PRE-CALCULUS & TRIGONOMETRY SUMMER ASSIGNMENT

Due the 1st day of School! You MUST SHOW WORK to receive credit, NO WORK, NO CREDIT! Answers on this page, work on a separate sheet.

Part I: Laws of Exponents

product	$a^m \cdot a^n = a^{m+n}$ Add exponents	$2^2 \cdot 2^3 = (2\cdot2)(2\cdot2\cdot2) = 2^5$
quotient	$\frac{a^m}{a^n} = a^{m-n}$ Subtract exponents	$\frac{2^3}{2^2} = \frac{2\cdot2\cdot2}{2\cdot2} = 2^{3-1} = 2$
power	$(a^m)^n = a^{m\cdot n}$ Multiply exponents	$(2^2)^3 = (2\cdot2\cdot2)(2\cdot2\cdot2)(2\cdot2\cdot2) = 2^9$
inverse	$a^{-1} = \frac{1}{a}$ Take the reciprocal	$2^{-1} = \frac{1}{2}$ (this is a definition)
zero exponent	$a^0 = 1$	$2^0 = 1$ Anything raised to the zero power is one.

Simplify the expression using the laws of exponents. There should be no negative exponents when completely simplified.

1. $x^5 \cdot x^2$
2. $y^3 \cdot y \cdot y^4$
3. $2b^4 \cdot 3b^{-4}$
4. $a^{10} \cdot a^2 \cdot a^{-6}$
5. $\frac{x^5}{x^2}$
6. $\frac{c^4}{c^8}$
7. $\frac{5x^4}{x^9}$
8. $\frac{2c^5}{4c^3}$
9. $\frac{b^3 \cdot b^4}{b^2}$
10. $(z^5)^5$
11. $(a^7)^2$
12. $(m^{-3})^{-8}$

Distributive Property of Exponents:

Property	Example
$(xy)^a = x^a y^a$	$(x^2y^3)^2 = (x^2)^2(y^3)^2 = x^{2\cdot2}y^{3\cdot2} = x^4y^6$
$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$	$\left(\frac{x^{2a}}{y^{3b}}\right)^3 = \frac{(x^{2a})^3}{(y^{3b})^3} = \frac{x^{2a\cdot3}}{y^{3b\cdot3}} = \frac{x^{6a}}{y^{9b}}$

13. $(3x^2)^4$
14. $(2ab)^5$
15. $(x^2y^4m^3)^8$
16. $(2x^3y^6)^6$
17. $p^2 \cdot (p^5)^2$
18. $(m^7)^4 \cdot m^3$
19. $\left(\frac{a^2}{b^3}\right)^4$
20. $\left(\frac{2m^3}{3}\right)^3$
21. $\left(\frac{3x^3}{4y^4}\right)^2$

Putting it all together:

23. $\frac{4m^4n^3p^3}{3m^2n^2p^4}$
24. $\frac{4x^0y^{-2}z^3}{4x}$
25. $\frac{2h^3j^{-3}k^4}{3jk}$

Part II: Factor out the Greatest Common Factor

Example D. Factor out the GCF.

a. $xy - 4y = y(x - 4)$
(the GCF is y)

b. $4ab + 6a = 2a(2b) + 2a(3) = 2a(2b + 3)$
(the GCF is 2a)

c. $12x^2y^3 + 6x^2y^2 = 6x^2y^2(2y) + 6x^2y^2(1) = 6x^2y^2(2y + 1)$
(the GCF is $6x^2y^2$)

Factor out the GCF:

1. $9 + 8b^2$
2. $45x^2 - 25$
3. $56 - 35p$
4. $7ab - 35a^2b$
5. $-3a^2b + 6a^3b^2$
6. $-5x^2 - 5x^3 - 15x^4$
7. $20x^4 - 30x + 30$
8. $28m^4 + 40m^3 + 8$
9. $30b^9 + 5ab - 15a^2$
10. $-48a^2b^2 - 56a^3b - 56a^5b$

Part III: Factor by Grouping

1. Group the first two terms, and group the second two terms.
2. Factor out the GCF of both pairs.
3. Now the GCF is (x+5)
4. Bring down what is left.
5. Check by multiplying the binomials.

$\underbrace{2wx + 10w}_{\text{factor}} + \underbrace{7x + 35}_{\text{factor}}$

$= 2w(x + 5) + 7(x + 5)$

$= (x + 5)(2w + 7)$ done!

Factor the following by grouping:

1) $8r^3 - 64r^2 + r - 8$

2) $12p^3 - 21p^2 + 28p - 49$

3) $12x^3 + 2x^2 - 30x - 5$

4) $6v^3 - 16v^2 + 21v - 56$

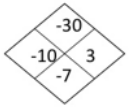
5) $63n^3 + 54n^2 - 105n - 90$

6) $21k^3 - 84k^2 + 15k - 60$

Part III: Factor a Trinomial (YOU MUST SHOW WORK!)

1. Trinomials are in the form: $ax^2 + bx + c$
2. Multiply $a \times c$
3. Use the "x" shaped graphic organizer to determine which two numbers multiply to $a \times c$ and add to b.
4. Split the middle term.
5. Group the first two terms together, and group the second two terms together.
6. Follow factor by grouping method.

$2x^2 - 7x - 15 = 0$



$2x^2 - 10x + 3x - 15 = 0$

$2x(x - 5) + 3(x - 5) = 0$

$(2x + 3)(x - 5) = 0$

Note: you are on the right track because you have (x-5) in both parenthesis

1) $b^2 + 8b + 7$

2) $n^2 - 11n + 10$

3) $m^2 + m - 90$

4) $n^2 + 4n - 12$

5) $n^2 - 10n + 9$

6) $b^2 + 16b + 64$

7) $7x^2 - 45x - 28$

8) $2b^2 + 17b + 21$

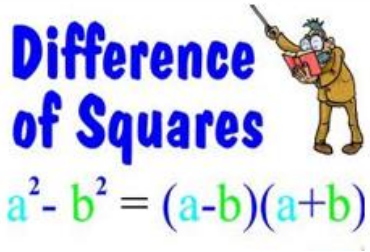
9) $5p^2 - p - 18$

10) $28n^4 + 16n^3 - 80n^2$

11) $3b^3 - 5b^2 + 2b$

12) $7x^2 - 32x - 60$

Part IV: Factor a Difference of Squares



Example:

$9x^2 - 64$

$a = 3x \text{ and } b = 8$

$(3x)^2 = 9x^2 \text{ and } 8^2 = 64$

$(3x + 8)(3x - 8)$

1) $r^2 - 4$

2) $x^2 - 49$

3) $9v^2 - 121$

4) $9x^2 - 1$

5) $m^2 + 100$

6) $1 - 36x^2$

7) $144 - x^2$

8) $m^4 - 64$

9) $n^4 - 36$

10) $m^4 - 25$