

Lab #1: Math Review Key

- 1) Explanation in words:
 - a. X is greater than 5
 - b. X is less than 5
 - c. X is less than or equal to 5
 - d. X is greater than or equal to 5

- 2) Explanation in symbols:
 - a. $X > Y$
 - b. $XY < Z$
 - c. $-Y < X < Y$ or $Y > X > -Y$
 - d. $\frac{X}{Y} \leq Z$

- 3) If $x = 3$, $y = 12$, and $z = 25$, are the following true or false?
 - a. $X < Y < Z = 3 < 12 < 25$ **T**
 - b. $\frac{X}{Y} \geq \frac{Y}{Z} = \frac{3}{12} \geq \frac{12}{25}$ **F**
 - c. $(X)(Y) \leq |-Z| = (3)(12) \leq |-25| = 36 \leq 25$ **F**
 - d. $(XY - Z) \leq Y = ((3)(12) - 25) \leq 12 = (36 - 25) \leq 12 = 11 \leq 12$ **T**

- 4) Solve:
 - a. $|-6| = 6$
 - b. $|6| = 6$
 - c. If $w = 6$ and $y = 10$:
 - d. $|w - y| = |6 - 10| = |-4| = 4$
 - e. $|-w - y| = |-6 - 10| = |-16| = 16$

- 5) Solve:
 - a. $8 + 2 = 10$
 - b. $8 - (-2) = 8 + 2 = 10$
 - c. $8 + (-2) = 6$
 - d. $-8 - (-2) = -8 + 2 = -6$

- 6) Solve:
 - a. $(-6)(-2) = 12$
 - b. $(-6)(2) = -12$
 - c. $(-6)(1)(0)(-3) = 0$
 - d. $(-a)(-b)(-c)(-d) = abcd$

7) Solve:

- a. $(-4)(1)(2)(-3) = 24$
- b. $(14)(-6)(-2)(-12) = -2,016$
- c. $(-a)(b)(-c)(-d) = -abcd$
- d. $(15)(-6)(0)(1) = 0$

8) Solve:

- a. $\frac{(-a)(b)}{-c} = \frac{-ab}{-c} = \frac{ab}{c}$
- b. $\frac{c}{(-b)(d)} = \frac{c}{-bd} = -\frac{c}{bd}$
- c. $\frac{(-c)(d)}{(-c)(-a)} = \frac{d}{-a} = -\frac{d}{a}$
- d. $\frac{0}{a} = 0$

9) If $x = 7$, $y = -13$, and $z = 15$:

- a. $\frac{(-x)(y)}{z} = \frac{(-7)(-13)}{15} = \frac{91}{15} = 6.0667$
- b. $\frac{x+z}{(-y)(x)} = \frac{7+15}{(-(-13))(7)} = \frac{7+15}{(13)(7)} = \frac{22}{91} = 0.241758$
- c. $\frac{z-y}{-x} = \frac{15-(-13)}{-7} = \frac{15+13}{-7} = \frac{28}{-7} = -4$
- d. $\frac{(x)(y)}{(z-x)} = \frac{(7)(-13)}{(15-7)} = \frac{-91}{8} = -11.375$

10) Reduce:

- a. $\frac{4}{30} = \frac{2}{15}$
- b. $\frac{6}{15} = \frac{2}{5}$
- c. $\frac{32}{12} = \frac{8}{3}$

d. $\frac{11}{121} = \frac{1}{11}$

11) Solve:

a. $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

b. $\frac{1}{4} + \frac{5}{12} = \frac{3}{12} + \frac{5}{12} = \frac{8}{12} = \frac{2}{3}$

c. $\frac{16}{3} - \frac{12}{3} = \frac{4}{3}$

d. $\frac{1}{4} - \frac{2}{9} = \frac{9}{36} - \frac{8}{36} = \frac{1}{36}$

12) Solve:

a. $\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$

b. $\frac{a}{b} - \frac{a}{bd} = \frac{ad}{bd} - \frac{a}{bd} = \frac{ad-a}{bd} = \frac{a(d-1)}{bd}$

c. $\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$

13) Solve:

a. $\frac{2}{6} * \frac{3}{4} = \frac{6}{24} = \frac{1}{4}$

b. $\frac{1}{2} * \frac{3}{8} = \frac{3}{16}$

c. $2\frac{1}{3} * \frac{4}{5} = \frac{7}{3} * \frac{4}{5} = \frac{28}{15}$

d. $\frac{a}{b} * \frac{c}{d} = \frac{ac}{bd}$

e. $\frac{1}{2} * \frac{3}{4} * \frac{12}{25} * \frac{5}{9} = \frac{180}{1800} = \frac{1}{10}$

14) Solve:

a. $\frac{1}{3} \div \frac{2}{3} = \frac{1}{3} * \frac{3}{2} = \frac{3}{6} = \frac{1}{2}$

b. $\frac{2}{6} \div \frac{3}{4} = \frac{2}{6} * \frac{4}{3} = \frac{8}{18} = \frac{4}{9}$

c. $2\frac{2}{5} \div \frac{2}{15} = \frac{12}{5} \div \frac{2}{15} = \frac{12}{5} * \frac{15}{2} = \frac{180}{10} = 18$

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

15) Solve:

a. $5! = (5)(4)(3)(2)(1) = 120$

b. $0! = 1$

c. $\frac{4!6!}{8!} = \frac{(4)(3)(2)(1)(6)(5)(4)(3)(2)(1)}{(8)(7)(6)(5)(4)(3)(2)(1)} = \frac{17280}{40320}$ or 0.4286

d. $\frac{5!}{2!} = \frac{(5)(4)(3)(2)(1)}{(2)(1)} = \frac{120}{2} = 60$

16) Solve:

a. $2^3 = (2)(2)(2) = 8$

b. $3^1 = 3$

c. $4^0 = 1$

d. $\left(\frac{3}{8}\right)^2 = \frac{3^2}{8^2} = \frac{9}{64}$ or 0.140625

17) Solve:

a. $2^3 + 3^4 = (2)(2)(2) + (3)(3)(3)(3) = 8 + 81 = 89$

b. $2^0 + 5^3 = 1 + (5)(5)(5) = 1 + 125 = 126$

c. $3^4 - 2^4 = (3)(3)(3)(3) - (2)(2)(2)(2) = 81 - 16 = 65$

d. $5^2 - 6^1 = (5)(5) - 6 = 25 - 6 = 19$

18) Solve:

a. $(x^3)(x^4) = x^{3+4} = x^7$

b. $(x^5)(x^3) = x^{5+3} = x^8$

c. $(2^2) \div (2^5) = 2^{2-5} = 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$ or 0.125

d. $\left(\frac{2}{5}\right)^3 \div \left(\frac{1}{2}\right) = \frac{2^3}{5^3} \div \frac{1}{2} = \frac{8}{125} * \frac{2}{1} = \frac{16}{125}$ or 0.128

19) Solve:

- a. $(a+b)^2 = (a+b)(a+b) = a^2 + ab + ab + b^2 = a^2 + 2ab + b^2$
- b. $(a-b)^2 = (a-b)(a-b) = a^2 - ab - ab + b^2 = a^2 - 2ab + b^2$
- c. $(ab+bc)^2 = (ab+bc)(ab+bc) = (ab(ab+bc) + bc(ab+bc))$
 $= (a^2b^2 + ab^2c) + (ab^2c + b^2c^2) = a^2b^2 + 2ab^2c + b^2c^2$
- d. $(x+\bar{x})^2 = (x+\bar{x})(x+\bar{x}) = x^2 + x\bar{x} + x\bar{x} + \bar{x}^2 = x^2 + 2x\bar{x} + \bar{x}^2$
- e. $(3x-4)(x+6) = 3x^2 + 18x - 4x - 24 = 3x^2 + 14x - 24$

20) Solve:

- a. $\frac{(ab-ac)+a(b+c)}{2b} = \frac{ab-ac+ab+ac}{2b} = \frac{2ab}{2b} = a$
- b. $4(3x)^2 = 4(9x^2) = (4)(3x)(3x) = 36x^2$
- c. $[4(3x)]^2 = [4(3x)][4(3x)] = (12x)(12x) = 16(9x^2) = 144x^2$
- d. Solve for x: $\frac{x}{y} = c \rightarrow x = cy$
- e. Solve for b: $-a-b=c \rightarrow -b=a+c \rightarrow b=-a-c$

21) Solve:

$$= ab + 5[a - b(6-4)]^2 = ab + 5[a - b(2)]^2 = ab + 5[(a-2b)(a-2b)]$$
$$= ab + 5[a^2 - 4ab + 4b^2] = ab + 5a^2 - 20ab + 20b^2 = 5a^2 - 19ab + 20b^2$$

22) Solve:

$$= \frac{bc(a+c)}{abc - cb^2} = \frac{bc(a+c)}{bc(a-b)} = \frac{a+c}{a-b}$$

23) Solve:

$$= \frac{-x(y-z) - (z-xy)}{x-1} = \frac{-xy + xz - z + xy}{x-1} = \frac{xz - z}{x-1} = \frac{z(x-1)}{x-1} = z$$

24) Solve:

- a. $\sqrt{b^2} = b$
- b. $2\sqrt{9} = 2(3) = 6$
- c. $\sqrt{25a} = \sqrt{25}\sqrt{a} = 5\sqrt{a}$

d. $\sqrt{16+9} = \sqrt{25} = 5$

e. $\sqrt{32} = \sqrt{16 * 2} = (\sqrt{16})(\sqrt{2}) = 4\sqrt{2}$

25) Solve:

a. $\sqrt{16x^2} = 4x$

b. $\sqrt{2x^2} = x\sqrt{2}$

c. $\frac{6}{9}\sqrt{9x} = \frac{2}{3} * 3\sqrt{x} = 2\sqrt{x}$

d. $\sqrt{x(2x^2)} = \sqrt{2x^3} = \sqrt{2x}\sqrt{x^2} = x\sqrt{2x}$

e. True or false?

i. $\sqrt{\frac{x+y}{z}} = \frac{\sqrt{x+y}}{\sqrt{z}}$ **T**

ii. $\sqrt{x+y} = \sqrt{x} + \sqrt{y}$ **F**