



# CHRISTOPHER COLUMBUS

A Marist Brothers High School 1958

## Summer Assignment Mathematics Students entering Precalculus Honors

**Due Date: August 17, 2026**

### **Directions:**

- Complete this assignment **without a calculator**.
- Show all work neatly and circle your answers.
- Check your answers for each section before proceeding to the next section.
- Do not just copy the answers since answers without supporting work will **not** be given credit.
- If the concepts in a particular section are more challenging, you may want to seek additional resources for extra practice.

### **Grading and Mastery Testing:**

- The summer assignment is due August 17, 2026 on Oncampus in the folder.
- Late assignments will be accepted but will be penalized based on the number of days the assignment is late.
- The first two days of class students may ask questions and teacher will review summer assignment.
- At the end of the first week students will be expected to take a mastery test that will consist of problems similar to those in the summer assignment.
- Any student who does not earn a grade of at least 80% on the mastery test will be expected to do remediation problems for the first quarter along with the required Precalculus coursework.

### **Required Content:**

- Factoring (GCF, grouping, trinomials ( $a=1$ ,  $a \neq 1$ ), difference of squares, sum/difference Cubes)
- Solving quadratic equations (square root property, factoring method)

## Quick Review of Factoring:

### Factor by Grouping

Example:

$$6x^2 + 15x - 21$$

$$= 3(2x^2 + 5x - 7) \quad \text{1. Factor out Greatest Common Factor}$$

$$2x - 7 = -14 \quad +5$$

Find two numbers when multiplied get -14 and when added get +5

$$+7 \times -2 = -14$$

$$+7 + -2 = +5$$

Rewrite  $5x$  as  $-2x + 7x$

$$= 3(2x^2 - 2x + 7x - 7)$$

2. Split the middle term into two terms.

$$= 3[2x(x-1) + 7(x-1)] \quad \text{3. Rewrite the pairs of terms and take out the common factor.}$$

$$= 3(x-1)(2x+7)$$

### Factor Difference of Perfect Squares

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

Examples:

$$16x^2 - 25$$

$$= (4x)^2 - 5^2$$

$$= (4x + 5)(4x - 5)$$

$$3x^2 - 75y^2$$

$$= 3(x^2 - 25y^2)$$

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

$$= 3(x + 5y)(x - 5y)$$

# SUM AND DIFFERENCE OF TWO CUBES

## SUM OF TWO CUBES

**BOTH POSITIVE**

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

**DIFFERENT SIGNS**

**ALWAYS POSITIVE**

## Quick Examples

$$x^3 + 8 = (x + 2)(x^2 - 2x + 4)$$

$$27m^3 + n^3 = (3m + n)(9m^2 - 3mn + n^2)$$

## DIFFERENCE OF TWO CUBES

**BOTH NEGATIVE**

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

**DIFFERENT SIGNS**

**ALWAYS POSITIVE**

## Quick Examples

$$1 - 64y^3 = (1 - 4y)(1 + 4y + 16y^2)$$

$$j^3 - k^3 = (j - k)(j^2 + jk + k^2)$$

## Quick Review on Solving Quadratic Equations by factoring:

Solve:  $x^2 - x - 25 = 5$  ← Our equation is not equal to 0.

$x^2 - x - 25 - 5 = 5 - 5$	Before we can factor, we must set our equation equal to 0. Subtract 5 from both sides.
$x^2 - x - 30 = 0$	Now our equation is equal to 0. I can factor.
$(x - 6)(x + 5) = 0$	Factor: $x^2 - x - 30$
$x - 6 = 0$ or $x + 5 = 0$ $x = 6$ or $x = -5$	Set both factors equal to 0. (The zero-factor property)
<b>Check:</b> $x^2 - x - 25 = 5$ $6^2 - 6 - 25 = 5$ $36 - 6 - 25 = 5$ $5 = 5$ 😊	Substitute the two solutions into the original equation. 6 works! When I substituted, I got an answer of 5.
$x^2 - x - 25 = 5$ $(-5)^2 - (-5) - 25 = 5$ $25 + 5 - 25 = 5$ $5 = 5$ 😊	-5 works! When I substituted I got an answer of 5.

### Example #1

$$x^2 + 6x + 8 = 0$$

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$$(x+4)(x+2) = 0$$

$$\begin{array}{l} x+4=0 \quad x+2=0 \\ \begin{array}{cc} -4 & -4 \\ -2 & -2 \end{array} \\ x = -4 \quad x = -2 \end{array}$$

$$x = \{-4, -2\}$$

### Example #2

$$x^2 + 6x = 12$$

$$x^2 + 4x - 12 = 0$$

$$(x+6)(x-2) = 0$$

$$\begin{array}{l} x+6=0 \quad x-2=0 \\ \begin{array}{cc} -6 & -6 \\ +2 & +2 \end{array} \\ x = -6 \quad x = 2 \end{array}$$

$$x = \{-6, 2\}$$

### Example #3

$$2x^2 - x - 6 = 0$$

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$$(2x+3)(x-2) = 0$$

$$\begin{array}{l} 2x+3=0 \quad x-2=0 \\ \begin{array}{cc} 2x=-3 & +2 & +2 \\ x=-3/2 & x=2 \end{array} \end{array}$$

$$x = \{-\frac{3}{2}, 2\}$$

## 2024 Summer Assignment

**Factor each completely.**

1)  $36p^3 + 24p^2 + 54p + 36$

2)  $15v^3 - 12v^2 + 40v - 32$

3)  $28x^3 + 28x^2 - 49x - 49$

4)  $18m^3 - 15m^2 + 42m - 35$

5)  $4x^3 - 6x^2 + 10x - 15$

6)  $49v^3 - 7v^2 - 21v + 3$

7)  $20x^3 + 15x^2 - 32x - 24$

8)  $168k^3 + 96k^2 + 56k + 32$

9)  $35x^3 + 7x^2 - 15x - 3$

10)  $42x^3 + 63x^2 - 56x - 84$

11)  $50p^2 - 8$

12)  $8a^2 - 50$

13)  $125x^2 - 80$

14)  $75x^2 + 120x + 48$

15)  $36b^2 - 100$

16)  $m^2 + 8m + 16$

17)  $a^2 - 9$

18)  $50x^2 + 20x + 2$

19)  $45b^2 + 30b + 5$

20)  $25n^2 - 1$

21)  $32 + 108a^3$

22)  $x^3 + 125$

23)  $108x^3 + 4$

24)  $81 + 375x^3$

25)  $27a^3 + 125$

26)  $8x^3 + 27$

27)  $108a^3 + 32$

28)  $64 + 125m^3$

29)  $27x^3 + 64$

30)  $16m^3 + 2$

31)  $2m^4 + 4m^2 - 126$

32)  $4u^4 - 12u^2 - 160$

33)  $x^4 - 12x^2 + 32$

34)  $3x^4 - 36x^2 + 96$

35)  $a^4 - 11a^2 + 18$

36)  $x^4 - 10x^2 + 16$

37)  $x^4 - 12x^2 + 20$

38)  $x^4 + 6x^2 - 16$

39)  $x^4 - 15x^2 + 50$

40)  $x^4 - 9x^2 + 14$

41)  $3x^4 - 45x^3 + 150x^2$

42)  $n^2 + n - 90$

43)  $n^3 - 10n^2 + 9n$

44)  $5b^2 - 65b + 180$

45)  $a^2 + 5a - 6$

46)  $n^2 - 49$

47)  $p^2 - 6p$

48)  $5n^2 + 5n - 280$

49)  $5a^2 + 5a - 280$

50)  $v^3 - 8v^2 - 20v$

**Solve each equation by factoring.**

51)  $7x^2 - 5x = 0$

52)  $15x^2 + 40 = 49x$

$$53) 5a^2 - 30 = -19a$$

$$54) 7v^2 - 22v = 24$$

$$55) 7k^2 + 12 = 31k$$

$$56) 7a^2 + 49a = 0$$

$$57) k^2 = 2k$$

$$58) 7x^2 - 35x = 0$$

$$59) 5x^2 - 45 = 0$$

$$60) m^2 - 14m = -48$$

$$61) 7m^2 - 56m + 84 = 0$$

$$62) k^2 - 16k + 64 = 0$$

$$63) x^2 - 14x + 48 = 0$$

$$64) x^2 + x - 42 = 0$$

$$65) 7n^2 + 42n - 49 = 0$$

$$66) (a - 4)(8a - 5) = 0$$

$$67) (r - 4)(r - 1) = 0$$

$$68) r(r + 2) = 0$$

$$69) (6n - 1)(n - 1) = 0$$

$$70) x(3x - 4) = 0$$