

PRIME

mathgazine

Powerful Numbers

A number is **powerful** if all of its PRIME factors when squared are also factors of the number.

E.g., 25 is **powerful** because its only prime factor is 5 and $5^2 = 25$, and 25 is a factor of 25.

E.g., 12 is **NOT powerful** because its prime factors are 2 and 3, and $2^2 = 4$ and 4 is a factor of 12, but $3^2 = 9$, and 9 is not a factor of 12.

1. What are the **powerful** numbers 100 or less?

2. Are all powers of 2 **powerful** numbers?

3. Which of these multiples of 100 are **powerful**? Circle the **powerful** ones.

200, 300, 400, 500, 600, 700, 800, 900



Completion Ops

Place +, -, ×, or ÷ in each to complete the equation.

1. $(11^2 \square 11) \square 9 \square 10 = 200$

2. $(8 \square 4 \square 2^3 \square 6) \square 5 = 50$

3. $(2^3 \square 4) \square (8 \square 2) \square 3 = 6$

4. $\frac{1}{3}(\square \times \square) \div \square \div \square = \frac{1}{2}$

5. $24 \square 2 \square 2 \square 2 \square 9^0 = 3$

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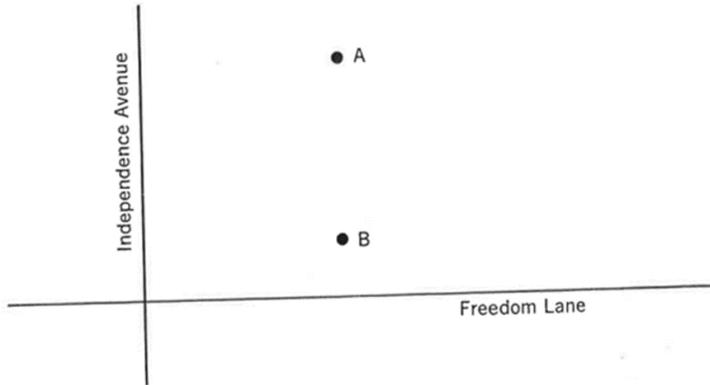
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PRIME
CENTER

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Traffic safety

A traffic cop at Station A has to check traffic on Independence Avenue, and then drive to Freedom Lane to check traffic there. After checking the traffic on those two streets, he has to drive to the Mayor's office located at point B. Draw the shortest route he can take.



MAGIC MULTIPLES

To be magic, sums of rows, columns, and the two major diagonals must be the same. In each square no number is used more than once.



1. Every number is a multiple of 10.

	30	
90	50	
	70	

2. Every number is a multiple of 3.

6	18	30
	12	

3. Every number is a multiple of 6.

	18	
54	42	30

News Update: MATH Discovery!

On January 7, 2016, Dr. Curtis Cooper, a professor at the University Central Missouri, discovered the largest known Mersenne prime number. A prime number is a number that is divisible by only 1 and itself, and 1 and itself must be different. A Mersenne prime is a prime number that is one less than a power of two ($2^n - 1$) for some integer n . These prime numbers are named after Marin Mersenne, a French friar, who studied them in the early 17th century.

The largest Mersenne prime is $2^{74,207,281} - 1$.

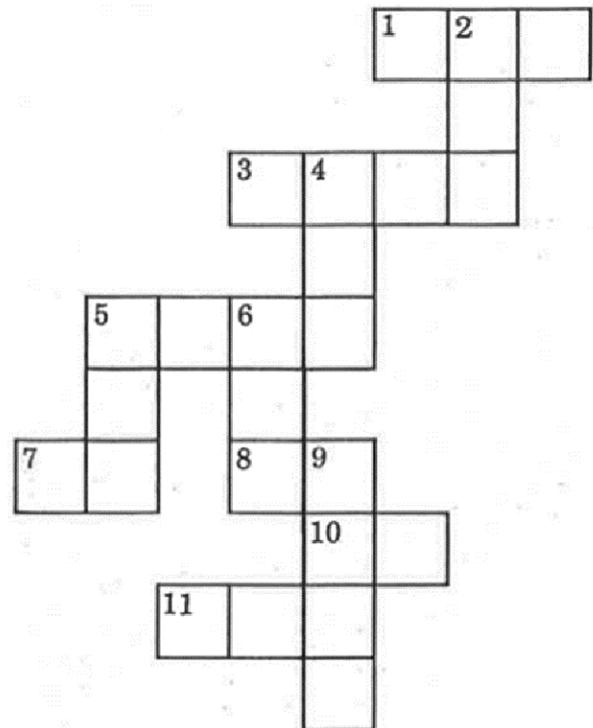
The first four Mersenne primes are: 3, 7, 31, and 127

What are the Mersenne primes greater than 127 and less than 500?

Cross Number Puzzle

Across Clues

1. Greatest 3-digit cubic number.
3.
 - Less than 2000.
 - Multiple of both 3 and 4.
 - Thousands and tens digit are the same.
5.
 - All of the digits are different prime numbers.
 - The product of the tens and ones digit is 21 less than the product of the thousands and hundreds digits.
 - The thousands digit is a triangular number.
7. Largest 2 - digit prime number.
8. Smallest 2 – digit abundant number.
10. Divisible by 2, 3, and 5.
11. A dozen dozen



Down Clues

2. The product of the hundreds and ones digits is equal to the sum of those two digits.
4. The least three – digits number in which all digits are prime numbers.
5. The product of 3 and 119.
6. The tens digit is half the sum of the hundreds and ones digits.
9. The product of 5 and 469.

βαίζαΝθς

Balzano is a puzzle that will tap into your logical reasoning abilities. Read the directions carefully, then try your hand at Balzano Shapes.

Directions:

Your job is to figure out the Desired Arrangement (the solution) of three shapes from clues that provide information about the shapes and their locations. The possible shapes are **circle, hexagon, square, and triangle**. Shapes may not be repeated.

The **Arrangement Column** shows sets of shapes in rows. In the Balzano puzzle below, the second row arranged in order from left to right is: triangle, circle, and hexagon.

Correct Shape in the Correct Place identifies the number of elements that are the correct shape AND are in the right place. The second row has zero shapes in the right place.

Correct Shape in the Wrong Place identifies the number of correct shapes BUT in the wrong place. There are 2 of these in the second row.

Incorrect Shape identifies the number of shapes that do not belong in the arrangement. There is 1 of these in the second row.

Arrangement	Correct shape in correct place	Correct shape in wrong place	Incorrect shape
  	1	0	2
  	0	2	1
  	1	2	0
  	1	1	1
  	0	2	1
	3	0	0