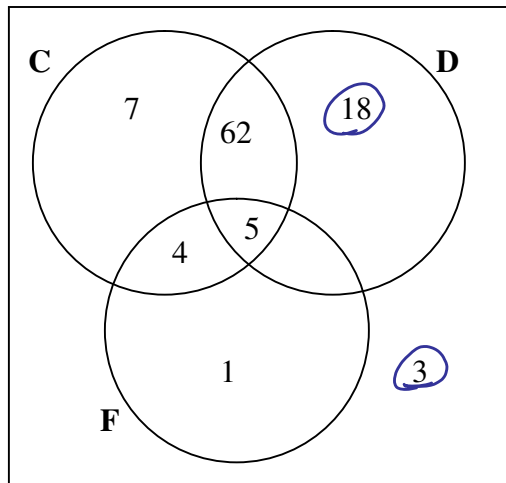
a) What % of families have a computer at home? $7+62+5+4=78\%$

b) How many families have all three machines in their home? 5

c) How many families have none of the machines in their homes? 3

d) How many families do not have a fax machine? $7+62+18+3=90$

e) How many families have a computer and a DVD player? 67

f) What fraction of the families have a computer or a fax machine?
$100-3-18=\dfrac{79}{100}$

g) What % of the families have a computer and a fax machine in their home, but not a DVD player? 4

Example 3: Draw a Venn Diagram to show the following.
A student survey shows the following:

60% of those surveyed have seen the movie Spiderman
40% have seen Matrix Reloaded
30% have seen Sixth Sense
30% have seen both Spiderman and Matrix Reloaded
20% have seen both Spiderman and Sixth Sense
15% have seen both Matrix Reloaded and Sixth Sense
10% have seen all three movies

(Venn diagram, handwritten: S and M circles at top, SS circle at bottom. Values: 20, 20, 5 across top; 10, 10, 5 in middle; 5 at bottom. Labels S, M, SS. Note: 30−10−10−5)

a) What percent of the students have seen at least one of the three movies?

$20 + 20 + 5 + 10 + 10 + 5 + 5 = 75$

b) What percent of the students have only seen Matrix Reloaded?

5

c) What percent of the students have only seen Spiderman?

20

d) What percent of the students have seen Spiderman and Sixth Sense, but not Matrix Reloaded?

10

$$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)$$

Example 4: Each member of a sports club plays at least one of soccer, rugby, or tennis,
The following information is known:

   43 members play tennis
   11 play tennis and rugby
   7 play tennis and soccer
   6 play soccer and rugby
   84 play rugby or tennis
   68 play soccer or rugby
   4 play all three sports

a) How many members does the club have?

b) How many members play only soccer?

c) How many members play soccer or tennis?

d) How many play rugby and soccer, but not tennis?