

Sequences (Part 1) – Worksheet

MCR3U

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SOLUTIONS

General formula for an Arithmetic Sequence:

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

General formula for a Geometric Sequence:

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

1) Find the next three terms of each arithmetic sequence.

a) $3, 7, 11, 15, \underline{19}, \underline{23}, \underline{27}$ c) $22, 20, 18, 16, \underline{14}, \underline{12}, \underline{10}$

b) $-13, -11, -9, -7, -5, \underline{-3}, \underline{-1}$ d) $-2, -5, -8, -11, -14, \underline{-17}, \underline{-20}$

2) Find the next three terms of each geometric sequence.

a) $4, 8, 16, \underline{32}, \underline{64}, \underline{128}$ b) $1, -6, 36, -216, 1296, \underline{-7776}$

c) $486, 162, 54, \underline{18}, \underline{6}, \underline{2}$ d) $3, 15, 75, 375, 1875, \underline{9375}$

3) Determine whether each sequence is an arithmetic sequence, a geometric sequence or neither. If it is an arithmetic or geometric sequence, determine a formula to represent the sequence.

a) $4, 7, 9, 12, \dots$ neither
b) $15, 13, 11, 9, \dots$ Arithmetic
c) $4, 12, 36, 108, \dots$ Geometric

$$t_n = 15 + (n-1)(-2)$$

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

d) $5, 10, 15, 20, \dots$ Arithmetic
e) $7, 10, 13, 16, \dots$ Arithmetic
f) $120, -60, 30, -15, \dots$ Geometric

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

$$t_n = 7 + (n-1)(3)$$

$$t_n = 120 \left(-\frac{1}{2}\right)^{n-1}$$

g) $-6, -5, -3, -1, \dots$ Neither
h) $-13, -6, 1, 8, \dots$ Arithmetic
i) $625, 125, 25, 5, \dots$ Geometric

$$t_n = -13 + (n-1)(7)$$

$$t_n = 625 \left(\frac{1}{5}\right)^{n-1}$$

4) Charlie deposited \$115 in a savings account. Each week thereafter, he deposits \$35 into the account.

a) Write a formula to represent this sequence.

$$t_n = 115 + (n-1)(35)$$

b) How much total money has Charlie deposited after 30 weeks?

$$\begin{aligned} t_{30} &= 115 + (30-1)(35) \\ &= 115 + 1015 \\ &= \$1130 \end{aligned}$$

5) A ball is dropped from a height of 500 meters. The table shows the height of each bounce.

BOUNCE #	HEIGHT (m)
1	400
2	320
3	256

$\left. \begin{array}{l} \text{ } \\ \text{ } \end{array} \right\} \times \frac{4}{5} \text{ OR } 0.8$
 $\left. \begin{array}{l} \text{ } \\ \text{ } \end{array} \right\} \times \frac{4}{5} \text{ OR } 0.8$

a) Write an equation to represent the height of the ball after each bounce.

$$t_n = 400(0.8)^{n-1}$$

b) How high does the ball bounce on the 6th bounce?

$$\begin{aligned} t_6 &= 400(0.8)^{6-1} \\ &= 131.072 \text{ m} \end{aligned}$$

Answers

1) a) 3, 7, 11, 15, 19, 23, 27, ... b) -13, -11, -9, -7, -5, -3, -1, ...
c) 22, 20, 18, 16, 14, 12, 10, ... d) -2, -5, -8, -11, -14, -17, -20, ...

2) a) 4, 8, 16, 32, 64, 128, ... b) 1, -6, 36, -216, 1296, -7776, ...
c) 486, 162, 54, 27, 9, 3, ... d) 3, 15, 75, 375, 1875, 9375, ...

3) a) 4, 7, 9, 12, ... neither
b) 15, 13, 11, 9, ... arithmetic $t_n = 15 + (n-1)(-2)$
c) 4, 12, 36, 108, ... geometric $t_n = 4(3)^{n-1}$
d) 5, 10, 15, 20, ... arithmetic $t_n = 5 + (n-1)(5)$
e) 7, 10, 13, 16, ... arithmetic $t_n = 7 + (n-1)(3)$
f) 120, -60, 30, -15, ... geometric $t_n = 120(-1/2)^{n-1}$
g) -6, -5, -3, -1, ... neither
h) -13, -6, 1, 8, ... arithmetic $t_n = -13 + (n-1)(7)$
i) 625, 125, 25, 5, ... geometric $t_n = 625(1/5)^{n-1}$

4) a) $t_n = 115 + (n-1)(35)$ b) $t_{30} = 1130$

5) a) $t_n = 400(0.8)^{n-1}$ b) $t_6 = 131.072$

