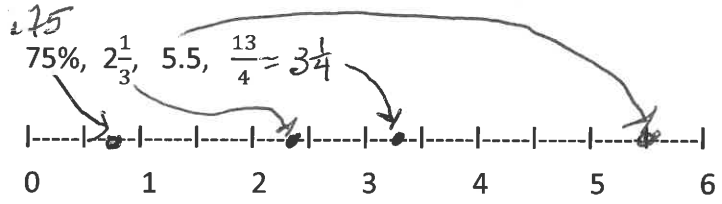
Math 6 Appeals Study Guide

Resources: http://everydaymath.uchicago.edu/parents/6th-grade/em-at-home/
http://cbsd.org/Page/2972

The following are sample problems demonstrating the standard and are not inclusive of all the problems on the test. The actual problems on the test may be more difficult than those represented here.

6.1.1.1 and 6.1.1.2: Locate and Compare Numbers

1. Graph each rational number on a number line.



2. Complete the chart below (This also addresses the following standards: 6.1.1.3, 6.1.1.4 and 6.1.1.7: Equivalence and Representation)

Fraction	Decimal	Percent
Example: $\frac{2}{5}$	.4	40%
$\frac{125}{1000} = \frac{1}{8}$	.125	12.5%
$\frac{88}{100} = \frac{22}{25}$	.88	88%
$\frac{5}{12}$	41.66	42% rounded

3. Fill each blank with <, >, or = to make a true statement.

a) 1.2 > 0.8

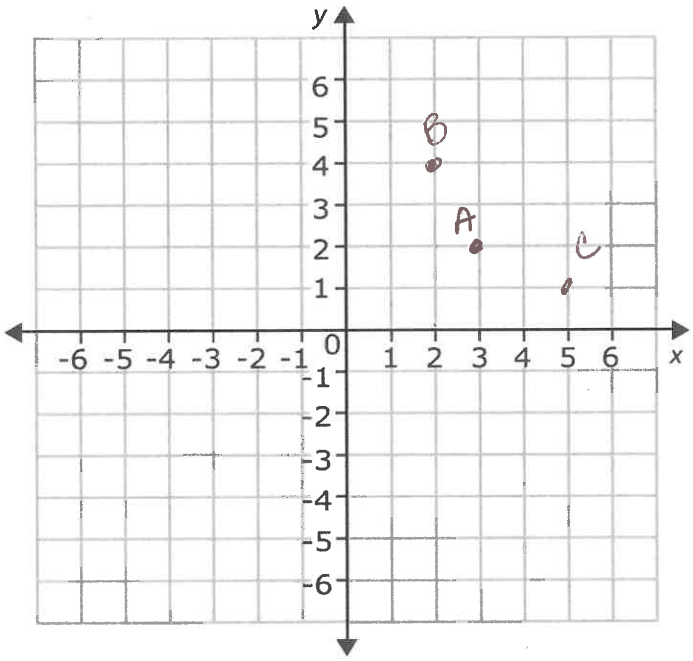
b) 1.40 > 1.25

c) 3/8 > 5/16

d) ¾ > 0.7

4. Plot the following points on the coordinate grid below:

a) A (3,2) b) B (2,4) c) C(5,1)



6.1.1.3, 6.1.1.4 and 6.1.1.7: Equivalence and Representation

5. John found that $\frac{3}{5}$ of his class prefers vanilla ice cream, 26% prefers chocolate, and 0.14 prefers strawberry. Which flavor of ice cream do students prefer the least?

$V = \frac{3}{5} = \frac{60}{100}$ $C = 26\% = .26 = \frac{26}{100}$ $S = .14 = \frac{14}{100}$

Strawberry

6.1.1.5 and 6.1.1.6: Factors and Primes/ GCF and LCM

6. Define:

a) **Factor** – numbers you multiply together to get another number; 1, 2, 3, and 6 are factors of 6

b) **Prime number** - a whole **number** greater than 1, whose only two whole-**number** factors are 1 and itself.

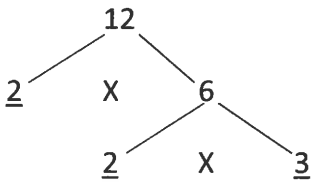
c) **GCF** - The **greatest common factor** is the greatest factor that divides two numbers.

d) **LCM** - the **least common multiple** of two integers a and b is the smallest positive integer that is divisible by both a and b.

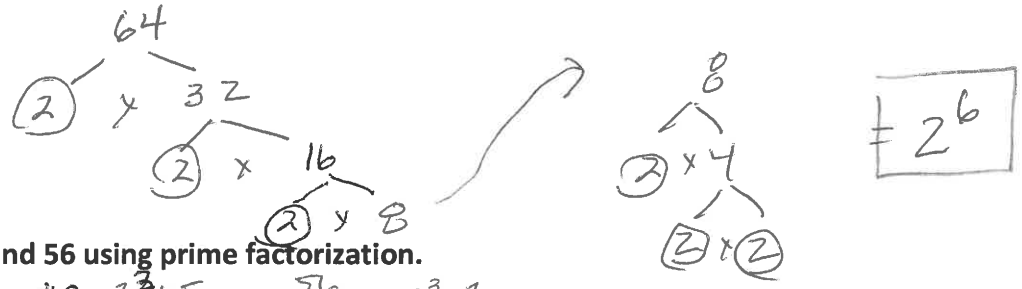
7. Using a factor tree, find the prime factorization for 64. Then write the factors as a multiplication expression using exponents.

For example:

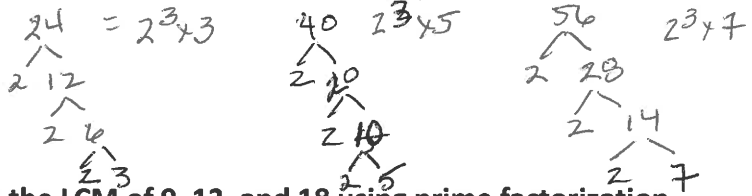
The factor tree for 12 might look like this:



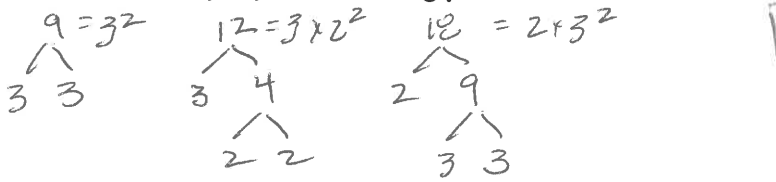
The multiplication expression using exponents would be: $2^2 \times 3$



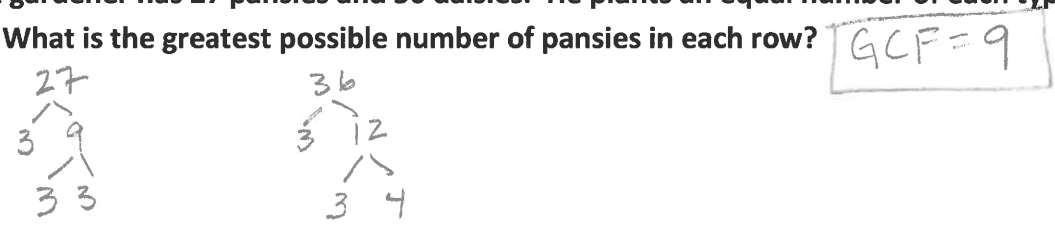
8. Find the GCF of 24, 40 and 56 using prime factorization.



9. Find the LCM of 9, 12, and 18 using prime factorization.



10. A gardener has 27 pansies and 36 daisies. He plants an equal number of each type of flower in each row. What is the greatest possible number of pansies in each row?



11. Inez waters her plants every two days. She trims them every 15 days. She did both today. When will she do both again?

12. Write each fraction in simplest form.

a) $\frac{12}{36}$ $\frac{1}{3}$

b) $\frac{14}{49}$ $\frac{2}{7}$

c) $\frac{10}{34}$ $\frac{5}{17}$

d) $\frac{75}{100}$ $\frac{3}{4}$

13. Write 2 equivalent fractions for each fraction below.

a) $\frac{1}{2}$ $\frac{2}{4}$ $\frac{4}{8}$ b) $\frac{1}{8}$ $\frac{2}{16}$ $\frac{3}{24}$ c) $\frac{3}{5}$ $\frac{6}{10}$ $\frac{9}{15}$

14. Elsie and her friend went on vacation where they hiked several different trail. The first trail they hiked was $6\frac{1}{2}$ miles. The second trail was $\frac{3}{4}$ mile and the last hike was $8\frac{1}{3}$ miles. How far did they hike on their vacation?

$6\frac{1}{2} + \frac{3}{4} + 8\frac{1}{3}$ $6\frac{6}{12} + \frac{9}{12} + 8\frac{4}{12}$ $14\frac{19}{12}$ $\frac{19}{12} = 1\frac{7}{12}$ $14 + 1\frac{7}{12} = 15\frac{7}{12}$

6.1.2.1 thru 6.1.2.4: Ratios and Rates

15. Define

a) **ratio** - A comparison of 2 numbers by division. The retio of 2 to 3 can be stated as 2 our of 3, 2 to 3, 2 : 3, or $\frac{2}{3}$

b) **rate** – a ratio comparing two quantities with different kinds of units

16. For a survey, a company decided to call 7 out of every 5000 people. How many people should be called in a town of 78,000 people?

$\frac{7}{5000} = \frac{x}{78000}$ $5000x = 546000$ $5x = 546$ $x = 109.2$ 109

17. A U.S. nickel contains 3.9 g of copper and 1.2 g of nickel. How many kilograms of copper must be combined with 500 kg of nickel to make nickel coins?

$\frac{1.2\ N}{3.9\ C} = \frac{500}{x}$ $1.2x = 1950$ $x = 1625$

18. The Reyes family bought four concert tickets for $252. What was the price per ticket?

$\frac{252}{4} = 63$

19. Davis printed 24 photos in 8 minutes. How many photos would he print in 20 minutes?

$\frac{8}{24} = \frac{20}{x}$ $8x = 480$ $x = 60$

6.1.3.1, 6.1.3.2 and 6.1.3.4: Multiplication and Division

20. Define: Reciprocal – Any two numbers that have a product of 1. Since $\frac{5}{6} \times \frac{6}{5} = 1$, $\frac{5}{6}$ and $\frac{6}{5}$ are reciprocals

21. Solve the following problems; be sure to express fractions in lowest terms.

a) $0.68 \div 3.4$ .2

b) $0.242 \div 0.4$ .605

c) $\frac{3}{8} \times \frac{4}{5} = \frac{12}{40} = \frac{3}{10}$

d) $1\frac{5}{9} \times 2\frac{1}{3}$ $\frac{14}{9} \times \frac{7}{3} = \frac{98}{27} = 3\frac{17}{27}$

e) $\frac{3}{5} \div \frac{4}{8}$ $\frac{3}{5} \cdot \frac{8}{4} = \frac{24}{20}$ $1\frac{4}{20} = 1\frac{1}{5}$

f) $4\frac{1}{2} \times 2\frac{2}{3}$ $\frac{1}{2} \cdot \frac{8}{3} = \frac{8}{6} = 1\frac{2}{6} = 1\frac{1}{3}$

22. A game board measures $9\frac{1}{2}$ inches by $11\frac{3}{4}$ inches. What is the area of the game board?

$L \times W = A$ $\frac{19}{2} \times \frac{47}{4} = \frac{893}{8} = 111\frac{5}{8}\ in^2$

23. Nathan deposited $\frac{7}{9}$ of his allowance into his savings account. He spent the remaining amount, or $2.50. How much did Nathan deposit into his savings account?

$\frac{2}{9} = 2.50$

$\frac{1}{9} = 1.25$

$7 \times 1.25 = 8.75$

24. To make 4 ½ gallons of ice cream, it takes $6\frac{3}{10}$ gallons of milk. How many gallons of milk does it take to make one gallon of ice cream?

milk $\frac{6\frac{3}{10}}{4\frac{1}{2}} = \frac{x}{1}$ gal icecream

$\frac{\frac{63}{10}}{\frac{9}{2}} = \frac{x}{1}$ $\frac{9}{2}x = \frac{63}{10}$ $x = \frac{63}{10} \times \frac{2}{9}$ $x = \frac{126}{90}$ $x = 1\frac{36}{90} = 1\frac{4}{15}$

6.1.3.1: Percents

25. 6 % of 95 = 5.7 **How would you write 6% as a fraction?** $\frac{6}{100} = \frac{3}{50}$

How would you write 6% as a decimal? .06

26. Evaluate the following problems:

a) 108% of 148 159.84

b) 0.03 % of 1500 45

c) 40 is 20% of what number? 200 (12 of — = 40, .2x = 40, x = 200)

d) 60 is 15% of what number?

e) What percent 12 is of 15 (% of 15 = 12, x 15 = 12, x = .8) 80%

f) What percent 77 is of 360 (% of 360 = 77, x 360 = 77, x = .21) 21%

27. The original price of a movie is $18. The sale price is 20% off the original price. What is the amount off the original price? 20% of 18 = 3.60

28. Miguel spent $\frac{1}{8}$ of his savings on a new video game system. Mila spent 12% of her savings on a DVD, and Manny spent 0.10 of his savings on a skateboard. Who spent the most of their savings?

Miguel $\frac{1}{8} = .125 = 12.5\%$ Mila = 12% Manny = .10 = 10%

29. A store is having a sale where winter clothes are 60% off the original price. A sweater is on sale for $30. What was the original price of the sweater?

60% of the original price = 30

.6 X = 30

X = 50

6.2.1.1 and 6.2.1.2: Variables and Representations of Relationships

30. Define:

a) **Variable** – a symbol, usually a letter, used to represent a number

b) **Independent Variables** – The variable in a function with a value that is subject to choice

c) **Dependent Variables** – the variable in a relation with a value that depends on the value of the independent variable

31. Write as an expression:

a) 4 added to X 4+X b) 3 times X 3X

32. When Sean stands on a box, he is 10 feet tall. If the box is 4 feet tall, write and solve an addition equation to find Sean's height.

H + 4 = 10

H = 6

33. The speed limit in front of Meadowbrook Middle School is shown. It is one third the speed limit of a major street two blocks away. Write and solve a division expression to find the speed limit of the major street.

$\frac{\text{major road}}{3}$ = speed limit in front of MMS

Major road = 3 (speed limit in front of MMS)

34. Whitney has a total of 30 cupcakes for her guests. Write a function to determine how many cupcake each guest will get if there are 6, 10, or 15 guests. Then graph the function.

Number of Guests	Function Rule: 3/# of guests	Cupcakes/Guest
6		5
10		3
15		2

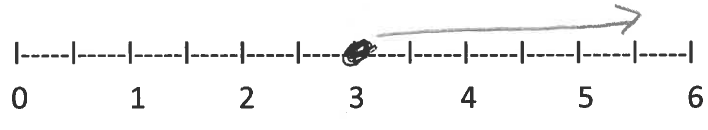
30 / number of guests

35. Solve the following inequalities and graph the result on a number line:

a) X + 7 ≥ 10

-7 -7

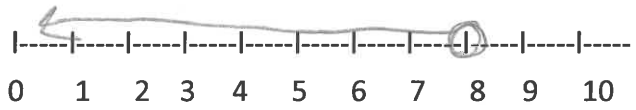
X ≥ 3



b) $X - 3 < 5$

+3 +3

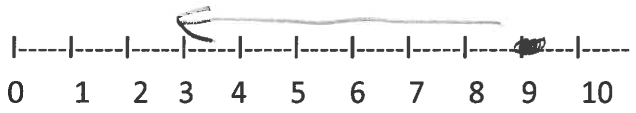
$X < 8$



c) $5X \leq 45$

$\frac{5}{5} \leq \frac{45}{5}$

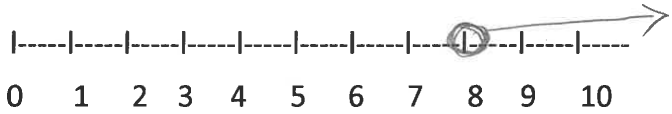
$X \leq 9$



d) $\frac{X}{4} > 2$

$\times 4 \quad \times 4$

$X > 8$



6.2.2.1: Properties and Equivalent Expressions

36. Define the following properties:

a) **Commutative** – The order in which numbers are added or multiplied does not change the sum or product

b) **Associative** - The way in which numbers are grouped does not change the sum or product

c) **Distributive** – To multiply a sum by a number, multiply each addend by the number outside the parenthesis

37. Which of the following properties, Commutative, Associative, or Distributive are illustrated below?

a) $3(x + 7) = 3x + 21$ Distributive

b) $5(x-1) = (x-1)5$ Associative

c) $20 - (12 - 3) = (20 - 12) - 3$ commutative

38. Write an equivalent expression for:

5(X + 3) $= 5X + 5 \times 3 = 5X + 15$

39. Find the value of this expression:

$9 + 4^3 \times (20 - 8) \div 2 + 6$

$9 + (64 \times (12) \div 2 + 6$

$9 + (768 \div 2) + 6$

$9 + 384 + 6 =$ **399**

6.2.3.1 and 6.2.3.2: Represent and Solve Equations

40. Solve the following equations:

a) $13 + X = 29$

$-13 \quad -13$

$X = 16$

b) $\frac{X}{4} = 17$

$\times 4 \quad \times 4$

$X = 68$

c) $X - 18 = 33$

$+18 \quad +18$

$X = 51$

41. A baker used 16 ounces of butter for every batch of dough pretzels. Make a function table to show the relationship between the amount of butter b and the total batches of pretzels *p* . Write an equation to represent the solution. $16b = P$

Batches of prezels (*p*)	Butter (*b*)
1	16
2	32
3	48

42. In order for an entire class to fit into a certain Theater, there must be less than 34 students in the class. Write the inequality where *c* is the class size to determine which classes fit in the theater. $c < 34$

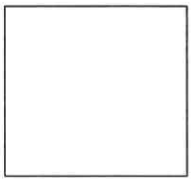
Fit in Theater

Homeroom	Size
Settell	34
Miller	30
Fuchs	32
Sonju	35

6.3.1.1, 6.3.1.2 and 6.3.1.3: Measurement of Polygons and Prisms

43. Find the area and perimeter of the following shapes:

Square Area: 25 units² **Perimeter:** 20



$A = L \times W$
$= 5 \times 5$
$= 25$

$P = 4(5)$
$= 4(5)$
$= 20$

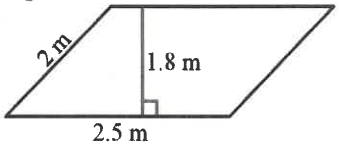
Rectangle Area: 60 units² **Perimeter:** 36

$A = L \times W$
$A = 6 \times 10$
$A = 60$

$P = 2L + 2S$
$= 2(10) + 2(6)$
$= 20 + 12$
$= 36$

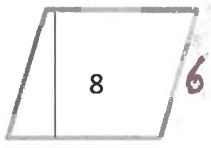
Parallelogram Area: 4.5 units² **Perimeter:** 9

$a = (\text{base})(\text{height})$
$a = (2.5)(1.8)$
$a = 4.5$



$P = 2(2+2.5)$
$= 2(4.5)$
$= 9$

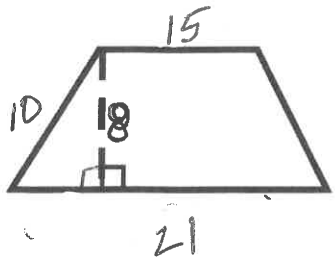
Rhombus/Kite Area: 48 units² **Perimeter:** 24



$A = (\text{base} \times \text{height})$
$= 6 \times 8$
$= 48$

$P = 4(5)$
$= 4(6)$
$= 24$

Trapezoid Area: 144 units² **Perimeter:** 56



$a = \frac{\text{base}+\text{base}}{2} \times \text{height}$

$= \frac{15+21}{2} \times 8$

$= 18 \times 8$

$= 144 \text{ units}^2$

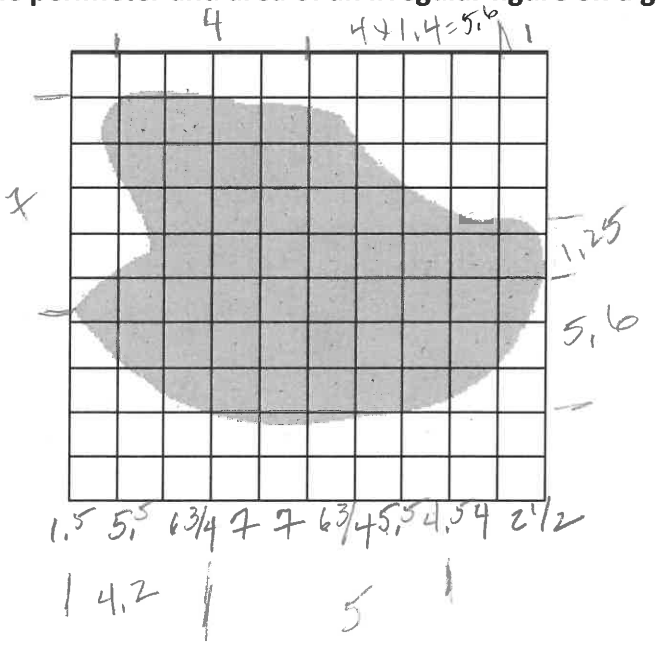
$P = b+b+2s$

$= 15+21+2(10)$

$= 15+21+20$

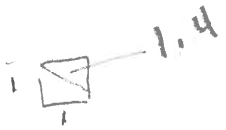
$= 56$

44. Find the perimeter and area of an irregular figure on a grid – only an approximation



Area $\approx$ 51 units^2

p $\approx$ 33.65



45. Find the volume and surface area of the following:

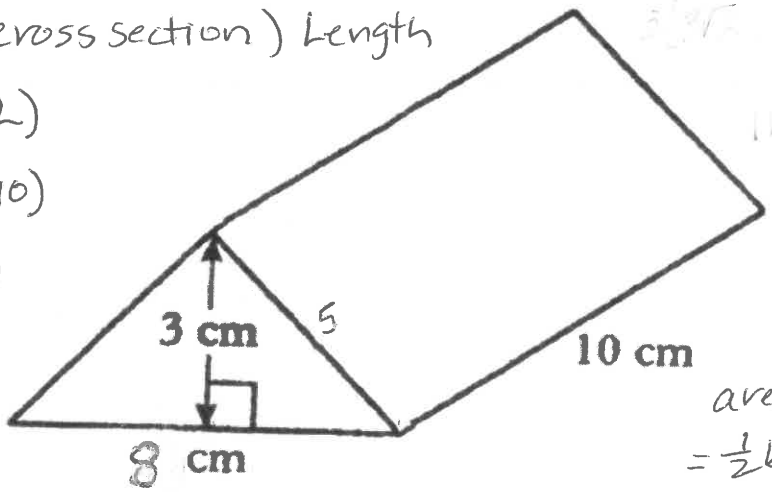
$V = (\text{Area of cross section}) \text{ Length}$

$= (\frac{1}{2}b \times h)(L)$

$= ((\frac{1}{2} \cdot 8) \times 3)10)$

$= (12)(10)$

$V = 120 \text{ cm}^3$



Surface Area =

2(area of cross section) +

2(area of sides) +

base

area of cross section =

$= \frac{1}{2}bh =$

$= (\frac{1}{2} \cdot 8)3 \rightarrow (2 \times 12)$

$= 4 \times 3$ $= 24$

$= 12$

base $= 8 \times 10$

$= 80$

sides $= 2(5 \times 10)$

$= 2 \times 50$

$= 100$

$SA = 24 + 100 + 80$

$= 204 \text{ cm}^2$

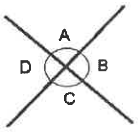
6.3.2.1: Angles and Intersecting Lines

46. Define:

Supplementary angles – The sum of 2 angles equals 180 degrees

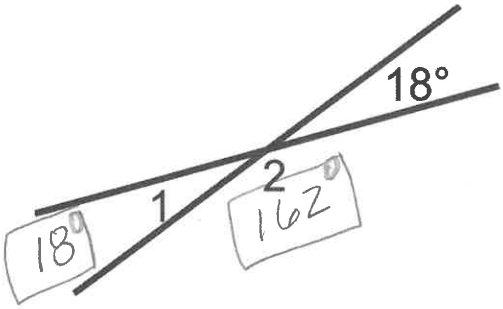
Complementary angles – The sum of 2 angles equals 90 degrees

Right angles – an angle that measures 90 degrees



Opposite angles - When two lines intersect they form two pairs of **opposite angles**, A + C and B + D. Another word for **opposite angles** are vertical **angles**. Vertical **angles** are always congruent, which means that they are equal.

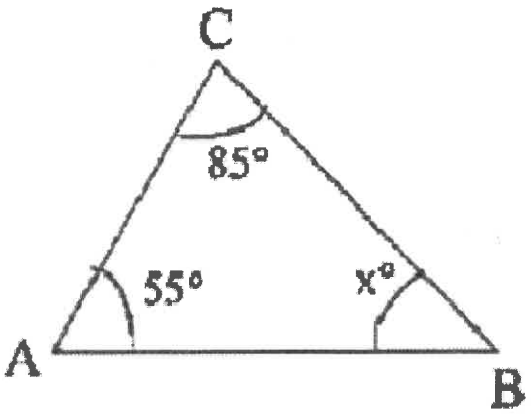
47. Find the measurement of angle1 and angle 2.



6.3.2.2 and 6.3.2.3: Angles in Geometric Figures

https://www.khanacademy.org/math/basic-geo/basic-geo-shapes/basic-geo-finding-angles/e/angles_1

48. Find the measure of the missing angle X



180 - 85 - 55 = 40°

6.3.3.1 and 6.3.3.2: Converting and Estimating Measurement

49. Convert 15 feet to inches 15 ft × 12 = 180 in

50. Convert 15 quarts to gallons

4 qt = 1 gal

$\frac{15}{4}$ = 3.75 gal

51. A 4 pound pork loin can be cut into 10 pork chops of equal weight. How many ounces is each pork chop? 64 oz ÷ 10 = 6.4

52. Convert 25 cm = 125 meters

6.4.1.1: Sample Space – go to the websites below for an explanation and problems

http://www.mathgoodies.com/lessons/vol6/sample_spaces.html

http://www.onlinemathlearning.com/tree-diagram.html

6.4.1.2, 6.4.1.3 and 6.4.1.4: Probability and Experiments

http://www.mathgoodies.com/lessons/vol6/intro_probability.html

53. Some of the balls in a bag are red, 14 are white, and the others are blue. The balls are alike in every way except for their color. When a ball is drawn at random, the probability that it is blue is 40% and the probability that it is white is 35%.

How many Red balls are in the bag?

10

R 10 25%
W 14 = 35%
B 16 = 40%

$\frac{14}{35} = \frac{x}{100}$ $35x = 1400$ $x = 40$ total balls

.25 × 40 = 10

54. A twelve-faced die has face numbered with a different counting number from 1 through 12. After it is rolled, each face of the die is equally likely to be the face showing on top. When Sharon rolls this die, what is the probability that the number showing on the top face is a perfect square number? (A perfect square is a number that can be expressed as the *product of two equal integers*: 9 is a perfect square because it can be expressed as 3 * 3 (the product of two equal integers)

1 4 9 $\frac{3}{12} = \frac{1}{4}$

55. A drawer contains 36 red socks and some green socks.
There are no other socks in the drawer.
After 8 of the green socks are removed from the drawer,
The probability of randomly selecting a green sock from the remaining socks is 1/10.
How many green socks remain in the drawer?

4

36 red + x green

$\frac{1}{10} = \frac{4}{20} = \frac{3}{30} = \frac{4}{40}$

36 + 4 ≠ 40

56. Mary is going to make some sandwiches. She has 3 different kinds of meat to choose from: ham, turkey, and roast beef . She also has 4 different kinds of cheese to choose from: cheddar, provolone, swiss, and pepper jack. How many meat and cheese combinations she make? (There is only 1 meat and 1 cheese in each sandwich)

ham — cheddar, provolone, swiss, pepperjack
turkey — cheddar, provolone, swiss, pepperjack
roastbeef — cheddar, provolone, swiss, pepperjack

12