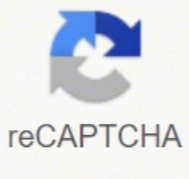




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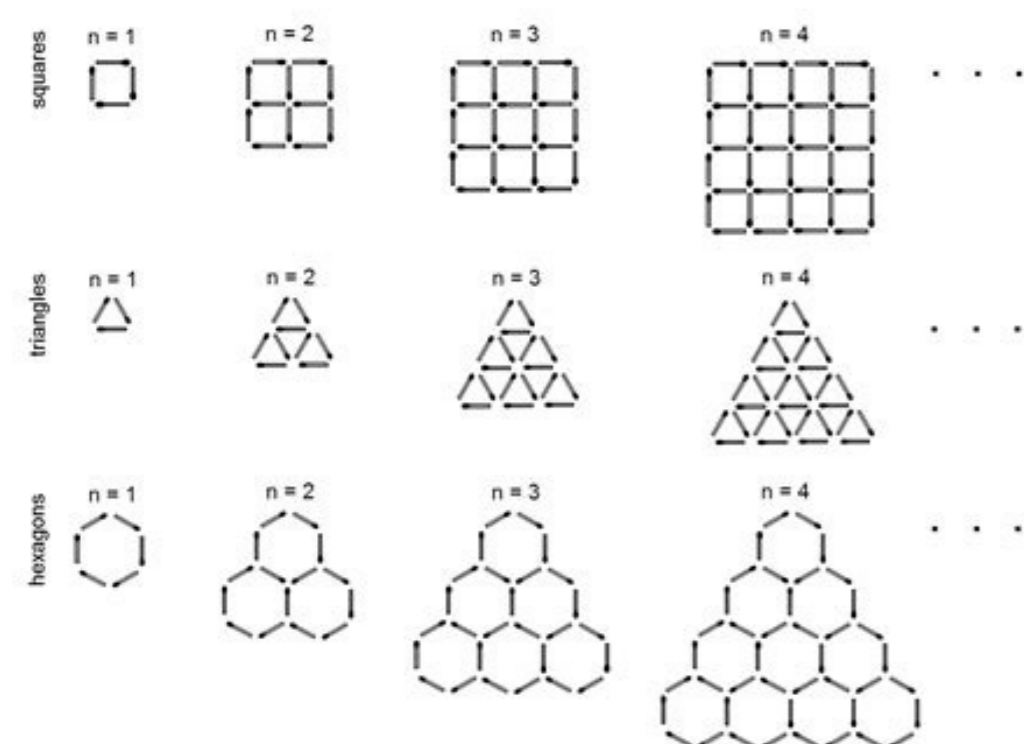
Subtraction (1-10)



- 4 - 3 =
- 5 - 2 =
- 9 - 6 =
- 8 - 2 =
- 10 - 6 =
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- 4 - 1 =
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- 8 - 7 =
- 9 - 3 =
- 5 - 3 =

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growing matchstick patterns (2-D)



Geometric Sequences

This lesson will work with arithmetic sequences, their recursive and explicit formulas and finding terms in a sequence. In this lesson, it is assumed that you know what an arithmetic sequence is and can find a common difference. If you need to review these topics, [click here](#).

Let's look at the geometric sequence

2, 6, 18, 54, 162, ...

This geometric sequence has a common ratio of 3, meaning that we multiply each term by 3 in order to get the next term in the sequence.

The recursive formula for a geometric sequence is written in the form

$$a_n = a_{n-1} \cdot r$$

For our particular sequence, since the common ratio ( $r$ ) is 3, we would write

$$a_n = a_{n-1} \cdot 3$$


So once you know the common ratio in a geometric sequence you can write the recursive form for that sequence.


However, the recursive formula can become difficult to work with if we want to find the 50<sup>th</sup> term. Using the recursive formula, we would have to know the first 49 terms in order to find the 50<sup>th</sup>. This sounds like a lot of work. There must be an easier way. And there is!


Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_


## 15-2 Practice Problems

1. What is the molarity of the solution produced when 145 g of sodium chloride (NaCl) is dissolved in sufficient water to prepare 2.75 L of solution?
2. How many grams of potassium chloride (KCl) are needed to prepare 0.790 L of a 1.90 M solution of potassium chloride in water?
3. What is the molarity of the solution produced when 85.6 g of hydrochloric acid (HCl) is dissolved in sufficient water to prepare 0.385 L of solution?
4. To produce 3.00 L of a 1.90 M solution of sodium hydroxide (NaOH), how many grams of sodium hydroxide must be dissolved?
5. If 8.77 g of potassium iodide (KI) are dissolved in sufficient water to make 4.75 L of solution, what is the molarity of the solution?
6. In order to prepare 2.00 L of a 3.00 M solution of ferric chloride (FeCl<sub>3</sub>), how many grams of ferric chloride must be used?
7. What is the molarity of the solution produced when 14.1 g of ammonia (NH<sub>3</sub>) is dissolved in sufficient water to prepare 0.100 L of solution?
8. To prepare 10.5 L of a 2.50 M solution of potassium hydroxide (KOH), how many grams of potassium hydroxide must be used?
9. What is the molality of a solution containing 75.2 g of silver perchlorate (AgClO<sub>4</sub>) dissolved in 885 g of benzene?
10. What is the molality of a solid solution containing 0.125 g of chromium and 81.3 g of iron?
11. If 18.6 g of methanol is used to dissolve 2.68 g of Hg(CN)<sub>2</sub>, what is the molality of the solution?
12. What is the molality of solid solder wire if it is made from 68.7 g of lead dissolved in 117 g of tin?

A pen has a mass of 15 grams. What is the mass of 5 identical pens?  **A**

A large box has a mass of 125 kilograms. A small box has a mass of 114 kilograms. What is the total mass of both boxes?  **B**

Sarah's fish tank holds 32 liters of water. Sarah uses a 4 liter container to fill the tank. How many times will Sarah need to fill the 4 liter container in order to fill the fish tank?  **C**

Ben has three cups, each filled with 325ml of lemonade. What is the total liquid volume of lemonade in the three cups?  **D**

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to 27 terms  
 9. Find the sum to infinity of  $9 + 3 + 1 + \dots$ .  
 10. Peterson writes a letter to four of his friends. Each year, it increases 2% of its value. Assuming that the process is unaltered and it costs \$2 to mail one letter, find the amount spent on postage when 8th set of letters is mailed. Answer :5 + 5 + 5 + .....  
 A. a. I decide to run a rabbit farm. For example, the expression  $1.15t$  can be rewritten as  $(1.151/12)12t = 1.01212t$  to reveal the approximate equivalent monthly interest rate if the annual rate is 15%. Show Video Lesson Compounding Interest and other Geometric Sequence Word Problems Examples: Suppose you invest \$1,000 in the bank. You invest \$5000 for 20 years at 2% p.a. How much will we end up with? Their daily goal is to sell double the number of boxes as the previous day. We are a non-profit group that run this website to share documents. Common Core: HSA-SSE.B.3c Geometric Sequences Word Problems Examples: Bruno has 3 pizza stores and wants to dramatically expand his franchise nationwide. B. Substitute  $r = -4$  in (1).  $a_1(-4) = 6a_1 = -3/2$  Substitute  $r = 4$  in (1).  $a_1(4) = 6a_1 = 3/2$  The possible values of the first term are  $-3/2$  and  $3/2$ . Answer :1, 2, 4, 8, .....  
 512 This is a geometric sequence with the first term 1 and common ratio 2. Let  $a_n = 512$ .  $a_1 r^{n-1} = 512$  Substitute  $a_1 = 1$  and  $r = 2$ .  $1(2)^{n-1} = 512$  Write 512 as a power of 2.  $2^n \cdot 1 = 29n - 1 = 9n = 104$ . Show Video Lesson Population Growth and Compound Interest This video gives examples of population growth and compound interest. The rabbit grows at 7% per week. He asks each one of them to copy the letter and mail to four different persons with the instruction that they continue the process similarly. If the number of stores he owns doubles in number each month, what month will he launch 6,144 stores? To keep our site running, we need your help to cover our server cost (about \$400/m), a small donation will help us a lot. Your salary for the first year is \$43,125. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. How many will I have in 15 weeks? Kindly mail your feedback to [v4formath@gmail.com](mailto:v4formath@gmail.com) We always appreciate your feedback. I have 50 rabbits. [onlinemath4all.com](http://onlinemath4all.com) Related Pages Number Sequences Linear Sequences Geometric Sequences: n-th Term Quadratic and Cubic Sequences Examples, solutions, videos, and lessons to help High School students learn to choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. 1. Thank you for interesting in our services, monthly? Answer :9 + 3 + 1 + ..... This is a geometric series with  $a_1 = 9$  and  $r = 1/3$ .  $S_n = a_1(1 - r^n)/(1 - r)$  Substitute  $a_1 = 9$  and  $r = 1/3$ .  $S_n = 9(1 - 1/3^n)/(1 - 1/3) = 9(2/3) = 9 \cdot 3/2 = 27/2$ . Factor a quadratic expression to reveal the zeros of the function it defines. Show Video Lesson Application of a Geometric Sequence Example: Bouncing ball application of a geometric sequence When a ball is dropped onto a flat floor, it bounces to 65% of the height from which it was dropped. If this pattern continues, on what day will they sell 24,576 boxes of cookies? How much money do you have in the bank after 3 years? + 131228. Find the sum of the geometric series :5 + 5 + 5 + ..... Answer :2 + 6 + 18 + ..... We need your help to maintenance this website. We welcome your feedback, comments and questions about this site or page. You leave the money in for 3 years, each year getting 5% interest per annum. Show Video Lesson Solve Word Problems using Geometric Sequences Example: Wilma bought a house for \$170,000. Answer : $a_n = 32n - 1$   $a_1 = 32(1) - 1 = 32 - 1 = 31$   $a_2 = 32(2) - 1 = 34 - 1 = 33 = 27$  Common ratio :  $r = a_2/a_1 = 32/31 = 9$  Formula for the sum of first n terms of a geometric sequence.  $S_n = a_1(1 - r^n)/(1 - r)$  Substitute  $n = 8$ ,  $a_1 = 3$  and  $r = 9$ .  $S_8 = 3(1 - 3^8)/(1 - 3) = 3(1 - 6561)/(-2) = 3(6560)/(-2) = 3(3280) = 9840$ . 1. A geometric sequence has first term 3 and common ratio -2. to 27 terms This is a geometric series with  $a_1 = 5$  and  $r = 1$ .  $S_n = na_1$  Substitute  $n = 27$  and  $a_1 = 5$ .  $S_n = 27(5) = 135$ . Answer : $a_2 = 6$  and  $a_4 = 96$   $a_2 = 6a_1 r^2 - 1 = 6a_1 r = 6$  ----(1)  $a_4 = 96a_1 r^4 - 1 = 96a_1 r^3 = 96$  ----(2) (2)  $\div$  (1) : $r^2 = 16$  Take square root on both sides.  $r = \pm 4$  The possible values of the common ratio are -4 and 4. Find the 10th term. 2. The second term of a geometric sequence is 6 and the fourth term is 96. Answer : $S_6 = 46872a_1(1 - r^6)/(1 - r) = 46872$  Substitute  $r = 5$ .  $a_1(1 - 5^6)/(1 - 5) = 46872$   $2a_1(1 - 15625)/(-4) = 46872$   $a_1(-15624)/(-4) = 46872$   $3906a_1 = 46872$  Divide each side by 3906.  $a_1 = 12$ . Write the equation that represents the house's value over time. What will the house be worth in 10 years? to 8 terms Find the sum of the terms in the above geometric sequence.  $S_n = a_1(1 - r^n)/(1 - r)$  Substitute  $n = 8$ ,  $a_1 = 8$  and  $r = 4$ .  $S_8 = 8(1 - 4^8)/(1 - 4) = 8(1 - 65536)/(-3) = 8(65535)/(-3) = 8(21845) = \$174,760$  Apart from the stuff given above, if you need any other stuff in math, please use our google custom search here. Show Video Lesson Try the free Mathway calculator and problem solver below to practice various math topics. How much will your salary be at the start of year six? Answer :Amount spent when the first set of letters is mailed : = 4 \cdot 2 = \$8 Amount spent when the second set of letters is mailed : = 4 \cdot 4 \cdot 2 = \$32 Amount spent when the third set of letters is mailed : = 4 \cdot 4 \cdot 4 \cdot 2 = \$128 If this pattern continues, we will have a geometric sequence with the first term 8 and common ratio 4 as shown below. 8, 32, 128, ..... How does this change if the interest is given quarterly? Find the possible values of the first term and the common ratio. 3. Find the number of terms in the geometric sequence :1, 2, 4, 8, .....  
 5124. Find the sum of 10 terms of the geometric sequence : 1, 2, 4, 8, .....  
 5. Find the sum of first 8 terms of a geometric sequence whose nth term is  $32n - 1$ . 6. Find the first term of a geometric sequence whose common ratio is 5 and sum to first 6 terms is 46872. 7. Find the sum of the geometric series :2 + 6 + 18 + ..... Remember these examples are variations on geometric sequence. Please help us to share our service with your friends. b. Suggested Learning Targets Use properties of exponents (such as power of a power, product of powers, power of a product, and rational exponents, etc.) to write an equivalent form of an exponential function to reveal and explain specific information about its approximate rate of growth or decay. Answer :1, 2, 4, 8, ..... This is a geometric sequence with  $a_1 = 1$  and  $r = 2$ . Formula for the sum of first n terms of a geometric sequence.  $S_n = a_1(1 - r^n)/(1 - r)$  Substitute  $n = 10$ ,  $a_1 = 1$  and  $r = 2$ .  $S_{10} = 1(1 - 2^{10})/(1 - 2) = 1(1 - 1024)/(-1) = -1023/(-1) = 1023$ . + 13122 This is a geometric series with  $a_1 = 2$  and  $r = 3$ . Let  $a_n = 13122$ .  $a_n = 13122a_1 r^{n-1} = 13122$  Substitute  $a_1 = 2$  and  $r = 3$ .  $2(3)^{n-1} = 13122$   $3^n \cdot 1 = 6561$  Write 6561 as a power of 3.  $3^n \cdot 1 = 3^{8n} - 1 = 8n = 9$  Formula for the sum of first n terms of a geometric sequence.  $S_n = a_1(1 - r^n)/(1 - r)$  Substitute  $n = 9$ ,  $a_1 = 2$  and  $r = 3$ .  $S_9 = 2(1 - 3^9)/(1 - 3) = 2(1 - 19683)/(-2) = 2(19682)/(-2) = 19682$ . Answer :Formula for nth term of a geometric sequence :  $a_n = a_1 r^{n-1}$  Substitute  $n = 10$ ,  $a_1 = 3$  and  $d = -2$ .  $a_{10} = 3(-2)^{10-1} = 3(-2)^9 = 3(-512) = -1536$ . © All rights reserved. If I can invest at 5% and I want \$50,000 in 10 years, how much should I invest now? If the ball is dropped from 80 cm, find the height of the fifth bounce. Use the properties of exponents to transform expressions for exponential functions. On January 1, Abby's troop sold three boxes of Girl Scout cookies online. Show Video Lesson Geometric sequence - salary Example: You land a job as a police officer. C. Please submit your feedback or enquiries via our Feedback page. You will receive 7% increase every year. At this rate, how many boxes will they sell on day ?? Try the given examples, or type in your own problem and check your answer with the step-by-step explanations.

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