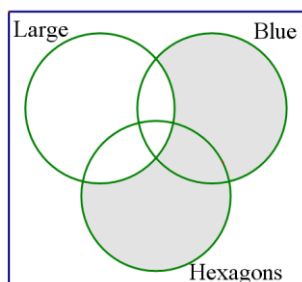PROBLEM 1

April is twice as old as May. June is 3 times as old as April. Together their ages add up to 36. How old is each girl? Use an algebra piece model to solve.

PROBLEM 2

A deck of 300 cards is numbered with whole numbers from 1 to 300, with each card having just one number. How many of these cards do not have a 4 printed on them?

PROBLEM 3

A) Write down the set notation indicating the shaded region.



B) Sketch a three-circle Venn diagram that accurately represents the following set relationships:

$$A \subseteq B \qquad C \not\subset B \qquad A \cap C \neq \varnothing$$

## PROBLEM 4

Write the equation of a line perpendicular to the line y = ½ x + 4 and passing through the point (3,2).

## PROBLEM 5

Solve for x:

$$6\left(\frac{x}{2} - 3\right) \le 5x + 6$$

## PROBLEM 6

Determine if the conclusion is valid. Justify your answer using the ideas of converse, inverse or contrapositive.

Premises:  1. The alarm rings when we eat French fries.

2. The alarm is ringing.

Conclusion: We ate French fries.

PROBLEM 7

Re-write the following as an "if-then" conditional statement:

I always order mushrooms on my pizza.

PROBLEM 8

Sketch a Venn diagram to determine whether the conclusion follows logically from the premises.

Premises: All Heridians are Zeridians. Some Zeridians like marshmallows.

Conclusion: Some Heridians like marshmallows.

PROBLEM 9

Is the following sequence arithmetic, geometric, or neither? In either case what comes next?

295, 250, 205, 160,_____

## PROBLEM 10

Is the following sequence arithmetic, geometric, or neither? In either case what comes next?

-12, -7, 0, 9,_____

## PROBLEM 11

Is the following sequence arithmetic, geometric, or neither? In either case what comes next?

3, 18, 108, 648, _____

## Problem 12

T = triangle, H = hexagon, S=square

Figure 1: T

Figure 2: TH

Figure 3: THSS

Figure 4: THSST

Figure 5: THSSTH

A. Assuming the pattern continues, what comes next?

B. How many squares in the 151st figure?

PROBLEM 13

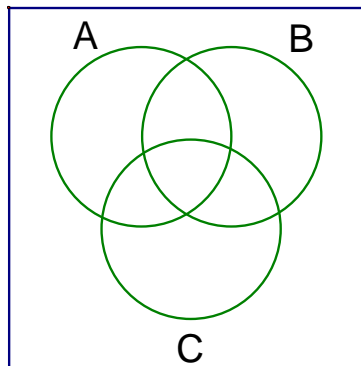List Polya's 4 steps for problem solving

PROBLEM 14

Is the following rule a function?

A. Assign to each state its capital city.

B. Each child is assigned to its grandparent.

PROBLEM 15

Shade a three circle Venn Diagram to represent (A∩B')∪C

Solutions:

1. April is 8, May is 4 and June is 24.
2. First count how many cards contain a 4.  Between 1 and 100 the cards containing 4's are 4, 14, 24, 34, 40, 41, . . . , 49, 54, 64, 74, 84, 94.  This is 19 cards.  There are also 19 cards containing 4's between 100 and 200, and 19 between 200 and 300.  So there are 300 − 19 − 19 − 19 = 243 cards that do not contain 4's.
3. a) $(B \cup H) \cap L'$   b)
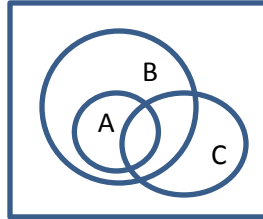


4. y = -2x+8
5. $x \geq -12$
6. Invalid –the conclusion uses the *converse* which is invalid.
7. If I order pizza, then I order mushrooms on it.
8.
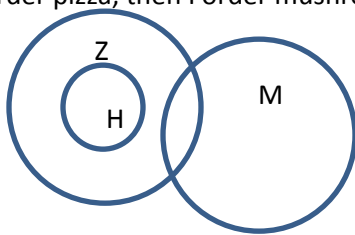


H=Heridians,Z= Zeridians, M="People who like marshmallows" . The marshmallow circle must overlap the Zeridian circle because of our premise, but I can draw that and still not overlap the Heridian circle so it is possible that there are no Heridians who like marshmallows so the conclusion is invalid.

9. Arithmetic, 115
10. Neither, 20
11. Geometric, 3888
12. A. Figure 6: THSSTHSS,  B. The 151$^{st}$ figure has 100 squares
13. Understand the Problem, Make a plan, Carry out the plan, Look back
14. A. Yes, B. No (a child can have more than one grandparent)
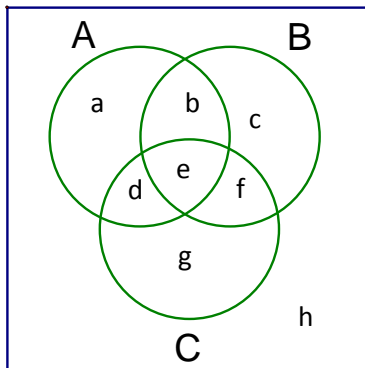


15. The regions a,d,e,f and g would be shaded