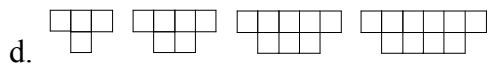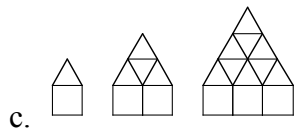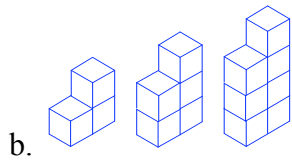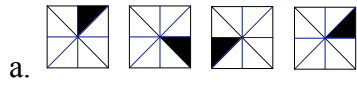1. For each of the following sequences of figures, determine a possible pattern, draw the next figure according to the pattern, and describe

a.

b.

c.

d.

2. Use the traditional clock face to determine the next three terms in the following sequence: 1, 6, 11, 4, 9…

3. The first windmill takes 5 match stick squares to build, the second takes 9 to build, and the third takes 13 to build, as shown below. How many match sticks will it take to build the 10th windmill?   The 17th? The 25th? Explain your thinking.

4. Cut a piece of paper into 5 strips. Take any one of the strips and cut it into 5 pieces; take another stripe, cut it into 5 pieces; and so on. How many pieces are there after the last strip is cut into pieces? Explain your thinking.

5. Jean wants to build a rectangular picture frame that encloses an area of 120 square centimeters. She wants the length and width to be natural numbers, {1, 2, 3, 4…}. What dimensions give the least perimeter?

6. Joe is setting up tables for a noon luncheon in the gym. He has 25 small square tables that hold one person to a side. He plans to put 25 of these tables in a row to make one long rectangular table that is only one table wide.

       a. If 60 people will be attending the lunch, will he have enough space to seat them all using this plan? Explain your thinking.

       b. If he places all 25 tables in the form of a big square, how many people would he seat? Explain your thinking.

7. Five friends decided to give a party and split the costs equally. Ann spent $4.75 on invitations, Ben spent $12 for drinks and $5.25 on vegetables, Carl spent $24 for pizza, Dina spent $6 on paper plates and napkins, and Ed spent $13 on decorations. Determine who owes money to whom and how the money can be paid.

8. An elevator stopped at the middle floor of a building. It then moved up 4 floors and stopped. It then moved down 6 floors, and then moved up 10 floors and stopped. The elevator was now 3 floors from the top floor. How many floors does the building have?

9. How many ways can you make change for a $50 bill using $5, $10, $20 bills?

10. The sign says you are leaving Missoula. Butte is 120 miles away and Bozeman is 200 miles away. There is a rest stop halfway between Butte and Bozeman. How far is the rest stop from Missoula?

11. Frankie and Johnny began reading a novel on the same day. Frankie reads 8 pages a day and Johnny reads 5 pages a day. If Frankie is on page 72, what page is Johnny on?

12. Two houses on the same street are separated by a large empty field. The first house is numbered 29 and the other is numbered 211. An architect is designing 13 new houses to be build between the two existing houses. What should the numbers of the new houses be if along with the existing houses, the numbers need to form an arithmetic sequence?

13. Same-sized cubes are glued together to form a staircase-like sequence of solids as shown below. All of the unglued faces of the cubes need to be pointed. How many faces will need to be painted in the 100th solid?
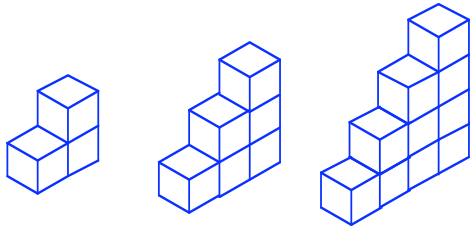
14. Eight marbles look alike, but one is slightly heavier than the others. Using a balance scale, explain how you can determine the heavier one in exactly
    a. 3 weighings
    b. 2 weighings

15. List three more terms that complete a pattern in each of the following:
    a. 0, 1, 3, 6, 10 …….
    b. 52, 47, 42, 37 …
    c. 1, 2, 3, 5, 8, 13…
    d. 2, 5, 8, 11, 14…
    e. 64, 81, 100, 121...
    f. 0, 4, 8, 12…..
    g. 1, 8, 27, 64...

16. If fence posts are to be placed in a row 5 meters apart, how many posts are needed for 100 meters of fence?

17. If a complete turn of a car tire moves a car forward 6 feet, how many turns of the tire occur before the tire goes off its 50,000 mile warranty?

18. A carpenter has three large boxes. Inside each large box are two medium-sized boxes. Inside each medium-sized box are five small boxes. How many boxes are there altogether?

19. Tom's team entered a mathematics contest where teams of students compete by answering questions that are worth either 3 points or 5 points. No partial credit was given. Tom's team scored 44 points on 12 questions. How many 5-point questions did the team answer correctly?

20. In a fraternity with 30 members, 18 take mathematics, 5 take both mathematics and biology, and 8 take neither mathematics nor biology. How many take biology but not mathematics?

21. At a volleyball game, the players stood in a row ordered by height. If Kent is shorter than Mischa, Sally is taller than Mischa, and Vera is taller than Sally, who is the tallest and who is the shortest?

22. Oakridge has a population of 4800 and only one movie theater. One week the movie, *The Break-Up* was shown, and 2200 residents went to see it. The following week, the movie *Pirates of the Caribbean* was shown and 3100 people went to see it.

    a. What is the greatest number of townspeople that could have seen both movies? Justify your answer.

    b. What is the least number of people that could have seen both movies? Justify your answer.

23. Millie and Sam began saving money at the same time. Millie plans to save $3 a month, and Sam plans to save $5 a month. After how many months will Sam have exactly $10 more than Millie?

24. You are asked to distribute $900 in prize money. The dollar amounts for the prizes are $625, $125, $25, $5, and $1. The maximum number of prizes is 900 with each winner receiving $1. How should this $900 be distributed in order to give the fewest number of prizes?

25. On a 14-day vacation, George increased his caloric intake by 1500 calories per day. He also worked out more than usual by swimming 2 hours a day. Swimming burns 666 calories per hour and a net gain of 3500 calories adds 1 pound of weight. Did George gain at least 1 pound during his vacation? Explain.

26. The owner of a bicycle shop reported his inventory of bicycles and tricycles in an unusual way. He said he counted 126 wheels and 108 pedals. How many bikes and how many trikes did he have?

27. A customer wants to mail a package. The postal clerk determines the cost of the package to be $18.95, but only 6¢ and 9¢ stamps are available. Can the available stamps be used for the exact amount of postage for the package? Explain.

28. Bill and Sue both work at night. Bill has every sixth night off and Sue has every eighth night off. If they are both off tonight, how many nights will it be before they are both off again?

29. Jim found that after working for 9 months he had earned 6 days of vacation time. How many days per year does he earn at this rate?

30. Pat is starting a diet. When he arrived home, he ate 1/3 of the half of pizza that was left from the previous night. The whole pizza contains approximately 2000 calories. How many calories did Pat consume?

31. In the old days it cost 29 cents to mail a letter and 19 cents to mail a postcard. Tina wrote to 20 people one month. Her cost for postage was $5.20. How may postcards did she write during that time?

32. Show that any six consecutive even whole numbers can be written in the figure so that the sum of the three numbers on each side of the triangle is the same.
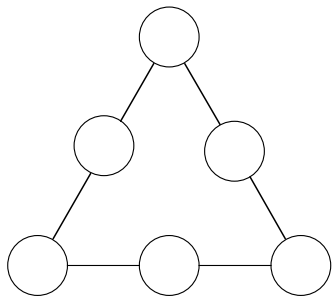
33. A "Super Bounce" ball will rebound half the height it drops. The ball is dropped from a height of 176 feet. How far off the ground is the ball when it has traveled a total of 500 feet?

34. In a group of 37 people, 18 are neither overweight nor lawyers. Ten are overweight and 13 are lawyers. How many lawyers in the group are not overweight?

35. Two men, each weighing 200 pounds, and their two sons weighing 100 pounds each, crossed a river in a small boat that can carry only 200 pounds. How many trips did it take to get everyone to other side of the river? Explain.

36. Two bike riders ride around in a circular path. The first rider completes one round in 12 minutes and second rider completes it in 18 minutes. If they both start at the same place and at the same time and go in the same direction, after how many minutes will they meet again at the starting place?

37. If taxi fares are $3.50 for the first half mile and $0.75 for each additional quarter mile, what is the fare for a two-mile trip?

38. Herman Hollerith, inventor of the electronic tabulating machine, was born on leap day 1860 and died on November 17, 1929. How old was he when he died and how many birthdays did he have?

39. Silver's Cleaners decided to raise the price of dry cleaning a sports coat from $4.00 to $5.00. The same percentage increase was applied to dry cleaning a jacket. The old cost of dry cleaning a jacket was $10.00. What is the new cost of dry cleaning a jacket?

40. Matthew is at a zoo. He takes a picture of a one-meter snake beside a brick wall. When he developed his pictures, the one-meter snake is 2 cm long and the wall is 4.5 cm high. What was the actual height of the brick wall in cm.

41. Jim has three times as many comic books as Charles. Charles has two-thirds as many comic books as Bob. Bob has 27 comic books. How many comic books does Jim have?

42. At the Party Store, paper plates come in package of 30, paper cups come in packages of 15, and napkins in packages of 20. What is the least number of plates, cups, and napkins that can be purchased so that there is an equal number of each?

43. Bugs Bunny has three carrots of lengths 10cm, 12cm and 15cm. How can he use these carrots to mark off a length of 17cm?

44. Homer Simpson entered a pie eating contest at the country fair. Homer was determined to win and went into training for 6 days. Each day he ate 4 more pies than the day before. Homer ate 150 pies while in training. How many pies did he eat each day?

45. On an algebra test, I had seven times as many correct answers as incorrect ones. There were 120 items on the test, how many did I get right?

46. What's the number I'm thinking of? It is greater than 44 squared and less than 45 squared. 5 squared is one of its factors, and it is a multiple of 13.

47. My father is four times as old as me. In 20 years, he will be only twice as old as me. How old is my father and how old am I?

48. When Malcolm was visiting his Grandpa's farm, he saw that the farm only raised hens and hogs. Malcolm counted 38 heads and 100 feet in the barnyard. How many hens and how many hogs did his grandpa have in the barnyard?

49. A boy ate 100 cookies in five days. Each day he ate 6 more than the day before. How many cookies did he eat on the first day?

50. Bacteria in a Petri dish double the area they cover every day. If the dish is covered after 16 days, on what day was only one quarter of it covered?

51. Shawn bought a car for $5600.00. He sold it to Rachel for 5/6 the price he paid for it. Rachel sold it to Raelene for 1/5 less than she paid. Raelene sold it to Rick for 3/4 what she paid.   What did Rick pay for the car?

52. A rectangular chalk board is 3 times as long as it is wide. If it were 3 meters shorter and 3 meters wider, it would be square. What are the dimensions of the chalk board?

53. Three people share a car for a period of one year and the mean number of kilometers traveled by each person is 152 per month. How many kilometers will be traveled in one year?

54. Pete's choices for lunch are three fruits: apples, bananas, and oranges, four kinds of sandwiches: bologna, cheese, salami, and peanut butter, and two cookies: chocolate chip and Oreo.

    a. How many different lunches are possible if a lunch consists of one fruit and one sandwich and one cookie?

    b. How many different lunches are possible if Pete refuses to eat a salami sandwich with an orange or an Oreo with an apple?

55. How many four digit numbers can you make using only the four digits 1, 2, 3, and 4.

     a. If you use each number only once?

     b. If there are no restrictions on how many times to use each number?