Name_____ Date_____

Algebra 1-1 Final Exam Review V2

Please follow all directions. Show all work.

* Next to each problem, I've written down the notes the corresponds to.

Competency 1

1-2 1) If you have $-5\cdot 6-(50\div 2)$, answer the following: **HINT: USE PEMDAS**

a) Simplify the above expression using the correct *order of operations.* Circle your answer.

$-5\cdot 6-(25)$

$-30-25$

-55

1-3 b) What number set(s) does your answer from part a) belong to? (Natural, whole, integer, rational, or irrational).

Integer, rational

1-2 2) If you have $\left(\frac{9-12}{1-3}\right)^2$ answer the following: **HINT: USE PEMDAS**

a) Simplify the above expression using the correct *order of operations.* Circle your answer.

$\left(\frac{-3}{-2}\right)^2 = \left(\frac{3}{2}\right)\left(\frac{3}{2}\right) = \frac{9}{4}$ or $2\frac{1}{4}$

1-3 b) What number set(s) does your answer from part a) belong to? (Natural, whole, integer, rational, or irrational).

Rational

3) Use that $a=-4$, $b=\frac{3}{4}$, *and* $c=1.6$.

a) What is $a+b+c$?

$1.6 = 1\frac{6}{10} = \frac{16}{10} = \frac{8}{5}$

$-4+\frac{3}{4}+1.6$

1-2 $\frac{20}{20}\left(-\frac{4}{1}\right)+\left(\frac{3}{4}\right)\frac{5}{5}+\left(\frac{8}{5}\right)\frac{4}{4}$

$\frac{-80}{20}+\frac{15}{20}+\frac{32}{20} = \frac{-65}{20}+\frac{32}{20} = \frac{-33}{20}$ or $-1\frac{13}{20}$

1-3 i) What number sets(s) does your answer from part a) belong to? (Natural, whole, integer, rational, or irrational).

Rational

Use that $a = -4,\ b = \frac{3}{4},\ and\ \ c = 1.6$

b) What is $ab - 5$?

$(-4)(\frac{3}{4}) - 5$

1-2

$= \frac{-12}{4} - 5$

$= -3 - 5 = -8$

i) ~~What number set(s) does your answer from part b) belong to? (Natural, whole, integer, rational, or irrational).~~ Integer, rational

1-3

4) Simplify the following expressions as much as possible. **HINT: USE THE DISTRIBUTIVE PROPERTY AND COMBINE LIKE TERMS.**

1-7

a) $2(3x - 5)$

$6x - 10$

b) $5 - 2(4 - 3x)$

$5 - 8 + 6x$

$-3 + 6x$

c) $4 + 2(x + 6) - 5$

$4 + 2x + 12 - 5$

$2x + 11$ or $11 + 2x$

d) $4\left(x^2 - 5x + \frac{3}{2}\right)$

$4x^2 - 20x + \frac{12}{2}$

$4x^2 - 20x + 6$

e) $5x - 9a + 4.2c - 6a + 9.4x$

$-15a + 14.4x + 4.2c$

f) $4(x^2 - 6) - 2(x^2 - x + 2)$

$4x^2 - 24 - 2x^2 + 2x - 4$

$2x^2 + 2x - 28$

5) Make a good scale on the number line, then plot the following numbers: $\sqrt{25}$ 3 3.49 $\sqrt{24}$ $\frac{18}{4}$ $3\frac{3}{4}$.

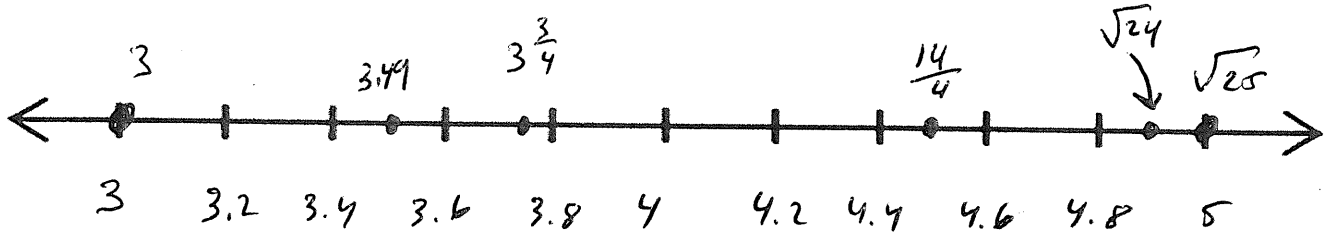
1-3

11
5

$\sqrt{24}$ → In between 4 and 5, closer to 5

$\frac{18}{4}$ → $4\frac{1}{2}$

$3\frac{3}{4}$ → 3.75



3 3.2 3.4 3.6 3.8 4 4.2 4.4 4.6 4.8 5

For Questions 7-10: Name ALL the sets that each number belongs to.

1-3

6) 2 natural, whole, integer, rational

7) -6 integer, rational

8) $\frac{1}{5}$ rational

9) $\sqrt{7}$ irrational

Simplify the following.

1-5

10) $2\frac{1}{3} - \frac{3}{4}$

$= \frac{4}{4}\left(\frac{7}{3}\right) - \left(\frac{3}{4}\right)\frac{3}{3}$

$= \frac{28}{12} - \frac{9}{12}$

$= \frac{19}{12}$ or $1\frac{7}{12}$

11) $\frac{-\frac{3}{2}}{\frac{1}{10}} = \frac{-3}{2} \cdot \frac{10}{1} = -15$

Competency 2

Solve the following equations.

2-2

1. $19 = 3x + 7$

$-7 \quad -7$

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

$4 = x$

2-2

2. $17 = \frac{w}{5} + 13$

$-13 \quad -13$

$5(4) = \left(\frac{w}{5}\right)5$

$20 = w$

2-3

3. $11x - 9x = 18$

$\frac{2x}{2} = \frac{18}{2}$

$x = 9$

2-3

$4\left(\frac{z-8}{4}\right) = (3)7$

$z - 8 = 21$

$+8 \quad +8$

$z = 29$

2-3

5. $5h + 2(h - 3) = -5$

$5h + 2h - 6 = -5$

$7h - 6 = -5$

$+6 \quad +6$

$\frac{7h}{7} = \frac{1}{7}$

$h = \frac{1}{7}$

2-3

6. $\frac{1}{3}(d + 3) = 5$

$\frac{1}{3}d + 1 = 5$

$-1 \quad -1$

$3\left(\frac{1}{3}d\right) = (4)3$

$d = 12$

Solve the following equations.

2-3

$7(8.9 + 3.6a - 1.2) = 14.9$

$3.6a + 7.7 = 14.9$

$-7.7 \quad -7.7$

$\frac{3.6a}{3.6} = \frac{7.2}{3.6}$

$a = 2$

or (multiply by 10)

$89 + 36a - 12 = 149$

$36a + 77 = 149$

$-77 \quad -77$

$\frac{36a}{36} = \frac{72}{36}$

$a = 2$

2-3

$8\left(\frac{1}{8}x\right) + \left(\frac{2}{9}\right)27 = \left(\frac{12}{27}\right)27$

$9x - 6 = 12$

$+6 \quad +6$

$\frac{9x}{9} = \frac{18}{9}$

$x = 2$

2-4

9. $5(n+2) = \frac{3}{5}(5+10n)$ **HINT: DISTRIBUTE BEFORE YOU TRY TO GET RID OF THE FRACTIONS.**

$5n + 10 = 3 + 6n$

$-5n \quad\quad -5n$

$10 = 3 + n$

$-3 \quad -3$

$7 = n$

Answer each word problem by defining the variable, writing an equation, and solving it. Write your answer in a sentence.

2-3

10. A dance academy charges $24 per class and a one-time registration fee of $15. A student paid a total of $687 to the academy. Find the number of classes the student took.

x = # classes student took

$24x + 15 = 687$

$-15 \quad\quad -15$

$\frac{24x}{24} = \frac{672}{24}$

$x = 28$ classes

Answer each word problem by defining the variable, writing an equation, and solving it. Write your answer in a sentence.

2-4

11. Dan and Sydney are getting high-speed Internet access at the same time. Dan's provider charges a one-time $64 fee for installation and $42 per month. Sydney's provider has free installation and chargers $57 per month. After how many months will Dan have the better deal for Internet service?

Dan: $42x + 64$

Syd: $57x$

x = # of months

$42x + 64 = 57x$

$-42x \quad\quad -42x$

$64 = 15x$

$4.27 = x$

So, after 4.27 or 5 months

Solve each equation for the indicated variable.

2-5

12. $b(y) = \left(\frac{x - v}{b}\right)$ for x

$by = x - v$

$+v \qquad +v$

$by + v = x$

2-5

13. $ax + 2xy = 14$ for y

$-ax \qquad -ax$

$\frac{2xy}{2x} = \frac{14 - ax}{2x}$

$y = \frac{14 - ax}{2x}$ or $y = \frac{14}{2x} - \frac{ax}{2x}$

$y = \frac{7}{x} - \frac{a}{2}$

2-6

14. Convert 80 cents/hour into dollars/day

$\frac{80¢}{1hr} \cdot \frac{\$1}{100¢} \cdot \frac{24hr}{1day} = \frac{\$1920}{100day}$

$= \frac{\$19.2}{day}$

2-6

15. Convert 60 ft/second into miles/hour.

$\frac{60ft}{1sec} \cdot \frac{1mi}{5280ft} \cdot \frac{60sec}{1min} \cdot \frac{60min}{1hr}$

$= \frac{216,000mi}{5280hr} = \frac{40.91mi}{1hr}$

2-7

Solve the following proportions.

16. $\frac{m}{2} = \frac{4}{5}$

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

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

or

$m = 1\frac{3}{5}$

2-7

17. $\frac{3}{3b+4} = \frac{2}{b-4}$

$3(b-4) = 2(3b+4)$

$3b - 12 = 6b + 8$

$-3b \qquad -3b$

$-12 = 3b + 8$

$-8 \qquad -8$

$\frac{-20}{3} = \frac{3b}{3}$

$\frac{-20}{3} = b$ or $b = -6\frac{2}{3}$

(2-6)

18. **Define a variable, write a proportion, and solve:** An iPod Nano has 2 gigabytes of storage and can hold about 500 songs. The iPod Plus has 80 gigabytes of storage. How many songs can the iPod Plus hold?

x = # songs

$$\frac{2 \text{ gig}}{500 \text{ songs}} = \frac{80 \text{ gig}}{x \text{ songs}}$$

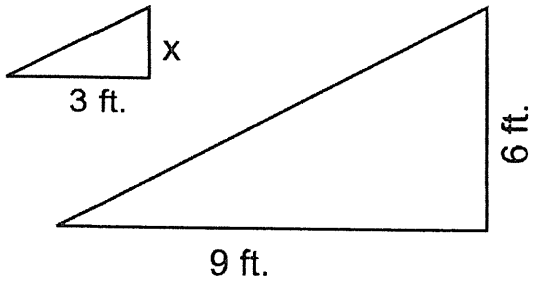
$$\frac{2x}{2} = \frac{40{,}000}{2}$$

$x = 20{,}000$ songs

2-8

19. Find the measure of the missing side if the two triangles are similar.

HINT: WRITE A PROPORTION AND SOLVE



$$\frac{x}{6} = \frac{3}{9}$$

$$\frac{18}{9} = \frac{9x}{9}$$

$2 = x$ ft

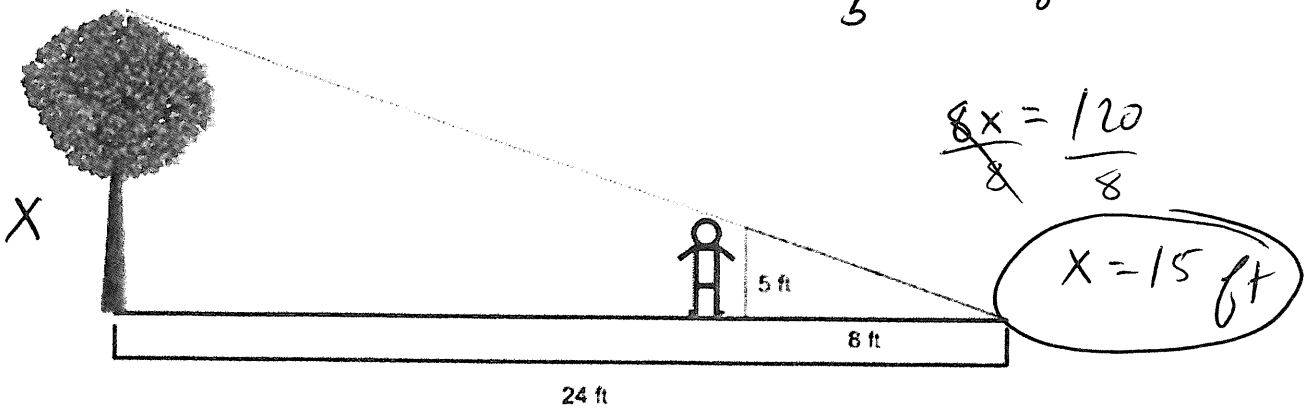
2-8

20. A tree casts a shadow that is 24 feet long. A 5 foot teenager casts a shadow that is 8 feet long. If the triangles formed by the tree's shadow and the teenager's shadow are similar, find the height of the tree. **HINT: WRITE A PROPORTION AND SOLVE**

$$\frac{x}{5} = \frac{24}{8}$$

$$\frac{8x}{8} = \frac{120}{8}$$

$x = 15$ ft



2-8

21. A blueprint scale is 1 in: 12 ft. The width of the actual building is 48 ft. What is the width of the building on the blueprint? **HINT: WRITE A PROPORTION AND SOLVE**

$\frac{1\text{ in}}{12\text{ Ft}} = \frac{x}{48\text{ ft}}$

x = width of building on blue print

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

$4 = x$

HINT FOR #'S 22-25: $\frac{PART}{WHOLE} = \frac{\%}{100}$

2-9 and 2-10

22. What percent of 32 is 40?

$\frac{40}{32} = \frac{x}{100}$

$\frac{4000}{32} = \frac{32x}{32}$

$125\% = x$

23. What is 63% of 150?

$\frac{x}{150} = \frac{63}{100}$

$\frac{100x}{100} = \frac{9450}{100}$

$x = 94.50$

24. 20% of what number is 80?

$\frac{80}{x} = \frac{20}{100}$

$\frac{8000}{20} = \frac{20x}{20}$

$400 = x$

25. 80% of what number is 20?

$\frac{20}{x} = \frac{80}{100}$

$\frac{80x}{80} = \frac{2000}{80}$

$x = 25$

Find each percent of change. Describe the percent of change as an increase or decrease. Round to the hundredth place.

HINT: PERCENT CHANGE = $\frac{NEW - OLD}{OLD}$

2-9 and 2-10

26. In 1985, the average price for gasoline was $1.20/gal. In 2000, the average price for gasoline was $1.56. Find the percent of change.

$\frac{1.56 - 1.20}{1.20} = .3 \rightarrow$ 30% increase

Competency 3

3-1

*) Is **4** a solution to $3 < x \leq 4$? Show work/explain to justify your answer.

$3 < 4 \leq 4 \longrightarrow$ True! So yes

SOLVE AND GRAPH #'s 2 thru 5 → 3-2 to 3-4 and 3-6

2) $(2)^3(d)+\left(\frac{1}{2}\right)^2<(0.8)^2$

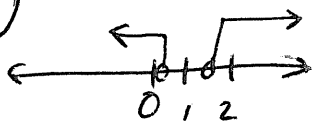
$10(4)^{10}<(2d+1)^{10}<(1.6)^{10}$

$40 < 20d + 10 < 16$

$-10 \quad -10 \quad -10$

$\frac{30}{20} < \frac{20d}{20} < \frac{6}{20}$

$\frac{3}{2} < d < \frac{3}{10}$

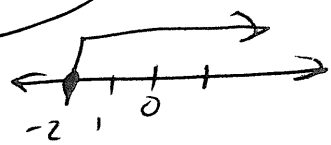


3) $-11y-9\leq 13$

$+9 \quad +9$

$\frac{-11y}{-11} \leq \frac{22}{-11}$

$y \geq -2$



4) $7\leq 4+3(3-x)$

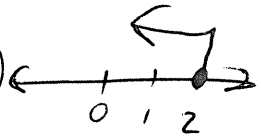
$7 \leq (4+9)-3x$

$7 \leq 13-3x$

$-13 \quad -13$

$\frac{-6}{-3} \leq \frac{-3x}{-3}$

$2 \geq x$

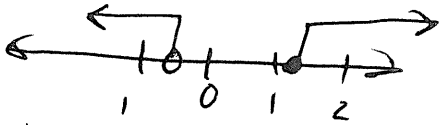


5) $2x+1<0$ *or* $3x+1\geq 5$

$-1 \quad -1 \qquad -1 \quad -1$

$\frac{2x}{2} < \frac{-1}{2}$ $\qquad$ $\frac{3x}{3} \geq \frac{4}{3}$

$x < -\frac{1}{2}$ or $x \geq \frac{4}{3}$



3-7 6) $|x-1|=3$

$x-1=3 \qquad x-1=-3$

$+1 \quad +1 \qquad +1 \quad +1$

$x=4$ or $x=-2$

3-7 7) $\frac{-2|2r-8|}{-2} = \frac{22}{-2}$

$|2r-8| = -11$

No solution

3-7

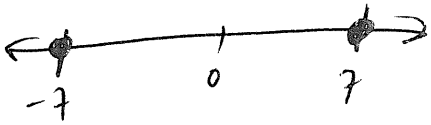
8) $-2|x|-6=-20$

$+6 \quad +6$

$\frac{-2|x|}{-2} = \frac{-14}{-2}$

$|x| = 7$

$x = \pm 7$



3-6

9) $2x-5<6$ *and* $-3x+5>14$

$+5 \quad +5 \qquad -5 \quad -5$

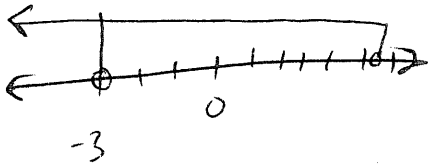
$\frac{2x}{2} < \frac{11}{2}$

$x < \frac{11}{2}$

$x < 5.5$

$\frac{-3x}{-3} > \frac{9}{-3}$

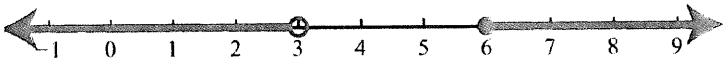
$x < -3$



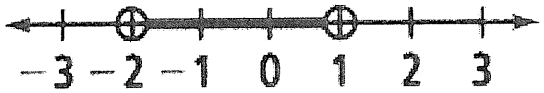
10) **Write a compound inequality that each graph could represent.**

3-6

a) $x < 3$ or $x \geq 6$



b) $-2 < x < 1$



3-6

11) A car seat is designed for a child between 10 lb and 35 lb inclusive. Write a compound inequality describing this situation.

$10 \leq x \leq 35$ x = weight of child

3-2 to 3-4

12) **Part-Time Job** You earn $7.25 per hour baby-sitting. Write and solve an inequality to find how many full hours you must work to earn at least $200.

x = # hours

$\frac{7.25x}{7.25} \geq \frac{200}{7.25}$

$x \geq 27.59$

At least 28 hours

13) 3-5 and 3-8

Suppose $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ and $B = \{2, 4, 6, 8\}$. What is B'?

a) What is $U \cap B$?

$U \cap B = \{2, 4, 6, 8\}$

b) What is $U \cup B$?

$U \cup B = \{1, 2, 3, 4, 5, 6, 7, 8\}$

14) 3-5 and 3-8

List all the subsets of each set.

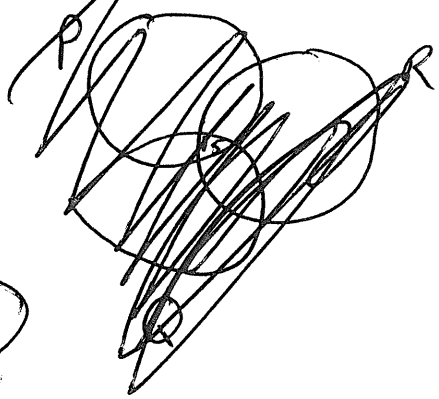
$A = \{s, t\}$ → $\{s\}, \{t\}$

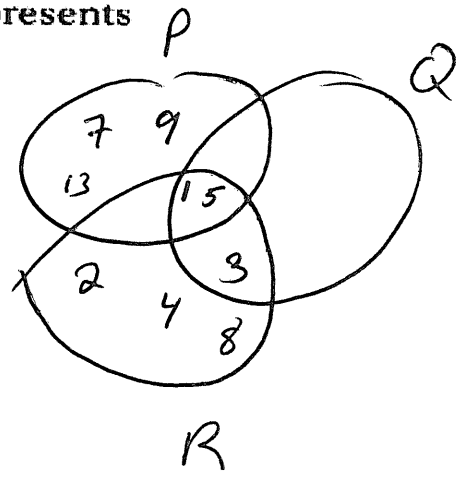
$B = \{5, 10, 15\}$

↳ $\{5\}, \{10\}, \{15\}, \{5, 10\}, \{10, 15\}, \{5, 15\}$

15) 3-5 and 3-8

Let $P = \{1, 5, 7, 9, 13\}$, $R = \{1, 2, 3, 4, 5, 6, 8\}$, and $Q = \{1, 3, 5\}$. Draw a Venn diagram that represents the intersection and union of the sets.





20) 3-5 and 3-8

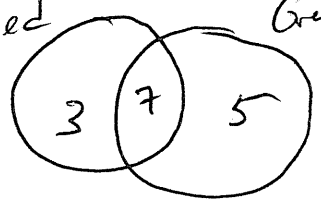
Cats There are 15 cats. Ten are striped and 7 are striped and have green eyes. The rest of the cats have green eyes but are not striped. How many cats have green eyes but are not striped?

10 — 7 = 3

10 striped + green eyes and just striped

7 striped + green eyes

3 just striped



3 + 7 + 5 = 15, so 5 only have green eyes

(17) Solve for x + graph.

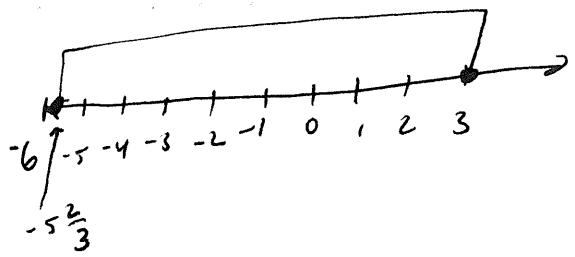
$|3x+4| \leq 13$ → "and"

$-13 \leq 3x+4 \leq 13$
$\quad -4 \quad -4 \quad -4$

$\frac{-17}{3} \leq \frac{3x}{3} \leq \frac{9}{3}$

$-\frac{17}{3} \leq x \leq 3$

$-5\frac{2}{3} \leq x \leq 3$



(18) Solve for x and graph your solution

$-3|2x-3| - 8 < -20$
$\quad +8 \quad +8$

$\frac{-3|2x-3|}{-3} < \frac{-12}{-3}$

$|2x-3| > 4$ → "or"

$2x-3 > 4$ or $2x-3 < -4$
$\quad +3 \quad +3 \qquad\qquad +3 \quad +3$

$\frac{2x}{2} > \frac{7}{2} \qquad\qquad \frac{2x}{2} < \frac{-1}{2}$

$x > \frac{7}{2}$ or $x < -\frac{1}{2}$