

Notice Anything?



GCF (Greatest common factor)

$$44 \rightarrow \underline{2} \times \underline{2} \times \underline{11}$$

$$132 \rightarrow \underline{2} \times \underline{2} \times 3 \times \underline{11}$$

$$\text{GCF} = 2 \times 2 \times 11 = 44$$

What is the Greatest Common Factor?

$$856x^2y^3 \quad \text{AND} \quad 1200x^4y^2$$

Anything Common?

$$3x + 10xy - 7xyz$$

3 terms
They all have a "x"

$$3x \rightarrow 3 \cdot \textcircled{x}$$

$$10xy \rightarrow 2 \cdot 5 \cdot \textcircled{x} \cdot y$$

$$7xyz \rightarrow 7 \cdot \textcircled{x} \cdot y \cdot z$$

$$\text{GCF} = x$$

Remember

$$3x + 10xy - 7xyz$$

$$3x \longrightarrow 3 \cdot x$$

$$10xy \longrightarrow 2 \cdot 5 \cdot x \cdot y$$

$$7xyz \longrightarrow 7 \cdot x \cdot y \cdot z$$

$$\underline{3x} + \underline{10xy} - \underline{7xyz}$$

$$\underline{x}(3 + 10y - 7yz)$$



We need to factor out an "x".

Divide each term by x:

$$\frac{3x}{x} = 3x^{1-1} = 3x^0 = 3$$

$$\frac{10xy}{x} = 10y$$

$$\frac{-7xyz}{x} = -7yz$$

What do you notice?

$$x^6 + x^5$$

2 terms

common factor of x^5

$$x^6 + x^5$$

The diagram shows the expansion of x^6 and x^5 into their prime factors. x^6 is written as $x \cdot x \cdot x \cdot x \cdot x \cdot x$ with the first five x 's circled in red. x^5 is written as $x \cdot x \cdot x \cdot x \cdot x$ with all five x 's circled in red. Below these, the common factor $x \cdot x \cdot x \cdot x \cdot x = x^5$ is circled in blue, with an arrow pointing to it from the label "GCF".

Take out the greatest common factor, which will be the smallest of the like powers!!

$$\begin{aligned}
 & x^6 + x^5 \\
 &= x^5(x^1 + 1) \\
 &= x^5(x + 1)
 \end{aligned}$$

Divide each term
by x^5

$$\begin{aligned}
 \frac{x^6}{x^5} &= x^{6-5} = x^1 \\
 \frac{x^5}{x^5} &= x^{5-5} = x^0 = 1
 \end{aligned}$$

$$14xy + 28xyz$$

$$\begin{array}{l}
 14 = 2 \cdot 7 \cdot x \cdot y \\
 28 = 2 \cdot 2 \cdot 7 \cdot x \cdot y \cdot z \\
 \underline{2} \cdot \underline{7} \cdot \underline{x} \cdot \underline{y} = 14xy
 \end{array}$$

$$\begin{aligned}
 &14xy + 28xyz \\
 &= 14xy(1 + 2z) \\
 &= 14xy(1 + 2z)
 \end{aligned}$$

Divide each term
by $14xy$

$$\frac{14xy}{14xy} = 1$$

$$\frac{28xyz}{14xy} = 2z$$

$$1. \quad a^5 c^6 z^{11} + a^9 c^{10} z^{13}$$

$$a^5 c^6 z^{11} (1 + a^4 c^4 z^2)$$

* lowest exponent

$$\frac{a^5 c^6 z^{11}}{a^5 c^6 z^{11}} = 1$$

$$\frac{a^9 c^{10} z^{13}}{a^5 c^6 z^{11}} = a^4 c^4 z^2$$

$$2. \quad 25x^7 - 15x^5$$

$$25x^7 \rightarrow 5 \cdot 5 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x$$

$$15x^5 \rightarrow 3 \cdot 5 \cdot x \cdot x \cdot x \cdot x \cdot x$$

$$\text{GCF} = 5x^5$$

$$25x^7 - 15x^5$$

$$= 5x^5 (5x^2 - 3)$$

$$3. \quad 12x^7y^8 - 24x^9y^4$$

$$12x^7y^4(y^4 - 2x^2)$$

$$\text{GCF} = 12x^7y^4$$

$$12 \rightarrow 2 \cdot 2 \cdot 3$$

$$24 \rightarrow 2 \cdot 2 \cdot 2 \cdot 3$$

$$\text{GCF} \rightarrow 2x^2x^3 = 12$$

$$4. \quad 13x^2y^5w^3 - 39x^5y^2w + 26x^3y$$

$$13x^2y(y^4w^3 - 3x^3yw + 2x)$$

$$\text{GCF} = 13x^2y$$

5. $91x - 7y$

GCF = 7

$$7(13x - y)$$

$$91x - 7y$$

6. $2x^5y^3 - 8x^2y^2 + 10y$

GCF = $2y$

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

FACTORS - (1)

A. Factor the following.

- $2x + 2y$ $2(x+y)$
- $ab + ac$ $a(b+c)$
- $3x + 4x$ $x(3+4) = 7x$
- $x^2y + 3y^2$ $y(x^2+3y)$
- $x^2y + x^2z$ $x^2(y+z)$
- $3xy + 4xyz$ $xy(3+4z)$
- $3x + 3y + 3z$ $3(x+y+z)$

8. $15y^2 + 20a + 30b$

$$5(3y^2 + 4a + 6b)$$

9. $4x + 6a$

$$2(2x + 3a)$$

10. $10y - 5$

$$5(2y - 1)$$

11. $15ax - 3a$

$$3a(5x - 1)$$

12. $a^3x^2 - a^2x^2 - qx$

$$x(a^3x - a^2x - q)$$

13. $14y^4 - 35y^3 - 42y^2$

$$7y^2(2y^2 - 5y - 6)$$

14. $12y^4 + 18y^6$

$$6y^4(2 + 3y^2)$$

15. $-6x^8 + 9$

$$3(-2x^8 + 3)$$

12. $a^3x^2 - a^2x^2 - qx$

13. $14y^4 - 35y^3 - 42y^2$

14. $12y^4 + 18y^6$

15. $-6x^8 + 9$

16. $2ax - 2bx - 2cx$

$2x(a-b-c)$

17. $-9x^3 + 33x^2 - 6x + 12$

$3(-3x^3 + 11x^2 - 2x + 4)$

18. $-100x^4 - 1000x^3 - 10\,000x$

$-100x(x^3 + 10x^2 + 100)$

19. $2x^3 - 10x^2 + 12x$

$2x(x^2 - 5x + 6)$

20. $4y^3 + 8y^2 - 4y$

$4y(y^2 + 2y - 1)$

21. $8x^2 - 24x + 96$

$8(x^2 - 3x + 12)$

22. $-63y^5 + 15y^3 - 27y^2 + 45y$

$3y(-21y^4 + 5y^2 - 9y + 15)$

23. $-10ey^5 - 30e^2y^2 + 45ey - 15e$

24. $36a^7x^4 - 42a^9x^2$

$6a^7x^2(6x^2 - 7a^2)$

25. $4y^3 - 2ay^2$

$2y^2(2y - a)$

26. $-3y^4 - 6y^3 + 21y^2$

$3y^2(-y^2 - 2y + 7)$

27. $4x^2 - 2x + 12$

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

28. $3x^3 - 9x^2 + 6x$

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

29. $30y^4 - 18y^3 - 6y^2$

$6y^2(5y^2 - 3y - 1)$

30. $7x - 28$

$7(x - 4)$

31. $42a^2b^2 + 7ab + 6b$

$b(42a^2b + 7a + 6)$

32. $3x^2 + 12x + 9$

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

33. $100 - 1000x$

$100(1 - 10x)$

29. $30y^4 - 18y^3 - 6y^2$

30. $7x - 28$

31. $42a^2b^2 + 7ab + 6b$

32. $3x^2 + 12x + 9$

33. $100 - 1000x$

34. $44a - 33b + 22c$

$11(4a - 3b + 2c)$

35. $4ab^2 - ab^2c$

$b^2(4a - ac)$

$$\textcircled{B} \quad -10ey^5 - 30e^2y^2 + 45ey - 15e \quad \text{GCF} = 5e$$
$$5e(-2y^5 - 6ey^2 + 9y - 3)$$

$$\textcircled{24} \quad 36a^7x^4 - 42a^9x^2$$

$$\boxed{6a^7x^2(6x^2 - 7a^2)}$$

$$36 \rightarrow \textcircled{2} \times \textcircled{2} \times \textcircled{3} \times \textcircled{3}$$

$$42 \rightarrow \textcircled{2} \times \textcircled{3} \times 7$$

$$\text{GCF} = 2 \times 3 = 6$$

$$\frac{36a^7x^4}{6a^7x^2} = 6a^{7-7}x^{4-2}$$

$$= 6x^2$$

$$\frac{-42a^9x^2}{6a^7x^2} = -7a^{9-7}x^{2-2}$$

$$= -7a^2$$


Common Factoring Day # 2 .

$$\textcircled{1} \quad 42x^4y - 6xy + 36x + 36$$

$$6(7x^4y - 1xy + 6x + 6)$$

$$\textcircled{4} \quad 64x^6y^2z^6 + 16x^3y^4z^5 + 56x^4y^2z^3 + 24xy^2z^2$$

$$8x^1y^2z^2(8x^5z^4 + 2x^2y^2z^3 + 7x^3z + 3)$$

$$\textcircled{17} \quad 3y^2(3x^2 + xy + 7y^2)$$


$$= 9x^2y^2 + 3xy^3 + 21y^4$$