

## 9<sup>th</sup> Grade Assignments – Week #4

Announcement: Your first Algebra test will be included as part of next week's assignment, to be taken at some over the next week.

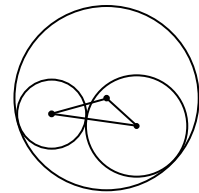
### Individual Work

- Do *Exponents & Polynomials* – **Problem Sets #2 and #3.**

### Group Assignment:

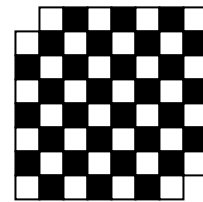
*for Tuesday*

- (1) Three Circles and a Triangle. Discover the special relationship found with any circle and two inner tangent circles (see drawing). Specifically, how does the triangle, which connects the three centers, relate to the radii of the circles? (Note that the two inner circles could be much smaller or larger than what is shown here. You are trying to find the a special relationship that must be true no matter what size the circles are.)

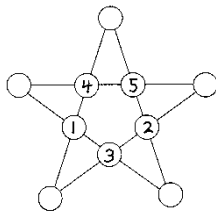


*for Thursday*

- (2) Dominoes on a Chessboard. You have 31 dominoes, and a standard (8-by-8) chessboard, except that one square from the top-left corner has been removed, and so has the bottom-right square. Each domino is a rectangle that perfectly covers two squares of the chessboard. Is it possible to cover the 62 squares of this chessboard with the 31 dominoes? If yes, then show how this can be done. If no, then give an explanation or proof for why it can't be done.



- (3) Magic Star. Fill in the pentagram shown here so that the sum of each diagonal is 20.



# Exponents & Polynomials

## Problem Set #1

### Section A

#### Simplify.

- 1)  $4x^3 + 7x^3$
- 2)  $(4x^3)(7x^3)$
- 3)  $7x + 8x$
- 4)  $(7x)(8x)$
- 5)  $\frac{2}{3}x^2 - \frac{3}{4}x^2$
- 6)  $(\frac{2}{3}x^2)(-\frac{3}{4}x^2)$
- 7)  $a^5 + a^5$
- 8)  $(a^5)(a^5)$
- 9)  $6w^5 - 20w^5$
- 10)  $(6w^5)(20w^5)$
- 11)  $3c^3 - 3c^3$

#### Solve.

- 25)  $5x + 2 = 3x - 7$
- 26)  $4 - 7x = 7x + 4$
- 27)  $8(9x - 2) + 1 = 7 - 2(x - 1)$
- 28)  $3(2x + 3 - 4x) = -(4 - x) - 9$
- 29)  $\frac{1}{3}x - 4 = 2 + \frac{2}{5}x$
- 30)  $\frac{1}{2x+1} = 7$
- 31)  $5 + 4(x - 8) = 2 - 2(2x - 1)$

- 12)  $(3c^3)(3c^3)$
- 13)  $-6r^4 - 3r^4$
- 14)  $(-6r^4)(-3r^4)$
- 15)  $5x^3 + 2x^5$
- 16)  $(5x^3)(2x^5)$
- 17)  $-\frac{2}{7}y^3 - \frac{1}{2}y^3$
- 18)  $(-\frac{2}{7}y^3)(-\frac{1}{2}y^3)$
- 19)  $5x^3 + 6x^3 + 11x^3$
- 20)  $5x^3 + 6x^2 + 11x^3$
- 21)  $3a^5 - 2a^5 - 5a^5$
- 22)  $3a^3 - 2a^4 - 5a^5$
- 23)  $3x^5 - 2a^5 - 5y^5$
- 24)  $(3a^5)(2a^5)(5a^5)$

### Section B

#### Solve.

- 32)  $5 - 2(3x - 8) + 4x - (x + 7) - 10x = 6(2x - 3) - 3(-7x - 8) - 46x + 12$
- 33)  $\frac{1}{6} - \frac{2}{3}(9x + \frac{3}{5}) + \frac{3}{4}x = \frac{4}{15} - \frac{5}{6}(\frac{3}{10}x - 1\frac{14}{25})$

## Problem Set #2

### Group Work

#### Vertical Multiplication

Example #1:  $52$

$$\begin{array}{r} \times 38 \\ 416 \\ 1560 \\ \hline 1976 \end{array}$$

$$416$$

$$1560$$

$$1976$$

Example #2:  $5x + 2$

$$\begin{array}{r} 3x + 8 \\ 40x + 16 \\ 15x^2 + 6x \\ \hline 15x^2 + 46x + 16 \end{array}$$

$$40x + 16$$

$$15x^2 + 6x$$

$$15x^2 + 46x + 16$$

Multiply like the example.

1) a)  $43 \times 23$

b)  $(4x + 3)(2x + 3)$

2) a)  $32 \times 21$

b)  $(3x + 2)(2x + 1)$

3) a)  $52 \times 38$

b)  $(5x + 2)(3x + 8)$

4) With #2 (above) both problems produce the same digits, but this is not the case for #1 and #3. Why is this so?

#### Solve.

25)  $3x + 2 - 4x = 8x - 1 + 13x - 5$

26)  $5(x + 3) = 10x + 1 - 5x$

27)  $1 - 4(3x + 6) = -14x + 5(3 - 5x)$

28)  $\frac{2}{3x+1} = 5$

29)  $\frac{1}{2}x - 3 = \frac{3}{7}x + 1$

### Section B

#### Solve.

30)  $7 - 5(2x - 3) + x - (3x - 2) - 8x = 3(x + 3) - 2(-4x - 5) - 4x + 7$

31)  $-7 - 3\frac{3}{5}(3\frac{1}{3}x - \frac{5}{6}) + 3\frac{2}{3}x = \frac{5}{8} - \frac{3}{8}(\frac{4}{5}x + \frac{2}{3}) + \frac{2}{15}x$

### Section A

#### Simplify.

5)  $x^4 + x^4$

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

7)  $x + x$

8)  $x \cdot x$

9)  $\frac{1}{3}x^5 - x^5$

10)  $(\frac{1}{3}x^5)(-x^5)$

11)  $-7w^5 - 3w^3$

12)  $(-7w^5)(-3w^3)$

13)  $4y^5 - y^5$

14)  $\frac{6}{11}y^5 - \frac{1}{3}y^5$

15)  $(\frac{6}{11}y^5)(-\frac{1}{3}y^5)$

16)  $(4w^3)(2w^2)(10w^5)$

17)  $5x^5 - 3x^4 + 6x^3 - 8x^5 - x^3$

18)  $5x^2y^3 + 2x^2y^3$

19)  $(5x^2y^3)(2x^2y^3)$

20)  $4x^3y^2 + 3x^3y^5$

21)  $(4x^3y^2)(3x^3y^5)$

22)  $5x^3 - 4x^3y^5 + x^3 - 3x^3y^5$

23)  $(5x^3)(-4x^3y^5)(x^3)(-3x^3y^5)$

24)  $(5x^4y^3)^3$

### Problem Set #3

#### Section A

**Simplify.**

- 1)  $7x^2 - x^2$
- 2)  $-7y^5 - 2y^5$
- 3)  $x^3 + x^3$
- 4)  $(x^3)(x^3)$
- 5)  $5x^4y^3 - y^3$
- 6)  $5x^4y^3 - 2x^4$
- 7)  $5x^4y^3 - 2x^4y^4$
- 8)  $(5x^4y^3)(-2x^4y^4)$
- 9)  $5x^4y^3 - 2x^4y^3$
- 10)  $3x^3 + x^2 + 7x^3$
- 11)  $(3x^3)(x^2)(7x^3)$
- 12)  $(3x^3y^5)^2$
- 13)  $(10x^3y^2)^5$
- 14)  $(3xy^4)^4$
- 15)  $5(3x + 5)$
- 16)  $5x^2(3x + 5)$
- 17)  $5x^3(3x^4 + 5x^3)$
- 18)  $4x^3(5x^2 - 6)$

**Multiply out horizontally**

- 19)  $(5x + 1)(10x + 3)$
- 20)  $(4x + 5)(4x + 5)$

**Solve.**

- 38)  $7 - 2(x+3) + 4x - 4(3x-2) - x = 5(2x-1) - 3(10x+3) + 3x + 8$
- 39)  $3 - \frac{5}{6}\left(\frac{18}{35}x + 4\right) = 2\frac{2}{3} - \frac{1}{3}\left(\frac{4}{7}x + 11\frac{3}{4}\right) - x$

- 21)  $(3x + 4)(2x + 5)$
- 22)  $(3x - 4)(2x + 5)$
- 23)  $(3x + 4)(2x - 5)$
- 24)  $(3x - 4)(2x - 5)$

**Solve.**

- 25)  $5x - 34(x-1) = 5 + 3(x-7)$
- 26)  $(x + 4)5 - 7(x - 1) = 2$
- 27)  $\frac{1}{3}(x - 1) + 8 = \frac{2}{9}x$
- 28)  $\frac{2}{x+1} = \frac{-3}{2x-1}$
- 29)  $3\frac{1}{2}x + 2 = 5\frac{1}{4}x - 3$

#### Section B

**Simplify.**

- 30)  $(5x^2)(6x^4y)(w^3xy^3)(5w^5)$
- 31)  $\frac{5}{8}w^5 + \frac{1}{12}w^5$
- 32)  $x^2 - 4x^3y + 2x^3 + 9x^3y$

**Multiply.**

- 33)  $(6x + 5)(3x + 4)$
- 34)  $(6x - 5)(3x - 4)$
- 35)  $(6x + 5)(3x - 4)$
- 36)  $(6x - 5)(3x + 4)$
- 37)  $(7x^5 - 6)(2x^5 - 9)$