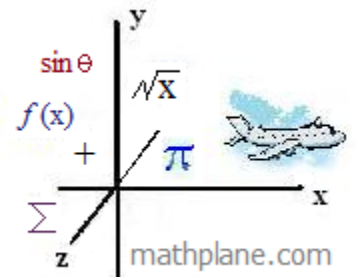


Prime Time

This introduction includes facts, puzzle, and a comic



Prime Numbers

Definition: A natural number (i.e. positive integer) greater than 1 that has no positive divisors other than 1 and itself.

⇔ Its factors are only 1 and itself

- * *2 is the only even prime number*. It is divisible by 1 and itself. (Every other even number is divisible by itself, 1, and 2)
- * A *non-prime*, positive integer is called a "*composite number*". It has at least 3 factors: 1, itself, and at least one other number.
- * *Zero is neither prime nor composite*.
Why? Because, zero has an infinite number of factors. (i.e. any number multiplied by 0 is zero!)
- * *One is neither prime nor composite*.
Why? Because, one has only 1 divisor: itself. So, it does not fit either definition.
- * *Negative numbers*, such as -7 , are not prime.

Why are negative numbers not included in the definition of prime?

Allowing negatives would double the number of divisors/factors.

Example: 7 would have factors of -1, 1, 7, -7

-7 would have factors of -1, 1, 7, -7

Other Comments:

300 BC Euclid demonstrated that there are infinitely number of primes.

3rd Century BC Greek mathematician Eratosthenes figured out a way to generate a list of primes. ('sieve of Eratosthenes')

7th Century Rules for negative numbers were stated

-- The concept of primes preceded the idea of negative numbers. So, primes excluded non-positive integers. The definition of prime numbers was never modified to include negatives.

- * The *Fundamental Theorem of Arithmetic* -- Any integer greater than one can be expressed uniquely as a product of primes. To maintain unique factorization, 1's and negative numbers must be omitted.

- * A *Mersenne Number* is a positive integer that is 1 less than a power of 2

$$M_p = 2^p - 1$$

So, a *Mersenne Prime* is any Mersenne number that is prime.

Hidden Message

Clue: "All of these Answers"

Solve the problems below.
Then, convert numbers to letters
to reveal the hidden message.

Letter Key:

0	1	2	3	4	5	6	7	8	9
B	E	I	G	M	N	P	R	S	U

1) $8^{(3-1)} - 3 =$

1 → _____

2) Sides in a regular heptagon

→ _____

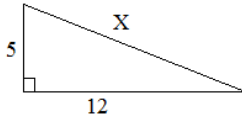
3) 40% of 5

→ _____

4) $4! + 17 =$

1 → _____

5) What is X?



3 → _____

6) Great Common Factor of 20, 25 and 100

→ _____

7) LIX in ancient Rome?

5 → _____

8) $\left(\frac{1}{2} - .03\right) \times 100 =$

7 → _____

9) FREE BOX

Free Box → **B**

10) $.38 = \frac{Y}{50}$ What is Y?

9 → _____

11) $\sqrt{144} + \sqrt{25} =$

1 → _____

12) The median of the following set: {83, 13, 33, 93, 93, 13, 93}

3 → _____

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13" Pizza
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11 ounce steak
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"Seating for four?
No, sir."

"But, we do have
a table for five."

"For dessert,
I recommend
31 flavors."

"31? Are you
teasing us?!"

The Mersenne Review:
"Considering its factors,
Prime is one-of-a-kind.."
"Odd ingredients. But, overall,
an intriguing menu."
"Best food around...
Count on it!"

"The Math Guy Opens
A Unique Restaurant"

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SOLUTIONS --->

Hidden Message

Clue: "All of these Answers"

Solve the problems below.
Then, convert numbers to letters
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SOLUTIONS

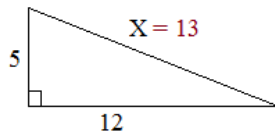
1) $8^{(3-1)} - 3 = 8^2 - 3 = 61$

2) Sides in a regular heptagon **7 sides in a heptagon**

3) 40% of 5 **.4 x 5 = 2**

4) $4! + 17 = (4 \times 3 \times 2 \times 1) + 17 = 24 + 17 = 41$

5) What is X?



5 - 12 - 13 special right triangle

$5^2 + 12^2 = 13^2$
(pythagorean theorem)

6) Great Common Factor of 20, 25 and 100 **GCF is 5**

7) LIX in ancient Rome? **Roman numerals: L = 50, I = 1, X = 10, IX = 9, 59**

8) $\left(\frac{1}{2} - .03\right) \times 100 = (.50 - .03) \times 100 = 47$

9) **FREE BOX**

10) $.38 = \frac{Y}{50}$ What is Y? **(multiply both sides by 50)**

$Y = 19$ Also, $\frac{38}{100} = \frac{19}{50}$

11) $\sqrt{144} + \sqrt{25} = 12 + 5 = 17$

12) The median of the following set: {83, 13, 33, 93, 93, 13, 93}

arrange in order: 13 13 33 **83** 93 93 93

83 is the middle term

6 1 → **P**

7 → **R**

2 → **I**

4 1 → **M**

1 3 → **E**

5 → **N**

5 **9** → **U**

4 7 → **M**

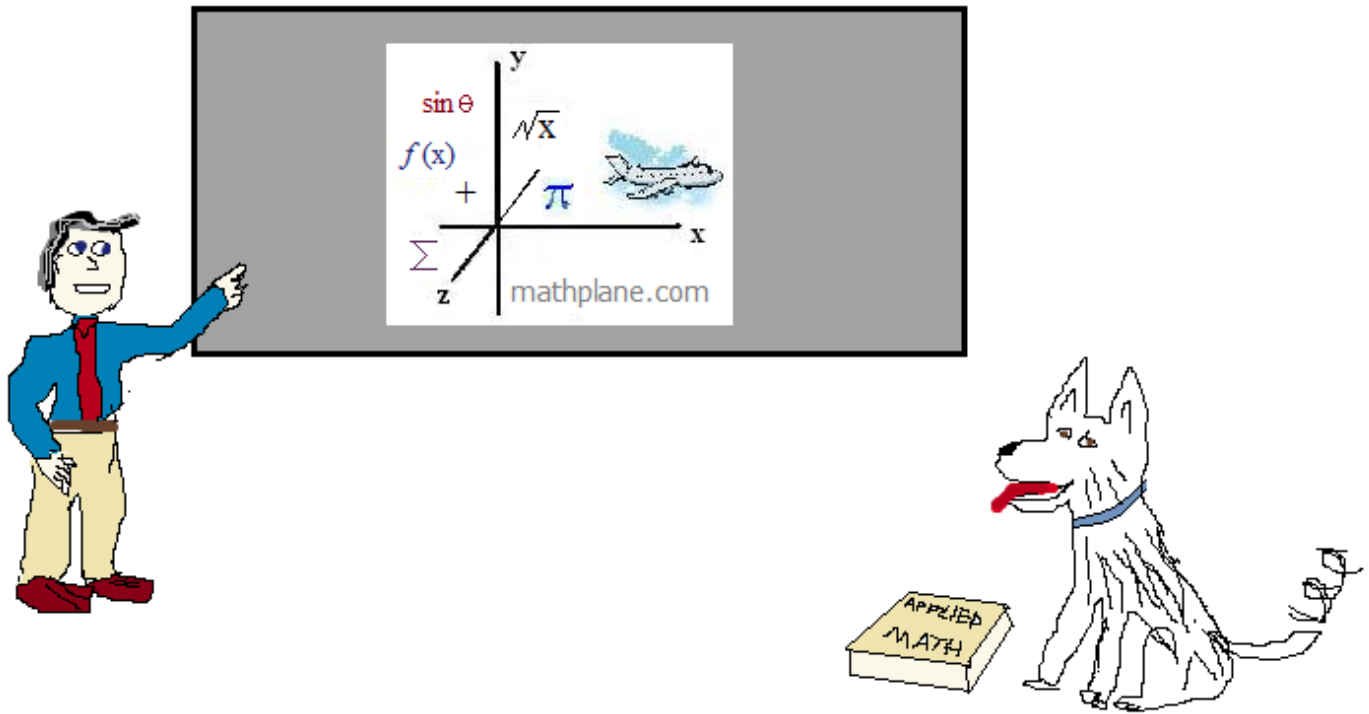
Free Box → **B**

1 9 → **E**

1 **7** → **R**

8 3 → **S**

"All of these answers":
61, 7, 2, 41, 13, 5, 59, 47, 19, 17, 83
PRIME NUMBERS



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