

MIXED PRACTICE: ON A SEPARATE SHEET/TABLE, factor each completely. If you get stuck on a problem, 1) identify the type, 2) find the guided notes for that type and watch the accompanying video(s), 3) get extra help with these problems.

- 1) $y^8 - 4$
- 2) $y^{3n} + 1$
- 3) $w(w - 2)^2 + 3(w - 2)^2$
- 4) $-9x^2 + 6x - 1$
- 5) $x^6 - 2x^3 - 35$
- 6) $7x - 32a + 28y - 8a$
- 7) $2(w + 2)^2 + 5(w + 2) - 3$
- 8) $18x^4y^5 + 36x^3y^7$
- 9) $-7a^2b^2 + 7$
- 10) $2m^4 - 2mn^3$
- 11) $2x^9 + 16$
- 12) $13x + 6 + 5x^2$
- 13) $b^1 + 22b^8 + 121$
- 14) $3x^2 + 20x + 12y^2$
- 15) $a^3x^3 - 5a^2x^2 + 9a$
- 16) $\frac{1}{8}x^2 - \frac{2}{9}x + 1$
- 17) $5y^2 - 9y - 2$
- 18) $5t^2 + 13t - 6$
- 19) $(y + 5)^2 - 2(y + 5) - 3$
- 20) $(m^2 - 8)^2 - 4(m^2 - 8) - 32$
- 21) $3(y - 1)^2 + 11(y - 1) - 20$
- 22) $12a^2 + 5a - 2b^2$
- 23) $x^4 - 6x^2 + 8$
- 24) $x^6 + 2x^3 - 3$

- Answers:
1. $(+2)(-2)$
 2. $(+1)(-)$
 3. $(-2)(+3)$
 4. $(-3)(-1)$
 5. $(-7)(+5)$
 6. $(+4)(7-8)$
 7. $(2+3)(+5)$
 8. $18(+2)$
 9. $-7(+1)(-1)$
 10. $2(-)(+)$
 11. $2(+2)(-2+4)$
 12. $(5+3)(+2)$
 13. $(+11)$
 14. $(3+2)(+6)$
 15. $(-5+9)$
 16. $- - 1$
 17. $(5+1)(-2)$
 18. $(5-2)(+3)$
 19. $(+2)(+6)$
 20. $(+4)(-4)(+2)(-2)$
 21. $(3-7)(+4)$
 22. $(4-)(3+2)$
 23. $(-2)(+2)(-2)$
 24. $(+3)(-1)(+1)$

PROBLEMS BY TYPE: (see guided videos links for help)

TYPE A: 8, 15

TYPE B: 1, 9

TYPE C: 2, 10, 11

TYPE D: 6

TYPE E: 4, 5, 12-14, 16-18, 22-24

TYPE F: 3, 7, 19-21

Guided Videos / Practice:

TYPE A. Factoring the **GCF** Video: <https://www.youtube.com/watch?v=3RJI PvX-3vg>

Determine the greatest common factor (GCF) of the given terms. The greatest common factor or GCF is the largest number that will divide into all the coefficients and the constant and uses the smallest exponent on the common variable(s).

ex: $36x^4 - 42x^3$

ex: $15x^3y^2 - 20x^2y^3 + 12x^4$

Factoring **Binomials**: Video: <https://www.youtube.com/watch?v=Rqu9KwjtVpl>

TYPE B: Factoring the sum/difference of squares

a. Factoring *difference of squares*

$$a^2x^2 - b^2$$
$$= (a + b)(a - b)$$

A.K.A. conjugate pairs

ex: $x^2 - 9$

ex: $81 - 16y^4$

ex: $(x + 2)^2 - y^2$

b. Factoring *sum of squares*

$$a^2x^2 + b^2$$

= prime in the real numbers' system

u **u - s**

aside: = $(a + b)(a - b)$ in complex numbers

ex: $9(x - 3)^2 + 16$

TYPE C: Factoring *difference/sum of cubes* (see video above)

$$a^3x^3 \pm b^3$$

S **O** **AP** = same, opposite, always positive

$$= (a \pm b)(a^2x^2 \mp a + b^2)$$

ex: $x^3 - 64$

ex: $8c^3 + 27$

ex: $1 - (x + 2)^3$

TYPE D: **Group Factoring** (four terms) Video: <https://www.youtube.com/watch?v=HnWkfSbAg9A>

- ✓ **Step 1:** Group the first two terms together and then the last two terms together.
- ✓ **Step 2:** Factor out a GCF from each separate binomial.
- ✓ **Step 3:** Factor out the common binomial.

ex: $a + b + a + b$

ex: $5x^3 + 15x^2 - 10x - 30$

TYPE E: **Factoring Trinomials**: Video: <https://www.youtube.com/watch?v=RCtqn4jtUVk&t=222s>

Video: perfect square trinomials <https://www.youtube.com/watch?v=xwVDcVNLxdY>

Video: quadratic form <https://www.youtube.com/watch?v=NRqFoo7eqrw>

a. Factoring $x^2 + b + c$

ex: $x^2 - 5x + 6$

ex: $-x^2 - x + 20$

b. Factoring $ax^2 + b + c$

ex: $5u^2 + 13u - 6$

ex: $-9z^2 + 3z + 2$

c. Factoring *perfect square trinomials* d. Factoring *quadratic form*

$$a^2x^2 \pm 2ax + b^2$$

ex: $x^2 - 8x + 16$

ex: $4x^2 - 20x + 25y^2$

higher order quadratics:

ex: $2c^6 - c^3 - 1$

TYPE F: **Factoring with a binomial factor**

Video: binomial factor <https://youtu.be/jlqE0MveYKM>

Video: factoring quadratic form with u-substitution <https://www.youtube.com/watch?v=DDtjs9-cdSE>

ex: $(z - 3)^2 - 5(z - 3) + 6$