Problems of Geometric progressions

1) For each of the following geometric progressions find a formula for the n–th term (general term) and the value of the a_6 term (r = *common ratio*):

a) $a_3 = 32, \quad r = 4$

b) $a_6 = 729, \quad a_9 = 19683$

c) $a_1 = -4, \quad a_2 = -8$

d) $a_1 = 11, \quad a_4 = 704$

2) For each of the following geometric progressions find a formula for the n–th term (general term) and the value of the a_6 term (r = *common ratio*):

a) $a_4 = 48, \quad a_5 = 96$

b) $a_5 = -243, \quad r = 3$

c) $a_1 = -2, \quad a_4 = -54$

d) $a_1 = 7, \quad a_2 = 28$

3) For each of the following geometric progressions find a formula for the n–th term (general term) and the sum of the first 7 terms (r = *common ratio*):

a) $a_4 = 54, \quad a_9 = 13122$

b) $a_1 = 2, \quad a_2 = 6$

c) $a_1 = 9, \quad r = 2$

d) $a_3 = 20, \quad a_4 = 40$

4) For each of the following geometric progressions find a formula for the n–th term (general term) and the sum of the first 9 terms (r = *common ratio*):

a) $a_1 = 7, \quad a_2 = 14$

b) $a_1 = 4, \quad a_5 = 64$

c) $a_5 = 48, \quad a_8 = 384$

d) $a_4 = -24, \quad r = 2$

5) For each of the following geometric progressions find a formula for the n–th term (general term) and the sum to infinity (r = *common ratio*):

a) $a_5 = \frac{1}{27}, \quad a_6 = \frac{1}{81}$

b) $a_5 = \frac{3}{64}, \quad r = \frac{1}{4}$

c) $a_1 = 4, \quad a_2 = 1$

d) $a_5 = \frac{1}{9}, \quad a_8 = \frac{1}{243}$

6) For each of the following geometric progressions find a formula for the n–th term (general term) and the sum to infinity (r = *common ratio*):

a) $a_4 = \frac{1}{9}, \quad a_8 = \frac{1}{729}$

b) $a_3 = \frac{11}{9}, \quad r = \frac{1}{3}$

c) $a_1 = 8, \quad a_2 = 2$

d) $a_4 = \frac{7}{8}, \quad a_5 = \frac{7}{16}$

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Answers:

1)
a) $a_n = 2 \cdot 4^{n-1}$, $a_6 = 2048$ **b)** $a_n = 3^n$, $a_6 = 729$
c) $a_n = -4 \cdot 2^{n-1}$, $a_6 = -128$ **d)** $a_n = 11 \cdot 4^{n-1}$, $a_6 = 11264$

2)
a) $a_n = 3 \cdot 2^n$, $a_6 = 192$ **b)** $a_n = -3 \cdot 3^{n-1}$, $a_6 = -729$
c) $a_n = -2 \cdot 3^{n-1}$, $a_6 = -486$ **d)** $a_n = 7 \cdot 4^{n-1}$, $a_6 = 7168$

3)
a) $a_n = 2 \cdot 3^{n-1}$, $S_7 = 2186$ **b)** $a_n = 2 \cdot 3^{n-1}$, $S_7 = 2186$
c) $a_n = 9 \cdot 2^{n-1}$, $S_7 = 1143$ **d)** $a_n = 5 \cdot 2^{n-1}$, $S_7 = 635$

4)
a) $a_n = 7 \cdot 2^{n-1}$, $S_9 = 3577$ **b)** $a_n = 2 \cdot 2^n$, $S_9 = 2044$
c) $a_n = 3 \cdot 2^{n-1}$, $S_9 = 1533$ **d)** $a_n = -3 \cdot 2^{n-1}$, $S_9 = -1533$

5)
a) $a_n = 3\left(\frac{1}{3}\right)^{n-1}$, $S = \frac{9}{2}$ **b)** $a_n = 12\left(\frac{1}{4}\right)^{n-1}$, $S = 16$
c) $a_n = 4\left(\frac{1}{4}\right)^{n-1}$, $S = \frac{16}{3}$ **d)** $a_n = 9\left(\frac{1}{3}\right)^{n-1}$, $S = \frac{27}{2}$

6)
a) $a_n = 3\left(\frac{1}{3}\right)^{n-1}$, $S = \frac{9}{2}$ **b)** $a_n = 11\left(\frac{1}{3}\right)^{n-1}$, $S = \frac{33}{2}$
c) $a_n = 8\left(\frac{1}{4}\right)^{n-1}$, $S = \frac{32}{3}$ **d)** $a_n = 7\left(\frac{1}{2}\right)^{n-1}$, $S = 14$