Multiplication and Division Puzzlers

1. Make 100 with four 9's

Challenge: Can you make four 9's equal 100? You can combine the 9's however you like—e.g. 99, 999, etc. You can also use any of these:: +, -, x, /.

2. Perfect Number

A perfect number is a number whose factors add to the number. E.g. 28. It's factors are: 1,2,4,7,& 14. 1+2+4+7+14=28.

Is, e.g., 4 a perfect number? It's factors—numbers that divide evenly into it—are 1 & 2. 1+2=3. So 4 is not a perfect number.

There is 1 perfect number between 1 and 20. Can you find it?

3. Square Cube

2x2=4. 3x3=9. 4 and 9 are squares. I.e. they are products of a number multiplied x itself.

2x2x2=8. 3x3x3=27. 8 and 27 are cubes. I.e. they are products of a number multiplied by itself 3x.

Only 1 number is both a square and a cube. Can you find it?

4 Square Cube's Cousin

Can you find the number that is 1 more than a square and 1 less than a cube?

5. Big Numbers

Jim & Jan took turns multiplying. Jim picked 4. Jan multiplied it by 4 to get 16. Jim multiplied that by 4 to get 64. Jan multiplied that by 4 to get 256. After going back and forth several times, one of them came up with the number 1,048,576. Who came up with that, Jim or Jan?

Hint: You don't need to multiply this all out to figure it out.

6. Half of 12 =7?

My math teacher says that half of 12 is 7. How can this be? Or is he off his rocker?

7. Secret Number

I'm thinking of a secret number. When you add it to itself, you get an answer. When you multiply it times itself, you get the same numbers as when you add, but reversed.

E.g. if the number is A. A+A=BC. AxA=CB.

Can you figure out the secret number?

8. Magic Number

1. Think of a # 1-9.
2. Write it 3x. E.g. if you picked 6, you would write 666.
3. Divide by 3.
4. Divide by your original number.

Is the number that you arrived at…37?

Why does this work?

9. 142857

Solve these problems:
142857 x 1 =
142857 x 2 =
142857 x 3 =
142857 x 4 =
142857 x 5 =
142857 x 6 =

1: 142857. 2: 285714. 3: 428571. 4: 571428. 5: 714285 6:857142
what happens if you mutliply it by 7?

10. Factoring

The number 5 has 2 factors--i.e. 2 numbers which, when multiplied by another whole number, = 5. 1 & 5. How many factors does 6 have? 4. (1,2,3,6).

Can you find these numbers below?

Between	# of factors
1-25	8
25-50	10
50-100	12

Solutions 1A

1. 99 + 9/9 = 100
2. 6. 1+2+3=6
3. 64. 4x4x4, or 8x8. If you like, give a hint: It's < 100.
4. 26. 25=5x5. 27=3x3x3
5. Jan. As you multiply 4s, the last # alternates between 4 & 6. Jan's all end in 6's.
6. Roman numerals. XII is 12. Draw a horizontal line through the middle. You get VII, which is 7!

Solutions 1B

7. 9. 9+9=18. 9x9=81
8. Writing your # 3x is the same as multiplying it x 111. 111/3=37. N x 111 / 3 / N = 37.
9. The answers all use the same numbers, in the same order!
   1: 142857. 2: 285714 3: 428571. 4: 571428. 5: 714285 6: 857142 7: 999999. These answers are 1/7,2/7,3/7…
10. 24: 1,2,3,4,6,8,12,24 48: 1,2,3,4,6,8,12,16,24,48 60, 72, 84, 90, & 96.

Split students into 5 groups, giving each a different puzzler above to solve. Circulate, helping as needed. Each group presents & teaches theirs to the class. Repeat with next 5 puzzlers.