

WARMUP- in notebook

Find the next two terms

1) 5, 8, 11, 14, 17, 20 ← arithmetic sequence

2) $\frac{1}{2}$, 1, 2, 4, 8, 16

3) J, F, M, A, M, J, J

4) 5, -10, 20, -40, 80, -160

geometric sequences

5) Find 3 different answers

7, 14, 21, 28, 35, 42

7, 14, 21, 28, 7, 14

7, 14, 21, 28, 5, 12

ARITHMETIC VS GEOMETRIC SEQUENCES

Arithmetic

Ex: 3, 6, 9, 12, ...

20, 16, 12, 8, ...

$a_n - a_{n-1}$ is constant

the common difference, d

Formula: $a_n = a + (n-1)d$

a = 1st term

d = common difference

Geometric

ex: 1, 2, 4, 8, 16, ...

100, 20, 4, $\frac{4}{5}$, ...

$\frac{a_n}{a_{n-1}}$ is constant,

a_{n-1}

the common ratio, r

Formula: $a_n = ar^{n-1}$

a = 1st term

r = common ratio

What kind of sequences are these?

$1, \frac{2}{3}, \frac{4}{9}, \frac{8}{27}, \dots$ Geometric with $r = \frac{2}{3}$

$5, 10, 16, 23, \dots$ Neither

2, 1.75, 1.5, 1.25, ... Arithmetic with $d = -0.25$

p872 12

$$a = -2$$

$$d = 4$$

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

$$a_n = -2 + (n-1) \cdot 4$$

$$a_n = -2 + 4n - 4$$

$$a_n = 4n - 6$$

fifth term: $a_5 = 4 \cdot 5 - 6$

$$a_5 = 14$$

ex: 9th term of

-5, 0, 5, ...

35

$$a_n = -5 + (n-1)5$$

$$a_n = -5 + 5n - 5$$

$$a_n = 5n - 10$$

ex: 26 p872

16 { 4th term is 3 } 32
20th term is 35

$$a = \underline{-3}$$

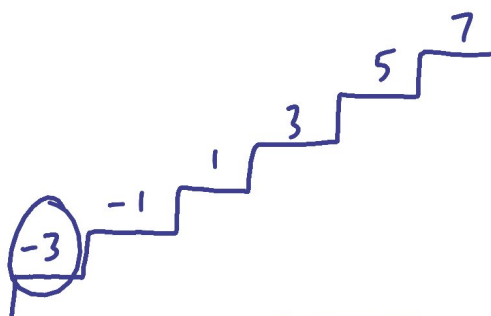
$$d = \underline{2}$$

$$d = \frac{32}{16} = 2$$

$$d = \frac{35-3}{20-4} = \frac{32}{16} = 2$$

like slope

-3, -1, 1, 3, 5, 7, ...



26 p882

$$a = -2, r = 4$$

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

$$a_n = -2 \cdot 4^{n-1}$$

$$a_5 = -2 \cdot 4^{5-1} = -2 \cdot 4^4$$

$$a_5 = -2 \cdot 256$$

$$a_5 = -512$$

36p882 10th term $-1, 2, -4, \dots$ $r = \frac{2}{-1} = -2$

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

$$a_{10} = -1 \cdot (-2)^9 = -1 \cdot (-512) = 512$$

$$1+2+3+\dots+98+99+100 = 5,050$$

$$\left. \begin{array}{l} 1+100 = 101 \\ 2+99 = 101 \\ 3+98 = 101 \\ \vdots \\ 50+51 = 101 \end{array} \right\} 50 \text{ of them } \frac{101 \cdot 50}{5050}$$

Sum of first n terms of arithmetic sequence

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

$$20+18+16+\dots+4+2$$

$$n=10 \quad S_{10} = \frac{10}{2} (20+2)$$

$$a=20$$

$$a_n=2$$

$$S_{10} = 5 \cdot 22 = 110$$

Infinite Geometric Series

$$\text{If } |r| < 1 \text{ then } \sum_{k=1}^{\infty} ar^{k-1} = \frac{a}{1-r}$$

$$\text{ex: } 8+4+2+1+\frac{1}{2}+\dots = \frac{8}{1-\frac{1}{2}} = \frac{8}{\frac{1}{2}} = 16$$

$$a=8$$

$$r = \frac{4}{8} = \frac{1}{2}$$

$$\text{ex: } 0.\overline{9} = 1$$

$$0.9 + 0.09 + 0.009 + \dots$$

$$a = 0.9$$

$$r = 0.1$$

$$\frac{0.9}{1-0.1} = \frac{0.9}{0.9} = 1$$

$$\text{ex: } 0.\overline{6} = 0.6 + 0.06 + 0.006 + 0.0006 + \dots$$

$$a = 0.6$$

$$r = 0.1$$

$$\frac{0.6}{1-0.1} = \frac{0.6}{0.9} = \frac{2}{3}$$

p872-873 11-27 odd, 47, 50, 51

p882-883 13-37 even, 51, 55, 59, 61