EXAM 1/CHAPTER 1-2
100 POINTS POSSIBLE   NAME____Key____
VERSION 1

COEFFICIENTS SHOULD BE INTEGERS OR SIMPLIFIED IMPROPER FRACTIONS
SHOW ALL WORK IN ORDER TO EARN FULL CREDIT
BOX YOUR FINAL ANSWER

1. (3 POINTS) Consider the expression $\dfrac{-b}{(a-b)^2}$. Evaluate this expression at $a=-3$, and $b=2$.

$$\frac{-(2)}{(-3-2)^2} = \frac{-2}{(-5)^2}$$

$$= \boxed{-\frac{2}{25}}$$

2. (1 POINT) Determine if 2 is a solution to the equation $3x-8=-2$.

Circle One: (YES)   NO

$$3(2)-8 \overset{?}{=} -2$$
$$6-8 \overset{?}{=} -2$$
$$-2 = -2 \checkmark$$

3. (16 POINTS) Perform the indicated operations and simplify. Each part is worth 4 points.

a. $\dfrac{-4^2}{2^2-21\div3} = \dfrac{-16}{4-21\div3}$

$$= \frac{-16}{4-7}$$

$$= \frac{-16}{-3}$$

$$= \boxed{\frac{16}{3}}$$

b. $\dfrac{15}{4} \div \left(-\dfrac{2}{3}\right)$

$$= \frac{15}{4} \cdot \left(-\frac{3}{2}\right)$$

$$= \boxed{-\frac{45}{8}}$$

c. $\dfrac{7}{6} - \left(-\dfrac{4}{9}\right) = \dfrac{7}{6} \cdot \dfrac{3}{3} + \dfrac{4}{9} \cdot \dfrac{2}{2}$

$$= \frac{21}{18} + \frac{8}{18}$$

$$= \boxed{\frac{29}{18}}$$

d. $\left(6\dfrac{1}{5}\right)\left(3\dfrac{2}{31}\right)$

$$= \frac{\cancel{31}}{\cancel{5}} \cdot \frac{\cancel{95}}{\cancel{31}}$$

$$= \frac{19}{1}$$

$$= \boxed{19}$$

4. (6 POINTS) Translate the English statements into expressions or equations. Each part is worth 3 points.

   a. The sum of twelve and a number, less two

   $$(12 + x) - 2$$

   b. The opposite of one half of a number is three times the number

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

5. (1 POINT) Convert the mixed number to an improper fraction.

   $$10\frac{5}{7} = \frac{10 \cdot 7 + 5}{7}$$

   $$= \frac{75}{7}$$

6. (1 POINT) Convert the improper fraction to a mixed number.

   $$\frac{76}{5} = 15\frac{1}{5}$$

   $$\begin{array}{r} 15 \\ 5\overline{)76} \\ \underline{5} \\ 26 \\ \underline{25} \end{array}$$

7. (6 POINTS) Consider the following set of numbers: $\left\{-\frac{4}{5}, -525, \frac{18}{9}, \sqrt{81}, 0, \pi, 0.34, \sqrt{11}\right\}$

   List the numbers in the set that are

   a. Natural numbers

   $$\frac{18}{9}, \sqrt{81}$$

   b. Rational numbers

   $$-\frac{4}{5}, -525, \frac{18}{9}, \sqrt{81}, 0, 0.34$$

   c. Irrational numbers

   $$\pi, \sqrt{11}$$

8. (10 POINTS) Each part is worth 5 points. Simplify the given algebraic expressions.

a. $-(5-x)-4[6-4(x-6)]$

$= -5+x-4[6-4x+24]$

$= -5+x-4[-4x+30]$

$= -5+x+16x-120$

$= \boxed{17x-125}$

b. $0.1(0.1x-0.8)-0.15x$

$= 0.01x-0.08-0.15x$

$= \boxed{-0.14x-0.08}$

9. (10 POINTS) Each part is worth 5 points. Solve each equation and state the solution set in roster notation.

a. $8 \cdot \dfrac{x}{8} = -3 \cdot 8$

$1x = -24$

$x = -24$

$\boxed{\{-24\}}$

b. $0.2x = 0.3(x-12)$

$0.2x = 0.3x - 3.6$

$(-10)(-0.1x) = (-3.6)(-10)$

$x = 36$

$\boxed{\{36\}}$

10. (6 POINTS) A car rental agency charges $180 per week plus $0.25 per mile. How many miles can you travel in one week for $395? Show all steps—no trial and error.

Let x be the # of miles

$180 + 0.25x = 395$

$\underline{-180 \qquad\qquad -180}$

$0.25x = 215$

$x = 860$

you can travel 860 miles in one week for $395.

11. (6 POINTS) One angle of a triangle is twice as large as another. The measure of the third angle is 20° more than that of the smallest angle. Find the measure of each angle. Show all steps—no trial and error.

Let x be the measure of the smallest angle.

$x + 2x + (x+20) = 180$

$4x + 20 = 180$

$\dfrac{4x}{4} = \dfrac{160}{4}$

$x = 40$

$2x = 2(40) = 80$

$x + 20 = 40 + 20 = 60$

The angles measure 40°, 80°, and 60°

12. (20 POINTS) Each part is worth 5 points. Solve the equation. Use set (roster) notation to identify solutions.

a. $x - 7 = 25$

$$\underline{+7 \quad +7}$$

$$x = 32$$

$\{32\}$

b. $5x + 2 = 7$

$$\underline{-2 \quad -2}$$

$$\frac{5x}{5} = \frac{5}{5}$$

$$x = 1$$

$\{1\}$

c. $2x - 8 = 3(x - 4) + 7$

$$2x - 8 = 3x - 12 + 7$$

$$2x - 8 = 3x - 5$$

$$\underline{-3x + 8 \quad -3x + 8}$$

$$(-1)(-x) = (3)(-1)$$

$$x = -3$$

$\{-3\}$

d. $6 - (x + 5) + 1 = 1 - x$

$$6 - x - 5 + 1 = 1 - x$$

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

$$2 - x = 1 - x$$

$$\underline{-2} \qquad \underline{-2}$$

$$-x = -1 - x$$

$$\underline{+x \qquad +x}$$

$$0x = -1 + 0x$$

$$0 = -1 \quad \text{False!}$$

no Solution !

$\{ \ \}$

13. (2 POINTS) Solve the formula $P = 2l + 2w$ for w.

$$P = 2l + 2w$$

$$\underline{-2l \quad -2l}$$

$$\tfrac{1}{2}(P - 2l) = 2w \cdot \tfrac{1}{2}$$

$$\frac{P - 2l}{2} = w$$

$$\boxed{w = \frac{P - 2l}{2}}$$

14. (2 POINTS, 1 POINT EACH) Express each percent as a decimal.

a. 0.4% = $\boxed{0.004}$

b. 2.1% = $\boxed{0.021}$

15. (2 POINTS, 1 POINT EACH) Express each decimal as a percent.
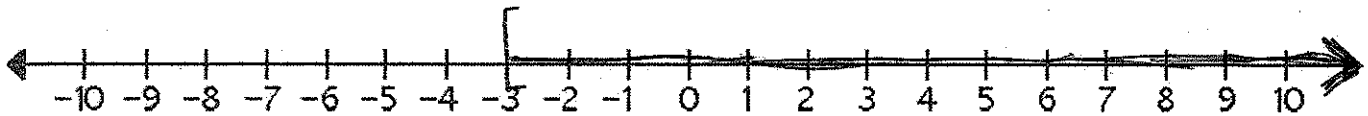
a. 2.8 = $\boxed{280\%}$

b. 1 = $\boxed{100\%}$

16. (8 POINTS, 4 POINTS EACH) Solve each inequality, represent the set of solutions in interval and set-builder notation, and graph the solution set.

a. $2x + 8 \geq 2$

$ -8 \ -8$

$\dfrac{2x}{2} \geq \dfrac{-6}{2}$

$x \geq -3$

Interval notation: $[-3, \infty)$

Set-builder notation: $\{x \mid x \geq -3\}$

b. $x + 4 < 2x - 1$

$-2x -2x$

$-x + 4 < -1$

$ -4 \phantom{<} -4$

$(-1)(-x) < (-5)(-1)$

$x > 5$
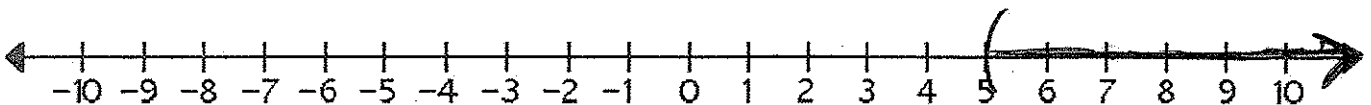
Interval notation: $(5, \infty)$

Set-builder notation: $\{x \mid x > 5\}$

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VERSION 2

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1. (3 POINTS) Consider the expression $\dfrac{-b}{(a-b)^2}$. Evaluate this expression at $a=-3$, and $b=2$.

$$\frac{-(2)}{(-3-2)^2} = \frac{-2}{(-5)^2}$$

$$= \boxed{-\frac{2}{25}}$$

2. (1 POINT) Determine if 4 is a solution to the equation $3x-8=-2$.

Circle One: YES   (NO)

$$3(4)-8 \overset{?}{=} -2$$
$$12-8 = -2$$
$$4 \neq -2$$

3. (16 POINTS) Perform the indicated operations and simplify. Each part is worth 4 points.

a. $\dfrac{-4^2}{2^2-21\div 3} = \dfrac{-16}{4-21\div 3}$

$$= \frac{-16}{4-7}$$

$$= \frac{-16}{-3}$$

$$= \boxed{\frac{16}{3}}$$

b. $\dfrac{15}{8} \div \left(-\dfrac{2}{3}\right)$

$$= \frac{15}{8} \cdot \left(-\frac{3}{2}\right)$$

$$= \boxed{-\frac{45}{16}}$$

c. $\dfrac{4}{9} - \left(-\dfrac{7}{6}\right) = \dfrac{4}{9}\cdot\dfrac{2}{2} + \dfrac{7}{6}\cdot\dfrac{3}{3}$

$$= \frac{8}{18} + \frac{21}{18}$$

$$= \boxed{\frac{29}{18}}$$

d. $\left(6\dfrac{1}{5}\right)\left(3\dfrac{2}{31}\right) = \dfrac{31}{5} \cdot \dfrac{95}{31}$

$$= \frac{19}{1}$$

$$= \boxed{19}$$

4. (6 POINTS) Translate the English statements into expressions or equations. Each part is worth 3 points.

    a. The sum of twelve and a number, less two

$$(12+x)-2$$

    b. The opposite of one half of a number is three times the number

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

5. (1 POINT) Convert the mixed number to an improper fraction.

$$9\frac{5}{7} = \frac{9\cdot7+5}{7}$$

$$= \frac{68}{7}$$

6. (1 POINT) Convert the improper fraction to a mixed number.

$$\frac{76}{4} = 19$$

$$\begin{array}{r} 19 \\ 4\overline{)76} \\ \underline{4} \\ 36 \\ \underline{-36} \\ 0 \end{array}$$

7. (6 POINTS) Consider the following set of numbers: $\left\{-\frac{4}{5}, -525, \frac{18}{9}, \sqrt{81}, 0, \pi, 0.34, \sqrt{11}\right\}$

List the numbers in the set that are

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$$\frac{18}{9}, \sqrt{81}$$

    b. Integers

$$-525, \frac{18}{9}, \sqrt{81}, 0$$

    c. Irrational numbers

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$= -8+x-4[3-4x+20]$

$= -8+x-4[23-4x]$

$= -8+x-92+16x$

$= \boxed{17x-100}$

b. $0.1(0.1x-0.8)-0.15x$

$= 0.01x-0.08-0.15x$

$= \boxed{-0.14x-0.08}$

9. (10 POINTS) Each part is worth 5 points. Solve each equation and state the solution set in roster notation.

a. $9 \cdot \dfrac{x}{9} = -3 \cdot 9$

$1x = -27$

$x = -27$

$\boxed{\{-27\}}$

b. $0.3x = 0.2(x-12)$

$0.3x = 0.2x - 2.4$

$\underline{-0.2x \quad -0.2x}$

$10(0.1x) = (-2.4)10$

$x = -24$

$\boxed{\{-24\}}$

10. (6 POINTS) A car rental agency charges $180 per week plus $0.25 per mile. How many miles can you travel in one week for $395? Show all steps—no trial and error.

Let x be the # of miles

$180 + 0.25x = 395$

$\underline{-180 \qquad\quad -180}$

$0.25x = 215$

$x = \underline{860}$

You can travel 860 miles in one week for $395

11. (6 POINTS) One angle of a triangle is twice as large as another. The measure of the third angle is 20° more than that of the smallest angle. Find the measure of each angle. Show all steps—no trial and error.

Let x be the measure of the smallest angle

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$4x+20 = 180$

$4x = 160$

$x = 40$

$2x = (2)(40) = 80$

$x + 20 = 40 + 20 = 60$

The angles measure 40°, 80°, and 60°

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a. $x - 10 = 25$

$\underline{+10\quad +10}$

$x = 35$

$\boxed{\{35\}}$

b. $5x + 3 = 13$

$\underline{-3\quad -3}$

$\dfrac{5x}{5} = \dfrac{10}{5}$

$\boxed{\{2\}}$

$x = 2$

c. $2x - 8 = 3(x - 4) + 7$

$2x - 8 = 3x - 12 + 7$

$2x - 8 = 3x - 5$

$\underline{-3x + 8\quad -3x + 8}$

$(-1)(-x) = (3)(-1)$

$\boxed{\{-3\}}$

$x = -3$

d. $6 - (x + 5) + 1 = 1 - x$

$6 - x - 5 + 1 = 1 - x$

$2 - x = 1 - x$

$\underline{-2 + x\quad -2 + x}$

$0 + 0x = -1 + 0x$

$0 = -1$ false!

No solution!

$\boxed{\{\ \}}$

13. (2 POINTS) Solve the formula $P = 2l + 2w$ for w.

$P = 2l + 2w$

$\underline{-2l \quad -2l}$

$\dfrac{1}{2}(P - 2l) = 2w \cdot \dfrac{1}{2}$

$\dfrac{P - 2l}{2} = w$

$\boxed{w = \dfrac{P - 2l}{2}}$

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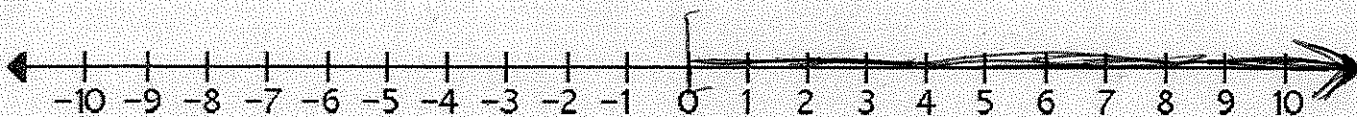a. 2.8 = $\boxed{280\%}$ b. 1 = $\boxed{100\%}$

16. (8 POINTS, 4 POINTS EACH) Solve each inequality, represent the set of solutions in interval and set-builder notation, and graph the solution set.

a. $2x + 8 \geq 8$

$$\underline{-8 \quad -8}$$

$$\frac{2x}{2} \geq \frac{0}{2}$$

$$x \geq 0$$

Interval notation: $[0, \infty)$

Set-builder notation: $\{x \mid x \geq 0\}$

b. $2x + 1 < 3x - 4$

$$\underline{-3x \quad -3x}$$

$$-x + 1 < -4$$

$$\underline{-1 \quad -1}$$

$$(-1)(-x) < (-5)(-1)$$

$$x > 5$$

Interval notation: $(5, \infty)$

Set-builder notation: $\{x \mid x > 5\}$