Algebra and Trigonometry Chapter R Test Formula Sheet

Properties of the Real Numbers

Commutative:	$a + b = b + a$; $ab = ba$
Associative:	$a + (b + c) = (a + b) + c$; $a(bc) = (ab)c$
Additive Identity:	$a + 0 = 0 + a = a$
Additive Inverse:	$-a + a = a + (-a) = 0$
Multiplicative Identity:	$a \cdot 1 = 1 \cdot a = a$
Multiplicative Inverse:	$a \cdot \frac{1}{a} = \frac{1}{a} \cdot a = 1$ $(a \neq 0)$
Distributive:	$a(b + c) = ab + ac$

Absolute Value

For any real number a,

$$|a| = \begin{cases} a, & \text{if } a \geq 0, \\ -a, & \text{if } a < 0. \end{cases}$$

Special Products of Binomials

$$(A + B)^2 = A^2 + 2AB + B^2$$
$$(A - B)^2 = A^2 - 2AB + B^2$$
$$(A + B)(A - B) = A^2 - B^2$$

Sum or Difference of Cubes

$$A^3 + B^3 = (A + B)(A^2 - AB + B^2)$$
$$A^3 - B^3 = (A - B)(A^2 + AB + B^2)$$

Properties of Exponents

For any real numbers a and b and any integers m and n, assuming 0 is not raised to a nonpositive power:

The Product Rule: $a^m \cdot a^n = a^{m+n}$

The Quotient Rule: $\dfrac{a^m}{a^n} = a^{m-n} \quad (a \neq 0)$

The Power Rule: $(a^m)^n = a^{mn}$

Raising a Product to a Power: $(ab)^m = a^m b^m$

Raising a Quotient to a Power:

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m} \quad (b \neq 0)$$

Properties of Radicals

Let a and b be any real numbers or expressions for which the given roots exist. For any natural numbers m and n $(n \neq 1)$:

If n is even, $\sqrt[n]{a^n} = |a|$.

If n is odd, $\sqrt[n]{a^n} = a$.

$\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$.

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \quad (b \neq 0).$$

$\sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m$.

Rational Exponents

For any real number a and any natural numbers m and n, $n \geq 2$, for which $\sqrt[n]{a}$ exists,

$a^{1/n} = \sqrt[n]{a}$,

$a^{m/n} = \sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m$, and

$$a^{-m/n} = \frac{1}{a^{m/n}}.$$

Name: _____

Date: _____

Algebra & Trigonometry Test, Chapter R
Show all work.

Add and simplify

Problem 1: $(3x^4 - 2x^2 + 6x) - (5x^3 - 3x^2 + x)$

Multiply the following polynomials.

Problem 2: $(x + 3)(2x - 5)$

Problem 3: $(2y - 1)^2$

Problem 4: $\left(2 + \sqrt{3}\right)\left(5 - 2\sqrt{3}\right)$

Factor the following polynomials

Problem 5: $y^2 - 3y - 18$

Problem 6: $x^3 + 10x^2 + 25x$

Simplify the following expression.

Problem 7: $(-3a^5b^{-4})(5a^{-1}b^3)$

Simplify the following expression.

Problem 8:

$$\frac{\frac{x}{y} - \frac{y}{x}}{x + y}$$

Useful Hint:
Step 1: Focus on just the numerator. Add those two fractions to get a single rational expression
Step 2: Now look at the denominator as well. Cancel out any common terms to simplify