

## Exam 2 Review Sheet

Name: \_\_\_\_\_

Please show all your work to get full credit.

- Determine if the following are factors or multiples of  $20(2x - 1)^5(3 + x)^2$ .
  - $60(2x - 1)^6(3 + x)^5(3 + 5x)^4$
  - $2x - 1$
  - $(x + 3)^6$
  - $5(2x - 1)^2(3 + x)^2$
- Factor the following completely.
  - $pq - p^2q^2$
  - $x(u + v) - y(u + v)$
  - $ax - ay + bz + az - by + bx$
  - $5t^4 - 4t^3 - t^2$
  - $x^3 + 64$
  - $16x^4 - 81y^6$
  - $x^2 + 3x - 4$
  - $3x^2 + 8x - 3$
  - $x^2 - 9$
  - $3x^2 - 11x + 6$
- Perform the operations below and simply your answer so that all fractions are written in the lowest terms and do not leave any negative exponents or radicals in the denominator. (Rationalize the denominators, if there any radicals in the denominator)

a.  $\frac{a^3b}{c^3d^6} - \frac{3c^5b^5}{a^2d^3}$

b.  $\frac{x+1}{5x} - \frac{3-x}{5x}$

c.  $\frac{2}{x} + \frac{3}{x+1}$

d.  $\frac{(2x-1)}{(x+5)} + \frac{(4x+3)}{(3x-2)}$

e.  $\frac{x}{x^2+5x-6} - \frac{3x+5}{x^2-1}$

f.  $3\frac{1}{2} \times 2\frac{2}{3}$

g.  $\frac{5}{12} \times \frac{14}{15}$

h.  $\frac{100}{-8} \times \frac{12}{30} \times \frac{-35}{21}$

i.  $\frac{x^2-9}{x^2+3x-4} \times \frac{x^3+64}{3x^2+8x-3}$

j.  $(a^2)^3$

k.  $(a^{-2})^3$

l.  $(a^2)^{-3}$

m.  $(a^{-2}b^3)^{-2}$

n.  $(a^{-2}b^3)^{-2} \times a^5$

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

p.  $(-3a^3b^{-2}c)^3(b^6c^{-4})^2$

q.  $\left(\frac{4x^{-2}y^9}{12x^{-3}y^5}\right)^{-2}$

r.  $\sqrt{a}\sqrt{a}$

s.  $\frac{\sqrt{a}}{\sqrt{b}}$

t.  $\sqrt{125x^5}$

u.  $\sqrt{40a^2b^6}$

v.  $(3\sqrt{a^5b^3})(\sqrt{40a^2b^6})$

w.  $(3 - 2\sqrt{3})(3 + 2\sqrt{3})$

x.  $\frac{1+5\sqrt{2}}{3-2\sqrt{3}}$

y.  $3\frac{1}{2} \div 2$

z.  $\frac{x^2+2x+1}{1-x^2} \div \frac{5x^2+4x-1}{5x^2-6x+1}$

aa.  $1 - 3 \times 6 + 8$

bb.  $\frac{-7+(3 \times 2-4)^2}{3^2-4+2 \times 5}$

cc.  $\frac{2+3 \times 5 \div 2}{2 \times 3-10 \div 2}$

dd.  $\frac{\frac{a}{x} - \frac{b}{y}}{\frac{a}{x} + \frac{b}{y}}$

$$\text{ee. } \frac{\frac{1}{x+2} - \frac{1}{2}}{\frac{1}{1} - \frac{3+x}{1}}$$

4. Use the division algorithms to perform the following divisions. Write your final answer in the form Quotient +  $\frac{\text{Remainder}}{\text{Divisor}}$ .
- $862 \div 21$
  - $(8x^2 + 6x + 2) \div (2x + 1)$
  - What is the difference and similarity between parts a and b?
5. Answer true or false and justify your answer.
- $4 \div \frac{1}{2} = \frac{4}{1} \div \frac{1}{2} = \frac{4 \times 2}{1 \times 2} \div \frac{1}{2} = \frac{8}{2} \div \frac{1}{2} = \frac{8 \div 1}{2 \div 2} = 8$
  - $\frac{a}{b} \div \frac{c}{d} = \frac{a \div c}{b \div d}$
  - $14 \div 0 = 0$
  - $0 \div 14 = 0$
6. Solve the following equations and inequalities for the respective variables. If an equation is an identity, or has no solution, or has an extraneous solution, please state so. For all the inequalities write the solution in algebraic notation, interval notation, and represent the solutions graphically on a number line. Explain the differences and similarities of solving the equivalent equations and inequalities.

Equation	Inequality
a. $11 + 2t = t - 3$	a. $11 + 2t > t - 3$
b. $3x + 4.5 = -8.5$	b. $3x + 4.5 > -8.5$
c. $5(1 - x) = 3 - 4(3x - 7)$	c. $5(1 - x) > 3 - 4(3x - 7)$
d. $5 + \frac{2}{3}x = \frac{3}{2}x - 9$	d. $5 + \frac{2}{3}x \geq \frac{3}{2}x - 9$
e. $ 2x - 1  = \frac{5}{2}$	e. $ 2x - 1  > \frac{5}{2}$
f. $\frac{2}{x-1} = 5$	f. $\frac{2}{x-1} < 5$
What are the similarity and differences between the corresponding equations and inequalities?	

7. Solve the equation below for  $x$ .

$$4y - 3x = 6$$

8. Below are some equations and inequalities students have solved. Please read them carefully to see if their work is correct or incorrect. If incorrect, please explain what property or mathematical principles are misapplied and at what step.

a.  $|2 - 3x| = 7$

Student's Solution

$$|2 - 3x - 2| = 7 - 2$$

$$|-3x| = 5$$

$$3x = 5 \text{ or } 3x = -5 \text{ (since } |-3x| = 3x)$$

$$x = \frac{5}{3} \text{ or } x = -\frac{5}{3}$$

b.  $|2 - 3x| > 7$

Student's Solution

$$2 - 3x > 7 \text{ or } 2 - 3x < -7$$

$$-3x > 5 \text{ or } -3x < -9$$

$$x > -\frac{5}{3} \text{ or } x < \frac{9}{3} = 3$$

$$\left(-\frac{5}{3}, \infty\right) \cup (-\infty, 3)$$

9. Create a linear equation that has the solution of  $x = \frac{1}{2}$ . You must have at least two terms on each side of the equation that contains the variable  $x$  and at least one constant term on the left or the right.
10. Create a linear inequality that has the solution of  $x = \frac{1}{2}$ . You must have at least two terms on each side of the equation that contains the variable  $x$  and at least one constant term on the left or the right.
11. Joshua purchased a car for \$27,200 that was on sale for 15% off. What was the presale price of the car?
12. A recipe calls for  $1\frac{1}{4}$  cups of flour,  $\frac{1}{3}$  c sugar and 1 stick of butter. It is critical that these ratios be adhered to in order for the cookies to turn out well. Paul was careless as he started and put in 2 cups of flour instead of the  $1\frac{1}{4}$  c and had added the  $\frac{1}{3}$  c. sugar before realizing his error. Determine **how much** total sugar and **how much** total butter he should use to keep the ratios in line with the recipe?
13. Write an equation that expresses the fact that  $P$  varies directly with  $T$  and inversely with  $V$ . Leave your constant of variation as  $k$ . Also determine the value of  $k$  if when  $T = 300$  and  $V = 25$  then  $P = 15$ .