

Interview your partner

Ask:

- Name
- why taking math / future studies
- how to stay motivated / focus
- one interesting thing about yourself

• Listen
to others
(no talking)

• Raising
hands
before
speaking

MTH-3053

Lesson 1: Review Algebra

March 25th
2024

Expressions:

Definition: a statement with #'s and operations
+ - × ÷

$2 + 4$ · Simplify

$x + 4$ · Evaluate

v.s.

Equations:

2 expressions that are equal

$2 + 4 = 3 + 3$

Solve
Isolate

$x + 4 = 6$

Expressions and the #'s Terms

ex. $2x^2 + 4x^1 + 2$

Annotations:

- coefficient (points to 2)
- exponent (points to 2)
- variable (points to x)
- constant (points to 2)

nota bene: only an addition or subtraction sign introduces a new term.

How many terms?

a) $3x^2$ (1) b) $a + 2(3a^2)$ (2)

c) $2 + x(3x^2 + 1)$ (2) d) $a^2 + 2(a - 5) + 3$

Combing Like Terms

Like Terms v.s. Unlike Terms

2 apples + 3 apples
Simplify: 5 apples

$$2a' + 3a'$$

$$5a$$

2 apples + 3 bananas

Simplify:

$$2a + 3b$$

can't

Simplify:

2 double-choco raspberry + 3 choco double raspberry

$$2c^2r' + 3c'r^2 \leftarrow \text{Unlike Terms}$$

ex

$$4c^2r + (-2c^2r)$$

$$2c^2r$$

ex. 10 euros + (-10 euros)

$$10e + (-10e)$$

$$0e$$

$$0$$

Definition:

Like Terms have
have the same
variable(s) AND
exponents.

Combining Like Terms

$$r \cdot a^n + s \cdot a^n = (r+s) a^n$$

ex.

$$5x^4 - 3x^4$$

$$(5-3)x^4 \text{ optional}$$

$$2x^4$$

ex. Simplify

$$-6abc + \cancel{2abc^2} + 9abc - \cancel{2abc^2}$$

$$3abc + 0abc^2 \text{ optional}$$

$$3abc$$

ex.

$$-xy + \underline{3xy^2} + xy - \underline{2y^2x}$$

$$-1 \cdot xy + 3xy^2 + 1 \cdot xy - 2xy^2$$

$$1 \cdot xy^2$$

$$xy^2$$

You do handout 1
(2.0)

Algebraic Exp. w Radicals

ex

root \rightarrow $2\sqrt{2}$

\uparrow base/radicand

, this reads, square root 2.

ex.

$$\sqrt[3]{x}$$

, cubed root of x

$$\sqrt[4]{16}$$

, the 4th root of 16

Simplify

$$4\sqrt[3]{x} + \sqrt[3]{x}$$

\swarrow coefficient

$$4\sqrt[3]{x} + 1\sqrt[3]{x}$$

$$5\sqrt[3]{x}$$

Simplify:

$$r\sqrt[n]{a} + s\sqrt[n]{a}$$

$$3\sqrt{a} + 5\sqrt[3]{a} = (r+s)\sqrt[n]{a}$$

can't simplify

ex. Simplify.

$$\underline{-7\sqrt{xy}} + \underline{3\sqrt{xy^2}} - \underline{4\sqrt{xy}} - \underline{3\sqrt{y^2x}}$$

$$-5\sqrt{xy}$$

You do
handout 2
(2.1)

Simplify:

$$d) \quad \cancel{-\sqrt[3]{q}} + \sqrt{q} + \cancel{\sqrt[3]{q}} - 2\sqrt{q} \\ - \sqrt{q}$$

Substitution

ex	Simplify:	Simplify
	Given $y = x$	Given chats = <u>cats</u>
	$2x + 3y$	$2 \text{ cats} + 3 \text{ chats}$
	$2x + 3x$	$2 \text{ cats} + 3 \text{ cats}$
	$5x$	<u>5 cats</u>

Don't do:
 given $y = x$ ew
 $2x + 3y$ ✓
 $2x + 3y = x$
 $2 \text{ cats} + 3 \text{ chats} = \text{cats}$

Simplify: Given $y = x^2$

$x^2 - 2y$

$1 \cdot x^2 - 2x^2$

$-x^2$

Substitution

Recall: Order of Operations
+ - x ÷

ex.

Simplify. Given $y = -x$

$$x + 3(6y + 3x)$$

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

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

$$x + 3(-3x)$$

$$1x - 9x$$

$$-8x$$

- simplify
- ① Brackets
 - ② Exponents
 - ③ { Division
Multiplication
 - ④ { Addition
Subtraction

ex

Simplify. Given $y = -2x^2$

$$-3(2x(x^2 - y)) + 18x^2$$

$$-3(2(x^2 - (-2x^2))) + 18x^2$$

$$-3(2(x^2 + 2x^2)) + 18x^2$$

$$-3(2(3x^2)) + 18x^2$$

$$-3(6x^2) + 18x^2$$

$$-18x^2 + 18x^2$$

0

f) Simplify : $y = \sqrt{x}$ → square root x

$$25\sqrt{x} - 2(3(5\sqrt{x} - y))$$

$$25\sqrt{x} - 2(3(5\sqrt{x} - \sqrt{x}))$$

$$25\sqrt{x} - 2(\underline{3(4\sqrt{x})})$$

$$25\sqrt{x} - \underline{2(12\sqrt{x})}$$

$$25\sqrt{x} - 24\sqrt{x}$$

$$\sqrt{x}$$

Fractions

ex. Simplify:

$$\frac{1x}{4} + \frac{3x}{4}$$

← numerator / top . part you have
 ← denominator / bottom . how whole is broken up.

$$\frac{1}{4}x + \frac{3}{4}x$$

$$\left(\frac{1}{4} + \frac{3}{4}\right)x$$

$$\frac{1+3}{4}x$$

$$\frac{4}{4}x$$

$$x$$

ex. $\frac{1x^2}{2} + \frac{1x^2}{4}$

$$\frac{1}{2}x^2 + \frac{1}{4}x^2$$


$$\left(\frac{1}{2} + \frac{1}{4}\right)x^2$$

$$\frac{3}{4}x^2$$

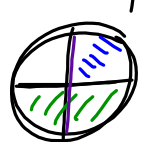
in calculator

$$\boxed{a \frac{b}{c}}$$

(to avoid decimals)

$$\frac{1x^2}{2 \times 2} + \frac{1x^2}{4}$$


$$\frac{2}{4} + \frac{1}{4}$$

$$\frac{3}{4}$$


ex.

$$\frac{2y^2}{3} - \frac{y^2}{4}$$

$$\frac{2}{3} \cdot y^2 - \frac{1}{4} y^2$$

$$4 \left(\frac{2}{3} - \frac{1}{4} \right) y^2$$

$$\left(\frac{8}{12} - \frac{3}{12} \right) y^2$$

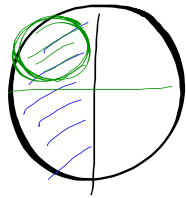
$$\frac{8-3}{12} y^2 = \frac{5}{12} y^2$$

Simplify:

$$-\frac{y}{5} + \frac{3y}{2}$$

Multiplication of Fractions

ex. Adamo bought $\frac{1}{2}$ a pizza
and Sergio took $\frac{1}{2}$ of his $\frac{1}{2}$.



$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

ex.

$$\frac{1}{2} \times \frac{4x}{1}$$

$$\frac{4x}{2}$$

$$2x$$

Division of Fractions

Recall: $15 \div 5 = 3$

ex $\frac{5}{6} \div \frac{1}{6} = 5$



$$\frac{5}{6} \div \frac{1}{6}$$

$$\frac{5}{6} \times \frac{6}{1}$$

$$\frac{5 \times \cancel{6}}{\cancel{6} \times 1} = 5$$

keep / change / flip
 1st frac × 2nd fractions