10th Grade Assignment – Week #21

Group Assignment *for either Tuesday or Thursday*

1. **Math Magic Trick!**
   Everyone in the group should do the following:
   "Start with any two numbers between 1 – 9. Add these two numbers together to get a third number. Add the second and third number together to get a fourth number. Add the third and fourth numbers together to get a fifth number. Continue this process until you have ten numbers. Add together all ten numbers. Divide by 11 to get your final answer."
   Now answer these questions:
   a) Everyone's final answer is the same as what other number in their list?
   b) Use algebra to show that this is always true.
   (Hint: the first four numbers are: X, Y, X+Y, X + 2Y.)
2. **Average Speed Puzzle**
   Loren leaves home for work at the same time every day. If she drives to work at an average speed of 75 km/hr, then she arrives two minutes early. If her average speed is 65 km/hr, then she arrives two minutes late. How far does Loren drive to work?
3. **The Three Lights Puzzle.**
   There is a room (without windows) which has three lamps sitting on a table. You are outside the room where there are three light switches, each switch controlling one of the lamps. Come up with a plan that allows you to determine which switch controls which light, provided that you can only go into (or look into) the room once. (With each switch, "up" is "on".)

- In order to prepare for the test, help each other out with some of the problems from the **Algebra Review** *Individual Work* (see below).

Individual Work

- Prepare for the *Algebra Review* test, which will be included in next week's assignment. Make sure you truly understand the problems that have been assigned in the *Algebra Review* unit.
  - **From Algebra Review "Section A"** Choose problems from **Problem Sets #8, 9, 10.**
    From Algebra Review "Section B" Choose problems from **Problem Sets #7 and #8.**
  - If you wish, do the practice test found at the end of this document.

Problem Set #8

Simplify.

1) $(6x^3)^3$

2) $(12x^3)(3x^4)$

3) $\sqrt{8} + \sqrt{32}$

4) $(3 + \sqrt{5})(3 - \sqrt{5})$

5) $\frac{3}{\sqrt{5}}$

Factor.

6) $x^2 + 25x + 150$

7) $x^2 - 25x + 150$

8) $x^2 + 25x - 150$

9) $x^2 - 25x - 150$

10) $x^2 + 8x + 15$

11) $x^2 - 8x - 20$

12) $x^2 + 16x + 15$

13) $2x^2 + 16x + 30$

14) $x^{14} - 20$

15) $5x^{14} - 20$

16) $x^7 - 25x$

17) $11x^8 + 11x^7 - 330x^6$

Solve for M in terms of N.

18) $5M + 4N = 20$

19) $-5M + 3 = -5N$

Solve.

20) $5 - (3 + 2x) = 12x$

21) $\frac{4x}{x^2 - 5} = \frac{7}{x}$

22) $(x + 3)(x - 12)$
$= (x - 4)(x - 5)$

23) $7x + 8 = x(3x + 5)$

24) $\frac{1}{2}x + 4 = \frac{1}{3}x - \frac{5}{6}$

25) $x^3 + 6x^2 - 7x = 0$

26) $(x - 7)(2x + 1) = 3(x + 2)$

27) $13x^2 - 39 = -26x$

28) $\frac{x+1}{x-2} = \frac{x+7}{x-5}$

Find the Common Solution.

29) $5x + 3y = -4$
$3x + 5y = -8$

30) $T_1 + T_2 = 23$
$75T_1 = 65T_2$

31) The area of a rectangle is 144 cm^2. If the perimeter of the recangle is 52 cm, find the dimensions of the rectangle.

32) Bob travels from New York to Chicago at an average speed of 75 mph. On his return trip (along the same route), he travels at an average speed of 65 mph. If his total roundtrip time was 23 hours, what was his average speed for the entire trip?

33) The product of two numbers is 80. If twice one number is 6 more than the other number, find all sets of numbers that fit these criteria.

Problem Set #9

Simplify.

1) $3x^2 - 10x^2$

2) $3x^2 - 10x^3$

3) $(3x^2)(10x^2)$

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

5) 18^2

6) 18^{-2}

7) $6 \pm \sqrt{196}$

8) $\sqrt{54}$

Solve for X in terms of Y

9) $5X - Y = 1$

10) $2Y = 3X + 6$

Factor.

11) $x^2 + 15x + 54$

12) $x^2 - 15x + 54$

13) $x^2 + 15x - 54$

14) $x^2 - 15x - 54$

15) $x^2 + 2x + 1$

16) $x^2 - 2x + 1$

17) $4x^4 - 28x^3 + 48$

18) $x^2 + 5x$

19) $x^3 + 11x^2 - 60x$

Quadratic Formula.

20) Solve by both factoring and the Quadratic Formula:

$3x^2 + 3x - 18 = 0$

Solve.

21) $7 - 3(5 - x) = 3 - 3x$

22) $x^2 - 169 = 0$

23) $x^2 + 169 = 0$

24) $x^2 + 13x + 36 = 0$

25) $x^2 - 13x - 30 = 0$

26) $x^2 - 13x + 1 = 0$

27) $\frac{3}{4}x = 12$

28) $\frac{2}{5}x + 4\frac{1}{3} = \frac{3}{4}x + 7\frac{1}{5}$

29) $(x + 1)(2x + 5)$
$= (2x - 1)(x - 4)$

30) $(x + 1)(2x + 5)$
$= (x - 1)(x - 4)$

31) $\frac{3}{x+1} = \frac{4}{2x-1}$

32) $\frac{x+1}{x-1} = \frac{x+1}{3}$

33) $x^3 - 7x^2 = 30x$

34) $4x^2 - 84 = -16x$

35) The product of two numbers is 63. If three times one number is 12 more than the other number, find all pairs of numbers that fit these criteria.

36) Jane and Bill decide to race their cars. They both begin and end at the same place but Jane takes a route that is 12 miles long while Bill's route is only 10 miles. If Jane averages 40 mph and Bill averages 35 mph, who wins the race and how many minutes does it take them?

Problem Set #10

Simplify.

1) $(2x^3y^2)^5$
2) $14x^2y + x^2y + 5xy^2 + 2$
3) $\left(\frac{2}{3}\right)^3$
4) $\left(\frac{2}{3}\right)^{-3}$

Factor.

5) $x^2 + 20x + 96$
6) $x^2 - 20x + 96$
7) $x^2 + 20x - 96$
8) $x^2 - 20x - 96$
9) $x^2 - 324$
10) $x^2 + 324$
11) $x^{10} - 4$
12) $x^{10} + 4$
13) $x^6 - 4y^6$
14) $x^4 - 10{,}000$
15) $x^3 + 10x^2 + 25x$

Solve.

16) $5x - 2 = 8x + 10$
17) $x^2 + 4x + 3 = 0$
18) $\frac{5}{3}x - \frac{7}{4} = -3(x + 5\frac{2}{9})$
19) $x^2 + 9x - 12 = 0$
20) $4x^2 = 3x$
21) $x(6x + 18) = -12$
22) $(x + 3)^2 - 1 = 4x^2$
23) $x^2 + 42 = -13x$
24) $(x + 3)(x - 4) = -12$
25) $\frac{2}{3}x + 1 = \frac{5}{2}x$
26) $\frac{x}{x+2} = \frac{1}{x}$
27) $5x^2 + 2x + 1$
$= (x + 1)(5x + 1)$
28) $x^4 - 1 = 0$
29) $(5x - 1)(x + 3) = 5$
30) $3x^2 + 12x = 15$
31) $3x^2 + 12x = -15$
32) $3 + 4(3x + 5) - 20x$
$= 5 - 5(-3 - 2x) + 14$

Find the Common Solution.

33) $x + y = 17$
$3x - y = -5$
34) $4x - 6 = 2y$
$3x + 4y = -5$

35) The sum of two numbers is 30. If the difference of the squares of these two numbers is 180, find the two numbers.

36) Bob travels to the grocery store at an average speed of 40 mph and returns home along the same route at an average speed of 60 mph. If Bob's total traveling time is 45 minutes and the grocery store is 18 miles away, what was Bob's average speed for the entire trip?

Problem Set #7

Simplify.

1) $(2x^3y^2)^2(-2xy^3)^3$

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

3) $\dfrac{x^2 - 10x + 21}{x^2 + 10x - 39}$

4) $\dfrac{3}{4x^2y} + \dfrac{5}{6xy^3}$

5) $\dfrac{\frac{25}{x} - x}{\frac{x}{2x^2 - 5x}} - 3$

Factor.

6) $x^2 + 25x - 70$

7) $5x^2 + 25x - 70$

8) $x^2 - 100$

9) $x^6 - 10$

10) $x^4 + 25$

11) $9x^4 - 25x^6$

12) $5x^2 + 23x - 10$

Solve for X in terms of Y.

13) $Y = \frac{2}{3}X - 6$

Find the Common Solution.

14) $x + 2y = 1$
$3x - 4y = 23$

Solve.

15) $\dfrac{x-2}{2x-25} = \dfrac{3}{x+20}$

16) $5x + 2 = -3x^2$

17) $(x - 3)^2 = 3x^2 + 4x + 12$

18) $\dfrac{4x}{x-2} = \dfrac{x-5}{x-3}$

19) $-\frac{3}{5}X - 4 = \frac{5}{6} - X$

20) $(2x+3)(2x-3) = -x - 6$

21) $\dfrac{x}{x+1} + \dfrac{1}{x-2} = \dfrac{3}{x^2-x-2}$

22) $\dfrac{2}{x-1} + \dfrac{8}{1-x^2} = \dfrac{3}{x+1}$

23) $10x = 3x^2 + 8$

24) $100x^2 + 5x^4 = 6x^4$

25) Find the area of the isosceles right triangle triangle that has a perimeter of 10. (leave answer in radical form.)

26) Bill jogged around a track averaging 3 m/s on the first lap and then 4 m/s on the second lap. The combined time for the two laps was 3 minutes 30 seconds. What is the perimeter of the track?

Problem Set #8

Simplify.

1) $(3x^2 + 1)(x^2 + 7)$

2) $(3x^2 + 1)(x + 7)$

3) $(4x^2)(5xy^3)(5xy^3)$

4) $(4x^2)(5x - y^3)(5x + y^3)$

5) $(x + 5)^3$

6) $\left(\frac{3y^{-3}}{2x^3}\right)^{-2}$

7) $\frac{5x^3 - 20x^2}{5x^2}$

8) $\frac{2x^3 - 16x^2 + 24x}{x^2 + 4x - 12}$

9) $\frac{5}{x-7} - \frac{x+3}{7-x}$

10) $\frac{\frac{1}{2x-2} - \frac{1}{x}}{\frac{2}{x} - \frac{1}{x-1}}$

Find the Common Solution.

11) $5x - 2y = 20$
$2x + 7y = 8$

Factor.

12) $x^6 - y^4$

13) $3x^6 - 12x^3$

14) $x^{20} - 16$

15) $3x^7 - 27x^5$

Solve.

16) $x(7x-5)+19=9x^2-12x+4$

17) $x^2 + 2 = -6x$

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

19) $(x+4)(x-5) = 2x^2+4x-48$

20) $4x^2 = 3 - x$

21) $4x^2-22x+14=x^2-10x+5$

22) $\frac{5}{x+6} = \frac{4}{2x-7}$

23) $\frac{x-2}{3x} + \frac{5}{6} = \frac{5-3x}{4x}$

24) $\frac{1}{x} + \frac{4}{x+1} = 6$

25) $\frac{2}{x-2} - \frac{1}{x^2+x-6} = \frac{x}{x+3}$

26) Bill is $^3/_8$ as old as Kathy. In 12 years Kathy will be twice as old as Bill. How old is Bill now?

27) Bobby is exactly 1m tall. Whatever percent Bobby's height is of Kate's height, Kate is that same percent taller than Bobby. How tall must Kate be?

Algebra Review Practice Test

Answers are at the end!!
Do your work on a separate sheet.

1) Evaluate this each expression
$3Z - 2XY^2$
given $X = -1; Y = 4; Z = -2$.

Simplify/Multiply

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

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

4) $5c^3 - 2c^3$

5) $(-6r^4v^2x^3)(-3r^4v^5z)$

6) $3x^4 + 2x^3$

7) $3x^2y^3 + 2x^2y^3$

8) $(2x^3y^4)^2$

9) $(⅔)^{-2}$

10) $\frac{2x^{-3}y^{-2}}{3x^5y^{-6}}$

11) $3x^3(4x^3 - 6x)$

12) $(x^3 + 6)(x^3 - 6)$

13) $(x - 4)(2x - 5)$

14) $(x - 6)^2$

15) $(x + 5)^3$

Factor.

16) $x^3 + 2x^2$

17) $x^2 - 10x + 24$

18) $x^2 + 10x - 24$

19) $x^6 - 4$

20) $x^4 + 16$

21) $x^5 - x$

22) $12x^3y^5 - 4x^2y^3$

23) $3x^4 + 18x^3 + 24x^2$

Solve.

24) $x^2 + 20 = 12x$

25) $x^2 + 10x = 7$

26) $5 - 2(x+3) = 3x - 6 + 5x - 1$

27) $⅓X + ⅔ = ¾X - ½$

28) $6 = 9 - (4X + 3) - 2X$

29) $x^2 + 3x + 24 = 3x^2 + x$

30) $\frac{12}{4X+3} = \frac{2}{X-3}$

31) *Challenge!* $\frac{1}{X+2} + \frac{1}{X-1} = \frac{1}{2}$

32) $(x - 5)(x + 8) = 2x^2 - 10x + 2$

Find the Common Solution.

33) $2x - 9y = 2$
$x + 6y = -6$

34) $3x + 2y = -4$
$2x - 3y = -7$

Answers

1) 26

2) $6x^3$

3) $15w^6$

4) $3c^3$

5) $18r^8v^7x^3z$

6) can't

7) $5x^2y^3$

8) $4x^6y^8$

9) $^9/_4$

10) $\frac{2y^4}{3x^8}$

11) $12x^6 - 18x^4$

12) $x^6 - 36$

13) $2x^2 - 13x + 20$

14) $x^2 - 12x + 36$

15) $x^3 + 15x^2 + 75x + 125$

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

17) $(x-6)(x-4)$

18) $(x+12)(x-2)$

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

20) can't

21) $x(x^2+1)(x+1)(x-1)$

22) $4x^2y^3(3xy^2-1)$

23) $3x^2(x+2)(x+4)$

24) $x = 10, 2$

25) $x = \frac{-10 \pm \sqrt{128}}{2}$

$x = -5 \pm 4\sqrt{2} \approx 0.657, -10.7$

26) $x = {}^3/_5$

27) $x = {}^{14}/_5$

28) $x = 0$

29) $x = 4, -3$

30) $x = {}^{21}/_2$

31) $x = 4, -1$

32) $x = 6, 7$

33) $x = -2, y = -{}^2/_3$

34) $x = -2, y = 1$