Homework Qs????

Arithmetic
∴ common difference

20) $x, \frac{1}{2}x + 7, 3x - 1$

$d = \left(\frac{1}{2}x + 7\right) - x$

$= \frac{1}{2}x - \frac{2}{2}x + 7$

$d = -\frac{1}{2}x + 7$

$d = (3x - 1) - \left(\frac{1}{2}x + 7\right)$

$= 3x - \frac{1}{2}x - 1 - 7$

$d = \frac{5}{2}x - 8$

EQUAL

$-\frac{1}{2}x + 7 = \frac{5}{2}x - 8$

$+7 + 8 = \frac{5}{2}x + \frac{1}{2}x$

$15 = \frac{6}{2}x$

$15 = 3x$

$\boxed{5 = x}$

21) $a \quad a+d \quad a+2d \quad a+3d$

15 43

$a + a + d = 15$

$2a + d = 15$ ①

$a + 2d + a + 3d = 43$

$2a + 5d = 43$ ②

6.3 - Geometric Sequences

$(3)^n$ exponent

A sequence where there is a common ratio, r, between consecutive terms. A new term is generated by multiplying/dividing each term by the same number.

eg. 5, 15, 45, 135, ... r = 3 (×3 ×3 ×3)

40, 20, 10, 5, 5/2, ... r = $\frac{1}{2}$ (×$\frac{1}{2}$)

3, -6, 12, -24, 48, ... r = −2

$r = \frac{t_2}{t_1}$ $\frac{20}{40} = \frac{1}{2}$

Geometric Sequence Formula

$$t_n = ar^{n-1}$$

where a is the first term, and r is the common ratio.

Ex. 1 Find t_7 for each sequence.

a) $t_n = -2(3)^{n-1}$

$t_7 = -2(3)^{7-1}$

$t_7 = -2(3)^6$

$= -1458$

b) $t_n = 100\left(\frac{1}{4}\right)^{n-1}$

$t_7 = 100\left(\frac{1}{4}\right)^{7-1}$

$= 100\left(\frac{1}{4096}\right)$

$$t_7 = \frac{25}{1024}$$

Ex. 2 Simplify the powers.

a) $3^{x-1} \cdot 3^{x+5}$

$= 3^{x-1+x+5}$

$= 3^{2x+4}$

b) $32^{x+2} \cdot 8^{6}$

$= (2^5)^{x+2} \cdot (2^3)^6$

$= 2^{5x+10+18}$

$= 2^{5x+28}$

Ex. 3 Find t_n for each sequence.

This means find the general formula which works to find any term in the sequence. Must be simplified.

a) 5, 10, 20, 40, ... (×2)

$a = 5$, $r = 2$

$t_n = ar^{n-1}$

$\boxed{t_n = 5(2)^{n-1}}$

b) 2, 6, 18, 54,.....

$a = 2$, $r = 3$

$t_n = ar^{n-1}$

$t_n = 2(3)^{n-1}$

c) 6561, 2187, 729, 243, ...

$a = 6561$, $r = \frac{1}{3}$

$t_n = ar^{n-1}$

$= 6561\left(\frac{1}{3}\right)^{n-1}$

$= 3^8(3^{-1})^{n-1}$

$= 3^8(3^{1-n})$

$\boxed{t_n = 3^{9-n}}$

d) 3, -12, 48, -192, ...

$a = 3$, $r = -4$

$t_n = ar^{n-1}$

$\boxed{t_n = 3(-4)^{n-1}}$ good

neg base

$= 3[(-1)(4)]^{n-1}$

$= (-1)^{n-1}3(4)^{n-1}$

e) 8, 32, 128, 512,.....

$a = 8$, $r = 4$

$t_n = ar^{n-1}$

$= 8(4)^{n-1}$

$= 2^3(2^2)^{n-1}$

$= 2^3(2^{2n-2})$

$t_n = 2^{2n+1}$

f) 1024, -256, 64, -16, ...

$a = 1024$, $r = -\frac{1}{4}$

$t_n = ar^{n-1}$

$= 1024\left(-\frac{1}{4}\right)^{n-1}$

$= (-1)^{n-1}1024\left(\frac{1}{4}\right)^{n-1}$

$= (-1)^{n-1}4^5(4^{-1})^{n-1}$

$= (-1)^{n-1}4^5(4^{1-n})$

$\boxed{t_n = (-1)^{n-1}4^{6-n}}$

$4^5\left(-4^{-1}\right)^{n-1}$

$4^5[(-1)^{n-1}(4^{-1})^{n-1}]$

$= (-1)^{n-1}(2^2)^{6-n}$

OR $t_n = (-1)^{n-1}2^{12-2n}$

Ex. 4 Determine the number of terms in each sequence.

$n = ?$

a) 5, 20, 80, ... , 81920

$a = 5$

$r = 4$

$t_n = 81920$

$t_n = ar^{n-1}$

$\frac{81920}{5} = \frac{5(4)^{n-1}}{5}$

$16384 = 4^{n-1}$

$4^7 = 4^{n-1}$

$7 = n-1$

$8 = n$

b) -19683, 6561, -2187, ... , -3

$a = -19683$

$r = -\frac{1}{3}$

$t_n = -3$

$t_n = ar^{n-1}$

$\frac{-3}{-19683} = \frac{-19683\left(-\frac{1}{3}\right)^{n-1}}{-19683}$

Ex. 5 Determine a, r, and t_n for the geometric sequence that has:

a) $t_5 = 324$ and $t_9 = 26244$

b) $t_4 = -8$ and $t_7 = 1$

Ex. 6 Determine the value of x that makes each sequence:

a) geometric
2, 6, 5x - 2

$\times 3 = 18$

$r = \frac{6}{2}$

$r = 3$

$r = \frac{5x-2}{6}$

$3 = \frac{5x-2}{6}$

$18 = 5x - 2$

b) arithmetic
x - 4, 6, x

Be careful of the wording in application problems:

Now -> t_1

First year -> t_2

HOMEWORK

p. 392 #1, 2bceh, 3ac, 5, 6, 8, 11, 16, 17, 20