

Recall in our last math classes we looked at GCF and LCM of 2 numbers using two methods

- 1) Prime factorization
- 2) Ladder Method (Easier of the 2)



Look back at the teacher pages for this (Feb 24 & Feb 26 dates)

We moved on to factoring GCF (greatest common factors) out of polynomial (Look back at March 9 & March 11 for these lesson)

March 12 we reviewed how to multiply a monomial by a polynomial

Expand and simplify

Just to review

Pause the video as you go to try some on your own and I will work it out and you can check.

Expand and Simplify

a) $3n^4 (5m^3n^2 - 10m^2n^2)$

$15m^3n^6 - 30m^2n^6$

b) $2x(3x-1) - 4(7x-2)$

$6x^2 - 2x - 28x + 8$

$6x^2 - 30x + 8$

Multiply the Binomial

see next page
for box method

$$(x + 4)(x - 3)$$

$27 \times 35 =$

	20	7	
30	20x30 =600	7x30 =210	600 +210
5	20x5 =100	7x5 =35	+100 + 35
			<hr/> 945

relate this to
the box method
taught in grade
5 with whole
numbers

$$(x + 4)(x - 3)$$

	x	+4
x	x^2	+ 4X
-3	-3x	-12

$$x^2 + 4x - 3x - 12$$

$$x^2 + 1x - 12$$

Rainbow method

binomial x binomial

(remember 2 terms x 2 terms will initially result in 4 terms...but sometimes these terms can combine)

$$(2x + 7)(-3x + 5)$$
$$\begin{array}{ccccccc} \underline{-6x^2} & \underline{+10x} & \underline{-21x} & \underline{+35} & & & \\ & \underbrace{\hspace{2cm}} & & & & & \\ & -11x & & & & & \end{array}$$
$$-6x^2 - 11x + 35$$

you can still use the box method for those that need a visual...but should move toward the rainbow

$$(2x + 7) (-3x + 5)$$

	-3x	+5
2x	•	•
+7	•	•

2x3 = 6 terms

Ultimate Question

$$(2x - 2)(3x^2 - 4x + 1)$$

$$\bullet \rightarrow \frac{6x^3}{\underbrace{\quad}} - \frac{8x^2}{\underbrace{\quad}} + \frac{2x}{\underbrace{\quad}} - \frac{6x^2}{\underbrace{\quad}} + \frac{8x}{\underbrace{\quad}} - \frac{2}{\underbrace{\quad}}$$

$$6x^3 - 14x^2 + 10x - 2$$

5)

$$(10x^5 + 3) (-2x^2 - 11x + 2)$$

$$\underline{-20x^7} \quad \underline{-110x^6} \quad \underline{+20x^5} \quad \underline{-6x^2} \quad \underline{-33x} \quad \underline{+ 6}$$

Expand and simplify

repeat the bracket twice

$$(x - 3)^2$$

$$\begin{array}{l}
 (x - 3)(x - 3) \\
 x^2 - 3x - 3x + 9 \\
 \hline
 x^2 - 6x + 9
 \end{array}$$

Expand and simplify

$$(x + 2)^3$$

repeat the bracket three times

Handwritten expansion of $(x+2)^3$ showing the FOIL process:

$$(x+2)(x+2)(x+2)$$

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

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

$$\underline{x^3 + 2x^2 + 4x^2 + 8x + 4x + 8}$$

$$x^3 + 6x^2 + 12x + 8$$

You can try

(Answer will be on the next slide)

$$(x-3)(x-1)$$

You can try

(Answer to previous question)

$$(x-3)(x-1)$$

$$\underline{x^2} \quad \underline{-1x} \quad \underline{-3x} \quad \underline{+3}$$

collect like terms

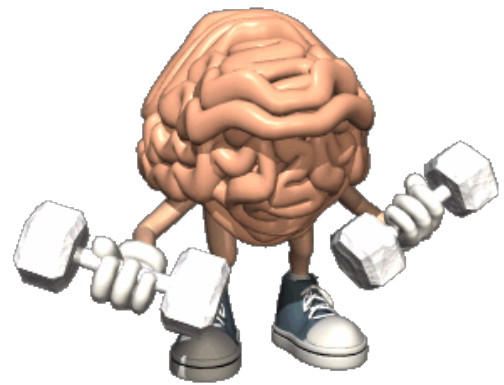
$$\underline{x^2} \quad \underline{-4x} \quad \underline{+3}$$

Want to try a harder one

Pause and Try

Expand and Simplify

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



Solution on next page

Expand and Simplify

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

$$(x-3)(x-3)$$

$$(x^2 - 3x - 3x + 9)$$

$$(x^2 - 6x + 9)$$

Solution to previous page

$$(x+2)(x+2)$$

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

$$-x^2 - 4x - 4$$

$$x^2 - x^2 \quad \underbrace{-6x - 4x}_{-10x} \quad \underbrace{+9 - 4}_{+5}$$

Some more for you to try

A little review



PAUSE and try (Solutions are on the next page)

- Prime factorization

Example: Prime factorization of 560

- Greatest Common Factor and LCM of

Example: 56, 72

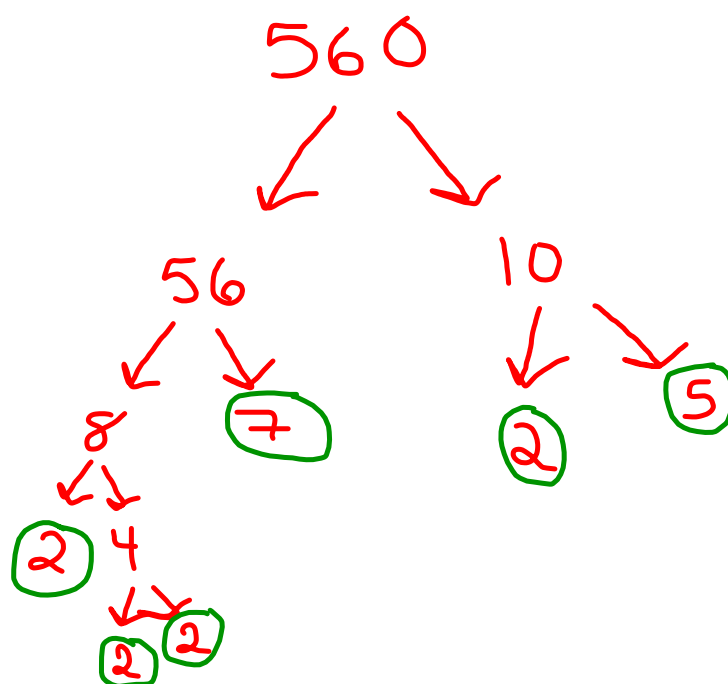
Factor ^{GCF}
Example: $(3xy + 6x^2y^3 - 24x)$

- Multiplying polynomials

Example: a) $3x(2x-7)$ b) $(5x+3)^2$

Solutions

Example: Prime factorization of 560



$$2^4 \times 7 \times 5$$

Prime factor
2, 7, 5

• Greatest Common Factor

Example: 56, 72

56

1, 56

2, 28

4, 14

7, 8

72

1, 72

2, 36

3, 24

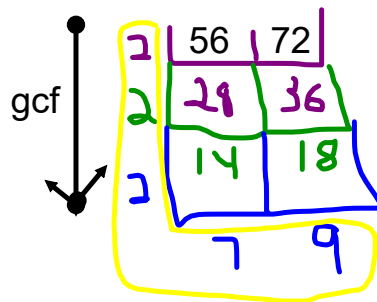
4, 18

6, 12

8, 9

GCF = 8

Ladder Method



$$\begin{aligned} \text{GCF}(56, 72) &= 2 \times 2 \times 2 \\ &= 8 \end{aligned}$$

$$\begin{aligned} \text{LCM}(56, 72) &= 2 \times 2 \times 2 \times 7 \times 9 \\ &= 504 \end{aligned}$$


Factor o

Example: $(3xy + 6x^2y^3 - 24x)$

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

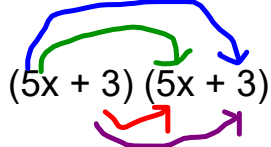
multiply polynomials

Example: a) $3x(2x-7)$



$$\underline{6x^2} - \underline{21x}$$

b) $(5x+3)^2$



$$\underline{25x^2} + \underline{15x} + \underline{15x} + \underline{9}$$

$$\underline{25x^2} + \underline{30x} + \underline{9}$$



Pick and choose which to try

Page 186-187

#4ab, 5ab, 8ab, 9acd

A

4. Expand and simplify.
- $(g + 1)(g^2 + 2g + 3)$
 - $(2 + t + t^2)(1 + 3t + t^2)$
 - $(2w + 3)(w^2 + 4w + 7)$
 - $(4 + 3n + n^2)(3 + 5n + n^2)$
5. Expand and simplify.
- $(2z + y)(3z + y)$
 - $(4f - 3g)(3f - 4g + 1)$
 - $(2a + 3b)(4a + 5b)$
 - $(3a - 4b + 1)(4a - 5b)$
 - $(2r + s)^2$
 - $(3t - 2u)^2$

B

6. a) Expand and simplify.
- $(2x + y)(2x + y)$
 - $(5r + 2s)(5r + 2s)$
 - $(6c + 5d)(6c + 5d)$
 - $(5v + 7w)(5v + 7w)$
 - $(2x - y)(2x - y)$
 - $(5r - 2s)(5r - 2s)$
 - $(6c - 5d)(6c - 5d)$
 - $(5v - 7w)(5v - 7w)$
- b) What patterns do you see in the factors and products in part a? Use these patterns to expand and simplify each product without using the distributive property.
- $(p + 3q)(p + 3q)$
 - $(2s - 7t)(2s - 7t)$
 - $(5g + 4h)(5g + 4h)$
 - $(10h - 7k)(10h - 7k)$
7. a) Expand and simplify.
- $(x + 2y)(x - 2y)$
 - $(3r - 4s)(3r + 4s)$
 - $(5c + 3d)(5c - 3d)$
 - $(2v - 7w)(2v + 7w)$
- b) What patterns do you see in the factors and products in part a? Use these patterns to expand and simplify each product without using the distributive property.
- $(11g + 5h)(11g - 5h)$
 - $(25m - 7n)(25m + 7n)$

8. Expand and simplify.
- $(3y - 2)(y^2 + y - 8)$
 - $(4r + 1)(r^2 - 2r - 3)$
 - $(b^2 + 9b - 2)(2b - 1)$
 - $(x^2 + 6x + 1)(3x - 7)$

9. Expand and simplify.
- $(x + y)(x + y + 3)$
 - $(x + 2)(x + y + 1)$
 - $(a + b)(a + b + c)$
 - $(3 + t)(2 + t + s)$

10. Expand and simplify.
- $(x + 2y)(x - 2y - 1)$
 - $(2c - 3d)(c + d + 1)$
 - $(a - 5b)(a + 2b - 4)$
 - $(p - 2q)(p + 4q - r)$

11. Find and correct the errors in this solution.
- $$\begin{aligned} &(2r - 3s)(r - 5s + 6) \\ &= 2r(r - 5s + 6) - 3s(r - 5s + 6) \\ &= 2r^2 - 5rs + 12r - 3rs - 15s^2 - 18s \\ &= 2r^2 - 8rs + 12r - 33s^2 \end{aligned}$$

12. The area of the base of a right rectangular prism is $x^2 + 3x + 2$. The height of the prism is $x + 7$. Write, then simplify an expression for the volume of the prism.

13. Expand and simplify. Substitute a number for the variable to check each product.
- $(r^2 + 3r + 2)(4r^2 + r + 1)$
 - $(2d^2 + 2d + 1)(d^2 + 6d + 3)$
 - $(4c^2 - 2c - 3)(-c^2 + 6c + 2)$
 - $(-4n^2 - n + 3)(-2n^2 + 5n - 1)$

14. Find and correct the errors in this solution.

$$\begin{aligned} &(3g^2 + 4g - 2)(-g^2 - g + 4) \\ &= -3g^4 - 3g^3 + 12g^2 - 4g^3 + 4g^2 + 8g \\ &\quad + 2g^2 + 2g + 8 \\ &= -3g^4 + 5g^3 + 6g^2 + 10g + 8 \end{aligned}$$

15. Expand and simplify.
- $(3s + 5)(2s + 2) + (3s + 7)(s + 6)$
 - $(2x + 3)(5x + 4) + (x - 4)(3x - 7)$
 - $(3m + 4)(m - 4n) + (5m - 2)(3m - 6n)$
 - $(4y - 5)(3y + 2) - (3y + 2)(4y - 5)$
 - $(3x - 2)^2 - (2x + 6)(3x - 1)$
 - $(2a + 1)(4a - 3) - (a - 2)^2$

3.7 Multiplying Polynomials, page 186

4. a) $g^3 + 3g^2 + 5g + 3$
 b) $2 + 7t + 6t^2 + 4t^3 + t^4$
 c) $2w^3 + 11w^2 + 26w + 21$
 d) $12 + 29n + 22n^2 + 8n^3 + n^4$
5. a) $6z^2 + 5zy + y^2$
 b) $12f^2 + 4f - 25fg - 3g + 12g^2$
 c) $8a^2 + 22ab + 15b^2$
 d) $12a^2 + 4a - 31ab - 5b + 20b^2$
 e) $4r^2 + 4rs + s^2$
 f) $9t^2 - 12tu + 4u^2$
6. a) i) $4x^2 + 4xy + y^2$
 ii) $25r^2 + 20rs + 4s^2$
 iii) $36c^2 + 60cd + 25d^2$
 iv) $25v^2 + 70vw + 49w^2$
 v) $4x^2 - 4xy + y^2$
 vi) $25r^2 - 20rs + 4s^2$
 vii) $36c^2 - 60cd + 25d^2$
 viii) $25v^2 - 70vw + 49w^2$
- b) i) $p^2 + 6pq + 9q^2$
 ii) $4s^2 - 28st + 49t^2$
 iii) $25g^2 + 40gh + 16h^2$
 iv) $100h^2 - 140hk + 49k^2$
7. a) i) $x^2 - 4y^2$ ii) $9r^2 - 16s^2$
 iii) $25c^2 - 9d^2$ iv) $4v^2 - 49w^2$
- b) i) $121g^2 - 25h^2$ ii) $625m^2 - 49n^2$
8. a) $3y^3 + y^2 - 26y + 16$
 b) $4r^3 - 7r^2 - 14r - 3$
 c) $2b^3 + 17b^2 - 13b + 2$
 d) $3x^3 + 11x^2 - 39x - 7$
9. a) $x^2 + 3x + 2xy + 3y + y^2$
 b) $x^2 + 3x + xy + 2y + 2$
 c) $a^2 + 2ab + b^2 + ac + bc$
 d) $3s + st + 5t + t^2 + 6$
10. a) $x^2 - x - 2y - 4y^2$
 b) $2c^2 + 2c - cd - 3d - 3d^2$
 c) $a^2 - 4a - 3ab + 20b - 10b^2$
 d) $p^2 + 2pq - 8q^2 - pr + 2qr$
11. $2r^2 - 13rs + 12r + 15s^2 - 18s$
12. $x^3 + 10x^2 + 23x + 14$
13. a) $4r^4 + 13r^3 + 12r^2 + 5r + 2$
 b) $2d^4 + 14d^3 + 19d^2 + 12d + 3$
 c) $-4c^4 + 26c^3 - c^2 - 22c - 6$
 d) $8n^4 - 18n^3 - 7n^2 + 16n - 3$
14. $-3g^4 - 7g^3 + 10g^2 + 18g - 8$

15. a) $9s^2 + 41s + 52$
 b) $13x^2 + 4x + 40$
 c) $18m^2 - 2m - 42mm - 4n$
 d) 0
 e) $3x^2 - 28x + 10$
 f) $7a^2 + 2a - 7$
16. a) $20 - 2x$
 b) $10 - 2x$
 c) $4x^2 - 60x + 200$
 d) $4x^3 - 60x^2 + 200x$
17. a) $27x^2 + 43x + 16$
 b) $x^2 + 2x - 2$
18. a) $x^3 - 6x^2 + 12x - 8$
 b) $8y^3 + 60y^2 + 150y + 125$
 c) $64a^3 - 144a^2b + 108ab^2 - 27b^3$
 d) $c^3 + 3c^2d + 3cd^2 + d^3$
19. a) $12a^3 + 2a^2 - 4a$
 b) $-6r^3 + 3r^2 + 3r$
 c) $40x^4 - 50x^3 + 15x^2$
 d) $-8x^3y - 10x^2y + 25xy$
 e) $4b^3 + 2b^2c - 2bc^2$
 f) $y^6 - y^2$
20. a) $(2x + 3)^3 = 8x^3 + 36x^2 + 54x + 27$
 b) $(2x + 3)^2 = 4x^2 + 12x + 9$

21. a) $6x^3 + 2x^2 - 128x - 160$
 b) $3b^3 - b^2 - 172b + 224$
 c) $18x^3 + 3x^2 - 88x - 80$
 d) $50a^3 - 235a^2 + 228a - 63$
 e) $8k^3 + 12k^2 - 18k - 27$
22. a) $x^3 + 3x^2y + 3xy^2 + y^3 + 3x^2 + 6xy + 3y^2 + 3x + 3y + 1$
 b) $x^3 - 3x^2y + 3xy^2 - y^3 - 3x^2 + 6xy - 3y^2 + 3x - 3y - 1$
 c) $x^3 + 3x^2y + 3xy^2 + y^3 + 3x^2z + 6xyz + 3y^2z + 3xz^2 + 3yz^2 + z^3$
 d) $x^3 - 3x^2y + 3xy^2 - y^3 - 3x^2z + 6xyz - 3y^2z + 3xz^2 - 3yz^2 - z^3$

3.8 Factoring Special Polynomials, page 194

4. a) $x^2 + 4x + 4$ b) $9 - 6y + y^2$
 c) $25 + 10d + d^2$ d) $49 - 14f + f^2$
 e) $x^2 - 4$ f) $9 - y^2$
 g) $25 - d^2$ h) $49 - f^2$
5. a) Difference of squares
 b) Neither
 c) Neither
 d) Perfect square trinomial