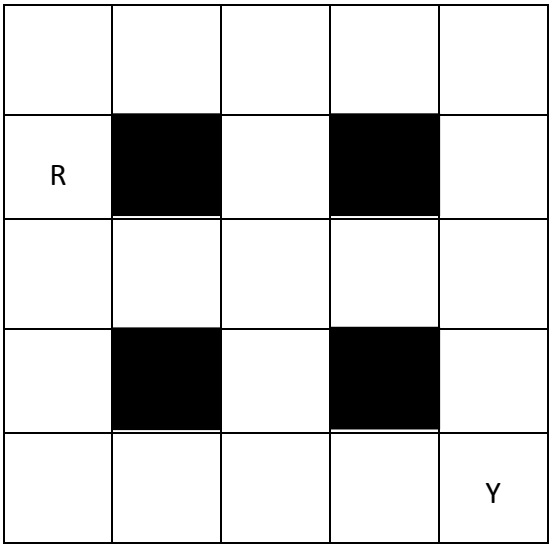
DKC^3 2018 - Word Problems

(Each word problem is worth 5 points)

1. Crossword Puzzle

Complete the crossword puzzle with the words from the list.



ANGER
ASTER
BATON
BLUSH
CARRY
CHASM
CIGAR
COMIC
CRASH
CUBIC
HONEY
HURRY
MONEY
ORGAN

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2. Determine the Values

What are X and Y?

A	A	B	B	12
A	B	C	B	19
B	X	A	B	17
Y	C	A	A	18
13	22	17	14	

3. Pick a Number

Which of the numbers in the box should be placed under 17 in the second line?

2	3	4	5	6	7	8	10	11	17
7	2	17	6	13	8	3	5	4	

9	15	20	33	21	25

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4. Which Two are Guilty?

In a series of failed code promotions, it was found that there were two disgruntled software engineers working together to break the builds and promotions and cause system downtime. An investigator was able to identify five suspects, and each of the five make two statements. One of the trouble makers makes two true statements. The other trouble maker makes two false statements. Little is known as to the truthfulness of the statements made by the three innocent software engineers.

Austin
1. I had nothing to do with the build that day.
2. Zach is innocent.

Zach
1. I am innocent.
2. Elizabeth's first statement is false.

Carrie
1. I have no idea who the guilty ones are.
2. Derek's statements are both false.

Derek
1. Carrie's second statement is not true.
2. Austin is not guilty.

Elizabeth
1. Austin and Zach are the culprits.
2. At least one of Derek's statements is true.

Which software engineer is guilty and lies and which one is guilty and tells the truth?

5. Add the Numbers

1 + 1 + 1 + 1 + 1
1 + 1 + 1 + 1 + 1
1 + 1 x 0 + 1 = ???

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6. Murder Mystery Word Riddle

A donkey behind another donkey
I'm behind that second donkey
But there is a nation behind me

It is a murder you can describe in a word.

7. House Hunting

My friend Ben has moved into a new house on a long road in which the houses are numbered consecutively, 1 – 82. To find out his house number I ask him three questions to which I receive a yes/no answer. I will not tell you the answers, but if you can work them out you will discover his house number. The questions are:

1. Is it under 41?
2. Is it divisible by 4?
3. Is it a square number?

Can you work out the number of Ben's house?

8. Working Together

If Ed works one shift every second day, Leni works once every third day, and Barry works every fifth day, how often do all three colleagues work together?

9. Feline Rescue

Firefighters Dean and Linda rescued a number of cats from trees in one week. Linda rescued twice as many cats as Dean. The total number of cats rescued is a perfect square. Neither rescued more than one cat a day. How many cats did each firefighter rescue?

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10. Tom Hoofs it Home

Back in the old days when my brother used to work, he used to have his wife drive him to the train station and then he'd take the train and go to work. Then an hour later, he'd get on the train to come home, right after lunch. He'd get to the train station and his wife would meet him there and they'd drive home. One day, he decides to leave work early at 11 am. Needless to say, he gets to the train station an hour early. Rather than call his wife, it's a nice day and he decides to hoof it. So he starts walking in the direction she'll be driving. And low and behold, he sees his wife coming up the road and she sees him by the side of the road. They get in the car and they drive home and arrive 20 minutes earlier. Don't forget - she left home at the usual time. Of course, she didn't know he was going to leave work an hour early. They get home 20 minutes earlier than they would have gotten home. How long was he walking before she picked him up?

11. Low Tide

There is a yacht tied to the dock in the harbor at dead low tide. The tide, because it is dead low, is obviously coming in. And it is coming in at the steady rate of two-thirds of a foot per hour. So, if you were in the harbor and you were measuring the rate, after a half hour it would have come in a third of a foot. The porthole on the side of the yacht is 9 feet above the surface of the water. How many minutes will it be until that distance is reduced from 9 feet to 7 ½ feet?

12. A Rope, Two Telephone Poles, and Some Confounding Math

There are two telephone poles. Each one is 100 feet tall. They are parallel and an unknown distance apart. We're going to attach a 150-foot rope from the very top of one of the poles, to the top of the other. This rope will, of course, droop down somewhat. That drooping rope is called a "catenary," from the Latin word for chain. So, we've got these two 100-foot poles, and a 150-foot rope. The rope is between the two poles, and it's going to droop down, making an arc. What must be the distance between the two poles, so that the lowest point of this catenary is 25-feet above the ground?

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13. Fruit Prices

An apple is 40 cents, a banana is 60 cents and a grapefruit is 80 cents. How much is a pear?

14. Lunch Money

John noticed that the amount he was paying for lunch was a rearrangement of the digits of the amount of money he had in his pocket, and that the money he had left over was yet another rearrangement of the same three digits. How much money did John start with?

15. Got Milk?

The first year, two cows produced 8100 liters of milk. The second year their production increased by 15% and 10% respectively, and the total amount of milk increased to 9100 liters a year. How many liters were milked from each cow each year?

16. Cryptarithm

Replace each letter of the cryptarithm by a numeral so that the resulting mathematical expression is true.

```
    S E V E N
+   S E V E N
+       S I X
-------------
  T W E N T Y
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17. Bowling Night

List each player along with their score, ball weight and ball color.

1. Josh's ball is 1 lb. heavier than the green ball.
2. The 15 lb. ball scored 5 points less than the 14 lb. one.
3. The golden ball weighs 14 or 15 lbs., and it belongs to Mark or Josh.
4. Paula scored more points than the owner of the blue ball.
5. The owner of the green ball scored 100 or 110 points.
6. Mark and Kelly's scores differ by 5 points.
7. Paula's ball is 2 lbs. lighter than the blue one.
8. The black ball scored fewer points than the blue one.
9. The 14 lb. ball didn't score 110 points and it isn't blue.
10. If Josh has the black ball, then Kelly scored 100 points.

18. Four-Sided Dice

Molly has three special four-sided dice. They have one letter on each side. When she rolls them together she gets three random letters which she then tries to rearrange into a word. In her first eight throws, she's made the words:

CAT, SON, POD, RIG, PEG, TAP, DIN, APE

What are the letters on each die?

19. Theater Revenue

A 6,000 seat theater has tickets for sale at $25 and $40. How many tickets should be sold at each price for a performance to get a total revenue of $174,000?

20. Cans of Paint

Amy wants to paint the four walls in her bedroom with two coats of paint. Two walls are each 8 feet high and 10 feet wide, and the other two are each 8 feet high and 12 feet wide. If a can of paint will cover 375 square feet, how many cans of paint will Amy need to buy?

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21. Antifreeze Solution

How many quarts of pure antifreeze must be added to 9 quarts of a 10% antifreeze solution to obtain a 20% antifreeze solution?

22. Two Students are Wrong

A teacher in a classroom of 30 students writes a number on the board and asks the students to tell her about its divisors. The first student says, "The number is divisible by 2." The second student says, "The number is divisible by 3." The third student claims it is divisible by 4 and so on until the final student claims that the number is divisible by 31. When they are done the teacher states that exactly two of the students were incorrect, and furthermore, the two incorrect students spoke consecutively. Which two numbers did the incorrect students claim were factors?

23. Circle Problem

A pair of standard 6-sided dice are rolled once. The sum of the numbers rolled determines the diameter of a circle. What is the probability that the numerical value of the area of the circle is less than the numerical value of the circle's circumference?

24. Triangle Problem

In a triangle with integer side lengths, one side is three times as long as the second side, and the length of the third side is 15. What is the greatest possible perimeter of the triangle?

25. Three Integers

The product N of three positive integers is 6 times their sum, and one of the integers is the sum of the other two. Find the sum of all possible values of N.