Warm Up

1. Determine how many terms are in each of the following sequences:

(a) 23, 18, 13, 8, ... , -5757 (Arithmetic) (b) -2, 6, -18, 54, ... , -9565938 (Geometric) [3]

$a=23,\ d=-5$

$-5757=23+(n-1)(-5)$

$-5757=23-5n+5$

$\frac{-5785}{-5}=\frac{-5n}{-5}$

$n=1157$

$a=-2,\ r=-3$

$\frac{-9565738}{-2}=\frac{(-2)(-3)^{n-1}}{-2}$

$4782969=(-3)^{n-1}$

$\log_3 4782969=(-3)^{n-1}$

$\frac{\log 4782969}{\log 3}=(-3)^{n-1}$

$(-3)^{14}=(-3)^{n-1}$

$14=n-1$

$n=15$

2. Determine the 7th term in each of the sequences described below:

(a) Geometric Sequence: $t_{12}=10240$ and $t_{23}=20971520$

(b) Arithmetic Sequence: $t_{48}=475$ and $t_{111}=1105$

a) $ar^{22}=20971520$ $\quad ar^{11}=10240$

$\frac{ar^{22}}{ar^{11}}=\frac{20971520}{10240}$

$\sqrt[11]{r^{11}}=\sqrt[11]{2048}$

$r=2 \Rightarrow a(2)^{11}=10240$

$a=\frac{10240}{2048}$

$a=5$

$t_7=5(2)^{7-1}$

$=320$

b) $a+47d=475$

$a+110d=1105$

$63d=630$

$d=10 \Rightarrow a+47(10)=475$

$a=5$

$t_7=5+(6)(10)$

$=65$

8. b) $x+4, 3x, x^2$

$10, 20, 30$

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

$2x-4=x^2-3x$

$0=x^2-5x+4$

$(x-4)(x-1)=0$

$x=4, 1$

$8, 12, 16$ $\quad$ $5, 3, 1$

12. $t_1 + t_3 = 10$ $\quad$ $t_2 + t_4 = 24$

$a + a + (2)d = 10$ $\quad$ $a + 1d + a + 3d = 24$

$2a + 2d = 10$ $\quad$ $2a + 4d = 24$

$2a + 2d = 10$

$2a + 4d = 24$

5, 8, 11, 14

7. $x+1, x+7, 2x+14$

$$\frac{x+7}{x+1} = \frac{2x+14}{x+7}$$

$$\frac{x+7}{x+1} = \frac{2(x+7)}{x+7}(x+1)$$

$$x+7 = 2x+2$$

$$5 = x$$

$6, 12, 24$

$10, 20, 40, 80$

$$\frac{20}{10} = \frac{40}{20} = \frac{80}{40} = \cdots$$

Questions from worksheet??

#10) $2, t_2, t_3, t_4, t_5, 6250$
$2, 10, 50, 250, 750$
$t_1 \qquad t_6$

$a = 2$

$ar^5 = 6250$

$2(r^5) = 6250$

$\sqrt[5]{r^5} = \sqrt[5]{3125}$

$r = 5$

11. $t_2 + t_3 = 24$ $\qquad t_7 + t_8 = 5832$

$ar + ar^2 = 24$ $\qquad ar^6 + ar^7 = 5832$

$$\frac{ar^6 + ar^7}{ar + ar^2} = \frac{5832}{24}$$

$$\frac{ar^6(1+r)}{ar(1+r)} = 243$$

$\sqrt[3]{r^5} = \sqrt[3]{243}$

$r = 3$

$a(3) + a(3)^2 = 24$

$12a = 24$

$a = 2$

2, 6, 18

Applications of Sequences

A stamp collector expects his collection will increase in value each year. For example, if a stamp worth is worth $20 and appreciates 12%/a, what will be its value in 15 years?

t	0	1
V	20	

$\times 1.12$

$V = 20(1.12)^n$

$\Rightarrow$ 20, 22.40, 25.09, ... ($\times 1.12$, $\times 1.12$)

$t_{16} = 20(1.12)^{15}$

$= \$109.47$

A watch dropped from the Calgary Tower falls 4.9 m in the first second, 14.7 m in the next second, 24.5 m in the third second, and so on. How far does the watch fall during the 10th second?

4.9, 14.7, 24.5, ... $t_{10} = ?$

$t_{10} = 4.9 + 9(9.8)$

$= 93.1$ m

9. f)

$(4a-2b)-(5a-3b)$

$-a+b$

$-5a+7b = 5a-3b+(n-1)(-a+b)$

$-10a+10b = (b-a)(n-1)$

$10(-a+b) = (b-a)(n-1)$

$\frac{10(-a+b)}{(b-a)} = n-1$

$10 = n-1$

$n = 11$

Homework:

Worksheet: Applications of Sequences

Attachments

applications of sequences.doc