Warm Up

1) Use the recursive equations to find each 7th term:

$a_1 = 6$ $\qquad\qquad$ $b_1 = 3$

$a_n = a_{n-1} + 8$ $\qquad\qquad$ $b_n = b_{n-1}\ (5)$

2) Use the explicit equations to find the corresponding terms:

$a_n = 6n + 18$ $\qquad\qquad$ $b_n = 36(3)^{n-1}$

$a_{45} =$ $\qquad\qquad$ $b_8 =$

3) Write the explicit equations for the equations in #1

4) Which of the following has the greater 5th term?

$a_n = a_{n-1} + 4$ $\qquad\qquad$ $b_n = n^2 + 4n - 10$

$a_1 = 27$

1) Use the recursive equations to find each 7th term:

$a_1 = 6$, 14, 22, 30, 38, 46,

$a_n = a_{n-1} + 8$ (Previous Term)

54

$b_1 = 3$, 15, 75, 375, 1875, 9375,

$b_n = b_{n-1}(5)$

46,875

2) Use the explicit equations to find the corresponding terms:

$a_n = 6n + 18$

$a_{45} = 6(45) + 18$

288

$b_n = 36(3)^{n-1}$

$b_8 = 36(3)^{8-1}$

78,732

3) Write the explicit equations for the equations in #1

Regression

$a_n = 6n - 2$

$b_n = 0.6(5)^n$

4) Which of the following has the greater 5th term?

$a_n = a_{n-1} + 4$

$a_1 = 27$

31

35

39

$5^{th} \rightarrow 43$

$b_n = n^2 + 4n - 10$

$5^2 + 4(5) - 10$

$5^{th} \rightarrow 35$

7) $a_n = a_{n-1} - 5$

$a_1 = 4$

n	a_n	
1	4	
2		-1
3		-6
4		-11
5		-16

8) $a_n = 1.5 + a_{n-1}$

$a_1 = -0.5$

n	b_n	
1	- 0.5	
2		1
3		2.5
4		4
5		5.5

9) $a_n = \frac{1}{3} a_{n-1}$

$a_1 = 36$

n	a_n	
1	36	
2		12
3		4
4		4/3
5		4/9

10) $a_n = 2\, a_{n-1}$

$a_1 = ¼$

n	a_n	
1	¼	
2		½
3		1
4		2
5		4

11) $a_n = a_{n-1} - 2n$

$a_1 = 5$

n	a_n	
1	5	
2		1
3		-5
4		-13
5		-23

12) $a_n = 3(n-2) + a_{n-1}$

$a_1 = 2$

n	a_n	
1	2	
2		2
3		5
4		11
5		20

Finding terms of a sequence using an explicit equation:

4) $d_n = 3n^2 - 12\,;\ d_5$

63

5) $e_n = -3(5)^{n-2} + 4\,;\ e_4$

-71

6) $f_n = \dfrac{2n-7}{n-1}\,;\ f_6$

1

Quad

4) $a_n = a_{n-1} \cdot 2\ ;\ a_1 = 1/4$

Exp

n	a_n
1	1/4
2	1/2
3	1
4	2
5	4

$\frac{1}{8}(2)^n$

Quad

5) $a_n = a_{n-1} - 2n\ ;\ a_1 = 5$

n	a_n
1	5
2	1
3	-5
4	-13
5	-23

$a_n = -n^2 - n + 7$

6) $a_n = 3(n-2) + a_{n-1}\,;\ a_1 = 2$

n	a_n
1	2
2	2
3	5
4	11
5	20

$a_n = 1.5n^2 - 4.5n + 5$

Unit 7: Sequence and Series

Unit 7: Sequence and Series

Primary Focus for this Unit...

Arithmetic - A pattern of adding, the value added is called the common difference

$-4 = +^{-}4$

Geometric - A pattern of multiplying, the value is called the common ratio $\div 3 = \cdot \frac{1}{3}$

Infinite - A special case for geometric series

Unit 7: Sequence and Series

Here are the 5 given formulas...

Arithmetic

Sequence

$$a_n = a_1 + (n-1)d$$

d: common difference

Series

$$S_n = \frac{n}{2}(a_1 + a_n)$$

a_1 = 1st Term

S_n = sum

a_n = Later Term

n = How Many Terms

Geometric

Sequence

$$a_n = a_1 \cdot r^{n-1}$$

r: common ratio

Series

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

Infinite

$$S_n = \frac{a_1}{1-r}$$

This unit is simply substitute the given values into the correct equation and solve for the missing piece of information.

Examples

1) 50th term for; 9, 15, 21...

Arith. Seq.

+6 +6

$a_n = a_1 + (n-1)d$

$a_{50} = 9 + (50-1)6$

303

2) Sum of the terms from #1

Arith. Series

$S_n = \frac{n}{2}(a_1 + a_n)$

$S_{50} = \frac{50}{2}(9 + 303)$

$= 7,800$

Examples

3) 10th term if $a_1 = 2$ and $r = 4$

Geo. Seq.

$a_n = a_1 \cdot r^{n-1}$

$a_{10} = 2 \cdot 4^{10-1}$

524,288

4) Sum of the terms from #3

Geo Series

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

$S_{10} = \frac{2(1-4^{10})}{1-4}$

699,050

5) Infinite series of 320, 160, 80...

$S_n = \frac{a_1}{1-r}$

$S_n = \frac{320}{(1-\frac{1}{2})}$

640

Other Notes

Converging (Closer)

$|r| < 1$

(Infinite)

Geo

Diverging (Spread Out)

$|r| > 1$

Sigma Notation (Greek Letter used for series)

$\sum$

Math

↓

summation Σ

Assignment::
WB 702
(the 2nd one)

Single

1	270
2	216
3	243
4	240
5	234
6	259

Sum

2	41
3	95
4	126
5	190
6	244
7	292
8	226
9	209
10	132
11	98
12	73