Lesson 5.1 & 5.2 Review Worksheet   Name: <u>KEY</u>

Evaluate the expression. Write your answer using exponents <u>and</u> as a simplified fraction. NO DECIMALS.

1.) $(-7)^2(-7)^1$

$(-7)^{2+1}$

$(-7)^3$	-343

2.) $4^{-6} \cdot 4^{-1}$

4^{-6+-1}

4^{-7}

$\dfrac{1}{4^7}$	$\dfrac{1}{16384}$

3.) $(5^{-2})^2$

5^{-4}

$\dfrac{1}{5^4}$	$\dfrac{1}{625}$

4.) $\dfrac{4^{-7}}{4^{-3}}$

$4^{-7-(-3)}$

4^{-4}

$\dfrac{1}{4^4}$	$\dfrac{1}{256}$

5.) $\dfrac{8^{-4}}{8^2}$

8^{-4-2}

8^{-6}

$\dfrac{1}{8^6}$	$\dfrac{1}{262144}$

6.) $\left(\dfrac{4}{5}\right)^{-3}$

$\dfrac{4^{-3}}{5^{-3}}$

$\dfrac{5^3}{4^3}$	$\dfrac{125}{64}$

Simplify the expression. Evaluate all powers with numerical bases. NO DECIMALS.

7.) $\dfrac{y^4}{y^{-7}}$

$y^{4-(-7)}$

y^{11}

8.) $(3^2 s^3)^6$

$3^{2 \cdot 6} s^{3 \cdot 6}$

$3^{12} s^{18}$

$531441 s^{18}$

9.) $(4^0 w^2)^{-5}$

$4^{0 \cdot -5} w^{2 \cdot -5}$

$4^0 w^{-10}$

$\dfrac{1}{w^{10}}$

10.) $(2m^{-3}n^{-1})(8m^4 n^{-2})$

$2 \cdot 8 m^{-3+4} n^{-1+-2}$

$16 m^1 n^{-3}$

$\dfrac{16m}{n^3}$

11.) $(7c^7 d^2)^{-2}$

$7^{-2} c^{7 \cdot -2} d^{2 \cdot -2}$

$7^{-2} c^{-14} d^{-4}$

$\dfrac{1}{7^2 c^{14} d^4}$

$\dfrac{1}{49 c^{14} d^4}$

12.) $\dfrac{x^5 y^{-8}}{x^5 y^{-6}}$

$y^{-8-(-6)}$

y^{-2}

$\dfrac{1}{y^2}$

13.) $\dfrac{16q^0 r^{-6}}{4q^{-3}r^{-7}}$

$\dfrac{16}{4} q^{0-(-3)} r^{-6-(-7)}$

$\boxed{4q^3 r}$

14.) $\dfrac{12a^{-3}b^9}{21a^2 b^{-5}}$

$\dfrac{12 a^{-3-2} b^{9-(-5)}}{21}$

$\dfrac{4a^{-5}b^{14}}{7}$ $\boxed{\dfrac{4b^{15}}{7a^5}}$

15.) $\left(\dfrac{x^4}{y}\right)^2 \cdot \dfrac{3y^2}{8x^8}$

$\dfrac{x^{4\cdot 2}}{y^2} \cdot \dfrac{3y^2}{8x^8}$

$\dfrac{x^8}{y^2} \cdot \dfrac{3y^2}{8x^8}$

$\dfrac{3x^8 y^2}{8x^8 y^2}$ $\boxed{\dfrac{3}{8}}$

16.) $\left(\dfrac{6y^{-2}}{x^4}\right)^{-3} \cdot \dfrac{8y^3 x^{-1}}{y^{-5}x^8}$

$\dfrac{6^{-3} y^{-2\cdot -3}}{x^{4\cdot -3}} \cdot \dfrac{8y^3 x^{-1}}{y^{-5}x^8}$

$\dfrac{6^{-3} y^6}{x^{-12}} \cdot \dfrac{8y^3 x^{-1}}{y^{-5}x^8}$

$\dfrac{6^{-3}\cdot 8 x^{-1} y^{6+3}}{x^{-12+8} y^{-5}}$

$\dfrac{6^{-3}\cdot 8 x^{-1} y^9}{x^{-4} y^{-5}}$

$6^{-3}\cdot 8 x^{-1-(-4)} y^{9-(-5)}$

$6^{-3}\cdot 8 x^3 y^{14}$

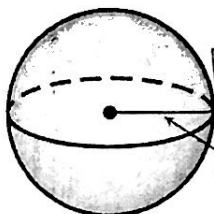$\dfrac{8x^3 y^{14}}{6^3}$

$\dfrac{8x^3 y^{14}}{216}$

$\boxed{\dfrac{x^3 y^{14}}{27}}$

Write an expression for the figure's area or volume in terms of x.

17.) $S = 4\pi r^2$

$S = 4\pi\left(\dfrac{x}{3}\right)^2$

$= 4\pi \dfrac{x^2}{9}$
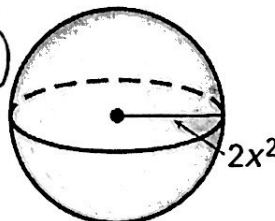
$\boxed{S = \dfrac{4\pi x^2}{9}}$

$\dfrac{x}{3}$

18.) $V = \dfrac{4}{3}\pi r^3$

$V = \dfrac{4}{3}\pi (2x^2)^3$

$= \dfrac{4}{3}\pi (2^3 x^6)$

$= \dfrac{4}{3}\pi \cdot 8 \cdot x^6$

$\boxed{V = \dfrac{32\pi x^6}{3}}$

$2x^2$

Decide whether the function is a polynomial function. If so, write it in standard form and state its degree, type, and leading coefficient. If it is not a polynomial, explain why.

19.) $f(x) = 4x + x^2\sqrt{11} - x^3 + \sqrt{2}$ $\boxed{\text{Yes}}$

SF: $f(x) = -x^3 + \sqrt{11}x^2 + 4x + \sqrt{2}$

D: 3

Type: cubic

LC: -1

20.) $h(x) = -5x^3 - 9x^5 + 21^a$ $\boxed{\text{NO}}$

a could be anything
only whole numbers
in exponents

21.) $g(x) = -6.25x - 4x^2 + \frac{2}{3}x^3 - 10x^4$ $\boxed{\text{Yes}}$

SF: $g(x) = -10x^4 + \frac{2}{3}x^3 - 4x^2 - 6.25x$

● D: 4

Type: Quartic

LC: -10

22.) $j(x) = x^4 + 12x^3 - 4x^2 + x^{1.25}$ $\boxed{\text{NO}}$

Can't have decimals in exponents

Use direct substitution to evaluate the polynomial function for the given value of x.

23.) $f(x) = 6x^4 - x^3 + 3x^2 - 5x + 9;\ x = -1$

$f(-1) = 6(-1)^4 - (-1)^3 + 3(-1)^2 - 5(-1) + 9$

$= 6 + 1 + 3 + 5 + 9$

$\boxed{f(-1) = 24}$

24.) $g(x) = 7x - x^4 + 1;\ x = -4$

$g(-4) = 7(-4) - (-4)^4 + 1$

$= -28 - 256 + 1$

$\boxed{g(-4) = -283}$

Use synthetic substitution to evaluate the polynomial function for the given value of x.

25.) $f(x) = 7x^4 - 3x^3 + x^2 + 5x - 9;\ x = 2$

```
2 | 7  -3   1   5   -9
  |     14  22  46  102
  ----------------------
    7   11  23  51  |93|
```

$\boxed{f(2) = 93}$

26.) $f(x) = x^3 - 8x + 6;\ x = -3$

```
-3 | 1   0  -8   6
   |    -3   9  -3
   ----------------
     1  -3   1  |3|
```

$\boxed{f(-3) = 3}$

27.) $h(x) = x^4 + 3x - 20;\ x = 4$

```
4 | 1   0   0   3   -20
  |     4   16  64  268
  ----------------------
    1   4   16  67  |248|
```

$\boxed{h(4) = 248}$

28.) $f(x) = -3x^5 + 6x^3 - x;\ x = -4$

```
-4 | -3   0   6   0   -1    0
   |      12  -48 168 -672  2692
   ------------------------------
     -3   12  -42 168 -673  |2692|
```

$\boxed{f(-4) = 2692}$

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Describe the end behavior of the graph of the polynomial function by completing the statements. (Hint: Sketch a general picture of the graph to help).

29.) $f(x) = -5x^3$

D: odd
LC: −
↑
↓

$f(x) \rightarrow \underline{+\infty}$ as $x \rightarrow -\infty$

$f(x) \rightarrow \underline{-\infty}$ as $x \rightarrow +\infty$

30.) $f(x) = 2x^5 - 7x^2 - 4x$

D: odd
LC: +
↗
↙

$f(x) \rightarrow \underline{-\infty}$ as $x \rightarrow -\infty$

$f(x) \rightarrow \underline{+\infty}$ as $x \rightarrow +\infty$

31.) $f(x) = 2x^8 + 9x^7 + 10$

D: even
LC: +
↑ ↗

$f(x) \rightarrow \underline{+\infty}$ as $x \rightarrow -\infty$

$f(x) \rightarrow \underline{+\infty}$ as $x \rightarrow +\infty$

32.) $f(x) = -12x^6 - 2x + 5$

D: even
LC: −
↙ ↓

$f(x) \rightarrow \underline{-\infty}$ as $x \rightarrow -\infty$

$f(x) \rightarrow \underline{-\infty}$ as $x \rightarrow +\infty$