

RVGS Algebra II Orientation

Expressions & Equations

Simplify each expression.

1) $-4(5a - 3b)$

$$-20a + 12b$$

2) $5(7 + 3x) - 12$

$$15x + 23$$

3) $8y - 6(3y - 7)$

$$-10y + 42$$

4) $2(z + 3) + 3(5 - 3z)$

$$-7z + 21$$

5) $8(10x - 3) - (12 - 6x)$

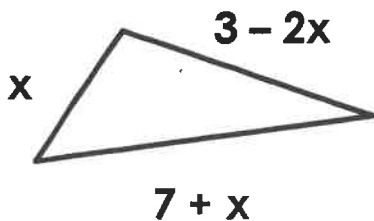
$$86x - 36$$

6) $x(3x + 2y) + y(4x + y)$

$$3x^2 + 6xy + y^2$$

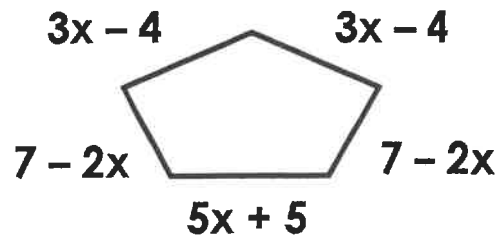
Find the perimeter (sum of the sides) of the following figures by combining like terms

7.)



$$10$$

8.)



$$7x + 11$$

$$\begin{array}{r} 3 \\ (56)^2 = \frac{56}{\times 56} \\ \hline 336 \\ 2800 \\ \hline 3136 \end{array}$$

Substitute and evaluate when: $w = -2, x = 5, y = 8, z = -7$

9.) $4(y+z) + 5(w+x)$

$$4(8-7) + 5(-2+5)$$

$$4(1) + 5(3)$$

$$4 + 15$$

$$19$$

10.) $(yz)^2 - 2wx$

$$(8(-7))^2 - 2(-2)(5)$$

$$(-56)^2 + 20$$

$$3,136 + 20 = 3,156$$

11.) $w^2 - x^2$

$$(-2)^2 - (5)^2$$

$$4 - 25$$

$$-21$$

12.) $|3xz| - |2wy|$

$$|3(5)(-7)| - |2(-2)(8)|$$

$$|-105| - |-32|$$

$$105 - 32 = 73$$

13.) $x^3 - 2x^2 + 7y$, when $x = -5$ & $y = 4$

$$(-5)^3 - 2(-5)^2 + 7(4)$$

$$-125 - 2(25) + 28$$

$$-125 - 50 + 28$$

$$-175 + 28$$

$$-147$$

14.) $\frac{4y-x}{3(2x+y)}$, when $x = -3$ & $y = 3$

$$\frac{4(3) - (-3)}{3(2(-3) + 3)} = \frac{12 + 3}{3(-3)}$$

$$\frac{15}{-9} = -\frac{5}{3}$$

$$\begin{array}{r} 18 \\ 8 \\ \hline 64 \\ 80 \\ 18 \\ \hline \times 18 \\ \hline 144 \\ 180 \\ \hline 324 \end{array}$$

15.) $[4x - 2(y+3)]^2$, when $x = 3$ & $y = -6$

$$[4(3) - 2(-6+3)]^2$$

$$[12 - 2(-3)]^2$$

$$[12 + 6]^2$$

$$18^2 = 324$$

16.) $25 - |4x - 3y^2|$, when $x = -2$ & $y = -7$

$$25 - |4(-2) - 3(-7)^2|$$

$$25 - |-8 - 3(49)|$$

$$25 - |-8 - 147|$$

$$25 - |-155|$$

$$25 - 155$$

$$-130$$

18.) $-5|9x - y| - y$, when $x = 1$ and $y = -12$

$$-5|9(1) - (-12)| - (-12)$$

$$-5|9 + 12| + 12$$

$$-5|21| + 12$$

$$-5(21) + 12$$

$$-105 + 12$$

$$-93$$

17.) $x|6 + xy| - 1$, when $x = -9$ & $y = -1$

$$-9|6 + (-9)(-1)| - 1$$

$$-9|15| - 1$$

$$-9(15) - 1$$

$$-135 - 1$$

$$-136$$

$$\begin{array}{r} 9 \\ 15 \\ \hline 45 \\ 90 \\ \hline 135 \end{array}$$

$$\begin{array}{r} 3 \\ 49 \\ \hline 27 \\ 120 \\ \hline 147 \end{array}$$

$$\begin{array}{r} 5 \\ 21 \\ \hline 5 \\ 100 \\ \hline 105 \end{array}$$

$$\begin{array}{r} 12 \\ 112 \\ -64 \\ \hline 48 \end{array}$$

$$\begin{array}{r} 5 \\ 42 \overline{) 210} \\ -210 \\ \hline 0 \end{array}$$

Solve the following equations:

19.) $2x - 8(x - 8) = 112$

$$2x - 8x + 64 = 112$$

$$-6x = 48$$

$$x = \frac{48}{-6} = -8$$

21.) $5(6 - 5x) + 4x = 4x - 20$

$$30 - 25x = -20$$

$$-25x = -50$$

$$x = 2$$

23.) $4(-3 + 2x) = -12 + 10x$

$$-12 + 8x = -12 + 10x$$

$$8x = 10x$$

$$0 = 2x$$

$$x = 0$$

25.) $6(z + 10) - 4(z - 6) = 5z - 10z$

$$6z + 60 - 4z + 24 = 5z - 10z$$

$$2z + 84 = -5z$$

$$84 = -7z$$

$$z = -12$$

27.) $8(k - 6) + 58 = 2(4k + 5)$

$$8k - 48 + 58 = 8k + 10$$

$$8k + 10 = 8k + 10$$

Identity

Identity

20.) $6(-7x + 3) = -192$

$$-42x + 18 = -192$$

$$-18 \quad -18$$

$$-42x = -210$$

$$x = 5$$

22.) $-4(-4x + 8) - 7 = -31 + 8x$

$$16x - 32 - 7 = -31 + 8x$$

$$16x - 39 = -31 + 8x$$

$$8x = 8$$

$$x = 1$$

24.) $7 + 9(1 + 2n) = -8 + 5(-n - 9)$

$$7 + 9 + 18n = -8 - 5n - 45$$

$$16 + 18n = -53 - 5n$$

$$16 + 23n = -53$$

$$23n = -69$$

$$n = -3$$

26.) $3(x - 4) = -x + 7(4 + 2x)$

$$3x - 12 = -x + 28 + 14x$$

$$3x - 12 = 13x + 28$$

$$-10x = 40$$

$$x = -4$$

28.) $4(x - 1) + 5 = -(1 - 4x)$

$$4x - 4 + 5 = -1 + 4x$$

$$4x + 1 = -1 + 4x$$

$$1 = -1$$

Contradiction

$\emptyset$

Simplifying Challenge Problems – simplify the following problems by combining like terms. Always leave your answers in simplest form. Reduce all fractions and write as an improper fraction when necessary.

$$1.) 2[5 - 3(y + 2)] - 3[2 - 4(y - 2)]$$

$$2[5 - 3y - 6] - 3[2 - 4y + 8]$$

$$2[-3y - 1] - 3[-4y + 10]$$

$$-6y - 2 + 12y - 30$$

$$6y - 32$$

$$3.) 2[3(4a - b) - 2(5a - 3b)] - \{5[3a - (b - 4a)] + b\}$$

$$-31a + 10b$$

$$2.) 6\{5 - 2[(x - 2y) - 3(2x - y)]\}$$

$$6\{5 - 2[x - 2y - 6x + 3y]\}$$

$$6\{5 + 10x - 2y\}$$

$$60x - 12y + 30$$

$$4.) 4\{7 - [4 - 2(5q - 3r)]\} - 6\{3 - [2 - 3(q + 2r)]\}$$

$$22q - 60r + 6$$

$$5.) \frac{3}{2}\left(\frac{3}{4}n + \frac{7}{6}\right) + \frac{17}{4}$$

$$\frac{19}{6}$$

$$\frac{54}{60}$$

$$\frac{114}{114}$$

$$\frac{9}{8}n + \frac{21}{12} + \frac{17}{4}$$

$$\frac{9}{8}n + \frac{21}{12} + \frac{51}{12}$$

$$\frac{9}{8}n + \frac{72}{12} = \frac{9}{8}n + 6$$

$$7.) \frac{2}{5}\left(\frac{23}{5}n + 1\right) - \frac{19}{10}\left(\frac{6}{5}n + 1\right)$$

$$\frac{46}{25}n + \frac{2}{5} - \frac{114}{50}n - \frac{19}{10}$$

$$\frac{92}{50}n - \frac{114}{50}n + \frac{4}{10} - \frac{19}{10}$$

$$-\frac{22}{50}n - \frac{15}{10} = -\frac{11}{25}n - \frac{3}{2}$$

$$6.) 2 + 9\left(\frac{1}{4}x - \frac{2}{5}\right)$$

$$2 + \frac{9}{4}x - \frac{18}{5}$$

$$\frac{9}{4}x + \frac{10}{5} - \frac{18}{5}$$

$$\frac{9}{4}x - \frac{8}{5}$$

$$8.) \frac{13}{4}\left(n - \frac{4}{3}\right) + \frac{29}{6}\left(-n + \frac{19}{4}\right)$$

$$\frac{13}{4}n - \frac{13}{3} - \frac{29}{6}n + \frac{551}{24}$$

$$\frac{39}{12}n - \frac{58}{12}n - \frac{104}{24} + \frac{551}{24}$$

$$-\frac{19}{12}n + \frac{447}{24} = \frac{-19}{12}n + \frac{149}{8}$$

$$\begin{array}{r} 149 \\ 3 \overline{) 447} \\ - 3 \downarrow \\ \hline 14 \downarrow 9 \\ - 12 \downarrow \\ \hline 27 \downarrow 19 \\ - 27 \downarrow \\ \hline 0 \end{array}$$

$$\begin{array}{r} 29 \\ \times 19 \\ \hline 171 \\ 380 \\ \hline 551 \end{array}$$

Evaluating Challenge Problems – Evaluate the following problems by substituting. Always leave your answers in simplest form. Reduce all fractions and write as an improper fraction when necessary.

1.) $[5(x+3) - 3(2x-5)] \div (x+2)$ if $x = 3$

$$\frac{[5(6) - 3(1)]}{5} = \frac{27}{5}$$

2.) $\{3[(x+2y) - 3(y-z)] - [z(x+y) + 2xy]\}$ if $x = 3, y = 5, \& z = -2$

$$3[(3+10) - 3(5+2)] - [-2(8) + 2(15)]$$

$$3[13 - 3(7)] - [-16 + 30]$$

$$3[13 - 21] - (14)$$

$$-24 - 14 = -38$$

3.) $f(x) = x^2 - 5x$; find $f(-10)$

$$(-10)^2 - 5(-10)$$

$$150$$

4.) $h(n) = n^2 - 4n$; find $h(7)$

$$(7)^2 - 4(7)$$

$$21$$

5.) $f(x) = -3x^2 - 2x - 5$; find $f(-8)$

$$-3(-8)^2 - 2(-8) - 5$$

$$-181$$

6.) $g(x) = -3|3x - 1|$; find $g(2)$

$$-3|3(2) - 1|$$

$$-15$$

7.) $s(t) = t^2 - 2t$; find $s(-\frac{4}{7})$

$$(-\frac{4}{7})^2 - 2(-\frac{4}{7})$$

$$\frac{16}{49} + \frac{8}{7} = \frac{16}{49} + \frac{56}{49} = \frac{72}{49}$$

8.) $g(t) = t^3 + \frac{5}{3}t$; find $g(\frac{3}{2})$

$$(\frac{3}{2})^3 + \frac{5}{3}(\frac{3}{2})$$

$$\frac{27}{8} + \frac{5}{2}$$

$$\frac{27}{8} + \frac{20}{8} = \frac{47}{8}$$

9.) $f(x) = x^2 + \textcircled{-}5$; find $f(x-1)$

$$(x-1)^2 + (x-1) - 5$$

$$(x-1)(x-1) + (x-1) - 5$$

$$x^2 - 2x + 1 + x - 1 - 5$$

$$x^2 - x - 5$$

10.) $h(x) = x^3 + 4x$; find $h(x-1)$

$$(x-1)^3 + 4(x-1)$$

$$(x-1)(x-1)(x-1) + 4x - 4$$

$$(x^2 - 2x + 1)(x-1) + 4x - 4$$

$$x^3 - x^2 - 2x^2 + 2x + x - 1 + 4x - 4$$

$$x^3 - 3x^2 + 7x - 5$$

Solving Challenge Problems – solve the following equations. Reduce all fractions and write as an improper fraction when necessary.

$$1.) -4 + \frac{10}{3}x = \frac{4}{3}x + 4x$$

$$-4 = \frac{4}{3}x + \frac{12}{3}x - \frac{10}{3}x$$

$$-4 = \frac{6}{3}x$$

$$-4 = 2x$$

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

$$3.) -\frac{7}{3}n + \frac{7}{6}n - \frac{43}{18} = \frac{7}{4}n + \frac{3}{2}$$

$$-\frac{7}{3}n + \frac{7}{6}n - \frac{7}{4}n = \frac{3}{2} + \frac{43}{18}$$

$$-\frac{28}{12}n + \frac{14}{12}n - \frac{21}{12}n = \frac{27}{18} + \frac{43}{18}$$

$$-\frac{35}{12}n = \frac{70}{18}$$

$$(18)(-\frac{35}{12}n) = 12(\frac{70}{18})$$

$$-630n = 840$$

$$5.) \frac{37}{20} - \frac{1}{2}x = x - \frac{7}{4} + \frac{18}{5}$$

$$\frac{1}{2}x - x = -\frac{7}{4} + \frac{18}{5} - \frac{37}{20}$$

$$-\frac{3}{2}x = \frac{-35}{20} + \frac{76}{20} + \frac{-37}{20}$$

$$-\frac{3}{2}x = \frac{5}{20}$$

$$-\frac{3}{2}x = \frac{1}{4}$$

$$-12x = 2$$

$$\boxed{x = -\frac{1}{6}}$$

$$7.) 2(z + \frac{11}{8}) = \frac{87}{20} + \frac{2}{5}z$$

$$2z + \frac{22}{8} = \frac{87}{20} + \frac{2}{5}z$$

$$2z - \frac{2}{5}z = \frac{87}{20} - \frac{11}{4}$$

$$\frac{10z}{5} - \frac{2}{5}z = \frac{87}{20} - \frac{55}{20}$$

$$\frac{8}{5}z = \frac{32}{20}$$

$$\frac{8}{5}z = \frac{8}{5}$$

$$\boxed{z = 1}$$

$$x + \frac{11}{4} - 3x - \frac{7}{6} = -\frac{3}{2}x + \frac{4}{3}$$

$$2.) x + \frac{11}{4} - 3x - \frac{7}{6} = -\frac{3}{2}x + \frac{4}{3}$$

$$-2x + \frac{3}{2}x = \frac{4}{3} - \frac{11}{4} + \frac{7}{6}$$

$$-\frac{4x}{2} + \frac{3}{2}x = \frac{16}{12} - \frac{33}{12} + \frac{14}{12}$$

$$-\frac{x}{2} = \frac{-3}{12}$$

$$-12x = -6$$

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

$$4.) -\frac{3}{4}n + \frac{3}{2} + 2n = -\frac{7}{2} - \frac{15}{40}$$

$$-\frac{3}{4}n + 2n + \frac{15}{4}n = -\frac{7}{2} - \frac{3}{2}$$

$$-\frac{3}{4}n + \frac{8n}{4} + \frac{15}{4}n = \frac{-10}{2}$$

$$\frac{20}{4}n = \frac{-10}{2}$$

$$5n = -5$$

$$\boxed{n = -1}$$

$$n = \frac{-840}{630}$$

$$n = \frac{-84 \div 21}{63 \div 21}$$

$$n = \frac{-4}{3}$$

$$6.) \frac{3}{2}x - \frac{11}{4}x = -\frac{19}{24} + \frac{1}{3}x$$

$$\frac{3}{2}x - \frac{11}{4}x - \frac{1}{3}x = \frac{-19}{24}$$

$$\frac{18}{12}x - \frac{33}{12} - \frac{4}{12}x = \frac{-19}{24}$$

$$-\frac{19}{12}x = \frac{-19}{24}$$

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

$$8.) \frac{9}{4}(x - \frac{5}{3}) = -\frac{9}{8} + \frac{9}{5}x$$

$$\frac{9}{4}x - \frac{15}{4} = -\frac{9}{8} + \frac{9}{5}x$$

$$\frac{9}{4}x - \frac{9}{5}x = -\frac{9}{8} + \frac{15}{4}$$

$$\frac{45}{20}x - \frac{36}{20} = \frac{-9}{8} + \frac{30}{8}$$

$$\frac{9}{20}x = \frac{21}{8}$$

$$8(9x) = 20(21)$$

$$72x = 420$$

$$x = \frac{420}{72} = \frac{35}{6}$$

$$\begin{array}{r} 6 \\ 12 \overline{) 72} \\ \underline{72} \\ 0 \end{array}$$

$$\begin{array}{r} 35 \\ 12 \overline{) 420} \\ \underline{36} \\ 60 \\ \underline{60} \\ 0 \end{array}$$

$$\begin{array}{r} 21 \\ \times 20 \\ \hline 420 \end{array}$$

Solve the following absolute value equations

9.) $2 - 5|5x - 5| = -73$

$$-5|5x - 5| = -75$$

$$|5x - 5| = 15$$

$$5x - 5 = 15$$

$$5x - 5 = -15$$

$$5x = 20$$

$$5x = -10$$

$$x = 4$$

$$x = -2$$

11.) $-3|3 - 5x| - 3 = 18$

$$-3|3 - 5x| = 21$$

$$|3 - 5x| = -7$$

Contradiction

$\emptyset$

10.) $6|1 - 5x| - 9 = 57$

$$6|1 - 5x| = 66$$

$$|1 - 5x| = 11$$

$$1 - 5x = 11$$

$$1 - 5x = -11$$

$$x = -2$$

$$-5x = -12$$

12.) $5|9 - 5n| - 7 = 38$ $x = 12/5$

$$5|9 - 5n| = 45$$

$$|9 - 5n| = 9$$

$$9 - 5n = 9$$

$$9 - 5n = -9$$

$$n = 0$$

$$-5n = -18$$

$$n = 18/5$$

Solve the following rational equations. Before you write down your final answer, answer the following question. Are there any value(s) of that the variable that would contradict the equation? In other words, are there any values that should be excluded?

13.) $\frac{1}{6x^2} + \frac{1}{6x} = \frac{1}{x^2}$

Exclude
 $x = 0$

$$\frac{1}{6x^2} + \frac{x}{6x^2} = \frac{1}{x^2}$$

$$\frac{x+1}{6x^2} = \frac{1}{x^2}$$

$$x^2(x+1) = 6x^2$$

$$x+1 = 6$$

$$x = 5$$

15.) $\frac{1}{m^2-m} + \frac{1}{m} = \frac{5}{m^2-m}$

Exclude
 $x = 0$ & $x = 1$

$$\frac{1}{m} = \frac{4}{m^2-m}$$

$$\frac{1}{m} = \frac{4}{m(m-1)}$$

$$m(m-1) = 4m$$

$$m-1 = 4$$

$$m = 5$$

14.) $\frac{1}{n-8} - 1 = \frac{7}{n-8}$ Exclude
 $x = 8$

$$-1 = \frac{6}{n-8}$$

$$-(n-8) = 6$$

$$-n+8 = 6$$

$$-n = -2$$

$$n = 2$$

16.) $\frac{x+6}{4x^2} + \frac{3}{2x^2} = \frac{x+4}{2x^2}$

Exclude
 $x = 0$

$$\frac{x+6}{4x^2} + \frac{6}{4x^2} = \frac{2x+8}{4x^2}$$

$$\frac{x+12}{4x^2} = \frac{2x+8}{4x^2}$$

$$x+12 = 2x+8$$

$$12 = x+8$$

$$x = 4$$

Solving Literal Equations

Solve the following equations for the indicated variable:

29.) $m = \frac{y_2 - y_1}{x_2 - x_1}$ for x_1

$$m(x_2 - x_1) = (y_2 - y_1)$$

$$x_2 m - x_1 m = y_2 - y_1$$

$$x_2 m - y_2 + y_1 = x_1 \frac{m}{m}$$

$$\boxed{\frac{x_2 m - y_2 + y_1}{m} = x_1}$$

31.) $R = \frac{\rho l}{A}$ for A $A \cdot R = \frac{\rho l}{A} \cdot A$

$$\frac{A \cdot R}{R} = \frac{\rho l}{R}$$

$$\boxed{A = \frac{\rho l}{R}}$$

33.) $U_g = mgh$ for m

$$\boxed{\frac{U_g}{gh} = m}$$

35.) $S = 2\pi r l + 2\pi r^2$ for l

$$\frac{S - 2\pi r^2}{2\pi r} = \frac{2\pi r l}{2\pi r}$$

$$\boxed{\frac{S}{2\pi r} - r = l} \quad \text{or} \quad \boxed{\frac{S - 2\pi r^2}{2\pi r} = l}$$

37.) $x = x_0 + v_0 t + \frac{1}{2} a_x t^2$ for v_0

$$\frac{x - x_0 - \frac{1}{2} a_x t^2}{t} = \frac{v_0 t}{t}$$

$$\boxed{\frac{x - x_0 - \frac{1}{2} a_x t^2}{t} = v_0}$$

30.) $z = \frac{x - \mu}{\frac{\sigma}{\sqrt{n}}}$ for n $\sigma \cdot z = \frac{\sqrt{n} \cdot (x - \mu)}{\sigma}$

$$\frac{\sigma \cdot z}{(x - \mu)} = \frac{\sqrt{n} (x - \mu)}{(x - \mu)}$$

$$\left(\frac{\sigma \cdot z}{x - \mu} \right)^2 = (\sqrt{n})^2$$

$$\boxed{\left(\frac{\sigma z}{x - \mu} \right)^2 = n}$$

32.) $K = \frac{1}{2} m v^2$ for v

$$\boxed{\sqrt{\frac{2K}{m}} = v}$$

34.) $T_s = 2\pi \sqrt{\frac{m}{k}}$ for k

$$k \cdot \left(\frac{T_s}{2\pi} \right)^2 = \frac{m}{k} \cdot k$$

$$k = \left(\frac{T_s}{2\pi} \right)^2 = \frac{4\pi^2 m}{T_s^2}$$

36.) $\sigma = \sqrt{npq}$ for n

$$\frac{\sigma^2}{pq} = \frac{npq}{pq}$$

$$\boxed{\frac{\sigma^2}{pq} = n}$$

38.) $\sigma = \sqrt{\frac{pq}{n}}$ for n

$$n \cdot \sigma^2 = \frac{pq}{n} \cdot n$$

$$\boxed{n = \frac{pq}{\sigma^2}}$$