SM3

Name **Key**   ID: 1

Review of Unit 3 Part 2

Date_____ Period_____

Find each term described.

1) Constant term in expansion of $(4y-1)^4$

$(-1)^4 = \boxed{1}$

2) y term in expansion of $(y-5)^3$

$$\begin{array}{cccc} 1 & 3 & 3 & 1 \\ y^3 & y^2 & y & \end{array}$$

$\boxed{75y} \quad 3(y)^1(-5)^2$

Expand completely.

$$\begin{array}{cccccc} & & 1 & & & \\ & 1 & & 1 & & \\ & 1 & 2 & 1 & & \\ 1 & 3 & & 3 & 1 & \end{array}$$

3) $(b-3)^4$

$1(b)^4(-3)^0 + 4(b)^3(-3)^1 + 6(b)^2(-3)^2 +$

$4(b)^1(-3)^3 + 1(b)^0(-3)^4 + 81$

$\boxed{b^4 - 12b^3 + 54b^2 - 108b}$

4) $(2+x)^3$

$$\begin{array}{cccc} 1 & 3 & 3 & 1 \end{array}$$

$1(2)^3 x^0 + 3(2)^2(x)^1 + 3(2)^1(x^2) + 1(x^3)$

$8 + 12x + 6x^2 + x^3$

$\boxed{x^3 + 6x^2 + 12x + 8}$

5) $(n+2m)^5$

$$\begin{array}{ccccc} & 1 & & 1 & \\ & 1 & 2 & 1 & \\ & 1 & 3 & 3 & 1 \\ 1 & 4 & 6 & 4 & 1 \\ 1 & 5 & 10 & 10 & 5 & 1 \end{array}$$

$1(n)^5(2m)^0 + 5(n)^4(2m)^1 + 10(n)^3(2m)^2 +$

$10(n)^2(2m)^3 + 5(n)^1(2m)^4 + 1(n)^0(2m)^5$

$\boxed{n^5 + 10n^4m + 40n^3m^2 + 80n^2m^3 + 80nm^4 + 32m^5}$

6) $(x^4-4)^4$

$1(x^4)^4(-4)^0 + 4(x^4)^3(-4)^1 + 6(x^4)^2(-4)^2 +$

$4(x^4)^1(-4)^3 + 1(x^4)^0(-4)^4 + 16x^8$

$\boxed{x^{16} - 16x^{12} + 96x^8 - 256x^4 + 256}$

Determine if the series is arithmetic or geometric. Find the common ratio, r, or the common difference, d. Write it using sigma notation/ Evaluate the related series.

7) $3 - 9 + 27 - 81 + 243$ $r = -3$

$\displaystyle\sum_{k=1}^{5} 3(-3)^{k-1} = \boxed{183}$

$\dfrac{243}{3} = \dfrac{3(-3)^{k-1}}{3}$

$81 = (-3)^{k-1}$

5

geo

8) $1 + \dfrac{2}{5} + \dfrac{4}{25} + ... + \dfrac{32}{3125}$ $\left(\dfrac{2}{5}\right)^5$

$\displaystyle\sum_{k=1}^{6} 1\left(\dfrac{2}{5}\right)^{k-1} = \dfrac{5187}{3125}$

geo

9) $13 + 16 + 19 + 22 + ... + 64$

$\displaystyle\sum_{k=1}^{18} 13 + 3(k-1) = 693$

arith

$64 = 13 + 3(k-1)$
$51 = 3(k-1)$

10) $23 + 29 + 35 + 41 + ... + 107$ $\boxed{arith}$

$\displaystyle\sum_{k=1}^{15} 23 + 6(k-1) = 975$

$107 = 23 + 6(k-1)$

Evaluate each geometric series described.

11) $\sum_{k=1}^{8} \left(\frac{1}{3}\right)^{k-1} = \dfrac{3280}{2187}$

12) $\sum_{m=1}^{9} -3 \cdot 3^{m-1} = -29523$

Evaluate each arithmetic series described.

13) $\sum_{k=1}^{8} (2k-4) = 40$

14) $\sum_{k=1}^{5} (3k-4) = 25$

Use a geometric or arthimetic series to answer the story problem. Write the series using sigma notation and evaluate.

15) Hailey is a nanny after school. Hubert, the little boy she watchess, stacks his ABC blocks. He starts with a row of 17 blocks, the next row has 15 blocks, and the next 13 blcoks. He continues to the top row where he places one block. How many blocks does Hailey need to get out for Hubert to stack!

$\sum_{k=1}^{9} 1 + 2(k-1) = 81 \text{ blocks}$

$17 = 1 + 2(k-1)$

$\frac{16}{2} = 8$

16) After wishing upon a star for world peace and love between all mankind, the Blue Fairy descends into your room. "I cannot grant your wish, but I will give you50 cents today, tomorrow $2, the next day $8, and I will continue to give you quadruple the amount for 14 days." How much money will you have in 14 days?

$\sum_{k=1}^{14} .50(4)^{k-1} =$

$\$ 44,739,242.50$

Factor each and find all roots.

17) $x^5 + 4x^3 - 12x = 0$

$X(x^4 + 4x^2 - 12) = 0$

$X(x^2 + 6)(x^2 - 2) = 0$

$\boxed{x = 0, \pm i\sqrt{6}, \pm\sqrt{2}}$

$\frac{-12}{4}$ $-2 \quad +6$

Factor each and find all roots. One factor has been given.

18) $x^7 + 3x^6 + 4x^5 + 12x^4 - 16x^3 - 48x^2 - 64x - 192 = 0$; $x + 3$

$$x^4(x^2+4) - 16(x^2+4)$$
$$(x^4-16)(x^2+4)$$
$$x(x^2-4)(x^2+4)(x^2+4)$$

$$\begin{array}{r|rrrrrrrr}
-3 & 1 & 3 & 4 & 12 & -16 & -48 & -64 & -192 \\
& \downarrow & -3 & 0 & -12 & 0 & 48 & 0 & 192 \\
\hline
& 1 & 0 & 4 & 0 & -16 & 0 & -64 & 0
\end{array}$$

$(x^6 + 4x^4) - (16x^2 - 64)$

$$\boxed{\begin{array}{l} x = -3 \quad x = \pm 2i \text{ mult 2} \\ x = \pm 2 \end{array}}$$

Factor each and find all roots. One root has been given.

19) $x^5 - 5x^4 + 4x^3 - 20x^2 + 4x - 20 = 0$; 5

$$\begin{array}{r|rrrrrr}
5 & 1 & -5 & 4 & -20 & 4 & -20 \\
& \downarrow & 5 & 0 & 20 & 0 & 20 \\
\hline
& 1 & 0 & 4 & 0 & 4 & 0
\end{array}$$

$$x^4 + 4x^2 + 4 = 0$$
$$(x^2+2)^2(x-5) = 0$$

$$\boxed{5, \ \pm i\sqrt{2} \text{ mult 2}}$$

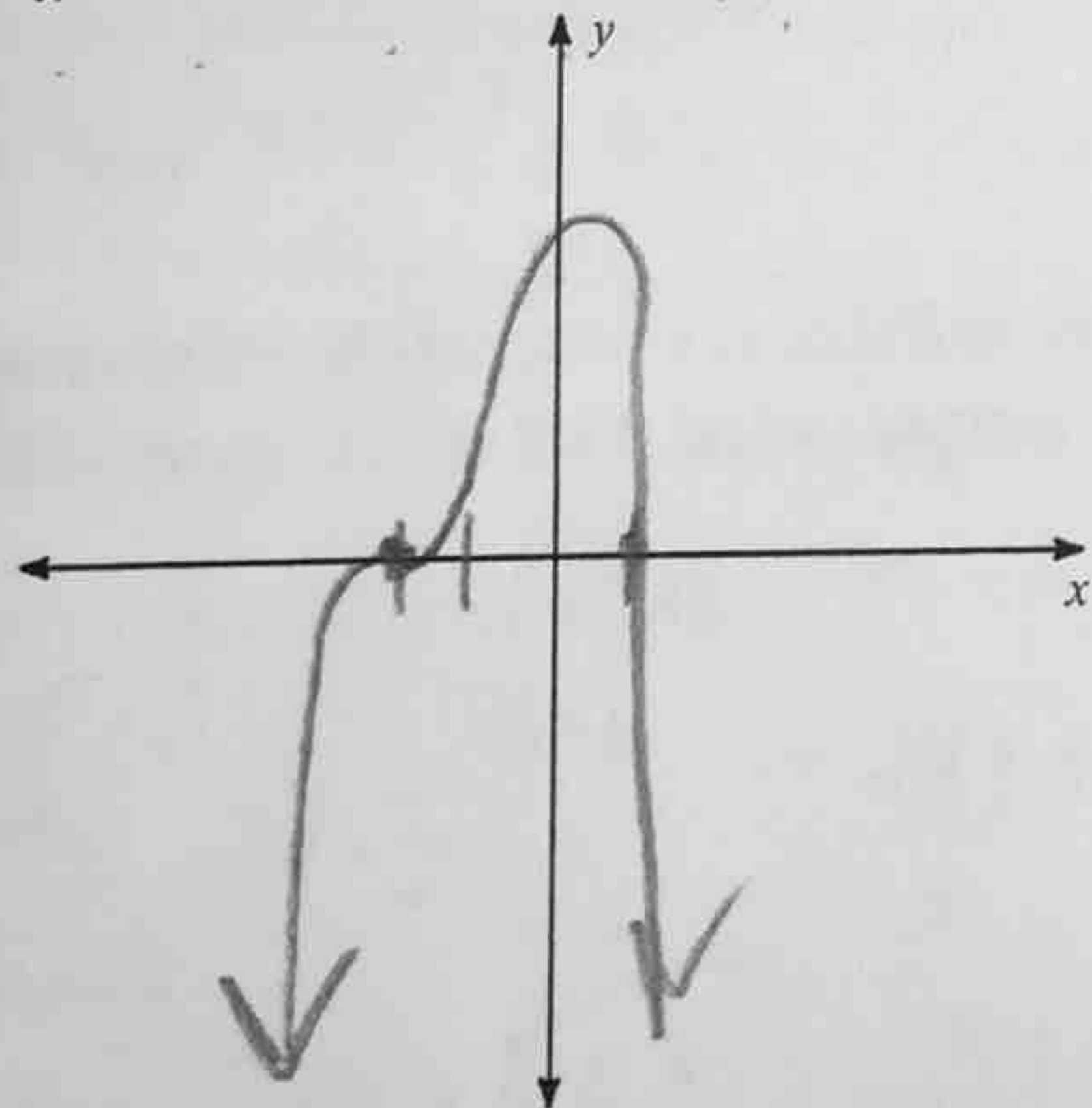**Given the information about the polynomial, graph a rough sketch. Label all known points.**

20) Degree of $P(x)$: 6
Left End Behavior: As $x \to \infty$, $y \to -\infty$
$x = 1$ is a zero
$(x+2)^3$ is a factor of $P(x)$
$x^2 + 1$ is a factor of $P(x)$

21) Degree of $P(x)$: 5
Leading coefficient is $\dfrac{1}{10}$
$x = -\dfrac{5}{3}$ is a zero with a multiplicity of 2
$2x - 7$ is a factor of $P(x)$
$(x-1)^2$ is a factor of $P(x)$
$P(0) = -3.5$

$7/2$