

**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)  $3^2 =$

(c)  $6^2 =$

(b)  $9^2 =$

(d)  $3^3 =$

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

(a)  $\sqrt{64} =$

(d)  $\sqrt{4} =$

(b)  $\sqrt{16} =$

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

(c)  $\sqrt{49} =$

(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)  $a_n = 3n + 1$

(b)  $a_1 = 2$  and  $a_{n+1} = a_n + 3$

(c)  $a_n = 4n - 5$

(d)  $a_n = 2^n$

7. The first term of a sequence is  $a_1 = 7$  and each subsequent term is found by adding 5 to the previous term. Which formula represents the  $n$ th term of the sequence?

(a)  $a_n = 5n + 2$

(b)  $a_n = 5n + 7$

(c)  $a_n = 5n - 3$

(d)  $a_n = 7n + 5$

8. Which of the following is the recursive formula for the sequence  $40, 30, 22.5, \dots$

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

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

(b)  $g_1 = 40$

(d)  $g_1 = 40$

$g_n = g_{n-1} - 10$

$g_n = \frac{3}{4}g_{n-1}$

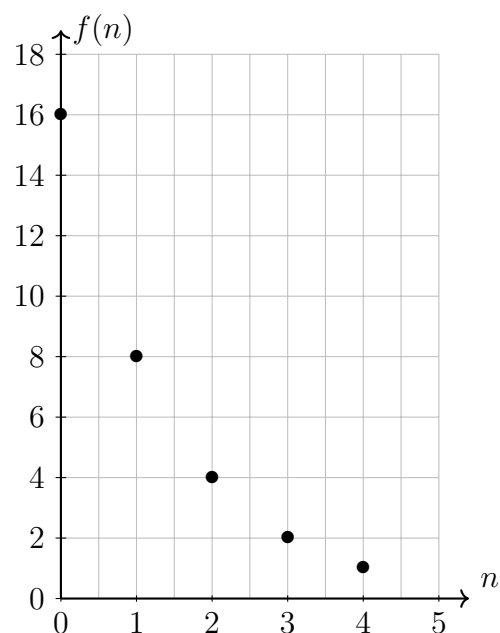
9. A sequence is defined recursively by  $a_1 = 2$  and  $a_{n+1} = 3a_n + 1$  for  $n \geq 1$ . Find the first four terms of the sequence.

10. Given the arithmetic sequence where  $a_1 = 5$  and the common difference  $d = 3$ , write an explicit formula for the  $n$ th term of the sequence. What is the 10th term?

11. Write a recursive formula for the sequence  $5, 10, 15, 20, \dots$
12. Savannah just got contact lenses. Her doctor said she can wear them 2 hours the first day, and can then increase the length of time by 30 minutes each day. If this pattern continues, which formula would not be appropriate to determine the length of time, in either minutes or hours, she could wear her contact lenses on the  $n$ th day?
- (a)  $t_n = 120 + 30(n - 1)$
- (b)  $t_n = 2 + 0.5(n - 1)$
- (c)  $t_n = 2 + 30n$
- (d)  $t_n = 120 + 0.5(n - 1)$
13. A sequence  $f(n)$  is shown below as a graph and as a table.

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

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



- (b) Write the recursive formula for the sequence.