Math 72: Mixed Practice on Selected Concepts from Chapters 1-2

1) Simplify. Write exact answers.

a. $-.3x + .4x + .5x$

b. $-.3x + .4x^2 + .5x^3$

c. $(-.3x)(.4x)(.5x)$

d. $(-.3x)(.4x^2)(.5x^3)$

e. $(-.3x)(.4x^2 + .5x^3)$

f. $(-.3x + .4x^2)(.5x^3)$

g. $-2x(-.3x)(.4x^2 + .5x^3)$

h. $-\frac{.3}{x} + \frac{.4}{x}$

i. $-\frac{x}{.3} - \frac{-x}{.4}$

j. $-.3x - \frac{-2}{3}x$

k. $-.3x + .4y + \frac{2}{5}x - \frac{5}{6}y$

l. $(-.3x)\left(-\frac{4}{5}x\right)$

m. $(-.3x)\left(-\frac{4}{5}y\right)$

n. $(-.3x) - \left(-\frac{4}{5}x\right)$

o. $(-.3x) - \left(-\frac{4}{5}y\right)$

p. $(-.3x)^2$

q. $(-.3x)^3$

r. $-(-.3x)^2$

s. $-(-.3x)^3$

t. $-(.3x)^2$

u. $-(.3x)^3$

v. $-(-.3xy)^3$

w. $-(-.3xy^2)^3$

x. $-\left(-\frac{.3xy^2}{z}\right)^3$

y. $-\left(-\frac{.3xy^2}{xy}\right)^3$

z. $-\left(-\frac{.3x^5y}{xy^4}\right)^3$

2) Water boils at 212°F, which is also called 100°C. Water freezes at 0°C, which is also called 32°F.

a. Using x to represent degrees Celsius and y to represent degrees Fahrenheit, write two ordered pairs, and then use these to write a linear equation to convert °C to°F.

b. Do the problem again. Using y to represent degrees Celsius and x to represent degrees Fahrenheit, write two ordered pairs, and then use these to write a linear equation to convert °F to °C.

Math 72 chapters 1-2 Selected Mixed Practice

① Simplify.

a) $-0.3x + 0.4x + 0.5x$

$= (-0.3 + 0.4 + 0.5)x$

$= \boxed{0.6x}$ or $\boxed{.6x}$ $= \boxed{\frac{3}{5}x}$

combine like terms (add)
variable unchanged

b) $\boxed{-0.3x + .4x^2 + .5x^3}$

$= \boxed{\frac{-3}{10}x + \frac{2}{5}x^2 + \frac{1}{2}x^3}$

not like terms
cannot combine
cannot be simplified

c) $(-.3x)(.4x)(.5x)$

$= (-.3)(.4)(.5)(x)(x)(x)$

$= \boxed{-0.06x^3} = \boxed{-\frac{3}{50}x^3}$

multiply
- multiply coefficients
- multiply variables — add exponents

d) $(-.3x)(.4x^2)(.5x^3)$

$= (-.3)(.4)(.5)(x)(x^2)(x^3)$

$= \boxed{-.06x^6} = \boxed{\frac{-3}{50}x^6}$

multiply coefficients and multiply variables — add exponents

e) $(-.3x)(.4x^2 + .5x^3)$

distribute → add inside 2nd set of parentheses

$= (-.3x)(.4x^2) + (-.3x)(5x^3)$

$= \boxed{-.12x^3 - .15x^4}$

$= \boxed{-\frac{3}{25}x^3 - \frac{3}{20}x^4}$

mult coefs
mult variables — add exp

f) $(-.3x + .4x^2)(.5x^3)$

distribute → add inside 1st set of parentheses

$= (-.3x)(.5x^3) + (.4x^2)(.5x^3)$

$= \boxed{-.15x^4 + .2x^5}$

$= \boxed{-\frac{3}{20}x^4 + \frac{1}{5}x^5}$

g) $-2x(-.3x)(.4x^2+.5x^3)$

multiply these first

$= (+.6x^2)(.4x^2+.5x^3)$ distribute

$= (.6x^2)(.4x^2) + (.6x^2)(.5x^3)$

$= \boxed{.24x^4 + .3x^5} = \boxed{\frac{6}{25}x^4 + \frac{3}{10}x^5}$

easier example
$2 \cdot 3(4+5)$
$6(4+5)$
$6 \cdot 9 = 54$

h) $-\frac{.3}{x} + \frac{.4}{x}$ combine like terms

$= (-.3+.4)\frac{1}{x}$

$= .1\left(\frac{1}{x}\right)$

$= \frac{.1}{x}$ or $\boxed{\frac{1}{10x}}$ ← best without decimals in a fraction

i) $\frac{-x}{.3} - \frac{-x}{.4}$ subtract negative means add a positive

$= \frac{-x}{.3} + \frac{x}{.4}$

$= \left(-\frac{1}{.3} + \frac{1}{.4}\right)x$ combine like terms

$= \boxed{-.8\overline{3}x}$ repeat bar over 3 only is required when giving decimal result

$= \boxed{\frac{-5}{6}x}$ better! use MATH 1. ▸frac on GC

j) $-.3x - \frac{-2}{3}x$

$= -.3x + \frac{2}{3}x$ combine like terms

$= \boxed{.3\overline{6}x}$ or $\boxed{\frac{11}{30}x}$

k) $-.3x + .4y + \frac{2}{5}x - \frac{5}{6}y$

combine x with x and y with y.

$= -.3x + \frac{2}{5}x + .4y - \frac{5}{6}y$

combine like terms (add)

$= \left(-.3 + \frac{2}{5}\right)x + \left(.4 - \frac{5}{6}\right)y$

$= .1x + -.4\overline{3}y$

$= \boxed{.1x - .4\overline{3}y}$

$= \boxed{\frac{1}{10}x - \frac{13}{30}y}$

l) $(-.3x)\left(-\frac{4}{5}x\right)$

multiply coefficients
multiply variables
(add exp)

$= (-.3)\left(-\frac{4}{5}\right) \cdot x \cdot x$

$= +\boxed{.24x^2}$

$= \boxed{\frac{6}{25}x^2}$

m) $(-.3x)\left(-\frac{4}{5}y\right)$

$= \boxed{.24xy}$ same coefficients as l)

$= \boxed{\frac{6}{25}xy}$

n) $(-.3x) - \left(-\frac{4}{5}x\right)$

subtract neg is add positive

$= -.3x + \frac{4}{5}x$

combine like terms

$= \left(-.3 + \frac{4}{5}\right)x$

variable unchanged

$= \boxed{.5x}$

$= \boxed{\frac{1}{2}x}$

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

o) $(-.3x) - \left(-\frac{4}{5}y\right)$

$= \boxed{-.3x + \frac{4}{5}y}$

subtract neg. means add

cannot combine unlike terms

p) $(-.3x)^2$

$= (-.3)^2(x^2)$

$= \boxed{.09x^2}$

$= \boxed{\frac{9}{100}x^2}$

exponent law $(ab)^n = a^n \cdot b^n$

q) $(-.3x)^3$

$= (-.3)^3 x^3$

$= \boxed{-.027x^3}$

$= \boxed{\frac{-27}{1000}x^3}$

exponent law $(ab)^n = a^n \cdot b^n$

r) $-(-.3x)^2$

↑ outside ↑ inside

$= -(-.3)^2 x^2$

$= -(+.09)x^2$

$= \boxed{-.09x^2}$

$= \boxed{\frac{-9}{100}x^2}$

exponent law $(ab)^n = a^n b^n$

s) $-(.3x)^3$

↑ no neg inside

$= -(.3)^3 \cdot x^3$

$= \boxed{-.027x^3}$

$= \boxed{-\frac{27}{1000}x^3}$

exponent law $(ab)^n = a^n b^n$

t) $-(.3x)^2$

↑ no neg inside

$= -(.3)^2 x^2$ exponent law $(ab)^n = a^n b^n$

$= \boxed{-.09x^2}$

$= \boxed{\frac{-9}{100}x^2}$

u) $-(.3x)^3$

$= -(.3)^3 x^3$ exponent law $(ab)^n = a^n b^n$

$= \boxed{-.027x^3}$

$= \boxed{\frac{-27}{1000}x^3}$

v) $-(-.3xy)^3$ exponent law $(abc)^n = a^n b^n c^n$

$= -(-.3)^3 x^3 y^3$

$= -(-.027)x^3 y^3$

$= +\boxed{.027x^3 y^3}$

$= \boxed{\frac{27}{1000}x^3 y^3}$

w) $-(-.3xy^2)^3$

$= -(-.3)^3 x^3 (y^2)^3$ exponent law $(abc)^n = a^n b^n c^n$

$= -(-.027)x^3 y^6$ exponent law $(a^n)^m = a^{n \cdot m}$

$= \boxed{.027x^3 y^6}$

$= \boxed{\frac{27}{1000}x^3 y^6}$

x) $-\left(-\frac{.3xy^2}{z}\right)^3$ exponent laws $(ab)^n = a^n b^n$ $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

$= -(-.3)^3 \frac{x^3 (y^2)^3}{z^3}$

$= -(-.027)\frac{x^3 y^6}{z^3}$ exponent law $(a^n)^m = a^{n \cdot m}$

$= \boxed{.027\frac{x^3 y^6}{z^3}}$

y) $-\left(-\frac{.3xy^2}{xy}\right)^3$

simplify inside ( ) first $\frac{x}{x} = 1$ $\frac{y^2}{y} = y^{2-1} = y$

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

$= -(-.3y)^3$ exponent law $(ab)^n = a^n b^n$

$= -(-.3)^3 y^3$

$= -(-.027)y^3$

$= \boxed{.027y^3}$

$= \boxed{\frac{27}{1000}y^3}$

7) $-\left(\frac{-.3x^5y}{xy^4}\right)^3$

simplify inside first

$\left(\frac{x^n}{x^m} = x^{n-m} = \frac{1}{x^{m-n}}\right)$

notice location AND order of subtraction

$= -\left(-.3\frac{x^{5-1}}{y^{4-1}}\right)^3$

$= -\left(-.3\frac{x^4}{y^3}\right)^3$ exp law $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

$= -\frac{(-.3)^3(x^4)^3}{(y^3)^3}$ exp law $(a^n)^m = a^{n\cdot m}$

$= -(-.027)\frac{x^{4\cdot3}}{y^{3\cdot3}}$

$= -(-.027)\frac{x^{12}}{y^9}$

$= \boxed{.027\frac{x^{12}}{y^9}}$

$= \boxed{\frac{27x^{12}}{1000y^9}}$

(2) water boils at $212°F = 100°C$
freezes at $32°F = 0°C$

a) $x = °C$
$y = °F$
means $(100°C, 212°F)$
$(0°C, 32°F)$

linear equation $\Rightarrow$ $y = mx+b$ $\Rightarrow$ need slope

$$m = \frac{212-32}{100-0} = \frac{180}{100} = \frac{9}{5}$$

Method 1: Point-slope formula $y - y_1 = m(x - x_1)$
substitute $x_1 = 0$, $y_1 = 32$ and $m = \frac{9}{5}$

$$y - 32 = \frac{9}{5}(x-0)$$

$$\boxed{y = \frac{9}{5}x + 32}$$

Method 2: Slope-intercept form $y = mx+b$
Substitute $y = 32$, $m = \frac{9}{5}$, $x = 0$ and solve for b.

$$32 = \frac{9}{5}(0) + b$$
$$32 = 0 + b$$
$$32 = b$$

rewrite: $\boxed{y = \frac{9}{5}x + 32}$

b) $x = °F$ means $(212°F, 100°C)$
$y = °C$ $(32°F, 0°C)$

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{100-0}{212-32} = \frac{100}{180} = \frac{5}{9}$$

Method 1: $y - 0 = \frac{5}{9}(x - 32)$

$$\boxed{y = \frac{5}{9}x - \frac{160}{9}}$$

Method 2: $0 = \frac{5}{9}(32) + b$

$$-\frac{160}{9} = b \longrightarrow \boxed{y = \frac{5}{9}x - \frac{160}{9}}$$