

This book is designed to be fun.

You can answer most of the questions in just a few minutes. Even though you can find most of the answers with mental math, you might like to have paper and pencil on hand. Writing down your ideas might help you think. You can answer the questions in any order, but it might be helpful to begin with the questions in the first chapter, "Facts, Just Math Facts," as a warm-up. The information in them will be useful later, and it will refresh your math skills.

Many people have trouble with math because it was not clearly explained to them how the equations can be used in real life. In this book, we will give examples of situations where understanding math concepts will help you solve everyday problems. You'll even learn techniques that can help you solve problems faster.

Read each question carefully, organize your thoughts and take your best shot. When you review the answers, take your time to understand the solutions to the problems and how to solve them. Once you understand that, we hope you will see the connection between the questions and the answers and how you can use them in your life. If you do that, you're doing a great job.

Above all—have fun!

# Facts, Just Math Facts Questions

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Answer the questions in the following sections as best you can, then check your answers in the corresponding answer section. The answers to the math facts questions can be found starting on page 67.

## 1. Easy as Pi

On March 14th, Albert's school celebrated Pi Day. They had several pi-related events, including a pie sale. What was the price of each pie?

- A. \$1.43      C. \$3.14  
B. \$2.31      D. \$4.44

## 2. Hip To Be Squared

What is the square of 15?

**HINT:** The square of a number is that number multiplied by itself. Its notation is a superscripted '2'; a number  $x$  squared is written as  $x^2$ . For example, the square of 3 is written as  $3^2$  ( $3 \times 3 = 9$ ). The square of 14 ( $14 \times 14$ ) is 196, and the square of 16 ( $16 \times 16$ ) is 256.

## 3. A Prime Number

Ogg, the caveperson, went hunting but didn't bring anything home. So, Nahtogg sent him to the butcher to buy some prime rib. Ogg returned with 4 bags of rib bones, each one containing a different quantity:

- Bag A: 2 ribs      Bag C: 4 ribs  
Bag B: 3 ribs      Bag D: 5 ribs

Nahtogg complained, "I send you to store for prime rib. One bag not prime rib, but composite rib. Go back to store and get all prime rib!"

Which bag made Nahtogg cranky?

**NEED A CLUE?** A prime number (also called a prime) is a whole number that has exactly 2 whole numbers (called "factors") that divide into it. The two factors are 1 and the prime number itself.

#### 4. Following Orders

Solve the following:  $7 \times 3 + 2 \div 4 - 2^2 \times (6 - 1)^2$

**NEED A CLUE?** The key to this problem is understanding which calculations you need to do first, a technique called "order of operations." In arithmetic and algebra, problems like the one above are evaluated using a universal set of operations.

These precedence rules are used in many computer programming languages and modern calculators. However, they are only tools that help you arrive at the answer and are not math "facts."

#### 5. Given the Choice

What is the result when you multiply 107 by 23?

- A. 1,811      C. 2,461  
B. 1,986      D. 2,593

**NEED A CLUE?** Usually, when multiple answers are provided (as in this case), you can rule out one or two of the answers very simply. One of the easiest ways is to figure out whether the answer should be odd or even. If the numbers are both odd, then the answer will be odd. Otherwise, the answer will be even.

#### 6. You Know the Drill

Joe has a  $\frac{3}{8}$ " wire that he needs to thread through a hole in a piece of wood. He wants the hole to be as small as possible, but still allow the wire to easily go through. His drill bits are all in metric units (millimeters). Which is the best drill bit to use?

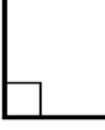
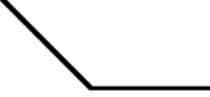
- A. 5 mm      C. 15 mm  
B. 10 mm     D. 20 mm

#### 7. Find it Fast

What is the product of  $25 \times 19$ ?

#### 8. Facts and Figures

Match up each geometric figure on the left with its correct name on the right.

A. 	1. Acute angle
B. 	2. Line segment
C. 	3. Right angle
D. 	4. Ray
E. 	5. Obtuse angle
F. 	6. Line

## 9. Name That Polygon

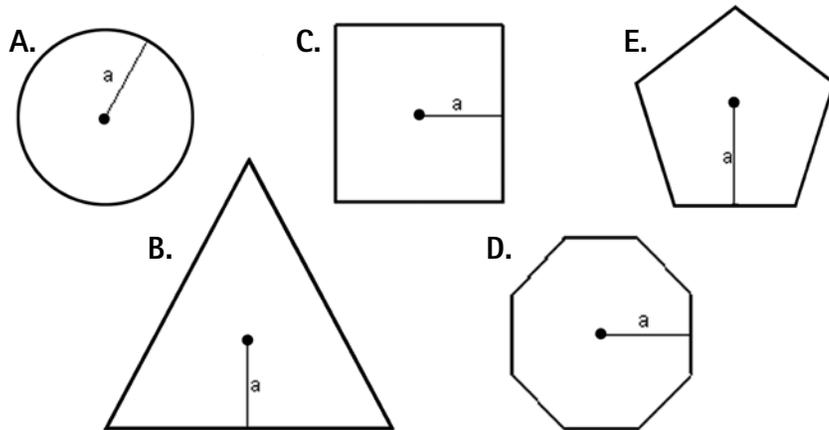
A polygon (from Greek, meaning "many-angle") is a set of line segments, in the same plane, that connect end to end. The straight line segments that make up the polygon are called its sides or edges and the points where the sides meet are the polygon's vertices, or corners.

Here are the names of polygons with varying numbers of sides, from 3 sides to 10 sides. Put the names of the polygons in order from fewest sides to most sides.

- |                       |                             |
|-----------------------|-----------------------------|
| A. Decagon            | E. Heptagon                 |
| B. Octagon            | F. Nonagon                  |
| C. Triagon (Triangle) | G. Hexagon                  |
| D. Pentagon           | H. Tetragon (Quadrilateral) |

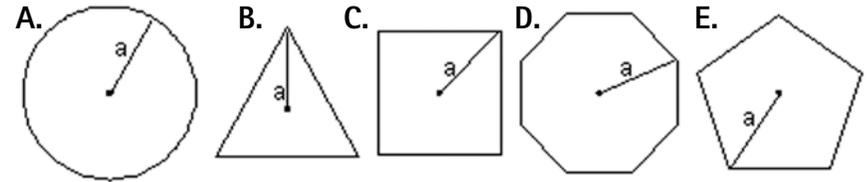
## 10. Polygon Area

Put these regular geometric shapes in order of least to greatest area.



## 11. Polygon Area, the Sequel

Put these regular geometric shapes in order of least to greatest area.

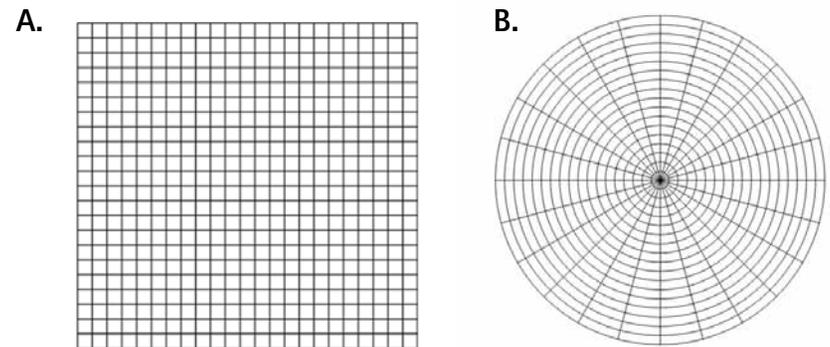


## 12. Show Me a Postcard

My 9th grade algebra teacher, Mr. Hronas, has a special picture frame that measures 3 feet by 2 feet. In it are postcards that students sent him from their vacations around the country. Each postcard is 4 inches tall by 6 inches wide, and none overlap. He can hang the frame either horizontally or vertically. What is the maximum number of postcards he can put in the frame?

## 13. The Great Pumpkins

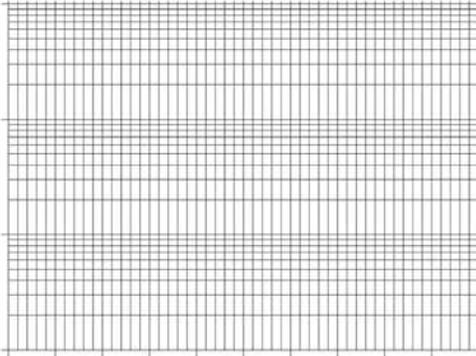
As part of a science experiment, Habib is growing two pumpkins, each with its own special soil mixture. Every day, Habib weighs each pumpkin and measures its diameter. He needs to plot the data on a graph. Which of the graphs below should he use?



C.

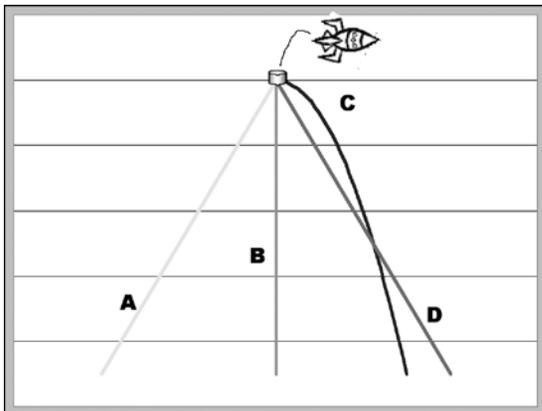


D.



### 14. Over the Moon

Spencer, the space cadet, is flying 1,000 meters over an airless moon at a speed of 30 kilometers per hour (kph). He drops a marker to remind him to visit that area again. From the viewpoint of someone standing on the moon, which of the following trajectories (paths) is the marker most likely to take on its way down to the surface?



### 15. Father of Algebra

Who is considered the father of algebra?

- A. Muhammad ibn Musa al-Khwarizmi
- B. Euclid of Alexandria
- C. Gottfried Wilhelm Leibniz
- D. Leonhard Euler

**NEED A CLUE?** The source of the word "algebra" is an Arabic word: al-jabr.

### 16. Proof Positive

True or false: the following proves that  $1=2$ :

Suppose  $a = b$

Multiply both sides by  $b$

Subtract  $a^2$  from both sides

Factor both sides

Cancel  $(b - a)$  from both sides

Substitute  $a$  for  $b$ , since  $a = b$

Divide both sides by  $a$

$$ab = b^2$$

$$ab - a^2 = b^2 - a^2$$

$$a(b - a) = (b + a)(b - a)$$

$$a = b + a$$

$$a = a + a \text{ or } a = 2a$$

$$1 = 2$$