Answer Key

Intermediate Algebra Review (Sections 1.2, 1.3, 1.4, 1.5, 1.6, and 1.7)

Solve each of the following equations using algebra.

1.) $9x - 5(x-3) = 27$

$9x - 5x + 15 = 27$

$4x + 15 = 27$
$ -15 \quad -15$

$\dfrac{4x}{4} = \dfrac{12}{4}$

$\boxed{x = 3}$

2.) $4x - 2(x+7) = 2(x-6)$

$4x - 2x - 14 = 2x - 12$

$2x - 14 = 2x - 12$
$-2x \qquad\quad -2x$

$-14 = -12$
contradiction

$\boxed{\text{No solution}}$
$\varnothing$

3.) $3(x-5) + 8 = 3x - 7$

$3x - 15 + 8 = 3x - 7$

$3x - 7 = 3x - 7$
$-3x \qquad\quad -3x$

$-7 = -7$
Identity

$\boxed{\text{All real numbers}}$
$\mathbb{R}$

4.) $4x^2 - 3 = 125$
$ +3 \quad +3$

$\dfrac{4x^2}{4} = \dfrac{128}{4}$

$x^2 = 32$

$\sqrt{x^2} = \pm\sqrt{32}$

$x = \pm\sqrt{16 \cdot 2}$

$\boxed{x = \pm 4\sqrt{2}}$

5.) $x^2 = 8x - 15$
$ -8x \quad -8x$

$x^2 - 8x = -15$
$ +15 \quad +15$

$x^2 - 8x + 15 = 0$

$(x-5)(x-3) = 0$

$x - 5 = 0 \qquad x - 3 = 0$
$+5 \ +5 \qquad\quad +3 \ +3$

$\boxed{x = 5 \,, \quad x = 3}$

6.) $2x^2 - 6x = -1$
$ +1 \quad +1$

$2x^2 - 6x + 1 = 0$

$x = \dfrac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(1)}}{2(2)}$

$x = \dfrac{6 \pm \sqrt{36-8}}{4} = \dfrac{6 \pm \sqrt{28}}{4}$

$x = \dfrac{6 \pm 2\sqrt{7}}{4} = \boxed{\dfrac{3 \pm \sqrt{7}}{2}}$

7.) $2x^3 - x^2 = 18x - 9$
$ -18x + 9 \qquad -18x + 9$

$2x^3 - x^2 - 18x + 9 = 0$

$x^2(2x-1) - 9(2x-1) = 0$

$(2x-1)(x^2-9) = 0$

$(2x-1)(x+3)(x-3) = 0$

$2x - 1 = 0 \qquad x + 3 = 0 \qquad x - 3 = 0$
$2x = 1 \quad \boxed{x = \frac{1}{2}} \qquad \boxed{x = -3} \qquad \boxed{x = 3}$

8.) $\left(\dfrac{64 - 5x}{4}\right) = \left(\dfrac{7x}{4}\right) - \left(\dfrac{2x+1}{8}\right)$

$3(64-5x) = 3(7x) - 4(2x+1)$

$192 - 15x = 21x - 8x - 4$

$192 - 15x = 13x - 4$
$ +15x \qquad +15x$

$192 = 28x - 4$
$+4 \qquad\qquad +4$

$\dfrac{196}{28} = \dfrac{28x}{28}$

$\boxed{x = 7}$

9.) $\dfrac{5}{x+2} + \dfrac{2}{x-4} = \dfrac{30}{x^2 - 2x - 8}$

$\dfrac{5(x+2)(x-4)}{x+2} + \dfrac{2(x+2)(x-4)}{x-4} = \dfrac{30(x+2)(x-4)}{(x-4)(x+2)}$

$5(x-4) + 2(x+2) = 30$

$5x - 20 + 2x + 4 = 30$

$7x - 16 = 30$
$ +16 \quad +16$

$\dfrac{7x}{7} = \dfrac{46}{7}$

$\boxed{x = \dfrac{46}{7}}$

Note
$x \neq -2$
$x \neq 4$

10.) $\dfrac{2x}{2x-1} + \dfrac{1}{x} = \dfrac{1}{2x-1}$

$\dfrac{2x(2x-1)x}{2x-1} + \dfrac{1(2x-1)x}{x} = \dfrac{1(2x-1)x}{2x-1}$

$2x^2 + 2x - 1 = x$
$ -x \quad -x$

$2x^2 + x - 1 = 0$

$(2x-1)(x+1) = 0$

$2x - 1 = 0 \qquad x + 1 = 0$
$+1 \ +1 \qquad\qquad -1 \ -1$

$\dfrac{2x}{2} = \dfrac{1}{2} \qquad \boxed{x = -1}$

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

Note
$2x - 1 \neq 0$
$2x \neq 1$
$x \neq \frac{1}{2}$
$x \neq 0$

Solve each inequality and **graph** the solution set on a number line. Write your answer using both **set builder and interval notation.**

11.) $-3 \le 2x + 15 < 6$

$-15 -15 \quad -15$

$\dfrac{-18}{2} \le \dfrac{2x}{2} < \dfrac{-9}{2}$

$\boxed{-9 \le x < -\dfrac{9}{2}}$

12.) $\overset{2}{\cancel{4}}\left(\dfrac{2x-5}{\cancel{2}}\right) + \overset{4}{\cancel{4}}(2) > \overset{\cancel{4}}{\cancel{4}}\left(\dfrac{3x+7}{\cancel{4}}\right)$

$2(2x-5) + 8 > 3x+7$

$4x - 10 + 8 > 3x+7$

$4x - 2 > 3x+7$

$-3x -3x$

$x - 2 > 7$
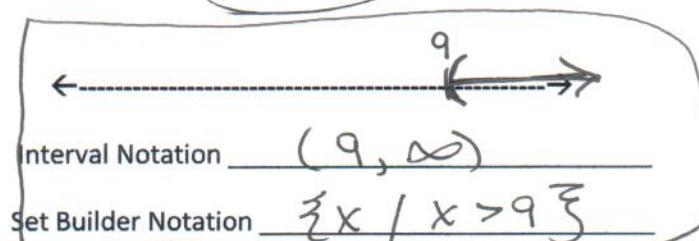
$+2 +2$

$\boxed{x > 9}$

Interval Notation $\underline{\quad [-9, -\frac{9}{2}) \quad}$

Interval Notation $\underline{\quad (9, \infty) \quad}$

Set Builder Notation $\underline{\left\{ x \mid -9 \le x < -\frac{9}{2} \right\}}$

Set Builder Notation $\underline{\left\{ x \mid x > 9 \right\}}$

Perform the indicated operations. Write your answer in standard form.

13.) $(7 + 2i) - (3 - 4i)$

$7 + 2i - 3 + 4i$

$\boxed{4 + 6i}$

14.) $(3 + 7i)(2 - 5i)$

$6 - 15i + 14i - 35i^2$

$6 - i - 35(-1)$

$6 - i + 35$

$\boxed{41 - i}$

Note
$i^2 = -1$

15.) $(2 + \sqrt{-49}) + (1 - \sqrt{-9})$

$2 + 7i + 1 - 3i$

$\boxed{3 + 4i}$

16.) Solve the formula below for t.

$A = P + Prt$

$-P \quad -P$

$\dfrac{A - P}{Pr} = \dfrac{\cancel{Pr}t}{\cancel{Pr}}$

$\boxed{\dfrac{A-P}{Pr} = t}$

or

$\dfrac{A}{Pr} - \dfrac{1}{r} = t$

17.) Solve the formula below for b.

$(2)A = \dfrac{h}{\cancel{2}}(b + c)$

$2A = h(b+c)$

$2A = hb + hc$

$-hc \qquad -hc$

$\dfrac{2A - hc}{h} = \dfrac{hb}{h}$

$\boxed{\dfrac{2A - hc}{h} = b}$ or $\dfrac{2A}{h} - c = b$

18.) A salesperson earns $300 per week plus 5% commission of sales. How much should be sold to earn $800 in a week? (**Show your algebra.**) $x = $ sales

$$300 + .05x = 800$$
$$-300 \qquad\qquad -300$$
$$\frac{.05x}{.05} = \frac{500}{.05}$$
$$\boxed{x = 10000}$$

$$\boxed{\$10,000}$$

19.) The Allen family sold their house. After paying the real estate agent a commission of 7% of the selling price and paying $1499 in other costs and $82,000 on the mortgage, they received $95,344.65. What was the selling price of the house?   (**Show your algebra.**)

$x = $ selling price

$$x - (.07x + 1499 + 82000) = 95344.65$$
$$x - .07x - 1499 - 82000 = 95344.65$$
$$.93x - 83499 = 95344.65$$
$$+83499 \qquad\qquad +83499$$
$$\frac{.93x}{.93} = \frac{178843.65}{.93}$$
$$\boxed{x = 192305}$$

$$\boxed{\$192,305}$$

20.) A grocer wants to mix two kinds of nuts. One kind sells for $1.00 per pound and the other sells for $4.99 per pound. He wants to mix a total of 21 pounds and sell it for $1.95 per pound. How many pounds of each kind should he use in the new mix? (**Show your algebra.**)

$x = $ lbs of $1.00 Nut
$y = $ lbs of $4.99 Nut

$$x + y = 21 \qquad\qquad x + 4.99y = 21(1.95)$$
$$-y \quad -y \qquad\qquad x + 4.99y = 40.95$$
$$\boxed{x = 21-y}$$
$$21 - y + 4.99y = 40.95$$
$$21 + 3.99y = 40.95$$
$$-21 \qquad\qquad -21$$
$$\frac{3.99y}{3.99} = \frac{19.95}{3.99}$$
$$\boxed{y = 5}$$

$$x = 21 - y$$
$$x = 21 - 5 = 16$$

$$\boxed{\begin{array}{l} 16 \text{ lbs of } \$1.00 \text{ Nut} \\ 5 \text{ lbs of } \$4.99 \text{ Nut} \end{array}}$$