Spiral Review

1. Complete the square.

$x^2 - 8x$ +16

$(x-4)^2$

2. Solve.

$|x-9|+4=10$

$-4 \quad -4$

$|x-9|=6$

(+) $x-9=6$, $x=15$

(−) $x-9=-6$, $x=3$

3. Factor.

$n^3 - 27$

$(n-3)(n^2+3n+9)$

4. Write the equation of the line.

m=1/3, passes through (-3,2)

$y-y_1=m(x-x_1)$

$y-2=\frac{1}{3}(x+3)$

$y-2=\frac{1}{3}x+1$

$y=\frac{1}{3}x+3$

p.589 8.3 Geometric Sequences

Consecutive terms of a **geometric sequence** have a common ratio.

ratio: $\frac{a_2}{a_1}$

Finding the nth term:

$a_n = a_1 r^{n-1}$

$= a_1(r)^{n-1}$

Finding the sum:

finite: $S_n = a_1\left(\frac{1-r^n}{1-r}\right)$

$\sum_{n=1}^{10}$

infinite: $|r|<1$

$\sum_{n=1}^{\infty}$ $S_n = \frac{a_1}{1-r}$

Students will be able to determine if a sequence is geometric and find the common ratio.

Example 1: Determine whether or not the sequence is geometric. If it is, find the common ratio.

a.) 3, 12, 48, 192, ...

$\frac{12}{3}$ $\frac{48}{12}$ $\frac{192}{48}$

4 4 4

yes, it is a geometric sequence

r=4

b.) 4, 19, 34, 49,...

$\frac{19}{4}$ $\frac{34}{19}$

not a geometric sequence

Students will be able to write the first five terms of the geometric sequence.

Example 2: Write the first five terms of the sequence.

a.) $a_1 = 4, r = 2$

4, 8, 16, 32, 64 (by hand)

or

$a_n = 4(2)^{n-1}$ (use formula & calculator)

b.) $a_1 = 6, r = 1/3$

$6, 2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}$

or

$a_n = 6\left(\frac{1}{3}\right)^{n-1}$

Students will be able to write the first five terms of the geometric sequence, and find the common ratio.

Example 3: Write the first five terms of the geometric sequence. Find the common ratio and write the nth term of the sequence as a function of n.

a.) $a_1 = 81$, $a_{k+1} = 1/3\,a_k$

$a_1 = 81$

$a_2 = \frac{1}{3}(81) = 27$

$a_3 = \frac{1}{3}(27) = 9$

$a_4 = \frac{1}{3}(9) = 3$

$a_5 = \frac{1}{3}(3) = 1$

$r = \frac{1}{3}$

$a_n = 81\left(\frac{1}{3}\right)^{n-1}$

b.) $a_1 = 5$, $a_{k+1} = 3a_k$

$a_1 = 5$

$a_2 = 15$

$a_3 = 45$

$a_4 = 135$

$a_5 = 405$

$r = 3$

$a_n = 5(3)^{n-1}$

Students will be able to find the indicated term of the geometric sequence.

Example 4: Find the indicated term of the geometric sequence. (Use graphing calculator)

a.) $a_1 = 2$, $r = \sqrt{3}$, 11th term

$a_n = 2(\sqrt{3})^{n-1}$

$a_{11} = 2(\sqrt{3})^{11-1}$

$= 2(\sqrt{3})^{10}$

$= \boxed{486}$

b.) $a_1 = 24$, $r = 2.6$, 8th term

$a_n = 24(2.6)^{n-1}$

$a_8 = 24(2.6)^{8-1}$

$= 24(2.6)^7$

$= 19276.344$

Students will be able to find the formula for the nth term and the indicated term of the geometric sequence.

Example 5: Find a formula for the nth term of the geometric sequence. Find the indicated term of the geometric sequence.

a.) 7th term: $3, 36, 432, \ldots$

$\frac{36}{3} = 12$

$a_1 = 3; r = 12$

$\boxed{a_n = 3(12)^{n-1}}$

$a_7 = 3(12)^{7-1}$

$= 3(12)^6$

$= 8957952$

b.) 22nd term: $4, 8, 16, \ldots$

$\frac{8}{4} = 2$

$a_1 = 4; r = 2$

$a_n = 4(2)^{n-1}$

$a_{22} = 4(2)^{22-1}$

$= 4(2)^{21}$

$= 8388608$

Students will be able to find the sum of the geometric sequence with and without using the calculator.

Example 6: Find the sum. If not possible explain why.

a.) $\sum_{n=1}^{9} (-2)^{n-1}$

$S_n = a_1\left(\frac{1-r^n}{1-r}\right)$

$= 1\left(\frac{1+2^9}{1+2}\right)$

$= \boxed{171}$

b.) $\sum_{n=0}^{15} 10\left(\frac{7}{6}\right)^n$

$S_n = 10\left(\frac{1-\left(\frac{7}{6}\right)^{16}}{1-\left(\frac{7}{6}\right)}\right)$

$= \boxed{646.805}$

c.) $\sum_{n=0}^{\infty} 6\left(\frac{2}{3}\right)^n$

Check: $|r| < 1$ ✓

$S_n = \frac{a_1}{1-r}$

$= \frac{6}{\left(1-\frac{2}{3}\right)}$

$= \boxed{18}$

d.) $\sum_{n=1}^{\infty} 8\left(\frac{5}{3}\right)^{n-1}$

Check: $|r| < 1$ ✗

not an infinite sum

Turn-in:
p.595 (12, 30, 36, 64)

HW:
p.595 (7,13,17,21,25-45,55-63,69-75 odds)