Welcome to MM150 Survey of Mathematics!

- PDF of this PPT & others: http://www.ramshillfarm.com/Math/Math150/Unit_1.html
- Extra Materials by me: http://www.ramshillfarm.com/Math/Math150/index.html
- Helpful Bookmarks: http://delicious.com/TamaraEyster
- Good Free PDF Printer: Primo PDF
- Me on Facebook: http://www.facebook.com/tinksbell
- MM150 Group on Facebook: http://www.facebook.com/groups/MM150/
- Flex Seminar Times:

Day	Time	Instructor Name	AIM Name	Email	Units Seminar Held
Wednesday	11PM - midnight ET	K Clem	kclem123	kclem@kaplan.edu	1, 2, 4, 7, 8
Thursday	7PM – 8PM ET	Tamara E	TamaraEyster	TEyster@Kaplan.edu	1, 4, 6, 9
Monday	8PM – 9PM ET	S Director	SusanAtKaplan07	sdirector@kaplan.edu	1, 2, 3, 5

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- There are lots of topics each week, we can't cover them all in Seminar, but I do cover a bunch of them, some topics are on 'my site'.
- Please, post to Doc Sharing or the Webliography any files or sites that you find helpful, so your classmates can make use of them too!
- Remember Active On-Topic Participation for the entire Hour is an important part of your Seminar Grade! Answer questions from me or your classmates, ask relevant questions, give further clarification!
- WARNING: Off-topic chatting during Seminar is distracting to me and to other students. Please keep it to a minimum, otherwise we may not get through many topics during our 'hour'.

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Virtual Field Trip: We'll visit the Academic Support Center, click "My Studies" on your KU Campus Homepage.

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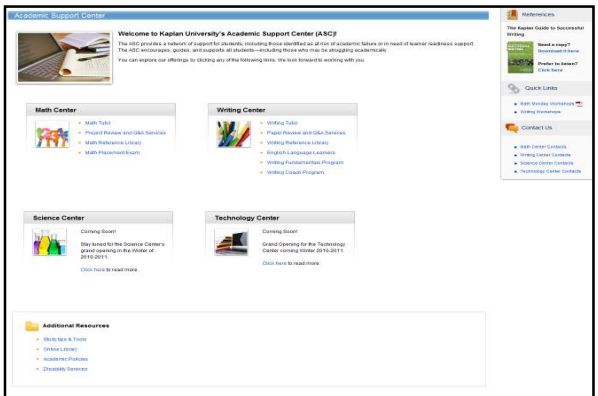

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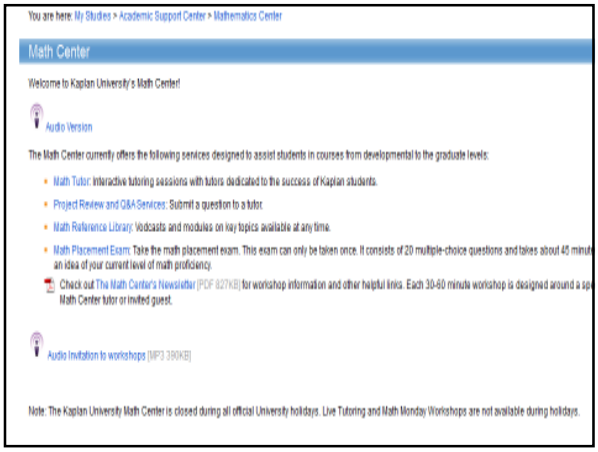

KU Math Center

Sunday, Wednesday & Thursday:
8:00pm-12:00am (midnight)
Monday: 11:00am-5:00pm AND
8:00pm-12:00am (midnight)
Tuesday: 11:00am-12:00am (midnight)

- All times are Eastern Time

at: http://khe2.acrobat.com/mathtutor/

Additional Information about the Math Center is in the Doc Sharing Portion of the course.

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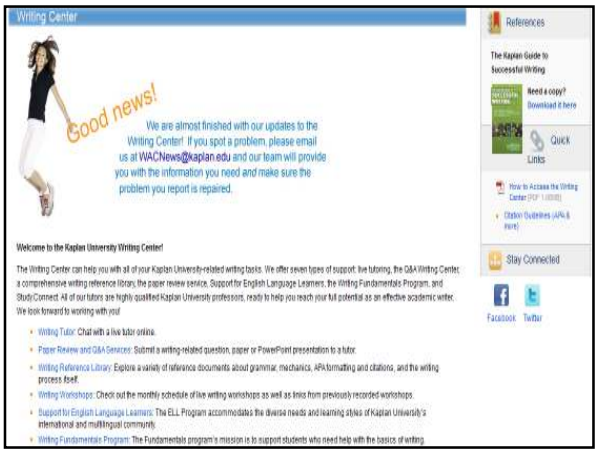

KU Writing Center

Sunday: 5:00 PM to 9:00 PM ET
Monday: 5:00 PM to 11:00 PM ET
Tuesday: 10:00 AM to noon ET AND
5:00 PM to 11:00 PM ET
Wednesday &
Thursday: 7:00 PM to 11:00 PM ET

- All times are Eastern Time

at: http://khe2.acrobat.com/ellwritingtutor/

Share one thing you found out about Academic Support you did not know (or you like).

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Typing Math

Use:

* for multiplication (shift 8), x is for variables
/ for division (next to right shift key)
^ for exponents (shift 6), may need (&) to clarify also
only one equals per line (on DB)
only one step of a problem per line (on DB)
Symbols are on DB under **Ω**

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Page 1

1.1

Number Theory

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Prime and Composite Numbers

A ***prime number*** is a natural number greater than 1 that has exactly two factors (or divisors), itself and 1.

A ***composite number*** is a natural number that is divisible by a number other than itself and 1.

The number 1 is neither prime nor composite, it is called a ***unit***.

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Exponents (from 1.6)

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When a number is written with an exponent, there are two parts to the expression: a^n, where ***a*** is called the ***base*** and ***n*** is called the ***exponent***.

The exponent tells how many times the base should be multiplied by itself, for real numbers.

$$4^5 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$$

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Greatest Common Divisor

The greatest common divisor (GCD), also called the greatest common factor (GCF), of a set of natural numbers is the largest natural number that divides (without remainder) every number in that set.

(Intersection, things in common)

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Example (GCD)

Find the GCD of 63 and 105.

$63 = 9 * 7 = 3 * 3 * 7 = 3^2 * 7$

$105 = 5 * 21 = 3 * 5 * 7$

Smallest exponent of each factor:

3 and 7

So, the GCD is $3 * 7 = 21$.

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Least Common Multiple

The least common multiple (LCM) of a set of natural numbers is the smallest natural number that is divisible (without remainder) by each element of the set.

(Union, everything)

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Example (LCM)

Find the LCM of 63 and 105.

$63 = 3 * 3 * 7 = 3^2 * 7$

$105 = 3 * 5 * 7$

Greatest exponent of each factor:

3^2, 5 and 7

So, the LCM is $3^2 * 5 * 7 = 315$.

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Example of GCD and LCM

Find the GCD and LCM of 48 and 54.

Prime factorizations of each:

$48 = 2 * 2 * 2 * 2 * 3 = 2^4 * 3$

$54 = 2 * 3 * 3 * 3 = 2 * 3^3$

GCD = $2 * 3 = 6$

LCM = $2^4 * 3^3 = 432$

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1.2

The Integers

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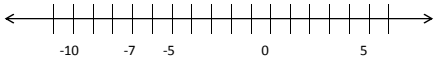
Subtraction of Integers

$a - b = a + (-b)$

Evaluate:

a) -7 - 3 = -7 + (-3) = -10

b) -7 - (-3) = -7 + 3 = -4



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Rules for Multiplication & Division

The product(quotient) of two numbers with *like signs,* positive * positive (negative ÷ negative) is a *positive number*.

The product(quotient) of two numbers with *unlike signs*, positive ÷ negative (negative * positive) is a *negative number*.

(negatives come in pairs, must have 2 in equation)

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Examples

Evaluate:

a) (3)(-4) b) (-7)(-5)

c) $\frac{-72}{-8}$ d) $\frac{72}{-8}$

Solution:

a) (3)(-4) = -12 b) (-7)(-5) = 35

c) $\frac{-72}{-8} = 9$ d) $\frac{72}{-8} = -9$

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1.3

The Rational Numbers

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The Rational Numbers

The set of **rational numbers**, denoted by *Q*, is the set of all numbers of the form, $\frac{p}{q}$ where *p* and *q* are integers and $q \neq 0$.

The following are examples of rational numbers:

$$\frac{1}{3},\ \frac{3}{4},\ -\frac{7}{8},\ 1\frac{2}{3},\ 2,\ 0,\ \frac{15}{7}$$

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Reducing Fractions

In order to *reduce a fraction to its lowest terms*, we cancel out the greatest common factor in both the numerator and denominator.

Example: Reduce $\frac{72}{81}$ to its lowest terms.

Solution: $\frac{72}{81} = \frac{8*9}{9*9}$ $\frac{8*\cancel{9}}{9*\cancel{9}} = \frac{8}{9}$

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Multiplication of Fractions

$$\frac{a}{b}\bullet\frac{c}{d}=\frac{a\bullet c}{b\bullet d}=\frac{ac}{bd},\quad b\neq 0,\ d\neq 0$$

Division of Fractions

$$\frac{a}{b}\div\frac{c}{d}=\frac{a}{b}\bullet\frac{d}{c}=\frac{ad}{bc},\quad b\neq 0,\ d\neq 0,\ c\neq 0$$

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Example
Dividing & Multiplying Fractions

Evaluate the following.

a) $\frac{2}{3}\div\frac{6}{7}$

$\frac{2}{3}\div\frac{6}{7}\rightarrow\frac{2}{3}*\frac{7}{6}\rightarrow$

$\frac{2}{3}*\frac{7}{2*3}\rightarrow\frac{\cancel{2}}{3}*\frac{7}{\cancel{2}*3}$

$\frac{7}{3*3}\rightarrow\frac{7}{9}$

b) $\frac{-5}{8}\div\frac{4}{5}$

$\frac{-5}{8}\div\frac{4}{5}=\frac{-5}{8}\cdot\frac{5}{4}$

$=\frac{-5\cdot 5}{8\cdot 4}=\frac{-25}{32}$

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Addition and Subtraction of Fractions

$$\frac{a}{c}+\frac{b}{c}=\frac{a+b}{c},\quad c\neq 0;$$

$$\frac{a}{c}-\frac{b}{c}=\frac{a-b}{c},\quad c\neq 0$$

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Example:

Evaluate: $\frac{7}{12}-\frac{1}{10}$.

Solution:
$$\frac{7}{12}-\frac{1}{10}=\left(\frac{7}{12}\cdot\frac{5}{5}\right)-\left(\frac{1}{10}\cdot\frac{6}{6}\right)$$
$$=\frac{35}{60}-\frac{6}{60}$$
$$=\frac{29}{60}$$

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1.5

Properties

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Real Number Properties

Commutative Property is when the order does not matter:

a + b = b + a a *b = b * a

Associative Property is when the grouping does not matter:

(a + b) + c = a + (b + c) (a * b) * c = a * (b * c)

Both are true for any real numbers a, b & c.

Note: The commutative & associative properties do not hold true for subtraction or division.

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Distributive Property

Distributive property of multiplication over addition

$a * (b + c) = a * b + a * c$

for any real numbers a, b, and c.

Example: $6 * (r + 12) = 6 * r + 6 * 12$

$= 6r + 72$

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1.4

The Irrational Numbers and the Real Number System

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Irrational Numbers

An **irrational number** is a real number whose decimal representation is a non-terminating, non-repeating decimal number.

Examples of irrational numbers:

5.12639573...

6.1011011101111...

0.525225222...

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Radicals

$\sqrt{2}$, $\sqrt{17}$, $\sqrt{53}$ are all irrational numbers. The symbol $\sqrt{\ }$ is called the ***radical sign***. The number or expression inside the radical sign is called the ***radicand***.

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Principal Square Root

The ***principal square root*** of a number *n*, written $\sqrt{n}$ is the positive number that when multiplied by itself, gives *n*.

For example, $\sqrt{16} = 4$ since $4 \cdot 4 = 16$

$\sqrt{49} = 7$ since $7 \cdot 7 = 49$

Perfect Square

Any number that is the square of a natural number is said to be a ***perfect square***.

The numbers 1, 4, 9, 16, 25, 36, and 49 are the first few perfect squares.

Product Rule for Radicals

$$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}, \quad a \geq 0, \quad b \geq 0$$

Simplify:

a) $\sqrt{40}$

$$\sqrt{40} = \sqrt{4 \cdot 10} = \sqrt{4} \cdot \sqrt{10} = 2 \cdot \sqrt{10} = 2\sqrt{10}$$

b) $\sqrt{125}$

$$\sqrt{125} = \sqrt{25 \cdot 5} = \sqrt{25} \cdot \sqrt{5} = 5 \cdot \sqrt{5} = 5\sqrt{5}$$

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Addition and Subtraction of Irrational Numbers

To add or subtract two or more square roots with the same radicand, add or subtract their coefficients.

The answer is the sum or difference of the coefficients multiplied by the common radical.

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Example: Adding or Subtracting Irrational Numbers

Simplify: $4\sqrt{7} + 3\sqrt{7}$

$$4\sqrt{7} + 3\sqrt{7}$$
$$= (4+3)\sqrt{7}$$
$$= 7\sqrt{7}$$

Simplify: $8\sqrt{5} - \sqrt{125}$

$$8\sqrt{5} - \sqrt{125}$$
$$= 8\sqrt{5} - \sqrt{25} \cdot \sqrt{5}$$
$$= 8\sqrt{5} - 5\sqrt{5}$$
$$= (8-5)\sqrt{5}$$
$$= 3\sqrt{5}$$

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Check the Roster under the Chat area for your Name, otherwise there may be delays in getting credit!

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  - **Mondays from 7PM to 8PM ET,** with Instructor: Stephanie Johnson, AIM Name: drsrjohnson, E-Mail: SJohnson4@kaplan.edu

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