General introduction
14 class meetings before final exam
30 textbook sections and extra topics
30/14=2.1429
Two or three sections per class meeting

---

1. Operations with Real Numbers

1.1 Algebraic Expressions
1.1 Exercise Set, page 40 (22): 1, 3, 5, 7, 9, 10, 12, 22, 27

Your Name MTH 111 bonus quiz 1 Write each problem. Put a box around each answer.

1. Add 35.4 and 41.6 No calculator.

$$\begin{array}{r} 35.4 \\ +\ 41.6 \\ \hline 77.0 \end{array} \qquad \boxed{77.0}$$

2. Find the difference between 183 and 75

$$\begin{array}{r} 183 \\ -\ 75 \\ \hline 108 \end{array} \qquad \boxed{108}$$

3. 1 foot = 12 inches
5280 feet = 1 mile
How many inches are there in 1 mile?

$$\Rightarrow \frac{1\text{ ft}}{12\text{ in}} = 1 = \frac{12\text{ in}}{1\text{ ft}}$$

$$\frac{5280\text{ ft}}{1\text{ mile}} = 1 = \frac{1\text{ mi}}{5280\text{ ft}}$$

$$1\text{ mile} = (1\text{ mile})(1) = (1\text{ mile})\left(\frac{5280\text{ ft}}{1\text{ mi}}\right)\left(\frac{12\text{ in}}{1\text{ ft}}\right)$$

$$\begin{array}{r} 5280 \\ \times\ \ 12 \\ \hline 10560 \\ 5280 \\ \hline 63360 \end{array}$$

$$= \boxed{63{,}360\text{ in}}$$

5280*12=63360

4. Solve and show your check $2x - 5 = 11$

$2x = 16$ long, detailed, complete

4. Solve and show your check $2x - 5 = 11$

$2x = 16$

Good, elegant

$x = 8$

long, detailed, complete

$2x - 5 = 11$

$2x - 5 + 5 = 11 + 5$

$2x + (-5+5) = 16$

$2x + 0 = 16$

$2x = 16$

$\frac{2x}{2} = \frac{16}{2}$

$1)x = 8$

$x = 8$

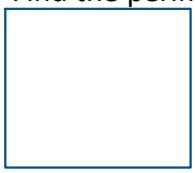
check

$2(8) - 5 \stackrel{?}{=} 11$

$16 - 5 \stackrel{?}{=} 11$

$11 = 11$ ✓

5. Find the perimeter and area of the square with side = 3 cm



3 cm

Perimeter $= 3\text{ cm} + 3\text{ cm} + 3\text{ cm} + 3\text{ cm} = 12\text{ cm}$

area $= (3\text{ cm})^2 = 3^2\text{ cm}^2 = 9\text{ cm}^2$

$= 4(3\text{ cm}) = 12\text{ cm}$

6. Add and simplify $\frac{2}{3} + \frac{1}{5}$

$\frac{2}{3}\left(\frac{5}{5}\right) + \left(\frac{1}{5}\right)\left(\frac{3}{3}\right) = \frac{10}{15} + \frac{3}{15}$

$= \frac{10+3}{15} = \frac{13}{15}$

7. Write as a single number $\frac{4\times1000}{2\times100}$

$= (2)\left(\frac{1000}{100}\right) = (2)(10) = 20$

$\frac{4\times10^3}{2\times10^2} = 2\times10^{3-2} = 2\times10^1 = 20$

scientific notation

8. What is 15% of 80?

$x = 15\left(\frac{1}{100}\right)(80)$

$x = (15)\left(\frac{8}{10}\right)$

$= (1.5)(8)$

$\% = \frac{1}{100} = 0.01$

0.15*80=12.0

0.15 80=12.0

$= \frac{(x \cdot 3)(8)}{x \cdot 2}$

$x = 12$

12 is 15% of 80

1.1

Memorize

Variables and Constants

A variable is a letter that represents a number or quantity whose value may change.

A constant is a number whose value always stays the same.

Memorize

Operation	**Notation**	**Say:**	**The result is…**
Addition	$a + b$	a plus b	the sum of a and b
Subtraction	$a - b$	a minus b	the difference of a and b
Multiplication	$a \cdot b, (a)\,(b)\,, (a)\,b, a\,(b)$	a times b	The product of a and b
Division	$a \div b, a/b,\ \frac{a}{b}, b\overline{)a}$	a divided by b	The quotient of a and b

Memorize

Algebraic Notation	**Say**
$a = b$	a is equal to b
$a \neq b$	a is not equal to b
$a < b$	a is less than b
$a > b$	a is greater than b
$a \leq b$	a is less than or equal to b
$a \geq b$	a is greater than or equal to b

Memorize

Common Grouping Symbols

Name	Symbol
parentheses	( )
brackets	[ ]
braces	{ }

Memorize

Expressions and Equations

An expression is a number, a variable, or a combination of numbers and variables and operation symbols.

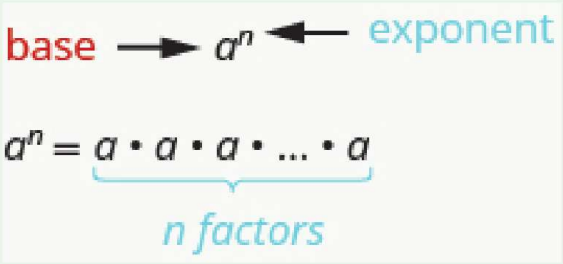
An equation is made up of two expressions connected by an equal sign.

Memorize

Exponential Notation (Power)

For any expression a^n, a is a factor multiplied by itself n times if n is a positive integer.

a^n means multiply n factors of a



The expression a^n is read a to the n^{th} power.

Memorize

Order of Operations

When simplifying mathematical expressions perform the operations in the following order:

1. **P**arentheses and other Grouping Symbols
    - Simplify all expressions inside the parentheses or other grouping symbols, working on the innermost parentheses first.
2. **E**xponents
    - Simplify all expressions with exponents.
3. **M**ultiplication and **D**ivision
    - Perform all multiplication and division in order from left to right. These operations have equal priority.
4. **A**ddition and **S**ubtraction
    - Perform all addition and subtraction in order from left to right. These operations have equal priority.

Students often ask, “How will I remember the order?” Here is a way to help you remember: Take the first letter of each key word and substitute the silly phrase.

Please **E**xcuse **M**y **D**ear **A**unt **S**ally.

Laws of exponents.

$$2^3 \cdot 2^2 = (8)(4) = \boxed{32}$$

$$= (2 \cdot 2 \cdot 2)(2 \cdot 2)$$

$$= 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

$$= 2^5 = 2^{3+2}$$

$$\boxed{a^m \cdot a^n = a^{m+n}}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$\frac{a^m}{a^m} = 1$$

by rule $\frac{a^m}{a^m} = a^{m-m} = a^0$

To keep our beautiful rule

define $a^0 = 1$

$$\frac{2^3}{2^5} = \frac{\cancel{2}\cdot\cancel{2}\cdot\cancel{2}^{1}}{\cancel{2}\cdot\cancel{2}\cdot\cancel{2}\cdot 2\cdot 2} = \frac{1}{2^2}$$

rule $\frac{2^3}{2^5} = 2^{3-5} = 2^{-2}$

define $2^{-2} = \frac{1}{2^2}$

$$a^{-n} = \frac{1}{a^n}$$

$$a^{\frac{1}{2}} \cdot a^{\frac{1}{2}} = a^{\frac{1}{2}+\frac{1}{2}} = a^1 = a$$

$$\sqrt{a}\sqrt{a} = a$$

define $a^{\frac{1}{2}} = \sqrt{a}$