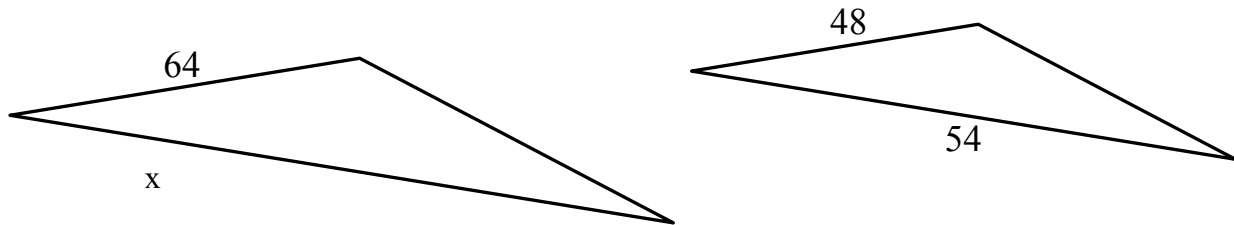


Geometry Homework #10

- 1) A transportation expert measures the amount of traffic on a certain road by recording the number of cars that pass a point on the road every 5 minutes. He starts setting up his equipment shortly before 8 AM and manually counts the cars until he gets the electronic monitoring system in place. By exactly 8 AM, he has manually counted 43 cars and he starts his equipment. If the electronic equipment records exactly 18 cars passing it every 5 minutes, find a formula to calculate the total amount of cars that have passed that point on the road since the expert started setting up his equipment, at five minute intervals, starting at 8 AM. Use this formula to figure out what time of day the 871st car will pass by the monitoring system.
- 2) Find the 85th term of the arithmetic sequence 56, 48, 40, 32...
- 3) Find the sum of all of the whole numbers from 73 to 155 without adding them all up.

- 4) If these two triangles are similar, find x .



- 5) Find the sum of all of the even numbers from 27 to 109 without adding them all up.
- 6) How many pairs of rabbits will result from a single pair of rabbits, in nine months (the beginning of the 10th month), under optimal conditions (none die, and the females always give birth to one male and one female)? Rabbits must be one month old to reproduce, so only one pair exists again at the beginning of the 2nd month. You must create a branching diagram, or tree, to justify your answers.
- 7) Find a formula to calculate any term for the geometric sequence 8, 16, 32, 64...

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- 8) Using graph paper, construct a golden rectangle from the first 8 terms of the Fibonacci's sequence. (Tape sheets together if necessary.)
- 9) Find a formula to calculate any term for the geometric sequence 81, 27, 9, 3...
- 10) Use the 11th and 12th terms of the Fibonacci sequence to approximate the golden ratio to three decimal places.
- 11) Find the sum of the geometric series $1 + 4 + 16 + \dots + 4,096$ without actually adding up all of the numbers.
- 12) You are the only witness to a news story. Your job is to spread that news according to the following rules. You can only call and tell two people. You can only talk to one person at a time. It takes you one minute to complete each call. Each person you call must agree to call two other people according to the same rules. Under these conditions, starting from when you first learned the news personally, how many people would be learning about the story each minute, during the first 7 minutes? You must create a branching diagram, or tree, to justify your answers.
- 13) A scientist in a lab is charged with growing a large amount of bacteria from a single bacterium. The scientist starts with one bacterium and the amount of bacteria grows geometrically, every hour, with the first bacterium producing two new ones, and so on to form the series $1 + 2 + 4 + 8 + \dots$. Without actually adding up the numbers, how many bacteria will the scientist have after 12 hours?
- 14) Using the first nine numbers from the Fibonacci sequence, construct a golden spiral. Use graph paper and tape together as many pieces as you deem necessary.
- 15) Joshua graduates from The Phillips Academy and goes on to use his math skills to found a company that makes him an eighty million dollar fortune. Joshua doesn't trust banks or Wall Street, so he keeps all of his money in a huge vault in the basement of his mansion. If inflation cuts the value of his fortune in half every year, what will his fortune be worth after 8 years?

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- 16) Use the 15th and 16th terms of the Fibonacci sequence to approximate the golden ratio to four decimal places.
- 17) Find a formula to calculate any term for the geometric sequence $\frac{5}{4}, \frac{5}{16}, \frac{5}{64}, \frac{5}{256}, \dots$
- 18) Find the sum of the geometric series $1 + 3 + 9 + \dots + 6,561$ without actually adding up all of the numbers.
- 19) In an effort to get Abigail to do a perfect job on her math homework and to keep her motivated, her dad offers her \$1 for getting the first week's homework completely correct and then promises to double that amount each week, every week, as long as she continues to get every problem on each homework assignment correct. If Abigail manages to get perfect papers on all 23 weekly homework assignments, how much will her dad have to pay her?
- 20) Find a formula to calculate any term for the geometric sequence $-12, -6, -3, \frac{-3}{2}, \dots$

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