Geometric Sequences Practice

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$8.1, \_\_, \_\_, \_\_, 240.1$

$r \quad r \quad r \quad r$

$$r^4 = \frac{240.1}{8.1}$$

$$r^4 = 29.6$$

$$r = \sqrt[4]{29.6}$$

$$r \approx 2.3$$

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Geometric

$3, 12, 48, 5y+7,$

What is y?

$r = 4$

$5y + 7 = 192$

$5y = 185$

$y = 37$

9) $\{3, 2.25, 1.69, 1.27, \ldots\}$

$r = 0.75$

$t_n = t_1(r)^{n-1}$

$t_n = 3(0.75)^{n-1}$

After the 6th bounce,

$t_6 = 3(0.75)^{6-1}$

$= 0.71 \text{ m}$

Enrichment

$2^x = 16$

$2^4 = 16$

$x = \frac{\log 16}{\log 2}$

Section 1.4 : Geometric Series

geometric series: the sum of the terms of a geometric sequence

ex) $3+6+12+24$

Formula $S_n = \frac{t_1(r^n-1)}{r-1}$, $r \neq 1$

ex.1) Determine the sum of the first 10 terms.

$\{4+12+36+\ldots\}$ $r=3$

$$S_{10} = \frac{4(3^{10}-1)}{3-1}$$

$$= \frac{4(59049-1)}{2}$$

$$= \frac{4(59048)}{2}$$

$$S_{10} = 118096$$

2) Find the sum.

$\frac{1}{27} + \frac{1}{9} + \frac{1}{3} + \ldots + 729$

$r = 3$

Need t_n formula

$t_n = t_1(r)^{n-1}$

$t_n = \frac{1}{27}(3)^{n-1}$

Determine 'n'

$729 = \frac{1}{27}(3)^{n-1}$

$\frac{729}{\frac{1}{27}} = 3^{n-1}$

$19683 = 3^{n-1}$ or $\frac{\log 19683}{\log 3} = n-1$

$3^9 = 19683$

$n = 10$

Find S_{10}

$S_{10} = \frac{\frac{1}{27}(3^{10}-1)}{3-1} = 1093.5$

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#1 a, b

2 a, b

#4 a, b

Practise

1. Determine whether each series is geometric. Justify your answer.
   a) $4 + 24 + 144 + 864 + \cdots$
   b) $-40 + 20 - 10 + 5 - \cdots$
   c) $3 + 9 + 18 + 54 + \cdots$
   d) $10 + 11 + 12.1 + 13.31 + \cdots$
2. For each geometric series, state the values of t_1 and r. Then determine each indicated sum. Express your answers as exact values in fraction form and to the nearest hundredth.
   a) $6 + 9 + 13.5 + \cdots (S_{10})$
   b) $18 - 9 + 4.5 + \cdots (S_{12})$
   c) $2.1 + 4.2 + 8.4 + \cdots (S_9)$
   d) $0.3 + 0.003 + 0.000\,03 + \cdots (S_{12})$
3. What is S_n for each geometric series described? Express your answers as exact values in fraction form.
   a) $t_1 = 12, r = 2, n = 10$
   b) $t_1 = 27, r = \frac{1}{3}, n = 8$
   c) $t_1 = \frac{1}{256}, r = -4, n = 10$
   d) $t_1 = 72, r = \frac{1}{2}, n = 12$
4. Determine S_n for each geometric series. Express your answers to the nearest hundredth, if necessary.
   a) $27 + 9 + 3 + \cdots + \frac{1}{243}$
   b) $\frac{1}{3} + \frac{2}{9} + \frac{4}{27} + \cdots + \frac{128}{6561}$
   c) $t_1 = 5, t_n = 81\,920, r = 4$
   d) $t_1 = 3, t_n = 46\,875, r = -5$