Lessons 5.3 & 5.4 Review Worksheet

Name: __KEY__

Find the sum or difference.

1.) $(2y^2 - 5y + 1) + (y^2 - y - 4)$

$2y^2 + y^2 - 5y - y + 1 - 4$.

$$\boxed{3y^2 - 6y - 3}$$

2.) $(12x^3 - 4x^2 + 7x - 3) - (-2x^3 + 5x - 5)$

$12x^3 + 2x^3 - 4x^2 + 7x - 5x - 3 + 5$

$$\boxed{14x^3 - 4x^2 + 2x + 2}$$

Find the product.

3.) $2x^3(5x - 1)$

$$\boxed{10x^4 - 2x^3}$$

4.) $(y - 1)(y^2 + 6y - 2)$

$y(y^2 + 6y - 2) - 1(y^2 + 6y - 2)$

$y^3 + 6y^2 - 2y - y^2 - 6y + 2$

$$\boxed{y^3 + 5y^2 - 8y + 2}$$

5.) $(4t + 1)^2$ ⟵ *can expand
or use
product patterns

$(4t + 1)(4t + 1)$

$16t^2 + 4t + 4t + 1$

$$\boxed{16t^2 + 8t + 1}$$

6.) $(2f + 1)^3$

↗ (expanded
& multiplied)

$(2f)^3 + 3(2f)^2(1) + 3(2f)(1)^2 + (1)^3$

$$\boxed{8f^3 + 12f^2 + 6f + 1}$$

↑ (product
pattern)

Write the volume of the figure as a polynomial in standard form.

7.) $V = lwh$

$2x + 1$

$x + 6$

x
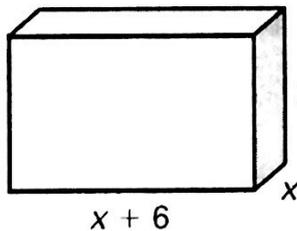
$V = x(x + 6)(2x + 1)$

$= x(2x^2 + x + 12x + 6)$

$= x(2x^2 + 13x + 6)$

$$\boxed{V = 2x^3 + 13x^2 + 6x}$$

Factor the polynomial completely (*Monomial Factors*).

8.) $128x^3 - 50x$

$2x(64x^2 - 25)$

$$\boxed{2x(8x + 5)(8x - 5)}$$

9.) $x^3 - 7x^2 + 10x$

$x(x^2 - 7x + 10)$

$$\boxed{x(x - 5)(x - 2)}$$

$\triangle$ $\frac{10}{-5 \cdot -2} = 7$

10.) $9x^4 - 75x^3 - 150x^2$

$3(-50) = -150$

$-30 + 5 = -25$

$3x^2(3x^2 - 25x - 50)$

$3x^2(3x^2 - 30x + 5x - 50)$

$\boxed{3x^2(x-10)(3x+5)}$

$3x^2(3x(x-10) + 5(x-10))$

Factor the polynomial completely (*Sum/Difference of Cubes*).

11.) $27g^3 + 343$

$(3g)^3 \quad (7)^3$

$\boxed{(3g+7)(9g^2 - 21g + 49)}$

12.) $40v^3 - 625$

$(2v)^3 \quad (5)^3$

$5(8v^3 - 125)$

$\boxed{5(2v-5)(4v^2 + 10v + 25)}$

Factor the polynomial completely (*By Grouping*).

13.) $x^3 + 6x^2 + 7x + 42$

$x^2(x+6) + 7(x+6)$

$\boxed{(x+6)(x^2+7)}$

14.) $9m^3 + 18m^2 - 4m - 8$

$9m^2(m+2) - 4(m+2)$

$(m+2)(9m^2 - 4)$

$\boxed{(m+2)(3m-2)(3m+2)}$

Factor the polynomial completely (*Quadratic Form*).

15.) $c^4 - 81$

$(c^2)^2 \quad (9)^2$

$(c^2+9)(c^2-9)$

$(c)^2 \quad (3)^2$

$\boxed{(c^2+9)(c+3)(c-3)}$

16.) $6y^6 - 5y^3 - 4$

$6(-4) = -24$

$-8 + 3 = -5$

$6y^6 - 8y^3 + 3y^3 - 4$

$2y^3(3y^3 - 4) + 1(3y^3 - 4)$

$\boxed{(3y^3 - 4)(2y^3 + 1)}$

Factor the polynomial completely (*Any Method*).

17.) $x^6 + 7x^3 + 6$

$(x)^3 \quad (1)^3$

$6 + 1 = 7$

$(x^3 + 6)(x^3 + 1)$ ← sum of cubes

$\boxed{(x^3+6)(x+1)(x^2+x+1)}$

18.) $2x^7 - 32x^3$

$2x^3(x^4 - 16)$ ← difference of squares

$2x^3(x^2+4)(x^2-4)$

$\boxed{2x^3(x^2+4)(x+2)(x-2)}$

Find the real-number solutions of the equation (Start by factoring).

19.) $x^3 + 2x^2 - 25x - 50 = 0$

$x^2(x+2) - 25(x+2) = 0$

$(x+2)(x^2 - 25) = 0$

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

$x+2=0 \quad x-5=0 \quad x+5=0$

$\boxed{x = -2} \quad \boxed{x = 5} \quad \boxed{x = -5}$

20.) $4w^4 + 40w^2 - 44 = 0$

$\overset{-11}{\overbrace{}}$

$\underset{10}{\underbrace{(11 + -1)}}$

$4(w^4 + 10w^2 - 11) = 0$

$4(w^2 + 11)(w^2 - 1) = 0$

$4(w^2 + 11)(w+1)(w-1) = 0$

$w^2 + 11 = 0 \qquad w + 1 = 0 \qquad w - 1 = 0$

$w^2 = -11 \qquad \boxed{w = -1} \qquad \boxed{w = 1}$

$\downarrow$

no real solutions

Find the possible value(s) of x.

21.) Area = 48 units^2

$3x + 2$

$3 \cdot -40 = -120$
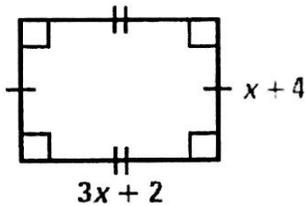
$\underset{\underbrace{(-6 + 20)} = 14}{}$

$(x+4)(3x+2) = 48$

$3x^2 + 2x + 12x + 8 = 48$

$3x^2 + 14x + 8 = 48$

$3x^2 + 14x - 40 = 0$

$3x^2 - 6x + 20x - 40 = 0$

$3x(x-2) + 20(x-2) = 0$

$(x-2)(3x+20) = 0$

$x - 2 = 0 \qquad 3x + 20 = 0$

$\boxed{x = 2} \qquad \cancel{x = -20/3}$

22.) At the ruins of Caesarea, archaelologists discovered a huge hydraulic concrete block with a volume of 945 cubic meters. The block's dimensions are x meters high by $12x - 15$ meters long by $12x - 21$ meters wide. What are the dimensions of the block?
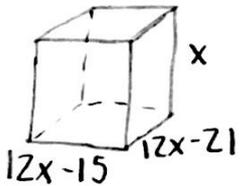
$x(12x-15)(12x-21) = 945$

$x(144x^2 - 252x - 180x + 315) = 945$

$x(144x^2 - 432x + 315) = 945$

$144x^3 - 432x^2 + 315x = 945$

$144x^3 - 432x^2 + 315x - 945 = 0$

$144x^2(x-3) + 315(x-3) = 0$

$(x-3)(144x^2 + 315) = 0$

$x - 3 = 0 \qquad 144x^2 + 315 = 0$

$\boxed{x = 3} \qquad \cancel{x^2 = -315/144}$

23.) Suppose you have 250 cubic inches of clay with which to make a sculpture shaped like a rectangular prism. You want the height and width each to be 5 inches less than the length. What should the dimensions of the prism be?
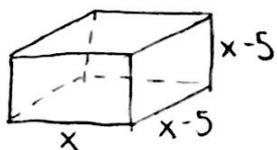
$x(x-5)(x-5) = 250$

$x(x^2 - 5x - 5x + 25) = 250$

$x(x^2 - 10x + 25) = 250$

$x^3 - 10x^2 + 25x = 250$

$x^3 - 10x^2 + 25x - 250 = 0$

$x^2(x-10) + 25(x-10) = 0$

$(x-10)(x^2 + 25) = 0$

$x - 10 = 0 \qquad x^2 + 25 = 0$

$\boxed{x = 10} \qquad \cancel{x^2 = -25}$