SOLUTIONS

Math 10C Review
To be completed before starting Math 20-1

1. Identify the error in each of the following and show a correct solution.

a. $\frac{1}{2}+\frac{2}{3}=\frac{3}{6}+\frac{4}{6}$ $\longrightarrow$ $\frac{3}{6}+\frac{4}{6}$

$=\frac{3+4}{6+6}$ do not add denominators

$=\frac{7}{12}$

$=\frac{3+4}{6}$

$=\frac{7}{6}$

b. $-5\frac{1}{4}+2\frac{1}{8}=-\frac{19}{4}+\frac{17}{8}$ $\longrightarrow$ $-\frac{21}{4}+\frac{17}{8}$ Should be $-\frac{21}{4}$

$=-\frac{38}{8}+\frac{17}{8}$

$=-\frac{21}{8}$

$=-\frac{42}{8}+\frac{17}{8}$

$=-\frac{25}{8}$

2. Add or subtract the following fractions by getting a common denominator. Show all steps of work. Express all answers in simplest ***improper*** form.

a. $\frac{2}{3}+\frac{4}{5}=\frac{10}{15}+\frac{12}{15}$

$=\frac{22}{15}$

b. $\frac{1}{2}-\frac{1}{3}=\frac{3}{6}-\frac{2}{6}$

$=\frac{1}{6}$

c. $3\frac{2}{3}+2\frac{1}{2}=\frac{11}{3}+\frac{5}{2}$

$=\frac{22}{6}+\frac{15}{6}$

$=\frac{37}{6}$

d. $\frac{5}{12}-\frac{1}{3}=\frac{5}{12}-\frac{4}{12}$

$=\frac{1}{12}$

e. $5\frac{1}{4}-2\frac{5}{6}=\frac{21}{4}-\frac{17}{6}$

$=\frac{63}{12}-\frac{34}{12}$

$=\frac{29}{12}$

f. $\frac{3}{8}+\frac{3}{4}-\frac{5}{6}=\frac{9}{24}+\frac{18}{24}-\frac{20}{24}$

$=\frac{7}{24}$

g. $\frac{4}{5}-\frac{2}{3}+\frac{1}{4}=\frac{48}{60}-\frac{40}{60}+\frac{15}{60}$

$=\frac{23}{60}$

h. $6-\frac{2}{3}=\frac{6}{1}-\frac{2}{3}$

$=\frac{18}{3}-\frac{2}{3}$

$=\frac{16}{3}$

i. $\frac{9}{5}-1=\frac{9}{5}-\frac{1}{1}$

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

$=\frac{4}{5}$

3. Multiply or divide the following fractions. Express in simplest *improper* form.

a. $\frac{2}{7} \times \frac{3}{4} = \frac{6}{28}$

$= \frac{3}{14}$

b. $\left(\frac{1}{5}\right)\left(\frac{12}{13}\right) = \frac{12}{65}$

c. $\left(\frac{3}{8}\right)\left(\frac{4}{5}\right) = \frac{12}{40}$

$= \frac{3}{10}$

d. $\left(2\frac{1}{6}\right)\left(\frac{3}{5}\right) = \left(\frac{13}{6}\right)\left(\frac{3}{5}\right)$

$= \frac{39}{30}$

$= \frac{13}{10}$

e. $\left(1\frac{1}{4}\right)\left(5\frac{2}{3}\right) = \left(\frac{5}{4}\right)\left(\frac{17}{3}\right)$

$= \frac{85}{12}$

f. $\left(-1\frac{5}{7}\right)\left(-2\frac{1}{2}\right) = \left(-\frac{12}{7}\right)\left(-\frac{5}{2}\right)$

$= \frac{60}{14}$

$= \frac{30}{7}$

g. $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \cdot \frac{2}{1}$

$= \frac{6}{4}$

$= \frac{3}{2}$

h. $\frac{3}{8} \div \frac{4}{5} = \frac{3}{8} \cdot \frac{5}{4}$

$= \frac{15}{32}$

i. $-\frac{5}{6} \div \frac{3}{4} = -\frac{5}{6} \cdot \frac{4}{3}$

$= -\frac{20}{18}$

$= -\frac{10}{9}$

j. $3\frac{1}{8} \div \frac{3}{4} = \frac{25}{8} \div \frac{3}{4}$

$= \frac{25}{8} \cdot \frac{4}{3}$

$= \frac{100}{24}$

$= \frac{25}{6}$

k. $-2\frac{1}{2} \div 1\frac{5}{6} = -\frac{5}{2} \div \frac{11}{6}$

$= -\frac{5}{2} \cdot \frac{6}{11}$

$= -\frac{30}{22}$

$= -\frac{15}{11}$

l. $3\frac{1}{4} \div \frac{-1}{2} = \frac{13}{4} \div -\frac{1}{2}$

$= \frac{13}{4} \cdot \frac{-2}{1}$

$= -\frac{26}{4}$

$= -\frac{13}{2}$

4. Convert the following radicals to *simplest mixed* radical form.

a. $\sqrt{50} = \sqrt{25 \cdot 2}$

$= \sqrt{25}\sqrt{2}$

$= 5\sqrt{2}$

b. $\sqrt{12} = \sqrt{4 \cdot 3}$

$= \sqrt{4}\sqrt{3}$

$= 2\sqrt{3}$

c. $\sqrt{60} = \sqrt{4 \cdot 15}$

$= 2\sqrt{15}$

d. $4\sqrt{45} = 4\sqrt{9 \cdot 5}$

$= 4\sqrt{9}\sqrt{5}$

$= 4(3)\sqrt{5}$

$= 12\sqrt{5}$

e. $\sqrt{21} = \sqrt{21}$

can not be simplified

f. $2\sqrt{48} = 2\sqrt{16 \cdot 3}$

$= 2\sqrt{16}\sqrt{3}$

$= 2(4)\sqrt{3}$

$= 8\sqrt{3}$

g. $\sqrt[3]{32} = \sqrt[3]{8 \cdot 4}$
$= \sqrt[3]{8}\sqrt[3]{4}$
$= 2\sqrt[3]{4}$

h. $5\sqrt[3]{250} = 5\sqrt[3]{125 \cdot 2}$
$= 5\sqrt[3]{125}\sqrt[3]{2}$
$= 5(5)\sqrt[3]{2}$
$= 25\sqrt[3]{2}$

i. $6\sqrt[3]{108} = 6\sqrt[3]{27 \cdot 4}$
$= 6\sqrt[3]{27}\sqrt[3]{4}$
$= 6(3)\sqrt[3]{4}$
$= 18\sqrt[3]{4}$

j. $\sqrt{99x^3} = \sqrt{9x^2 \cdot 11x}$
$= \sqrt{9x^2}\sqrt{11x}$
$= 3x\sqrt{11x}$

k. $\sqrt{600a} = \sqrt{100 \cdot 6a}$
$= \sqrt{100}\sqrt{6a}$
$= 10\sqrt{6a}$

l. $\sqrt[3]{162} = \sqrt[3]{27 \cdot 6}$
$= \sqrt[3]{27}\sqrt[3]{6}$
$= 3\sqrt[3]{6}$

m. $2\sqrt{20} = 2\sqrt{4 \cdot 5}$
$= 2\sqrt{4} \cdot \sqrt{5}$
$= 2(2)\sqrt{5}$
$= 4\sqrt{5}$

n. $-1\sqrt[3]{16} = -1\sqrt[3]{8 \cdot 2}$
$= -1\sqrt[3]{8}\sqrt[3]{2}$
$= -1(2)\sqrt[3]{2}$
$= -2\sqrt[3]{2}$

o. $\sqrt{700x^2y} = \sqrt{100x^2 \cdot 7y}$
$= \sqrt{100x^2}\sqrt{7y}$
$= 10x\sqrt{7y}$

5. Complete the following chart by converting between radical and exponential form.

Radical Form	Exponent Form
$\sqrt[5]{3^2}$	$3^{2/5}$
$\sqrt{x}$	$x^{\frac{1}{2}}$
$5\sqrt{ac}^3$	$5(ac)^{3/2}$
$\sqrt[4]{(xy)}^3$	$(xy)^{\frac{3}{4}}$
$\sqrt[3]{6}$	$6^{\frac{1}{3}}$
$4\sqrt{y}^3$	$4y^{\frac{3}{2}}$

6. Fully simplify the following exponential expressions using the laws of exponents. Express final answers using positive exponents only.

a. $(3xy)(4x^5y^2) = 12x^6y^3$

b. $\left(\frac{p^{-7}q^2}{p^2q^{-8}}\right)^2 = \left(p^{-9}q^{10}\right)^2$

$= p^{-18}q^{20}$

$= \frac{q^{20}}{p^{18}}$

c. $(a^{-2}b)^{-3}(ab^{-7})$

$= (a^6b^{-3})(ab^{-7})$

$= a^7b^{-10}$

$= \frac{a^7}{b^{10}}$

d. $\left(\frac{-6u^{-5}v^2}{-2u^4v^3}\right)^2 = \left(3u^{-9}v^{-1}\right)^2$

$= 9u^{-18}v^{-2}$

$= \frac{9}{u^{18}v^2}$

e. $(-8m^{-3}n^2)(2m^5n)^3$

$(-8m^{-3}n^2)(8m^{15}n^3)$

$-64m^{12}n^5$

f. $\left(\frac{-9mn^{-3}}{3m^4n^{-5}}\right)^2 = \left(-3m^{-3}n^2\right)^2$

$= 9m^{-6}n^4$

$= \frac{9n^4}{m^6}$

g. $\frac{(5r^{-2})(2r^{-6})}{7r^5} = \frac{10r^{-8}}{7r^5}$

$= \frac{10}{7}r^{-13}$

$= \frac{10}{7r^{13}}$

h. $\left(\frac{-3x^2y^3}{x^{-4}y^2}\right)(-2x^{-8}y^{-2})$

$= (-3x^6y)(-2x^{-8}y^{-2})$

$= 6x^{-2}y^{-1}$

$= \frac{6}{x^2y}$

i. $(s^4t^2)^3(s^{-5}t^3)^2$

$= (s^{12}t^6)(s^{-10}t^6)$

$= s^2t^{12}$

j. $(-8r^3s^{-5})\left(\frac{r^7s^{-5}}{2r^{-4}s^7}\right)$

$(-8r^3s^{-5})\left(\frac{1}{2}r^{11}s^{-12}\right)$

$-4r^{14}s^{-17}$

k. $\left(\frac{-4b^{-2}c^3}{-8b^4c^{-7}}\right)^{-3}$

$\left(\frac{1}{2}b^{-6}c^{10}\right)^{-3}$

$8b^{18}c^{-30}$

$\frac{8b^{18}}{c^{30}}$

l. $(-5a^2b^4)(2bc^{-3})^2(-3c^4)^3$

$(-5a^2b^4)(4b^2c^{-6})(-27c^{12})$

$540a^2b^6c^6$

7. These problems have some of the most common mistakes that students make with exponents. ***Three*** of these problems are correct. Circle the correct ones & explain ***and*** correct the mistake in the ones with errors.

a) $(x^3y^4)(x^3y^4) = 2x^3y^4$
added the 2 terms instead of multiply
x^6y^8

b) $(3m^3)(2m^5) = 5m^8$
need to multiply coefficients
$6m^8$

c) $(6a^3b)(2a^3b^4) = 12a^6b^4$
forgot to add exponents on b
$12a^6b^5$

d) $(4p^2q^4)(p^2q) = 4p^4q^5$ ✓

e) $(5f^3)(7f^5) = 35f^{15}$
need to add exponents instead of multiply
$35f^8$

f) $(x^3y)^2 = x^5y^2$
multiply exponents instead of adding
x^6y^2

g) $(m^2)^3 = m^{2^3} = m^8$
multiply these exponents
m^6

h) $(3m^3)^3 = 27m^9$ ✓

i) $(4g^2)(g^5) = 16g^5$
add exponents on g
$4g^7$

j) $(5x^7y^4)^5 = 5x^{35}y^{20}$
Coefficient is $5^5 = 3125$
$3125x^{35}y^{20}$

k) $(3a^4b^2)^3 = 9a^{12}b^6$
Coefficient should be $3^3 = 27$
$27a^{12}b^6$

l) $(-m^2n)(2m^5n^4) = m^3n^3$
multiply coefficients and add exponents
$-2m^7n^5$

m) $(-m^2)(2m^5n^4) = 2m^7n^4$
forgot to multiply $(-1)(2)$ to get coefficient
$-2m^7n^4$

n) $3x(4x^2y)^2 = (12x^3y)^2 = 144x^6y^2$
must do this first!
$3x(16x^4y^2) = 48x^5y^2$

o) $w^4(3w^2 + 2w - 1) = 3w^6 + 2w - 1$
- need to use distributive law to expand
$3w^6 + 2w^5 - w^4$

p) $5xy^3(5x - y) = 25x^2y^3 - 5xy^4$ ✓

q) $3x^2(x^4 + 3x^2 + 2) = 3x^6 + 9x^4 + 6x^2 = 18x^{12}$
$3x^6 + 9x^4 + 6x^2$ — correct answer
$18x^{12}$ — can not add these terms together. They are not "like" terms.

r) $5a^2b(3a^2 + 2b^3) = 8a^4b + 7ab^4$
missing exponent here
- multiply the coefficients instead of adding them
$15a^4b + 10a^2b^4$

8. Kristine was solving some linear equations. Her work is shown below. Each solution is ***incorrect***. Identify the error & provide a correct solution.

a)

$8 - 5c = -37$
$-8 \quad -8$
$-5c = -45$
$\frac{-5c}{-5} = \frac{-45}{-5}$
$c = 9$

should be negative

$8 - 5C = -37$
$-8 \quad -8$
$-5c = -45$
$\frac{-5c}{-5} = \frac{-45}{-5}$
$c = 9$

b)

$4x - 3 = 17$
$+3 \quad +3$
$4x = 20$
$-4 \quad -4$
$x = 16$

need to divide by 4 instead of subtracting

$4x - 3 = 17$
$+3 \quad +3$
$\frac{4x}{4} = \frac{20}{4}$
$x = 5$

9. Solve the following equations algebraically. Show all your work.

a) $-20 = -4x - 6x$
$-20 = -10x$
$\frac{-20}{-10} = \frac{-10x}{-10}$
$2 = x$

b) $6 = 1 - 2n + 5$
$6 = 6 - 2n$
$-6 \quad -6$
$\frac{0}{-2} = \frac{-2n}{-2}$
$0 = n$

c) $8x - 2 = -9 + 7x$
$-7x \qquad -7x$
$x - 2 = -9$
$+2 \quad +2$
$x = -7$

d) $a + 5 = -5a + 5$
$+5a \quad +5a$
$6a + 5 = 5$
$-5 \quad -5$
$\frac{6a}{6} = \frac{0}{6}$
$a = 0$

e) $4m - 4 = 4m$
$-4m \quad -4m$
$0 - 4 = 0$
$-4 \neq 0$
$\therefore$ no solution

f) $p - 1 = 5p + 3p - 8$
$p - 1 = 8p - 8$
$-p \qquad -p$
$-1 = 7p - 8$
$+8 \qquad +8$
$\frac{7}{7} = \frac{7p}{7}$
$1 = p$

g) $5p - 14 = 8p + 4$
$-5p \qquad -5p$
$-14 = 3p + 4$
$-4 \qquad -4$
$\frac{-18}{3} = \frac{3p}{3}$
$-6 = p$

h) $p - 4 = -9 + p$
$-p \qquad -p$
$-4 = -9$
$-4 \neq -9$
$\therefore$ no solution

i) $-8 = -(x + 4)$
$-8 = -x - 4$
$+4 \qquad +4$
$\frac{-4}{-1} = \frac{-x}{-1}$
$4 = x$

j) $12 = -4(-6x - 3)$
$12 = 24x + 12$
$-12 \qquad -12$
$\frac{0}{24} = \frac{24x}{24}$
$0 = x$

k) $14 = -(p - 8)$
$14 = -p + 8$
$-8 \qquad -8$
$\frac{6}{-1} = \frac{-p}{-1}$
$-6 = p$

l) $-(7 - 4x) = 9$
$-7 + 4x = 9$
$+7 \qquad +7$
$\frac{4x}{4} = \frac{16}{4}$
$x = 4$

m) $-18 - 6k = 6(1 + 3k)$

$-18 - 6K = 6 + 18K$

$+6K \quad +6K$

$-18 = 6 + 24k$

$-6 \quad -6$

$\frac{-24}{24} = \frac{24k}{24}$

$-1 = K$

n) $5n + 34 = -2(1 - 7n)$

$5n + 34 = -2 + 14n$

$-5n \quad -5n$

$34 = -2 + 9n$

$+2 \quad +2$

$\frac{36}{9} = \frac{9n}{9}$

$4 = n$

o) $2(4x - 3) - 8 = 4 + 2x$

$8x - 6 - 8 = 4 + 2x$

$8x - 14 = 4 + 2x$

$-2x \quad -2x$

$6x - 14 = 4$

$+14 \quad +14$

$\frac{6x}{6} = \frac{18}{6}$ → $x = 3$

p) $3n - 5 = -8(6 + 5n)$

$3n - 5 = -48 - 40n$

$+40n \quad +40n$

$43n - 5 = -48$

$+5 \quad +5$

$\frac{43n}{43} = \frac{-43}{43}$

$n = -1$

q) $-(1 + 7x) - 6(-7 - x) = 36$

$-1 - 7x + 42 + 6x = 36$

$41 - x = 36$

$-41 \quad -41$

$-x = -5$

$x = 5$

r) $24a - 22 = -4(1 - 6a)$

$24a - 22 = -4 + 24a$

$-24a \quad -24a$

$-22 = -4$

$-22 \neq -4$

∴ no solution

s) $-3(4x + 3) + 4(6x + 1) = 43$

$-12x - 9 + 24x + 4 = 43$

$12x - 5 = 43$

$+5 \quad +5$

$\frac{12x}{12} = \frac{48}{12}$

$x = 4$

t) $-5(1 - 5x) + 5(-8x - 2) = -4x - 8x$

$-5 + 25x - 40x - 10 = -12x$

$-15x - 15 = -12x$

$+15x \quad +15x$

$\frac{-15}{3} = \frac{3x}{3}$

$-5 = x$

10. ***Completely factor*** the following polynomials.

a) $2x^2 + 3x - 9$

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

mult -18, add 3 → $6, -3$

	x	$+3$
$2x$	$2x^2$	$6x$
-3	$-3x$	-9

b) $5x^2 + 19x + 12$

$(x + 3)(5x + 4)$

mult 60, add 19 → $15, 4$

	x	$+3$
$5x$	$5x^2$	$15x$
$+4$	$4x$	12

c) $2w^2 + 7w + 5$

$(2w + 5)(w + 1)$

mult 10, add 7 → $2, 5$

	w	$+1$
$2w$	$2w^2$	$2w$
$+5$	$5w$	5

d) $2p^2 + 11p + 5$

$(p + 5)(2p + 1)$

mult 10, add 11 → $10, 1$

	p	$+5$
$2p$	$2p^2$	$10p$
$+1$	$1p$	5

e) $3v^2 - 8v + 4$

$(v - 2)(3v - 2)$

mult 12, add -8 → $-6, -2$

	v	-2
$3v$	$3v^2$	$-6v$
-2	$-2v$	4

f) $3x^2 - 2x - 5$

$(x + 1)(3x - 5)$

mult -15, add -2 → $-5, 3$

	$3x$	-5
x	$3x^2$	$-5x$
$+1$	$3x$	-5

g) $25n^2 - 1 = 25n^2 + 0n - 1$ mult -25, add 0 → $-5, 5$

$(5n+1)(5n-1)$

	$5n$	-1
$5n$	$25n^2$	$-5n$
$+1$	$5n$	-1

h) $9m^2 + 66m + 21$

$= 3(3m^2 + 22m + 7)$

$= 3(3m+1)(m+7)$

mult 21, add 22 → $21, 1$

	m	$+7$
$3m$	$3m^2$	$21m$
$+1$	$1m$	7

i) $7q^2 + 53q + 28$

$(q+7)(7q+4)$

mult 196, add 53 → $49, 4$

	q	$+7$
$7q$	$7q^2$	$49q$
$+4$	$4q$	28

j) $2x^2 - 18$

$= 2(x^2 - 9)$

$= 2(x^2 + 0x - 9)$

$= 2(x+3)(x-3)$

mult -9, add 0 → $-3, 3$

	x	-3
x	x^2	$-3x$
$+3$	$3x$	-9

k) $15n^2 - 27n - 6$

$= 3(5n^2 - 9n - 2)$

$= 3(5n+1)(n-2)$

mult -10, add -9 → $-10, 1$

	n	-2
$5n$	$5n^2$	$-10n$
$+1$	$1n$	-2

l) $5r^2 - 18r + 9$

$(5r-3)(r-3)$

mult 45, add -18 → $-15, -3$

	r	-3
$5r$	$5r^2$	$-15r$
-3	$-3r$	9

m) $4n^2 - 15n - 25$

$(n-5)(4n+5)$

mult -100, add -15 → $-20, 5$

	n	-5
$4n$	$4n^2$	$-20n$
$+5$	$5n$	-25

n) $4c^2 - 35c + 49$

$(4c-7)(c-7)$

mult 196, add -35 → $-28, -7$

	c	-7
$4c$	$4c^2$	$-28c$
-7	$-7c$	49

o) $4x^2 - 17x + 4$

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

mult 16, add -17 → $-16, -1$

	x	-4
$4x$	$4x^2$	$-16x$
-1	$-1x$	4

p) $6y^2 + 7y - 49$

$(2y+7)(3y-7)$

mult -294, add 7 → $21, -14$

	$2y$	$+7$
$3y$	$6y^2$	$21y$
-7	$-14y$	-49

q) $6k^2 + 37k + 6$

$(6k+1)(k+6)$

mult 36, add 37 → $36, 1$

	K	$+6$
$6K$	$6K^2$	$36K$
$+1$	$1K$	6

r) $-6m^2 - 25m - 25$

$= -1(6m^2 + 25 + 25)$

$= -1(3m+5)(2m+5)$

mult 150, add 25 → $15, 10$

	$2m$	$+5$
$3m$	$6m^2$	$15m$
$+5$	$10m$	25

11. Solve the following systems of equations algebraically by using either the elimination method or the substitution method.

a) $y = -3x + 4$
$y = 3x - 2$
$2y = 2$
$y = 1$

then $y = 3x - 2$
$1 = 3x - 2$
$3 = 3x$
$1 = x$

intersecting at $(1, 1)$

b) $y = x + 2 \longrightarrow y = x + 2$
$x = -3 \longrightarrow y = -3 + 2$
$y = -1$

intersecting at $(-3, -1)$

c) $x - y = 3 \longrightarrow x - y = 3$
$-1(7x - y = -3) \longrightarrow -7x + y = 3$
$-6x = 6$
$x = -1$

then $x - y = 3$
$-1 - y = 3$
$-y = 4$
$y = -4$

intersecting at $(-1, -4)$

d) $4x + y = 2$
$x - y = 3 \longrightarrow x = 3 + y$

$4x + y = 2$
$4(3+y) + y = 2$
$12 + 4y + y = 2$
$12 + 5y = 2$
$5y = -10$
$y = -2$

So $x = 3 + y$
$x = 3 + -2$
$x = 1$

intersecting at $(1, -2)$

e) $y = 4x - 9 \longrightarrow y = 4x - 9$
$-4(y = x - 3) \longrightarrow -4y = -4x + 12$
$-3y = 3$
$y = -1$

then $y = 4x - 9$
$-1 = 4x - 9$
$8 = 4x$
$2 = x$

intersecting at $(2, -1)$

f) $4x + 2y = 10$
$x - y = 13 \longrightarrow x = 13 + y$

$4x + 2y = 10$
$4(13+y) + 2y = 10$
$52 + 4y + 2y = 10$
$52 + 6y = 10$
$6y = -42$
$y = -7$

$x = 13 + y$
$x = 13 + -7$
$x = 6$

intersecting at $(6, -7)$

g) $6x + 8y = -22$
$y = -5$

$6x + 8(-5) = -22$
$6x - 40 = -22$
$+40 \quad +40$
$\frac{6x}{6} = \frac{18}{6}$
$x = 3$

intersecting at $(3, -5)$

h) $-3(-7x + 2y = 18) \longrightarrow 21x - 6y = -54$
$6x + 6y = 0 \longrightarrow 6x + 6y = 0$
$27x = -54$
$x = -2$

$6x + 6y = 0$
$6(-2) + 6y = 0$
$-12 + 6y = 0$
$6y = 12$
$y = 2$

intersecting at $(-2, 2)$

i) $-7x - 24 = -4y$

$\frac{4x}{4} = \frac{4y}{4}$

$x = y$

$-7x - 24 = -4y$

$-7x - 24 = -4x$

$-24 = 3x$

$-8 = x$

intersecting at $(-8, -8)$

j) $x + 7y = 0$

$\frac{2x}{2} = \frac{22}{2} + \frac{8y}{2} \rightarrow x = 11 + 4y$

$x + 7y = 0$

$11 + 4y + 7y = 0$

$11 + 11y = 0$

$11y = -11$

$y = -1$

$x = 11 + 4y$

$x = 11 + 4(-1)$

$x = 7$

intersecting at $(7, -1)$

k) $4x = 20 + y \longrightarrow 4x - 20 = y$

$0 = 2x + 2y + 10$

$0 = 2x + 2(4x - 20) + 10$

$0 = 2x + 8x - 40 + 10$

$0 = 10x - 30$

$30 = 10x$

$3 = x$

$y = 4x - 20$

$y = 4(3) - 12$

$y = -8$

intersecting at $(3, -8)$

l) $20 + 8x = 6y$

$7y = 16x + 30$

$2(8x - 6y = -20) \rightarrow 16x - 12y = -40$

$-16x + 7y = 30 \longrightarrow -16x + 7y = 30$

$-5y = -10$

$y = 2$

$20 + 8x = 6y$

$20 + 8x = 6(2)$

$20 + 8x = 12$

$-20 \quad -20$

$8x = -8$

$x = -1$

intersect at $(-1, 2)$

12. Mrs. Properzi was trying to solve the system of equations shown below by using the substitution method but she made an error. Find and correct her mistake.

$-3x + 5y = 17$ Solution: $\left(\frac{17}{3}, \frac{31}{6}\right)$

$2x - 8y = -30$

$-3x + 5y = 17$

$2x - 8y = -30 \quad - \quad x = \frac{8y - 30}{2} = 4y - 15$

$-3(4y - 15) = 17$

$-12y - 45 = 17$

$-12y = 62$

$y = \frac{31}{6}$

$x = 4\left(\frac{31}{6}\right) - 15 = \frac{62}{3} - \frac{45}{3} = \frac{17}{3}$

Description of Error:

$-3(4y - 15) + 5y = 17$

$-12y + 45$

The 45 should be positive and forgot $+5y$

Correct Solution:

$2x - 8y = -30$

$\frac{2x}{2} = \frac{8y}{2} - \frac{30}{2}$

$x = \boxed{4y - 15}$

$-3x + 5y = 17$

$-3(4y - 15) + 5y = 17$

$-12y + 45 + 5y = 17$

$\frac{-7y}{-7} = \frac{-28}{-7}$

$y = 4$

$x = 4y - 15$

$x = 4(4) - 15$

$x = 1$

$\therefore$ intersecting at $(1, 4)$

13. Katherine was solving the system of equations shown below but made a terrible mistake. Find & correct the error.

$7x-2y=24$
$-x+y=-2$

Solution: dependent system, infinite number of solutions

$7x-2y=24$
$-x+y=-2$ — $y=x-2$ ✓

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

Description of Error:

This needs to be substituted into the OTHER equation ($7x-2y=24$) instead of the same equation.

Correct Solution:

$-x+y=-2$
$y=x-2$

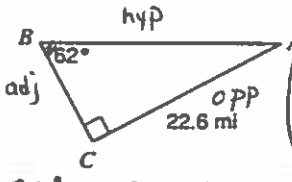
$7x-2y=24$
$7x-2(x-2)=24$
$7x-2x+4=24$
$5x+4=24$
$\frac{5x}{5}=\frac{20}{5}$
$x=4$

$y=x-2$
$y=4-2$
$y=2$

Intersecting at $(4,2)$

14. Solve the following triangles for all the unknown sides and angles. Round sides to the nearest tenth and angles to the nearest degree.

a)



$A=28°$ $a=12.0$
$B=62°$ $b=22.6$
$C=90°$ $c=25.6$

$\angle A = 180° - 90° - 62°$
$= 28°$

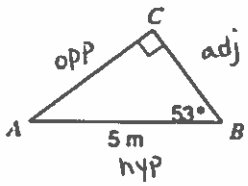
$\sin B = \frac{opp}{hyp}$ $\quad \tan B = \frac{opp}{adj}$

$\frac{\sin 62}{1} = \frac{22.6}{c}$ $\quad \frac{\tan 62}{1} = \frac{22.6}{a}$

$c = \frac{(22.6)(1)}{\sin 62}$ $\quad a = \frac{1(22.6)}{\tan 62}$

$c = 25.6$ $\quad a = 12.0$

b)



$A=37°$ $a=3.0$
$B=53°$ $b=4.0$
$C=90°$ $c=5.0$

$\angle A = 180° - 90° - 53°$
$= 37°$

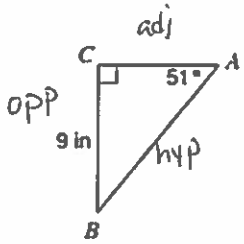
$\sin B = \frac{opp}{hyp}$ $\quad \cos B = \frac{adj}{hyp}$

$\frac{\sin 53}{1} = \frac{b}{5}$ $\quad \frac{\cos 53}{1} = \frac{a}{5}$

$b = \frac{(5)(\sin 53)}{1}$ $\quad a = \frac{5(\cos 53)}{1}$

$b = 4.0$ $\quad a = 3.0$

c)



$A = 51°$ $a = 9$
$B = 39°$ $b = 7.3$
$C = 90°$ $C = 11.6$

$\angle B = 180° - 90° - 51°$

$\tan 51 = \frac{opp}{adj}$

$\frac{\tan 51}{1} = \frac{9}{b}$

$b = \frac{1(9)}{\tan 51} = 7.3$

$\sin A = \frac{opp}{hyp}$

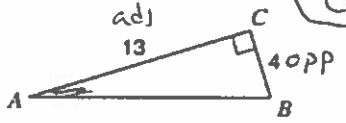
$\frac{\sin 51}{1} = \frac{9}{c}$

$c = \frac{1(9)}{\sin 51}$

$c = 11.6$

d)

$A = 17°$ $a = 4$
$B = 73°$ $b = 13$
$C = 90°$ $c = 13.6$



$c^2 = a^2 + b^2$

$c^2 = 4^2 + 13^2$

$c^2 = 185$

$c = \sqrt{185} = 13.6$

$\tan A = \frac{opp}{adj}$

$\tan A = \frac{4}{13}$

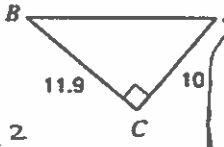
$A = \tan^{-1}(4/13)$

$A = 17°$

$B = 180 - 90 - 17$

$= 73°$

e)



$A = 50°$ $a = 11.9$
$B = 40°$ $b = 10$
$C = 90$ $c = 15.5$

$a^2 + b^2 = c^2$

$11.9^2 + 10^2 = c^2$

$241.61 = c^2$

$\sqrt{241.61} = c$

$15.5 = c$

$\tan B = \frac{opp}{adj}$

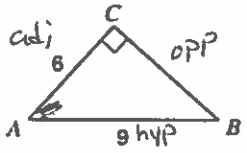
$\tan B = \frac{10}{11.9}$

$B = \tan^{-1}(10/11.9)$

$B = 40°$

then $A = 180 - 90 - 40 = 50°$

f)



$A = 48°$ $a = 6.7$
$B = 42°$ $b = 6$
$C = 90$ $c = 9$

$a^2 = c^2 - b^2$

$a^2 = 9^2 - 6^2$

$a^2 = 45$

$a = \sqrt{45} = 6.7$

$\cos A = \frac{adj}{hyp}$

$\cos A = \frac{6}{9}$

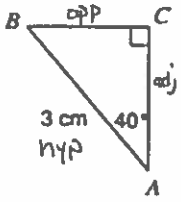
$A = \cos^{-1}(6/9)$

$A = 48°$

then $B = 180° - 90° - 48°$

$B = 42$

g)



$A = 40$ $a = 1.9$
$B = 50°$ $b = 2.3$
$C = 90$ $C = 3$

$\sin A = \frac{opp}{hyp}$

$\frac{\sin 40}{1} = \frac{a}{3}$

$a = \frac{3 \sin 40}{1}$

$a = 1.9$

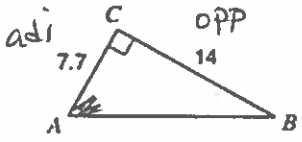
$\cos A = \frac{adj}{hyp}$

$\frac{\cos 40}{1} = \frac{b}{3}$

$b = \frac{3 \cos 40}{1}$

$b = 2.3$

h)



$A = 61°$ $a = 14$
$B = 29°$ $b = 7.7$
$C = 90$ $c = 16.0$

$c^2 = a^2 + b^2$

$c^2 = 14^2 + 7.7^2$

$c^2 = 255.29$

$c = 16.0$

$\tan A = \frac{opp}{adj}$

$\tan A = \frac{14}{7.7}$

$A = \tan^{-1}(14/7.7)$

$A = 61$

$B = 180° - 90° - 61°$

$= 29°$