



## Fall

- Rational vs irrational numbers (  $\pi$  vs 3.14 and the square root of any non-perfect square)
- Divisibility by 2-11 and by combinations of relatively prime numbers such as 3 and 4 for 12, etc. including word problems related to the rules
- Prime and composite numbers
- Exponents- including zero and negative
- Prime factorization
- Number of factors of a given number
- Census problem and similar problems involving factors.
- GCF and LCD.
- Cycle of the units digits with exponents
- Problem solving techniques: looking for patterns, drawing diagrams, elimination, making tables, solving simpler problems

## Spring

- Basic counting principle
- Introduction to Pascal's triangle and its patterns
- Handshake problem
- Counting principle with and without overlap.
- Problem-solving involving casework
- Review of all previously learned problem solving strategies, with application

## Possible Summer Topics

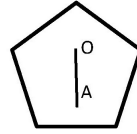
- Identifying and naming polygons
- Symmetry in polygons
- Convex vs concave polygons
- Sum of the angle measures of polygons, angle measures of regular polygons



- 
- Pythagorean Theorem
  - Develop formula for area of a regular polygon
  - Area of circle, triangle, square, rectangle, parallelogram, trapezoid, and composite figures composed of those
  - Simplification of radicals, used in Pythagorean Theorem problems.
  - Scaling of two dimensional figures and the impact on area.
  - Use of algebra in pattern description.

## Sample Problems

1. Write an irrational number.
2. Write a rational number.
3. If a number is divisible by 3 and 4, it must also be divisible by...
4. Name the largest two-digit prime number.
5. Write the prime factorization of 120.
6. How many factors does 144 have?
7. Name a positive integer that has an odd number of factors.
8. My brothers are 16 years apart in age. Right now, both of my brothers' ages are prime numbers. In 4 years, they will be prime number ages again. How old is each brother now?
9. I have packages of hot dog rolls and packages of hot dogs. The hot dog rolls come in packages of 16 each. The hot dogs come in packages of 12. What is the minimum number of packages of hot dog rolls and hot dogs I need to buy so that I can use one hot dog roll for each hot dog and not have anything left?
10. Find the units digit of 3125
11. How many different sized squares of integer dimensions are on a chess board?
12. At the deli I can order a sandwich with 3 different kinds of meat, on 3 different kinds of bread with 3 combinations of kinds of dressing. How many different kinds of sandwiches with one meat, one kind of bread, and one dressing can I order?
13. There are 8 people in a room. If each person shakes hands with all the other people in the room, how many handshakes will there be?
14. In how many different ways can the letters of the word TREES be written?
15. What is the name of this polygon?



16. Draw the all the lines of symmetry for the above polygon.
17. Given that apothem  $OA = 3$  and one side of the polygon is 4.13, find the area of the polygon.
18. Is the above polygon a concave or a convex polygon?
19. Find the sum of the measures of the angles in an octagon.
20. Find the measure of one of the angles in a regular octagon.
21. Mary walks 9m east. She then turns and walks 12m south. It starts to rain so Mary returns to her starting point using the shortest path possible. How far did Mary walk to get back to her starting point?
22. A circle has a radius of 5. If the radius of the circle is doubled, how is the area affected?
23. Find the exact area of the figure below given that side EY of rectangle EASY is the diameter of semi-circle O, AS of rectangle EASY is the base of equilateral triangle ETS,  $EA = 12$ ,  $IT = 6.93$  and  $EY = 8$ .

