WARMUP

Find the next 3 terms of each:

1) $\frac{1}{3}, 1, 3, 9, \underline{27}, \underline{81}, \underline{243}$ $\times 3$

2) $64, 32, 16, 8, 4, \underline{2}, \underline{1}, \underline{\frac{1}{2}}$ $\times \frac{1}{2}$

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3) $\sum_{k=1}^{80} (3k+1) = \frac{80}{2}(4+241) = 9800$

$n = 80$

$a = 3 \cdot 1 + 1 = 4$

$a_{80} = 3 \cdot 80 + 1 = 241$

Section 11.3 Geometric Sequences

ex: $1, 2, 4, 8, 16, \ldots$

$100, 20, 4, \frac{4}{5}, \ldots$

$\frac{a_n}{a_{n-1}}$ is constant,

the common ratio, r

Formula: $a_n = a r^{n-1}$

a = 1st term

r = common ratio

What kind of sequences are these?

$1, \frac{2}{3}, \frac{4}{9}, \frac{8}{27}, \ldots$ Geometric with $r = \frac{2}{3}$

$5, 10, 16, 23, \ldots$ Neither

$2, 1.75, 1.5, 1.25, \ldots$ Arithmetic with $d = -0.25$

26 p882

$a = -2$

$r = 4$

$a_n = -2 \cdot 4^{n-1}$

$a_5 = -2 \cdot 4^{5-1} = -2 \cdot 4^4 = -2 \cdot 256$

$= -512$

36 p882 Formula and 10^{th} term $-1, 2, -4, 8, \ldots$

$r = \frac{2}{-1} = -2$

$a_n = -1 \cdot (-2)^{n-1}$

$a_{10} = -1 \cdot (-2)^9 = -1 \cdot (-512)$

$= 512$

Infinite Geometric Series (Adding terms of a sequence)

If $|r| < 1$ then $\sum_{K=1}^{\infty} ar^{K-1} = \frac{a}{1-r}$

ex: $0.\overline{6} = 0.6 + 0.06 + 0.006 + 0.0006 + \ldots$

$r = \frac{0.06}{0.6} = 0.1$, $a = 0.6$

$$\text{Sum} = \frac{0.6}{1-0.1} = \frac{0.6}{0.9} = \frac{6}{9} = \frac{2}{3}$$

ex: $0.\overline{9} = 1$

$$r = \frac{0.9}{1-0.1} = \frac{0.9}{0.9} = 1$$

$$\sqrt{2}$$

$$\sqrt{2+\sqrt{2}}$$

$$\sqrt{2+\sqrt{2+\sqrt{2}}}$$

ex: $8 + 4 + 2 + 1 + \frac{1}{2} + \ldots = \frac{8}{1-0.5}$

$a = 8$

$r = \frac{4}{8} = 0.5$

$= \frac{8}{0.5} = 16$

p 882-884 3-33 multiples of 3

51-63 odd, 70, 77