

Algebra 2 Name \_\_\_\_\_ ID: 1  
 Composition & Geometric Series & Sequence Date \_\_\_\_\_ Period \_\_\_\_\_

Perform the indicated operation.

1) $f(n) = 2n$ $g(n) = 4n$ Find $(f + g)(n)$	2) $f(x) = x + 2$ $g(x) = 4x - 4$ Find $(f + g)(x)$
3) $g(x) = x - 2$ $f(x) = 4x - 1$ Find $(g - f)(x)$	4) $f(x) = 3x$ $g(x) = x^2 - 3x$ Find $(f - g)(x)$
5) $g(a) = a - 2$ $h(a) = a^3 + 2a^2 - 2a$ Find $(g \cdot h)(a)$	6) $h(n) = 3n^3 - 5$ $g(n) = -4n - 5$ Find $(h \cdot g)(n)$
7) $f(x) = x^2 - 3x$ $g(x) = 3x - 3$ Find $\left(\frac{f}{g}\right)(x)$	8) $g(x) = 3x + 5$ $f(x) = x^2 + 5x^2$ Find $\left(\frac{g}{f}\right)(x)$
9) $h(x) = 3x - 5$ Find $(h \cdot h)(x)$	10) $h(x) = x^3 + 2x$ Find $(h \cdot h)(x)$
11) $f(x) = -3x - 2$ $g(x) = 4x - 4$ Find $(4f + 2g)(x)$	12) $f(t) = t + 1$ $g(t) = t^2 + t$ Find $(3f - 5g)(t)$
13) $g(x) = 2x + 3$ $f(x) = 4x + 2$ Find $(g + f)(4)$	14) $g(t) = 2t + 5$ $h(t) = t^2 + 3 + t$ Find $(g + h)(-3)$
15) $g(n) = n^2 + 4n$ $f(n) = 3n - 1$ Find $(g - f)(-9)$	16) $g(n) = n - 1$ $h(n) = n^2 - 4$ Find $(g - h)(5)$
17) $g(n) = 2n + 5$ $h(n) = n + 1$ Find $(g \cdot h)(2)$	18) $h(x) = 4x + 4$ $g(x) = 4x - 1$ Find $(h \cdot g)(-2)$

-1-

16)  $g(n) = n - 1$   
 $h(n) = n^2 - 4$   
Find  $(g - h)(5)$

$g(5) - h(5)$   
 $5 - 1 - (5^2 - 4)$   
 $4 - 21 = -17$

$(n - 1) - (n^2 - 4)$   
 $n - 1 - n^2 + 4$   
 $-n^2 + n + 3$   
 $-(5)^2 + 5 + 3$   
 $-25 + 5 + 3 = -17$

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18)  $h(x) = 4x + 4$   
 $g(x) = 4x - 1$   
Find  $(h \cdot g)(-2)$

$(4x + 4) \cdot (4x - 1)$   
 $(-8 + 4) \cdot (-8 - 1)$   
 $(-4) \cdot (-9) = 36$

-1-

12)  $f(t) = t + 1$   
 $g(t) = t^3 + t$   
 Find  $(3f - 5g)(t)$

$t = \text{time}$

$$3f(t) - 5g(t)$$

$$3(t + 1) - 5(t^3 + t)$$

$$3t + 3 - 5t^3 - 5t$$

$$-5t^3 - 2t + 3$$

Apr 28-12:36 PM

10)  $h(x) = x^3 + 2x$   
 Find  $(h \circ h)(x)$

$$h(h(x))$$

$$(x^3 + 2x)^3 + 2(x^3 + 2x)$$

$$(x^3 + 2x)(x^3 + 2x)(x^3 + 2x) + 2x^3 + 4x$$

$$x^6 + 2x^4 + 2x^4 + 4x^2 + 2x^3 + 4x$$

$$x^6 + 4x^4 + 4x^2 + 2x^3 + 4x$$

$$x^9 + 2x^7 + 4x^7 + 8x^5 + 4x^5 + 8x^3 + 2x^3 + 4x$$

$$x^9 + 6x^7 + 12x^5 + 10x^3 + 4x$$

Apr 28-12:30 PM

8)  $g(x) = 3x + 5$   
 $f(x) = x^3 + 5x^2$   
 Find  $\left(\frac{g}{f}\right)(x)$

$$\frac{3x+5}{x^3+5x^2}$$

$$\frac{3x+5}{x^3+5x^2}$$

$x \neq 0, x \neq -5$

$$x^3 + 5x^2 = 0$$

$$\frac{x^3}{x^2} + \frac{5x^2}{x^2} = 0$$

$$(x^2)(x+5) = 0$$

$$x^2 = 0 \quad x+5 = 0$$

$$x = 0 \quad x = -5$$

Apr 28-12:28 PM

6)  $h(n) = 3n^3 - 5$   
 $g(n) = -4n - 5$   
 Find  $(h \cdot g)(n)$

$$(3n^3 - 5) \cdot (-4n - 5)$$

$$-12n^4 - 15n^3 + 20n + 25$$

Apr 28-12:26 PM

12)  $f(t) = t + 1$   
 $g(t) = t^3 + t$   
 Find  $(3f - 5g)(t)$

$t = \text{time}$

$$3f(t) - 5g(t)$$

$$3(t + 1) - 5(t^3 + t)$$

$$3t + 3 - 5t^3 - 5t$$

$$-5t^3 - 2t + 3$$

Apr 28-9:36 AM

10)  $h(x) = x^3 + 2x$   
 Find  $(h \circ h)(x)$

$h(x) = x^3 + 2x$

$h(x) = x^3 + 2x$

$h(h(x))$

$$(x^3 + 2x)^3 + 2(x^3 + 2x)$$

$$(x^3 + 2x)(x^3 + 2x)(x^3 + 2x) + 2x^3 + 4x$$

$$x^6 + 2x^4 + 2x^4 + 4x^2$$

$$(x^6 + 4x^4 + 4x^2)(x^3 + 2x) + 2x^3 + 4x$$

$$x^9 + 2x^7 + 4x^7 + 8x^5 + 4x^5 + 8x^3 + 2x^3 + 4x$$

$$x^9 + 6x^7 + 12x^5 + 10x^3 + 4x$$

Apr 28-9:27 AM

2)  $f(x) = x + 2$   
 $g(x) = 4x - 4$   
 Find  $(f + g)(x)$

$$f(x) + g(x)$$

$$(x+2) + (4x-4)$$

$$\underline{x} + \underline{2} + \underline{4x} - \underline{4}$$

$$5x - 2$$

Apr 28-9:22 AM

4)  $f(x) = 3x$   
 $g(x) = x^2 - 3x$   
 Find  $(f - g)(x)$   
 $f(x) - g(x)$

$$(3x) - (x^2 - 3x)$$

$$3x - x^2 + 3x$$

$$-x^2 + 6x$$

6)  $h(n) = 3n^3 - 5$   
 $g(n) = -4n - 5$   
 Find  $(h \cdot g)(n)$

$$(3n^3 - 5)(-4n - 5)$$

$$-12n^4 - 15n^3 + 20n + 25$$

8)  $g(x) = 3x + 5$   
 $f(x) = x^3 + 5x^2$   
 Find  $\left(\frac{g}{f}\right)(x)$

$$\frac{3x + 5}{x^3 + 5x^2}$$

$$x^2(x+5) = 0$$

$$x \neq 0 \quad x \neq -5$$

Apr 28-9:17 AM

10)  $h(x) = x^3 + 2x$   
 Find  $(h \circ h)(x) \Rightarrow h(h(x))$

$$(x^3 + 2x)^3 + 2(x^3 + 2x)$$

$$(x^3 + 2x)(x^3 + 2x)(x^3 + 2x) + 2x^3 + 4x$$

$$x^6 + 2x^4 + 2x^4 + 4x^2$$

$$(x^6 + 4x^4 + 4x^2)(x^3 + 2x)$$

$$x^9 + 2x^7 + 4x^7 + 4x^5 + 8x^3$$

$$x^9 + 6x^7 + 4x^5 + 8x^3 + 2x^3 + 4x$$

$$x^9 + 6x^7 + 4x^5 + 10x^3 + 4x$$

Apr 28-8:21 AM

$t \Rightarrow \text{time}$

12)  $f(t) = t + 1$   
 $g(t) = t^3 + t$   
 Find  $(3f - 5g)(t) \Rightarrow 3f(t) - 5g(t)$

$$3(t+1) - 5(t^3 + t)$$

$$3t + 3 - 5t^3 - 5t$$

$$-5t^3 - 2t + 3$$

Apr 28-8:26 AM

19) $h(x) = x^2 + 4$ $g(x) = x - 5$ Find $\left(\frac{h}{g}\right)(10)$	20) $g(n) = 2n - 2$ $h(n) = n^3 + 5$ Find $\left(\frac{g}{h}\right)(4)$
21) $g(x) = 2x - 3$ $h(x) = 4x - 2$ Find $(g \circ h)(-6)$	22) $g(x) = x + 1$ $f(x) = x^2 - 1$ Find $(g \circ f)(-7)$
23) $g(n) = 2n + 4$ $f(n) = -3n + 4$ Find $(2g + f)(-3)$	24) $g(n) = n^3 - 1 + n$ $h(n) = 4n + 5$ Find $(4g - 5h)(1)$

**Evaluate each geometric series described.**

25) $-3 - 9 - 27 - 81 \dots, n = 6$	26) $-1 + 4 - 16 + 64 \dots, n = 8$
27) $a_1 = 4, r = 3, n = 10$	28) $a_1 = 3, r = 2, n = 9$
29) $a_1 = -4, a_n = -256, r = 2$	30) $a_1 = 3, a_n = 139968, r = -6$
31) $a_1 = -1, a_n = -16384, r = 4$	32) $a_1 = 2, a_n = 128, r = 2$

**Determine if the sequence is geometric. If it is, find the common ratio, the 8th term, and the explicit formula.**

33) 4, -12, 36, -108, ...	34) 3, 6, 12, 24, ...
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**Given two terms in a geometric sequence find the common ratio and the 8th term.**

35) $a_6 = 15552$ and $a_1 = 72$	36) $a_6 = -128$ and $a_2 = -64$
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**Given the first term and the common ratio of a geometric sequence find the 8th term.**

37) $a_1 = 2, r = -6$	38) $a_1 = 2, r = 3$
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**Given the explicit formula for a geometric sequence find the 8th term.**

39) $a_n = 2 \cdot (-5)^{n-1}$	40) $a_n = (-2)^{n-1}$
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**Given the recursive formula for a geometric sequence find the 8th term.**

41) $a_n = a_{n-1} \cdot -2$ $a_1 = -3$	42) $a_n = a_{n-1} \cdot 4$ $a_1 = 1$
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-2-

32)  $a_1 = 2, a_n = 128, r = 2$       $2, 4, 8, 16, 32, \dots$

$n = ?$

$$S_n = \frac{2(1 - 2^n)}{1 - 2}$$

$$a_n = a_1(r)^{n-1}$$

$$128 = 2(2)^{n-1}$$

$$n = 7$$

28)  $a_1 = 3, r = 2, n = 9$

$$S_9 = \frac{a_1(1-r^n)}{1-r} = \frac{3(1-2^9)}{1-2} = \frac{-1533}{-1} = 1533$$

Apr 28-1:03 PM

Evaluate each geometric series described.

Series  $\Rightarrow$  Sum

26)  $-1 + 4 - 16 + 64 \dots, n = 8$

- + - + - + - + -

Sequence

$-1, 4, -16, 64, \dots, n = 8$

$a_n = a_1(r)^{n-1}$

term

$a_2, a_3, a_4 \dots$

$\frac{4}{-1} = -4$

$\frac{-16}{4} = -4$

$\frac{64}{-16} = -4$

$n = 8$

$a_1 = -1$

$r = -4$

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S_8 = \frac{-1(1-(-4)^8)}{1-(-4)}$

$= 13,107$

Apr 28-12:50 PM



.01   .02   .04   .08   .16  
 .32   .64   1.28   ...

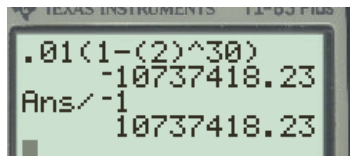
$$S_n = \frac{a_1(1-r^n)}{1-r} \quad \text{30 day}$$

$n = 30$

$a_1 = .01$

$r = .02 / .01 = 2$

$$S_{30} = \frac{.01(1-(2)^{30})}{1-2} = -1$$



\$ 10,737,418.23

Apr 28-12:58 PM

24)  $g(n) = n^3 - 1 + n$   
 $h(n) = 4n + 5$   
 Find  $(4g - 5h)(1)$

$$4g(1) - 5h(1)$$

$$4(1^3 - 1 + 1) - 5(4(1) + 5)$$

$$4 - 45$$

$$= -41$$

Apr 28-12:49 PM

$$20) \quad g(n) = 2n - 2$$

$$h(n) = n^3 + 5$$

$$\text{Find } \left(\frac{g}{h}\right)(4) \Rightarrow \frac{g(4)}{h(4)} = \frac{2(4) - 2}{4^3 + 5} = \frac{6}{69} = \frac{2}{23}$$

$$\frac{2n-2}{n^3+5}$$

Apr 28-12:47 PM

$$22) \quad g(x) = x + 1$$

$$f(x) = x^2 - 1$$

$$\text{Find } (g \circ f)(-7)$$

$$g(f(-7))$$

$$f(-7) = (-7)^2 - 1$$

$$= 49 - 1$$

$$= 48$$

$$g(48) = (48) + 1$$

$$= 49$$

Apr 28-12:44 PM

28)  $a_1 = 3, r = 2, n = 9$

$$S_9 = \frac{3(1 - (2)^9)}{1 - 2} = 1533$$

Apr 28-9:56 AM

Evaluate each geometric series described.

Series  $\Rightarrow$  sum

26)  $-1 + 4 - 16 + 64 \dots, n = 8$

Sequence

$-1, 4, -16, 64 \dots, n = 8$

$$\sum_{n=1}^{n=8} \boxed{\phantom{000}}$$

$a_n = a_1(r)^{n-1}$

$\Sigma \Rightarrow$  sum

to find terms

$$S_n = \frac{a_1(1 - r^n)}{1 - r}$$

$\frac{4}{-1} = -4$

$\frac{-16}{4} = -4$

$\frac{64}{-16} = -4$

1<sup>st</sup> term  $\Rightarrow a_1 = -1$   
ratio  $\Rightarrow r = -4$

$$S_8 = \frac{-1(1 - (-4)^8)}{1 - (-4)}$$

$= -13,107$

Apr 28-9:45 AM

22)  $g(x) = x + 1$   
 $f(x) = x^2 - 1$   
 Find  $(g \circ f)(-7)$

$g(f(-7))$   
 $(-7)^2 - 1$   
 $49 - 1$   
 $= 48$

$g(48) = 48 + 1$   
 $= 49$

24)  $g(n) = n^3 - 1 + n$      $4g(n) + 5h(n)$   
 $h(n) = 4n + 5$   
 Find  $(4g - 5h)(1)$      $n = 1$

$4(g(1)) - 5(h(1))$

$g(1) =$   
 $1^3 - 1 + 1$   
 $1 - 1 + 1$   
 $= 1$

$h(1) = 4(1) + 5$   
 $= 4 + 5$   
 $= 9$

$4(1) - 5(9) = 4 - 45 = -41$

Apr 28-9:40 AM

32)  $a_1 = 2, a_n = 128, r = 2$

$S_n =$      $a_n = a_1(r)^{n-1}$

$128 = 2(2)^{n-1}$

$64 = 2^{n-1}$

$\frac{\log 64}{\log 2} = \frac{(n-1) \log 2}{\log 2}$

$6 + 1 = n$

$7 = n$

Apr 28-9:01 AM

Determine if the sequence is geometric. If it is, find the common ratio, the 8th term, and the explicit formula.

33) 4, -12, 36, -108, ...

$$r = -3$$

YES

34) 3, 6, 12, ~~20~~, ...

$$r = 2$$

YES

Apr 28-9:00 AM

28)  $a_1 = 3, r = 2, n = 9$

$$= 1533$$

$$S_n = \frac{a_1(1-r^n)}{1-r}$$

$$S_9 = \frac{(3)(1-(2)^9)}{1-(2)}$$

$$3 + 6 + 12 + 24 + 48 + 96 + 192 + 384 + 768 = 1533$$

$a_9 = 768$

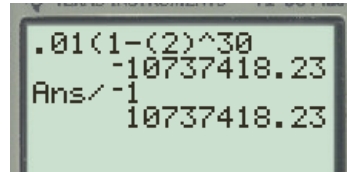
Apr 28-8:42 AM

$r = .02 / .01 = 2$

$.01$     $.02$     $.04$     $.08$     $.16$   
 $.32$     $.64$     $1.28$

$$S_{30} = \frac{(.01)(1 - (2)^{30})}{1 - (2)} \quad \text{30 day}$$

$$= 10,737,418.23$$



Apr 28-8:46 AM

32)

Find n :

$a_1 = 2$     $a_n = 128$     $r = 2$

$$a_n = \frac{a_1(1 - r^n)}{1 - r}$$

$$(-1) 128 = \frac{2(1 - 2^n)}{1 - 2} \quad (-1)$$

$$\frac{-128}{2} = \frac{2(1 - 2^n)}{2}$$

$$\frac{-64}{-1} = \frac{1 - 2^n}{-1}$$

$$\frac{-65}{-1} = \frac{-2^n}{-1}$$

$$65 = 2^n$$

$$65 = 2^n$$

$$\frac{\log 65}{\log 2} = \frac{n \log 2}{\log 2}$$

$$6 = n$$

Apr 28-8:50 AM

<p><u>Series</u></p> <p>26) <math>-1 + 4 - 16 + 64 \dots, n=8</math>  <math>a_1, a_2, a_3, a_4 \dots a_8</math></p> <p><math>n=1</math> to <math>n=8</math></p> <p><math>r = ?</math>  <math>4/-1 = (-4)</math>  <math>-16/4 = (-4)</math></p> <p><math>M \Rightarrow</math> sum</p> <p><math>S_n = \frac{a_1(1-r^n)}{1-r}</math></p> <p><math>S_8 = \frac{-1(1-(-4)^8)}{1-(-4)} = 13,107</math></p>	<p><u>Sequence</u></p> <p><math>-1, 4, -16, 64, \dots</math></p> <p><math>4/-1 = (-4)</math>  <math>64/-16 = (-4)</math></p> <p>1st term in the sequence of series</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p><math>a_n = a_1(r)^{n-1}</math>  <math>a_n = -1(-4)^{n-1}</math></p> </div>
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Apr 28-8:32 AM

22)  $g(x) = x + 1$   
 $f(x) = x^2 - 1$   
 Find  $(g \circ f)(-7)$

$g(f(-7))$

$f(-7) = (-7)^2 - 1$   
 $= 49 - 1$   
 $= 48$

$g(48) = 48 + 1$   
 $= 49$

Apr 28-8:29 AM

Algebra 2 Name \_\_\_\_\_ ID: 1

Composition & Geometric Series & Sequence Date \_\_\_\_\_ Period \_\_\_\_\_

**Perform the indicated operation.**

1) $f(n) = 2n$ $g(n) = 4n$ Find $(f + g)(n)$ $6n$	2) $f(x) = x + 2$ $g(x) = 4x - 4$ Find $(f + g)(x)$ $5x - 2$
3) $g(x) = x - 2$ $f(x) = 4x - 1$ Find $(g - f)(x)$ $-3x - 1$	4) $f(x) = 3x$ $g(x) = x^2 - 3x$ Find $(f - g)(x)$ $-x^2 + 6x$
5) $g(a) = a - 2$ $h(a) = a^3 + 2a^2 - 2a$ Find $(g \cdot h)(a)$ $a^4 - 6a^2 + 4a$	6) $h(n) = 3n^3 - 5$ $g(n) = -4n - 5$ Find $(h \cdot g)(n)$ $-12n^4 - 15n^3 + 20n + 25$
7) $f(x) = x^2 - 3x$ $g(x) = 3x - 3$ Find $\left(\frac{f}{g}\right)(x)$ $\frac{x^2 - 3x}{3x - 3}$	8) $g(x) = 3x + 5$ $f(x) = x^3 + 5x^2$ Find $\left(\frac{g}{f}\right)(x)$ $\frac{3x + 5}{x^3 + 5x^2}$
9) $h(x) = 3x - 5$ Find $(h \cdot h)(x)$ $9x^2 - 20$	10) $h(x) = x^3 + 2x$ Find $(h \cdot h)(x)$ $x^9 + 6x^7 + 12x^5 + 10x^3 + 4x$
11) $f(x) = -3x - 2$ $g(x) = 4x - 4$ Find $(4f + 2g)(x)$ $-4x - 16$	12) $f(t) = t + 1$ $g(t) = t^2 + t$ Find $(3f - 5g)(t)$ $-5t^2 - 2t + 3$
13) $g(x) = 2x + 3$ $f(x) = 4x + 2$ Find $(g + f)(4)$ $29$	14) $g(t) = 2t + 5$ $h(t) = t^2 + 3 + t$ Find $(g + h)(-3)$ $8$
15) $g(n) = n^2 + 4n$ $f(n) = 3n - 1$ Find $(g - f)(-9)$ $73$	16) $g(n) = n - 1$ $h(n) = n^2 - 4$ Find $(g - h)(5)$ $-17$
17) $g(n) = 2n + 5$ $h(n) = n + 1$ Find $(g \cdot h)(2)$ $27$	18) $h(x) = 4x + 4$ $g(x) = 4x - 1$ Find $(h \cdot g)(-2)$ $36$

-1-

19) $h(x) = x^2 + 4$ $g(x) = x - 5$ Find $\left(\frac{h}{g}\right)(10)$ $\frac{104}{5}$	20) $g(n) = 2n - 2$ $h(n) = n^3 + 5$ Find $\left(\frac{g}{h}\right)(4)$ $\frac{2}{23}$
21) $g(x) = 2x - 3$ $h(x) = 4x - 2$ Find $(g \circ h)(-6)$ $-55$	22) $g(x) = x + 1$ $f(x) = x^2 - 1$ Find $(g \circ f)(-7)$ $49$
23) $g(n) = 2n + 4$ $f(n) = -3n + 4$ Find $(2g + f)(-3)$ $9$	24) $g(n) = n^3 - 1 + n$ $h(n) = 4n + 5$ Find $(4g - 5h)(1)$ $-41$

**Evaluate each geometric series described.**

25) $-3 - 9 - 27 - 81 \dots, n = 6$ $-1092$	26) $-1 + 4 - 16 + 64 \dots, n = 8$ $13107$
27) $a_1 = 4, r = 3, n = 10$ $118096$	28) $a_1 = 3, r = 2, n = 9$ $1533$
29) $a_1 = -4, a_n = -256, r = 2$ $-508$	30) $a_1 = 3, a_n = 139968, r = -6$ $119973$
31) $a_1 = -1, a_n = -16384, r = 4$ $-21845$	32) $a_1 = 2, a_n = 128, r = 2$ $254$

**Determine if the sequence is geometric. If it is, find the common ratio, the 8th term, and the explicit formula.**

33) $4, -12, 36, -108, \dots$ Common Ratio: $r = -3$ $a_8 = -8748$	34) $3, 6, 12, 24, \dots$ Common Ratio: $r = 2$ $a_8 = 384$
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**Given two terms in a geometric sequence find the common ratio and the 8th term.**

35) $a_8 = 15552$ and $a_1 = 72$ Common Ratio: $r = 6$ $a_8 = 559872$	36) $a_8 = -128$ and $a_1 = -64$ Common Ratio: $r = 2$ $a_8 = -512$
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**Given the first term and the common ratio of a geometric sequence find the 8th term.**

37) $a_1 = 2, r = -6$ $a_8 = -559872$	38) $a_1 = 2, r = 3$ $a_8 = 4374$
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**Given the explicit formula for a geometric sequence find the 8th term.**

39) $a_n = 2 \cdot (-5)^{n-1}$ $a_8 = -156250$	40) $a_n = (-2)^{n-1}$ $a_8 = 128$
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**Given the recursive formula for a geometric sequence find the 8th term.**

41) $a_n = a_{n-1} \cdot -2$ $a_1 = -3$ $a_8 = 384$	42) $a_n = a_{n-1} \cdot 4$ $a_1 = 1$ $a_8 = 16384$
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-2-