* Greatest Common Factor (GCF) — for a polynomial is the largest monomial that divides each term of the polynomial evenly.

1. Find the greatest common factor of: $21b^3z^5$, $15b^5z^4$

$21\ b^3\ z^5$, $15\ b^5\ z^4$

* Seperate each expression numbers, and like variables

21 , 15
/\   /\
1·21   1·15
③·7   ③·5

3

b^3 , b^5

b^3

z^5 , z^4

z^4

* Then circle the Variable in each pair with the <u>Smallest</u> exponent.

* For each number, write down each set of numbers that can multiply together to get your number.
* Then circle the <u>Largest</u> number they have in common

$3b^3z^4$

2. What is the greatest common factor of the polynomial. $6z^6 + 2z^5 + 14z^4$

$6z^6 + 2z^5 + 14z^4$

6, 2 , 14
/\   /\   /\
1·6   1·②   1·14
②·3   ②·7

z^6 , z^5 , z^4

* Then circle the Variable in each pair with the <u>Smallest</u> exponent.

* Write down each set of numbers the multiply together to get each number.
* Circle the <u>largest</u> number they have in common.

$2z^4$

3. Factor the following by taking out the greatest common factor. $18b^3 + 12b^2 + 30b$

$18b^3 + 12b^2 + 30b$

18 , 12 , 30 b^3 , b^2 , $\boxed{b}$

$1 \cdot 18$ $1 \cdot 12$ $1 \cdot 30$
$2 \cdot 9$ $2 \cdot 6$ $2 \cdot 15$
$3 \cdot 6$ $3 \cdot 4$ $3 \cdot 10$
           $5 \cdot 6$

$6b$ ← greatest common factor

$$\frac{18b^3}{6b} + \frac{12b^2}{6b} + \frac{30b}{6b}$$

$$6b(3b^{3-1} + 2b^{2-1} + 5)$$

$$\boxed{6b(3b^2 + 2b + 5)}$$

* once you find the greatest common factor, you will write it down and then make a set of ( ).
* Take your original problem and divide each term by the GCF you found.
* Your final answer will have the GCF next to a set of ( ), with what's left over in the ( ).

---

4. Factor the following by taking out the greatest common factor. $54x^4 + 30x^3 + 42x^2$

$54x^4 + 30x^3 + 42x^2$

54 , 30 , 42 x^4 , x^3 , $\boxed{x^2}$ ← circle variable with smallest exponent

$1 \cdot 54$ $1 \cdot 30$ $1 \cdot 42$
$2 \cdot 27$ $2 \cdot 15$ $2 \cdot 21$
$3 \cdot 18$ $3 \cdot 10$ $3 \cdot 14$
$\boxed{6} \cdot 9$ $5 \cdot \boxed{6}$ $\boxed{6} \cdot 7$

$6x^2$ ← GCF

* Circle largest number they have in common.

$$\frac{54x^4}{6x^2} + \frac{30x^3}{6x^2} + \frac{42x^2}{6x^2}$$

$$6x^2(9x^{4-2} + 5x^{3-2} + 7)$$

$$\boxed{6x^2(9x^2 + 5x + 7)}$$

* once you find the greatest common factor, you will write it down and then make a set of ( ).
* Take your original problem and divide each term by the GCF you found.
* Your final answer will have the GCF next to a set of ( ), with what's left over in the ( ).

5. Factor by grouping. $ab + 6a + 8b + 48$

$(ab + 6a) + (8b + 48)$ ← *insert ( ) around the 1st two terms and insert ( ) around 2nd two terms

$a(b+6) + 8(b+6)$

$(b+6)(a+8)$

* for each set of ( ), factor out what the 2 terms have in common and write what's left over in the ( ).

  * Hint: The ( ) should have the same thing in them.

* Then write down whats inside the ( ).
* Then make another set of ( ) next to it and write down what was outside the ( ) in it.

6. Factor by grouping. $xy + 8x - 10y - 80$

$(xy + 8x)(-10y - 80)$

$x(y+8) - 10(y+8)$

$(y+8)(x-10)$

* insert ( ) around the 1st two terms and insert ( ) around 2nd two terms

* for each set of ( ), factor out what the 2 terms have in common and write what's left over in the ( ).

  • You may need to factor out a (-) as well to make what's in the ( ) the same.

* Then write down whats inside the ( ).
* Then make another set of ( ) next to it and write down what was outside the ( ) in it.

7. Factor by grouping. $z^3 + 5z^2 - 3z - 15$

$(z^3 + 5z^2)(-3z - 15)$

$z^2(z+5) - 3(z+5)$

$(z+5)(z^2-3)$

*insert ( ) around the 1st two terms and insert ( ) around 2nd two terms

* for each set of ( ), factor out what the 2 terms share in common and write what's left over in the ( ).
  • You may need to factor out a (-) as well to make what's in the ( ) the same.

* Then write down whats inside the ( ).
* Then make another set of ( ) next to it and write down what was outside the ( ) in it.

8. Factor by grouping. $ay - 4a + 5y - 20$

$(ay - 4a)(+5y - 20)$

$a(y-4) + 5(y-4)$

$(y-4)(a+5)$

*insert ( ) around the 1st two terms and insert ( ) around 2nd two terms

* for each set of ( ), factor out what the 2 terms share in common and write what's left over in the ( ).
  * Hint: The ( ) should have the same thing in them.

* Then write down whats inside the ( ).
* Then make another set of ( ) next to it and write down what was outside the ( ) in it.