Greatest Common Factor

Directions: Answer each question to the best of your ability, Show ALL of your work for EACH problem in three or more steps. Circle your final answer. You will have to REDO each problem you do not show your work for. If you do not know how to do a problem, circle the number, don't guess. **DO NOT USE A CALCULATOR**

Factoring is the opposite of multiplication (distribution) and FOILing. You should always start by factoring out the Greatest Common Factor (GCF). It is the biggest number/letter that is a multiple of all the terms.

Find the GCF of each polynomial. Write *prime* if it cannot be factored.

Example: Factor by the GCF

$$15x^2y^4 - 27xy^5z^2$$
$$3xy^3(3xy - 9xy^2z^2)$$

The GCF is $3xy^3$ because 3 goes into both 15 and 27 and then you take each common variable (the lowest exponent). Check your work by distributing back into the parenthesis **(SHOW THIS STEP!)**

Your turn!

1. $3z^2 + 6z$

$3 \cdot z \cdot z + 3 \cdot 2 \cdot z$

$3z(z+2)$

Check

$3z(z+2)$

$3z^2 + 6z$ ✓

2. $xy^4 - 14y^4$

$x \cdot y \cdot y \cdot y \cdot y - 2 \cdot 7 \cdot y \cdot y \cdot y \cdot y$

$y^4(x - 14)$

$y^4(x-14)$

$xy^4 - 14y^4$ ✓

3. $14b^2 - 35b^3$

$2 \cdot 7 \cdot b \cdot b - 5 \cdot 7 \cdot b \cdot b \cdot b$

$7b^2(2 - 5b)$

$7b^2(2-5b)$

$14b^2 - 35b^3$ ✓

4. $18x^3y^2 + 42x^2y^3$

$6 \cdot 3 \cdot x \cdot x \cdot y \cdot y + 6 \cdot 7 \cdot x \cdot y \cdot y \cdot y$

$6x^2y^2(3x + 7y)$

$6x^2y^2(3x+7y)$

$18x^3y^2 + 42x^2y^3$ ✓

5. $12x^2 + 16y^2$

$3 \cdot 4 \cdot x \cdot x + 4 \cdot 4 \cdot y \cdot y$

$4(3x^2 + 4y^2)$

$4(3x^2+4y^2)$

$12x^2 + 16y^2$ ✓

6. $3x^2 - 9xy + 12y$

$3 \cdot 1 \cdot x \cdot x - 3 \cdot 3 \cdot x \cdot y + 3 \cdot 4 \cdot y$

$3(x^2 - 3xy + 4y)$

$3(x^2 - 3xy + 4y)$

$3x^2 - 9xy + 4y$ ✓

7. $45x^3 - 60xy^2$

$15 \cdot 3 \cdot x \cdot x \cdot x - 15 \cdot 4 \cdot x \cdot y \cdot y$

$15x(3x^2 - 4y^2)$

$15x(3x^2-4y^2)$

$45x^3 - 60xy^2$ ✓

8. $36x^2 + 18x^3 - 6x + 12x^4$

$6 \cdot 6 \cdot x \cdot x + 6 \cdot 3 \cdot x \cdot x \cdot x - 6 \cdot 1 \cdot x + 6 \cdot 2 \cdot x \cdot x \cdot x \cdot x$

$6x(6x + 3x^2 - 1 + 2x^3)$

$6x(2x^3 + 3x^2 + 6x - 1)$

9. $84x^3y^4 - 28x^5y^2 + 14x^2y^2$

$6 \cdot 27\, xxx\, yyyy - 6 \cdot 2 \cdot 7\, xxxxx\, yy + 7 \cdot 2\, xxyy$

$14x^2y^2(6xy^2 - 2x^3 + 1)$

10. $24x^2y^2 - 18xy$

$6 \cdot 4\, xxyy - 6 \cdot 3\, xy$

$6xy(4xy - 3)$

11. $a^3b^2 + a^3b^4 + ab^4$

$aaabb + aaabbbb + abbbb$

$ab^2(a^2 + a^2b^2 + b^2)$

12. $4k^5n^3 - 72k^4n^2 + 36k^3n$

$4 \cdot 1\, kkkkknnn - 4 \cdot 18\, kkkknn + 4 \cdot 9\, kkkn$

$4k^3n(k^2n^2 - 18kn + 9)$

13. $2s^3t^3 - 5o^3p^3 + 10i^3t^3$

prime

14. $9x^2 + 9x^2y - 72y^2$

$9xx + 9xxy - 8 \cdot 9yy$

$9(x^2 + x^2y - 8y^2)$

15. $-72x^3y^3 - 36x^2y^4 - 90x^2y^3$

$2(-9)4\, xxxyyy + (-9)22\, xxyyyyy + (-9)5 \cdot 2\, xxyyy$

$-18x^2y^3(4x + 2y + 5)$

16. $9u^4v^3 + 18u^5v^2 - 105u^9v^2$

$3 \cdot 3\, uuuuvvv + 3 \cdot 6\, uuuuuvv - 3 \cdot 35\, uuuuuuuuuv$

$3u^4v^2(3v + 6u - 35u^5)$