DKC^3 2016 – Word Problems

1. My House Number

If my house number is a multiple of 3, then it is a number from 50 through 59.
If my house number is not a multiple of 4, then it is a number from 60 through 69.
If my house number is not a multiple of 6, then it is a number from 70 through 79.

What is my house number?

2. Series

Look at this series: 8, 6, 9, 23, 87 , ... What number should come next?

3. Handshake

At a party, everyone shook hands with everybody else. There were 105 handshakes.

How many people were at the party?

4. Driving Time

Interstate 94 runs between Minneapolis, MN and Fargo, ND. There are 235 miles of Interstate between the two cities. John lives in Minneapolis and will be driving to Fargo. Mallory lives in Fargo and will be driving to Minneapolis. If they both leave at 9:00am on the same day, and John is traveling at a constant speed of 69 mph, and Mallory is traveling at a constant speed of 72mph, what time will they pass each other? (Round to the nearest minute).

5. Arrangements

Arrange the digits 1 – 9 in any order so that:

The number formed by the first two digits is divisible by 2.
The number formed by the first three digits is divisible by 3.
The number formed by the first four digits is divisible by 4.
The number formed by the first five digits is divisible by 5.
And so on up to nine digits…

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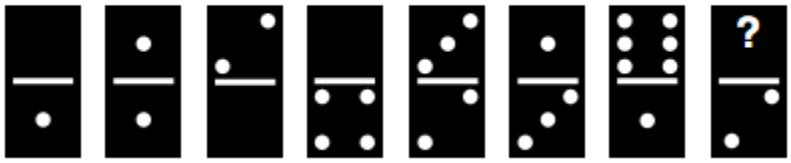
6. Dominoes

How many number of dots replaces the question mark?



7. Poker Face

Five-card stud is a poker game, in which a player is dealt 5 cards from an ordinary deck of 52 playing cards. How many distinct poker hands could be dealt? (Hint: In this problem, the order in which cards are dealt is NOT important. For example, if you are dealt the ace, king, queen, jack, and ten of spades, it is the same as being dealt the ten, jack, queen, king, and ace of spades.

8. Code Refactoring

Charlie is a Software Engineer at Digi-Key. He is working on a new app to increase the productivity of the Marketing department. Each morning, Charlie writes 200 lines of code, and each afternoon he refactors the code to be more modular and take advantage of reusing existing classes and methods. This refactoring reduces the total lines of code in the app by 10% each day (rounded to the nearest line of code).

How many work days will it take Charlie to have over 1000 lines of code in his app at the end of the day?

9. Nasty Numbers

We will call a positive integer “nasty” if it has at least two pairs of positive integer factors such that the difference of one pair equals the sum of the other pair. Example: 6 is nasty because 6 * 1 = 6, 2 * 3 = 6 and 6 – 1 = 2 + 3.

List all the nasty numbers between 1 and 50 inclusive.

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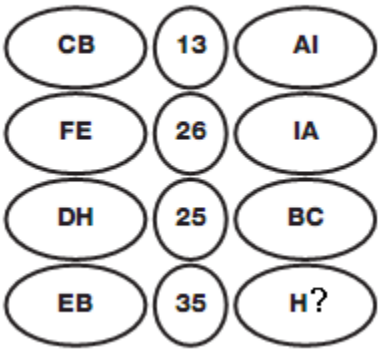
10. Need a Letter

Which letter replaces the question mark?



11. Number Crunch

Three numbers are such that the second is eight more than the first, and the third is seven less than four times the first. The sum of the three numbers is 37.

What are the numbers?

12. Jobs

There are three men – Orville, Virgil, and Homer. Each has two jobs. The jobs are: private eye, racecar driver, singer, jockey, bartender and cardsharp. Try to find each man's two jobs from these facts:

1.) The bartender took the racecar driver's girlfriend to a party

2.) Both the racing driver and the singer like playing cards with Homer

3.) The jockey often had a drink with the bartender

4.) Virgil owes the singer a buck

5.) Orville beat both Virgil and the jockey at cards

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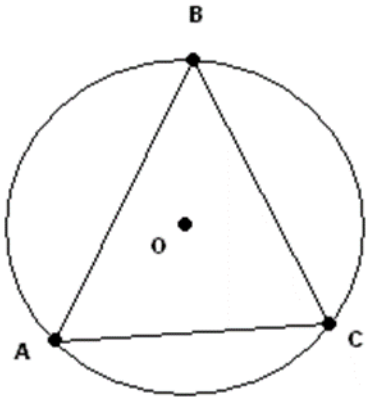
13. Circles

In the triangle ABC sides AB and CB have equal lengths and the measure of angle ABC is equal to 36 degrees. What is the measure of angle BOC where O is the center of the circle?



14. Broke Bill

Bill enters the bank to cash a check. The teller gets confused and, where cents are written, gives Bill paper dollars and, where dollars are written, gives Bill cents. As Bill gathers the money, he unwittingly drops a coin on the floor, losing it. When Bill gets home and counts the money, he discovers he has exactly twice the amount that was written on the check.

What amount of money was written on the check?

15. Find That Number

There is a two-digit number whose digits are the same and has the following property: when squared, it produces a four-digit number whose first two digits are the same and equal to the original's minus one, and whose last two digits are the same and equal to the half of the original's.

What is the two-digit number?

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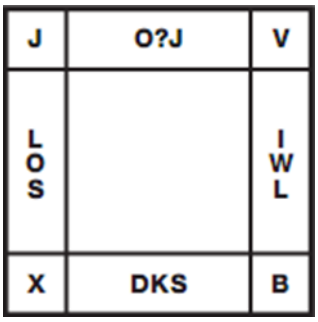
16. Squares

Which letter replaces the question mark?



17. Spider

A spider is one foot from the floor in the middle of a 12 foot square end wall of a 30-foot long room. A fly is situated in the middle of the other end wall, 1 foot from the ceiling.

What is the shortest walking distance for the spider to reach the fly?

18. Rectangles

One side of a rectangle is 3 cm shorter than the other side. If we increase the length of each side by 1 cm, then the area of the rectangle will increase by 18 cm^2.

Find the lengths of all sides.

19. Light Bulb Switching

If you have 100 lightbulbs (labeled 1-100) and they all start off. On the first pass, you flip the switch for all of the lights (turning them all on). On the second pass, you flip the switch for every other light (so every second light, turning half of them off). On the third pass, you flip every third light (every third light that was off gets turned on, and every third light that was turn on gets turned off).

If this pattern continued for 100 total passes, how many lights would be on?

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20. Farming

A farming field can be ploughed by 6 tractors in 4 days. When 6 tractors work together, each of them ploughs 120 hectares a day. If two of the tractors were moved to another field, then the remaining 4 tractors could plough the same field in 5 days.

How many hectares a day would one tractor plough then?

21. The Emperor's Proposition

You are a prisoner sentenced to death. The Emperor offers you a chance to live by playing a simple game. He gives you 50 black marbles, 50 white marbles and 2 empty bowls. He then says, "Divide these 100 marbles into these 2 bowls. You can divide them any way you like as long as you use all the marbles. Then I will blindfold you and mix the bowls around. You then can choose one bowl and remove ONE marble. If the marble is WHITE you will live, but if the marble is BLACK… you will die."

How do you divide the marbles up so that you have the greatest probability of choosing a WHITE marble?

22. What Door Do I Open?

There are two doors (a blue door and a red door) with a person standing beside each of the doors. Behind one of the doors is $1 million, behind the other door is nothing. Both people know what is behind each of the doors. You know for a fact that one person always lies and the other person always tells the truth. You only get to ask one question to one person before you have to choose what door you would like to open.

What question and to what person do you ask to win get the $1 million?

23. Old Math

Diophantus was a Greek mathematician who lived in the third century. He was one of the first mathematicians to use algebraic symbols. Most of what is known about Diophantus's life comes from an algebraic riddle from around the early sixth century. The riddle states:

Diophantus's youth lasted one sixth of his life. He grew a beard after one twelfth more. After one seventh more of his life, he married. 5 years later, he and his wife had a son. The son lived exactly one half as long as his father, and Diophantus died four years after his son.

How many years did Diophantus live?

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24. What's In the Box?

There are three boxes which each contains two marbles: one has two white, one has two black, and one has one white and one black marble. Each of the boxes also is labeled as to its contents, but each label is incorrect.

What is the fewest number of marbles you need to remove from the boxes and look at to definitely determine the contents of all three boxes?

25. Standard Sequence

Given the word STANDARD, take away two letters from this eight letter word and add three digits to make a logical sequence.