BECA/Huson/Precalculus: Sequences First and last name:
19 September 2024 Section:

1.12 Test: Powers and radicals, sequences **Mental math - no calculators**

1. Memorize the squares to 100. *3.OA.7 Fluently multiply and divide within 100*

   (a) $3^2 =$

   (b) $9^2 =$

   (c) $6^2 =$

   (d) $3^3 =$

2. Memorize the square roots of whole numbers through 100 and cubes through five.

   (a) $\sqrt{64} =$

   (b) $\sqrt{16} =$

   (c) $\sqrt{49} =$

   (d) $\sqrt{4} =$

   (e) $\sqrt[3]{27} =$

   (f) $\sqrt[3]{8} =$

3. Round to the *nearest thousandth*.

   (a) $A = 3.1415926$

   (b) $V = 1.4142135$

4. Simplify each expression by "collecting like terms"

   (a) $x - 5x^2 - 6x + 9x^2$

   (b) $5\sqrt{3} + 3y - \sqrt{3} - 7y$

5. Use the function $f(x) = 3x - 5$ to answer the questions.

   (a) What is $f(1)$?

   (c) Solve for x if $f(x) = 16$.

   (b) Find $f(\frac{2}{3})$

6. Which sequence is defined recursively?
   (a) $a_n = 4n - 5$
   (b) $a_n = n^2 + 2$
   (c) $a_1 = 16$ and $a_n = a_{n-1} \times \frac{1}{2}$
   (d) $a_n = 1 + \frac{1}{2}n$

7. The nth term of a sequence is given by $a_n = 5n - 3$. What is the 10th term of the sequence?
   (a) 47
   (b) 45
   (c) 43
   (d) 41

8. A sequence is defined recursively by $a_1 = 5$ and $a_{n+1} = 2a_n$ for $n \geq 1$. Find the first four terms of the sequence.

9. A geometric sequence has a first term of $a_1 = 4$ and a common ratio of $r = \frac{1}{2}$. Write the recursive formula for the sequence. Calculate the 5th term.

10. Write a recursive formula for the sequence $1, 3, 9, 27, \ldots$

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11. Which situation could be modeled using a geometric sequence?

    (a) A cell phone company charges \$30.00 per month for 2 gigabytes of data and \$12.50 for each additional gigabyte of data.

    (b) The temperature in your car is 79°. You lower the temperature of your air conditioning by 2° every 3 minutes in order to find a comfortable temperature.

    (c) David's parents have set a limit of 50 minutes per week that he may play online games during the school year. However, they will increase his time by 5% per week for the next ten weeks.

    (d) Sarah has \$100.00 in her piggy bank and saves an additional \$15.00 each week.

12. Which of the following is the recursive formula for the sequence $40, 30, 20, \ldots$

    (a) $g_n = 40 - 10(n-1)$

    (b) $g_1 = 40$
    $g_n = g_{n-1} - 10$

    (c) $g_n = 40\left(\frac{3}{4}\right)^{n-1}$

    (d) $g_1 = 40$
    $g_n = \frac{3}{4}g_{n-1}$

13. A sequence is defined recursively by $a_1 = 3$ and $a_{n+1} = 2a_n - 1$ for $n \geq 1$. What is the explicit formula for the nth term of the sequence?

    (a) $a_n = 2^n - 1$

    (b) $a_n = 2^n + 1$

    (c) $a_n = 3 \cdot 2^{n-1}$

    (d) $a_n = 3 \cdot 2^n - 1$

14. A tree farm initially has 150 trees. Each year, 20% of the trees are cut down and 80 seedlings are planted. Which recursive formula models the number of trees, a_n, after n years?

    (a) $a_1 = 150$
    $a_n = a_{n-1}(0.2) + 80$

    (b) $a_1 = 150$
    $a_n = a_{n-1}(0.8) + 80$

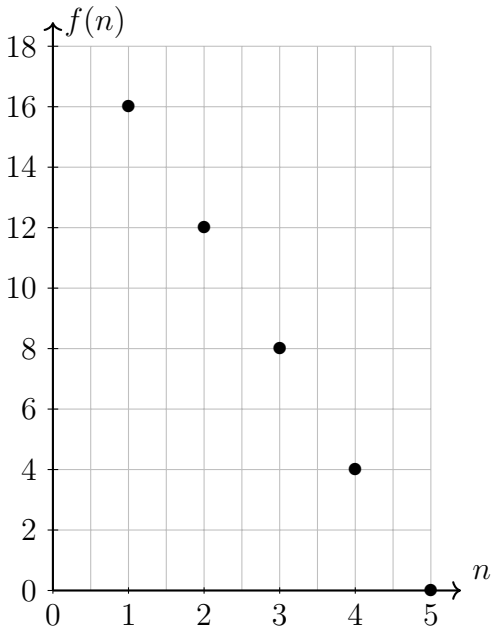
    (c) $a_n = 150(0.2)^n + 80$

    (d) $a_n = 150(0.8)^n + 80$

15. A sequence $f(n)$ is shown below as a graph and as a table.

    (a) Is sequence geometric or arithmetic? Explain how you know.

n	$f(n)$
1	16
2	12
3	8
4	4
5	0



    (b) Write the recursive formula for the sequence.

16. Fill in the blank.

    Question: Who does time wait for? Answer: Time waits for _____