9th Grade Assignment – Week #23

<u>Group Assignment</u>:

For Tuesday

1) Using the Pascal's Triangle that you created last week, look carefully for patterns. What do you see? There is much to be found!

2) How many ways are there to scramble each of these words:
   a) GREAT   b) HAPPY   c) MUMMY
   d) BOOKKEEPER   e) YELLOWWOODDOOR

3) What is the probability of rolling three dice and getting a sum equal to 4?

For Thursday (Solutions are at the bottom of the page.)

4) There are 5 choices for an appetizer, 10 choices for a main course, and 3 choices for dessert. How many different 3-course meals can a person order?

5) How many possible ways can four people order main courses (without appetizers or desserts)?

6) How many possible ways can four people order different main courses?

7) How many possible ways can four people order three different main courses and share them?

8) On a shelf in the restaurant, there are 4 identical art books, 3 identical math books, and 5 identical history books. How many possible ways can these books be arranged on the shelf?

9) If 3 out of the 10 main courses are vegetarian, what is the probability of you getting a random main course and having it turn out to be vegetarian?

10) If 2 out of the 10 main courses are gluten-free, what is the probability of you getting a random main course and having it turn out to be vegetarian, *and* your friend getting a random main course and having it turn out to be gluten-free?

11) *Challenge!* What is the probability of choosing three cards from a standard 52-card deck, and getting all hearts. (Hint: there are 13 hearts in the whole deck.)

12) *Challenge!* How many ways are there to distribute 10 gold coins amongst 6 people?

<u>Individual Work</u>

- *Midyear Review*. From the *Midyear Review* unit of the workbook, look over the problems in **Problem Set #5** and **Problem Set #6**, and do the ones that you feel you need the most practice with.

- *Main Lesson Book pages*. Below are suggestions for main lesson book pages. Do what you can.

  Following the format outlined in the Week #21 assignment, write a page for:
  - *Rolling Two Dice*. Add a "conclusions" section to last week's essay.
  - *Pascal's Triangle*. Add to what you started last week. Include your favorite patterns.
  - *The Street Problem*. Include what I did in the lecture.
  - *The Birthday Problem*. Include what I did in the lecture.
  - *Probability Summary Page*. In Monday's lecture I outlined four important principles of probability. Give an example of each one with explanations.
  - *The Power of Thought*. Write an essay reflecting upon my statement (made in Wednesday's lecture): "The only way to effect positive change in the world is through clarity in thinking and effective communication."

Problem Set #5

Section A

Simplify.

1) $5x^7 - x^7$

2) $4x^7 + 5x^6$

3) $(4x^7)(5x^6)$

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

5) $\dfrac{4x^{-3}y^{-2}}{7y^5z^{-4}}$

6) $\left(\dfrac{5x^{-2}}{4y^3}\right)^{-3}$

7) $6x^5y^2 - y^2$

8) $(5x^2y)(3x^4y^3)^2$

9) $(x^6+4)(x^3+2)(x^3-2)$

Multiply.

10) $(x + 6)(x + 9)$

11) $(x^3 - 11)(x^3 - 9)$

12) $(x^2 + 8)(x^2 - 8)$

13) $(2x - 5)(3x - 1)$

14) $-4x^5(2x^4 - 3x^2)$

15) $(w + 9)^2$

16) $6x(x + 5)^2$

Factor.

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

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

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

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

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

22) $x^2 - 144$

23) $x^2 + 144$

24) $x^3 - 9$

25) $10x^3y^7 + 8x^2y^4$

26) $5x^7 - 45x^5$

27) $2x^3 + 14x^2 + 24x$

28) $7x^6 - 21x^3$

29) $x^2 - 17x + 70$

30) $3x^5 - 12x^3$

Solve.

31) $5x - 6 - x = 9 - 10x - 22$

32) $5 - 4(2x + 3) = 6 - (4x + 5)$

33) $x^2 + 16x + 48 = 0$

34) $5x^3 + 20x^2 - 25x = 0$

35) $x^2 + 37x = 16 + 37x$

36) $3x^2 + 10x = 2x^2 - 25$

Percent Review

37) What is 0.03% of 3400?

38) 6 is what percent of 8?

39) What is 350% of 4000?

40) What is 4000 increased by 250%?

41) What percentage increase is it going from 210 up to 575?

42) 73 is 27% of what?

PDA Review

43) Unit Conversions
   a) 30 ft = _____ yd
   b) 90 kg = _____ mg
   c) 9 cm = _____ mm
   d) 7 lb ≈ _____ kg
   e) 700 cm ≈ _____ in
   f) 3000 oz ≈ _____ kg

44) If a model of the Earth were made exactly to scale with a diameter of one meter, how far above the surface of the model would Mount Everest stick out? (Mount Everest has a height of about 8800m and the Earth has a radius of about 6400km.)

Section B

Factor.

45) $x^3 - x^5$

46) $5x^8 - 30x^7 + 40x^6$

47) $4x^6 - 9y^8$

Solve.

48) $3x^2 + 5 = (x+7)^2 + 16$

49) $3x^3(x+3)^2 = 6x^3(3x+17)$

50) $x^4 - 9x^2 = 4(x-3)(x+3)$

Percent Review

51) 121 is 12% less than what?

52) George has 80% as much money as Vicky. How much money does George have if Vicky has $990?

53) George has 80% as much money as Vicky. How much money does Vicky have if George has $990?

54) Bob weighs 20% more than Pete.
   a) Bob's weight is what percent of Pete's?
   b) Pete's weight is what percent of Bob's?
   c) Pete weighs what percent less than Bob?

PDA Review

55) Unit Conversions
   a) $14 \text{ ft}^3 \approx$ _____ m^3
   b) $26 \frac{\text{m}}{\text{s}} =$ _____ $\frac{\text{km}}{\text{h}}$
   c) $800 \frac{\text{in}}{\text{s}} \approx$ _____ mph

56) What is the volume (in in^3) of a block of iron that weighs 10 pounds?

57) A rock has a volume of 5.6 ft^3 and weighs 1400 pounds.
   a) What is the density in both lb/ft^3 and oz/in^3?
   b) What percent as dense as gold is it?
   c) What percent as dense as water is it?

58) Hans bought a 3.7-hectare plot of land in Germany for 3.2 million euros. What is the cost of this land in dollars per acre? ($1 = 0.855$euro)

Problem Set #6

Section A

Simplify.

1) $7x^6 - x^6$

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

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

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

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

6) $\left(\frac{2x^2y^{-3}}{3y^3z^{-4}}\right)^{-2}$

7) $7x^5y^2 + x^5y^2$

8) $3(x+2y)(5x-3y)$

Multiply.

9) $(x + 7)(x + 2)$

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

11) $(w^4 + 5)(w^4 - 5)$

12) $(6x - 5)(2x + 3)$

13) $2y^2(y + 3)(y - 6)$

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

Factor.

15) $x^2 - 12x + 11$

16) $x^2 - x - 90$

17) $x^2 - 34x - 240$

18) $x^2 + 34x + 240$

19) $x^2 + 34x - 240$

20) $x^2 - 34x + 240$

21) $10x^5 - 90x^4 + 180x^3$

22) $x^8 - 9$

23) $x^8 + 9$

24) $x^8 + 9x^6$

25) $x^7 - 9x$

26) $x^8 - 1$

Solve.

27) $6 - x = 8x + 7$

28) $x^2 - 5x = 24$

29) $x^2 - 4x - 21 = 2x^2 - 18$

30) $(x + 1)(x + 4) = x^2$

31) $(x + 1)(x + 4) = 40$

32) $8 - 3x = x^2 + 4$

33) $8 - 3x = x + 4$

34) $\frac{3x + 6}{12} = \frac{x+2}{4}$

Percent Review

35) What is 93.2% of 8000?

36) 7 is what percent of 23?

37) 10 is what percent of 15?

38) 15 is what percent of 10?

39) What percentage increase is it going from 73 up to 90?

PDA Review

40) Unit Conversions

   a) 68 mg = _____kg

   b) 24 g ≈ _____ oz

   c) 4 gal = _____pt

   d) 3140 km ≈ _____ mi

   e) 200 mℓ ≈ _____ fl oz

   f) 2.1 km ≈ _____ yd

Section B

Solve.

41) $3(x+2)(x+5) = 3x(x-3)$

42) $(x-4)^3 = 2(x^2 - 32)$

43) $2x^5(x+4)(x-2) = 4x^6 + 18x^3$

Percent Review

44) 75 is 20% of what?

45) 75 is 20% more than what?

46) 75 is 20% less than what?

47) In an election with 3,600 people voting and only two candidates running, the loser received 40% of the votes. How many votes did each candidate receive?

48) In an election with 3,600 people voting and only two candidates running, the loser received 40% fewer votes than his opponent. How many votes did each candidate receive?

49) In an election with 3,600 people voting and only two candidates running, the winner received 40% more votes than his opponent. How many votes did each candidate receive?

50) Sally has 80% less money than Mark. How much money does Sally have if Mark has $990?

51) Sally has 80% less money than Mark. How much money does Mark have if Sally has $990?

PDA Review

52) Unit Conversions
   a) $0.9\, \ell \approx$ _____ cups
   b) $130\, \frac{km}{h} \approx$ _____ mph
   c) $4{,}000{,}000\ cm^3 \approx$ __ ft^3
   d) $2.5\, \frac{yd}{sec} \approx$ _____ $\frac{km}{h}$
   e) $43\ ft^3 \approx$ _____ ℓ
   f) $14.7\, \frac{lb}{in^2} \approx$ _____ $\frac{kg}{m^2}$

53) A school has an enrollment of 495, and the ratio of boys to girls is 7:8. How many boys are there in the school?

54) In 2005, Bill Carpenter set a record for running the Leadville 100 (a 100-mile race) in just 15 hours and 42 minutes.
   a) What was his average speed in miles per hour?
   b) What was his average speed in miles per minute?
   c) How many minutes per mile is this?

55) A 4-pint container of milk in England costs £1.05. In Germany a liter of milk costs 0.53 euros. In the U.S. a gallon of milk costs $2.50. The exchange rates are:
   $1 = £0.578 = 0.855euro
   a) Milk in England is what percent more expensive than milk in the U.S.?
   b) Milk in Germany is what percent cheaper than milk in the U.S.?

56) A block has a volume of 59 in^3, and weighs 7.8 lb. Find the density of the block both in lb/ft^3 and kg/m^3.