

Keep Your **BRAIN FIT!**

8 Summer Math
Fitness Challenges
FOR GRADES 9-12



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SUMMER MATH FITNESS CHALLENGE:

Do a problem a week to keep your brain fit!

Grades 9 - 12



Workouts are more fun with a partner.
Tutor.com tutors are ready to help train your brain this summer.

It's easy to connect with a tutor for one-to-one help.

- Select your grade, topic (Math), and Subject (Middle Grades Math)
- Type the Challenge Problem into the question box
- Click Get a Tutor



Challenge Problems:

WEEK 1

You are off on a mystery vacation. Your airplane leaves Paris, France traveling at an average speed of 500 miles per hour. After 26 minutes, the plane is flying over another country's capital. Name the capital city. Can you also name any monuments or landmarks that you might see in the City?

WEEK 2

Looking for a summer job? Have you considered lawn mowing? You will want to know how much lawn you can mow in an hour to make sure you are earning a good wage. Try this challenge to figure out how long would it take to mow a football field from goal line to goal line, using a lawn mower that mows a 20-inch strip and moves at a constant rate of 3 feet per second?

WEEK 3

Ready for a challenge from ancient times? Khufu built the largest Egyptian pyramid in 2580 B.C. The pyramid had 2.3 million stone blocks each weighing 2.5 tons. The Great Wall of China, started in 246 B.C., contained enough rock to construct 120 pyramids the size of Khufu's pyramid. How many pounds of rock were in the Great Wall of China when it was built?

WEEK 4

U.S. Supreme Court Justices decide some of the most important legal matters in our country. They don't always agree with each other but we would like to help them all get along well. If each of the U.S. Supreme Court Justices shook hands with each of the other Justices, once and only once, how many handshakes would take place?

WEEK 5

Tennis anyone? We know that you would rather keep the tennis ball in the air but sometimes it has a tendency to just roll away. How many turns would a tennis ball make if it were rolled from one end of a tennis court to the other end?

Challenge Problems:

WEEK 6

Wayne's Plumbing Service charges \$90 for any service call plus an additional \$70 an hour for the labor. A service call from Joseph's Plumbing Service charges \$60 plus for any service call plus an additional \$130 an hour for labor. When is the total price for a service call the same for both companies?

WEEK 7

You have a friend in another town and you are both training for a marathon. You live 40 miles apart. You run 8 miles per hour, and your friend, Sean, runs 6 miles per hour. If Sean starts running toward your house and you start running toward Sean's house 2 hours later, how long will you have been running when you both meet?

WEEK 8

The Tour de France, the world's most prestigious bike race, will cover a total distance of 3,656 kilometers this summer. During the Tour de France and all bike races, every second counts. In third gear, how many times would a 27 inch wheel of a bicycle make a complete turn in a 7 mile bike race?



Solutions:

WEEK 1 SOLUTION:

$$\frac{500 \text{ miles}}{60 \text{ minutes}} = \frac{x \text{ miles}}{26 \text{ minutes}}$$

$$60x = 13,000$$

$$X = 216.67 \text{ miles}$$

The capital city the plane is flying over is London, England.
Buckingham Palace, the Tower of London, the London Ferris wheel...

WEEK 2 SOLUTION:

The football field is 300 feet long and 160 feet wide. The mower will need to cut 96 inch strips the length of the field. The mower will take 100 seconds to mow the length of the field, which is one strip. Therefore, the mower will take 9,600 minutes, which is 2 hours and 46 minutes, to mow the entire field.

WEEK 3 SOLUTION:

The stone blocks in each pyramid weigh 11,500,000,000 tons (or 11.5 million tons).

If the Great Wall of China contained enough stone blocks to construct 120 pyramids:

$120 \times 11.5 \text{ million} = 1,380,000,000,000$ pounds (which can be written as 1 trillion, 380 billion pounds)

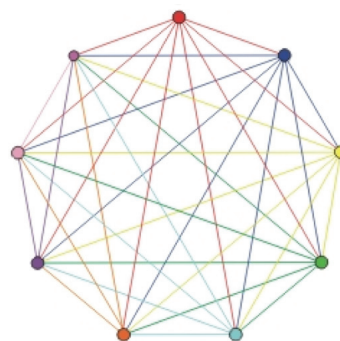
WEEK 4 SOLUTION:

This is a recursive relation problem. The formula is $\frac{n(n-1)}{2}$.

$$\frac{9(9-1)}{2} = \frac{9(8)}{2} = 36 \text{ handshakes}$$

To the right is a pictorial representation of the problem.

A dot represents a person and each line segment represents a handshake between two people.



Solutions:

WEEK 5 SOLUTION:

The length of a tennis court is 78 feet (which is 936 inches).

The diameter of a tennis ball is 2.5 inches. The circumference of the tennis ball can be found by using the circumference formula, $C = \pi d$.

$$C = \pi(2.5) = 7.85 \text{ inches}$$

$$936 \div 7.85 = 119.24$$

The ball would roll approximately 120 times.

WEEK 6 SOLUTION:

Let x represent the hours of labor and y represent the total price for the repair.

Write an equation that represents the total price for a service call from each company.

$$y = 90x + 70 \quad \text{Wayne's Plumbing Service}$$

$$y = 60x + 130 \quad \text{Joseph's Plumbing Service}$$

Solve by substitution:

$$90x + 70 = 60x + 130$$

$$30x = 60$$

$$x = 2$$

In 2 hours, the total price for the service call will be the same for both companies.

WEEK 7 SOLUTION:

Let t = the number of hours Jose runs.

Then $t + 2$ = the number of hours Sean runs.

$$\text{Distance} = \text{rate} \times \text{time}$$

$$\text{Sean's distance} = 6(t+2)$$

$$\text{Jose's distance} = 8(t)$$

Since the total distance is 40 miles, you can write the following equation.

$$8t + 6(t + 2) = 40$$

$$8t + 6t + 12 = 40$$

$$14t + 12 = 40$$

$$14t = 28$$

$$t = 2$$

Jose will have been running for two hours.

Sean will have been running for four hours.

Solutions:

WEEK 8 SOLUTION:

The diameter of the tire is 27 inches.

$$\text{Circumference} = \pi d \quad \text{or} \quad \text{Circumference} = 3.14(27)$$
$$C = 3.14(27)$$

The circumference of the tire is 84.78 inches.

Seven Miles = (5280 feet x 12inches x 7) = 443,520 inches

443,520 inches ÷ 84.79 inches = 5231 (rounded)

The wheel will turn 5231 times during the seven mile bike race.

Note: The position of the gear does not affect the number of times the tire turns.