Homework Qs

Note Title 1/29/2018

1.4 #85

$$-4-\{11-[4-(-9)]\}$$
$$=-4-\{11-[4+9]\}$$
$$=-4-\{11-13\}$$
$$=-4-\{-2\}$$
$$=-4+2$$
$$=\boxed{-2}$$

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$$15-\{25+2[3-(-1)]\}$$
$$=15-\{25+2[3+1]\}$$
$$=15-\{25+2(4)\}$$
$$=15-\{25+8\}$$
$$=15-33$$
$$=\boxed{-18}$$

$$2[3(-1)]$$
$$2[-3]$$
$$=-6$$

$$2[3+(-1)]$$
$$=2[3-1]$$
$$=2(2)$$
$$=4$$

1.5: Multiplication and Division of Real numbers (cont'd)

Ex: $3(-5)$
$= \boxed{-15}$

Ex: $-3(-5)$
$= \boxed{15}$

Ex: $\left(-\frac{1}{4}\right)(-6)$

$= \left(-\frac{1}{4}\right)\left(-\frac{6}{1}\right)$

$= +\frac{6}{4}$

$= \frac{6 \div 2}{4 \div 2}$

$= \boxed{\frac{3}{2}}$

Note:

all of these are equivalent

$\frac{-2}{8} = -\frac{1}{4}$

$\frac{2}{-8} = -\frac{1}{4}$

$-\frac{2}{8} = -\frac{1}{4}$

all equal!

$\frac{-2}{-8} = \frac{1}{4}$

Example: $\frac{0}{12} = \boxed{0}$

because $12(?) = 0$
answer: 0
$12(0) = 0$

Ex: $\frac{48}{12} = 4$ because
$12(?) = 48$
answer: 4
$12(4) = 48$

Ex: $\frac{12}{0}$ is $\boxed{\text{undefined}}$ because $0(?) = 12$ is impossible!

What about $\frac{0}{0}$?

denominator ↓ ↙ numerator

$$0(?) = 0$$

answer: anything!

So there is not one unique answer to this.

$\frac{0}{0}$ is undefined

So this is still $\boxed{\text{undefined.}}$

Important: * Division by 0 is undefined
We can never have a zero denominator.

* 0 divided by a nonzero number is equal to 0

Ex: $-\frac{2}{3}\left(-\frac{6}{5}\right) = +\frac{\cancel{12}^{4}}{\cancel{15}_{5}} = \boxed{\frac{4}{5}}$

Ex: $-\frac{2}{5}(-7)\left(-\frac{1}{4}\right) = -\frac{2}{5}\,\frac{(-7)}{1}\left(-\frac{1}{4}\right) = -\frac{14}{20}$

$$= \boxed{-\frac{7}{10}}$$

Division with Fractions

Ex: $\frac{3}{5} \div 4$

$= \frac{3}{5} \div \frac{4}{1}$

$= \frac{3}{5} \cdot \frac{1}{4} = \boxed{\frac{3}{20}}$

Dividing by a number is equivalent to multiplying by its reciprocal.

Note: Reciprocal of 4 is $\frac{1}{4}$.

Reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$.

Reciprocal of $-\frac{3}{5}$ is $-\frac{5}{3}$.

Two numbers are reciprocals if their product (what you get when you multiply them) is 1.

Ex: $-\frac{3}{5} \div \frac{2}{9}$

$= -\frac{3}{5} \cdot \frac{9}{2}$

$= \boxed{-\frac{27}{10}}$

Ex: $-6 \div \left(-\frac{4}{5}\right)$

$= -\frac{6}{1} \cdot \left(-\frac{5}{4}\right)$

$= +\frac{\cancel{30}^{15}}{\cancel{4}_{2}} = \boxed{\frac{15}{2}}$

1.6: Simplifying Expressions and Properties of Real Numbers

Commutative Property of Addition: $a+b=b+a$

Ex: $2+3=3+2$ (both equal 5)

Commutative means you can change the order

Commutative Property of multiplication: $ab=ba$

$2\cdot 3=3\cdot 2$ (both equal 6)

Division and subtraction are **not commutative**:

Ex: $\frac{8}{2}\neq\frac{2}{8}$

$8\div 2\neq 2\div 8$

$\frac{8}{2}=4$, $\frac{2}{8}=\frac{1}{4}$

$8-2\neq 2-8$

$8-2=6$, $2-8=-6$

Associative Property of Addition. $a+(b+c)=(a+b)+c$

Ex: $2+(3+4)=(2+3)+4$ (both equal 9)

Associative Property of multiplication: $a(bc)=(ab)c$

Ex: $2(3\cdot 4)=(2\cdot 3)\cdot 4$ (both equal 24)

Associative means you can change the grouping

Division and subtraction are **not associative**.

Distributive Property of Real Numbers

Multiplication distributes over addition

$$a(b+c) = ab+ac$$

$$(a+b)(c) = ac+bc$$

Ex: $2(3+4)$

$= 2(3)+2(4)$

$= 6+8$

$= \boxed{14}$

Algebraic Expression: Numbers and variables combined using arithmetic operations

Note: an expression does not have an equals sign.

Examples of expressions: $2x+5$

$3x^2y$

Algebraic expressions being added are called terms.

Algebraic expressions being multiplied are called factors.

The coefficient is the numerical factor in a term.

Ex: $4x^2-7x+5$ has 3 terms.

The coefficient of the x^2 term is 4.

The coefficient of the x term is -7.

The constant coefficient (or constant) is 5.
(or constant term)

When simplifying, we combine like terms by adding the coefficients.

Like terms have the same variables and exponents.

Ex: $2x^2, -7x^2, \frac{3}{5}x^2, x^2$ are like terms

$4x^2, 3x$ are unlike terms

Ex: Simplify.

$$2x^2 - 8x + 5 - 3x^2 - \frac{1}{2}x + 17$$
$$= -1x^2 - 8x - \frac{1}{2}x + 22$$
$$= -1x^2 - \frac{8x}{1}\left(\frac{2}{2}\right) - \frac{1}{2}x + 22$$
$$= -x^2 - \frac{16}{2}x - \frac{1}{2}x + 22$$
$$= \boxed{-x^2 - \frac{17}{2}x + 22}$$

Note:

$$-8 - \frac{1}{2}$$
$$= -\frac{8}{1}\left(\frac{2}{2}\right) - \frac{1}{2}$$
$$= -\frac{16}{2} - \frac{1}{2}$$
$$= -\frac{17}{2}$$

Note: Never write $-8\frac{1}{2}x$

$-8.5x$ is OK

Ex: $4(3m^3 - 2m + 5m - 8)$

$$= 12m^3 - 8m + 20m - 32$$
$$= \boxed{12m^3 + 12m - 32}$$

$\boxed{1.6.4}$

Ex: $-8(4-5a^2+2a)-(-a^2-6a+4)$

$$= -32+40a^2-16a-1(-a^2-6a+4)$$

$$= -32+40a^2-16a+a^2+6a-4$$

$$= \boxed{41a^2-10a-36}$$

Ex: $\frac{2}{3}\left(2x-\frac{1}{4}\right)-\frac{3}{8}\left(\frac{1}{2}x-\frac{1}{3}\right)$

$$= \frac{2}{3}\frac{(2x)}{1}+\frac{2}{3}\left(-\frac{1}{4}\right)-\frac{3}{8}\left(\frac{1}{2}x\right)-\frac{3}{8}\left(-\frac{1}{3}\right)$$

$$= \frac{4x}{3}-\frac{2}{12}-\frac{3}{16}x+\frac{3}{24}$$

$$= \frac{4}{3}x-\frac{3}{16}x-\frac{1}{6}+\frac{1}{8}$$

$$= \frac{4}{3}x\left(\frac{16}{16}\right)-\frac{3}{16}x\left(\frac{3}{3}\right)-\frac{1}{6}\left(\frac{4}{4}\right)+\frac{1}{8}\left(\frac{3}{3}\right)$$

$$= \frac{64}{48}x-\frac{9}{48}x-\frac{4}{24}+\frac{3}{24}$$

$$= \boxed{\frac{55}{48}x-\frac{1}{24}}$$

Note: $\frac{4x}{3}=\frac{4}{3}x$

Why? $\frac{4}{3}x=\frac{4}{3}\cdot\frac{x}{1}=\frac{4x}{3}$

Never write:

$\frac{4}{3}x$ or $4/3\,x$