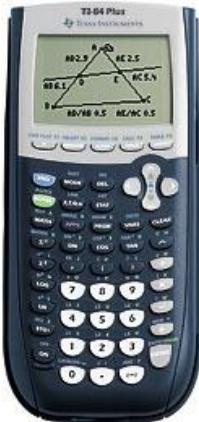
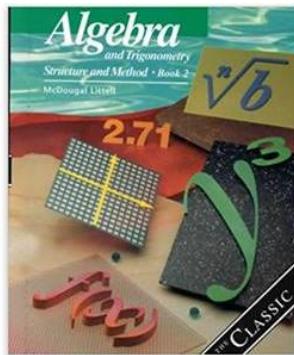


**The text...**

**Algebra and Trigonometry  
Structure and Method—Book 2**  
“The Classic”  
published by McDougall Littell



The class will use the TI-84 Plus graphing calculator. This calculator will get you through all classes at Altamont and is ACT/SAT approved. If you choose a higher version, please (1) keep the instruction manual, and (2) make sure it is ACT/SAT approved.

### **Summer Packet**

This summer math packet is intended to keep you brushed up on the important aspects of Algebra so we can move forward with the new material. I would not recommend working this all in one night, but rather a little at a time spread out over the summer.

### **WORK IS TO BE COMPLETED IN PENCIL.**

This will be turned in on day one as your first homework assignment. Please show your work! If you have any questions over the summer, I can be reached at [lottaviani-chacon@altamontschool.org](mailto:lottaviani-chacon@altamontschool.org).

## I. Properties of Rational Exponents

Simplify the expression. Write your answer using exponents.

1.  $8^2 \cdot 8^3$

2.  $(-3)^4(-3)^2$

3.  $(6^3)^5$

4.  $[(-2)^2]^5$

5.  $(16 \cdot 7)^4$

6.  $4^3 \cdot 4 \cdot 4^5$

7.  $\frac{9^{12}}{9^5}$

8.  $\frac{2^7 \cdot 2^8}{2^3}$

9.  $x^3 \cdot x^7$

10.  $-(x^7)^2$

11.  $(x^2)^4(3x^5)$

12.  $(3x^3)^2(2x)^3$

13.  $\frac{1}{x^2} \cdot x^{17}$

14.  $\left(-\frac{x^5}{2}\right)^4$

KEY CONCEPTFor Your Notebook

**Properties of Rational Exponents**

Let  $a$  and  $b$  be real numbers and let  $m$  and  $n$  be rational numbers. The following properties have the same names as those listed on page 330, but now apply to rational exponents as illustrated.

Property	Example
1. $a^m \cdot a^n = a^{m+n}$	$5^{1/2} \cdot 5^{3/2} = 5^{(1/2 + 3/2)} = 5^2 = 25$
2. $(a^m)^n = a^{mn}$	$(3^{5/2})^2 = 3^{(5/2 \cdot 2)} = 3^5 = 243$
3. $(ab)^m = a^m b^m$	$(16 \cdot 9)^{1/2} = 16^{1/2} \cdot 9^{1/2} = 4 \cdot 3 = 12$
4. $a^{-m} = \frac{1}{a^m}, a \neq 0$	$36^{-1/2} = \frac{1}{36^{1/2}} = \frac{1}{6}$
5. $\frac{a^m}{a^n} = a^{m-n}, a \neq 0$	$\frac{4^{5/2}}{4^{1/2}} = 4^{(5/2 - 1/2)} = 4^2 = 16$
6. $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$	$\left(\frac{27}{64}\right)^{1/3} = \frac{27^{1/3}}{64^{1/3}} = \frac{3}{4}$

**Simplify the expression. Write your answer using only positive exponents.**

15.  $(8x)^3 \cdot 8^{-4}$

16.  $2x^{-5} \cdot y^{-3}$

17.  $(4x^4y^{-3})^{-2}$

18.  $\frac{1}{(3x)^{-2}}$

**Answers**

1.  $8^5$

2.  $(-3)^6$

3.  $6^{15}$

4.  $(-2)^{10}$

5.  $16^4 \cdot 7^4$  or  $112^4$

6.  $4^9$

7.  $9^7$

8.  $2^{12}$

9.  $x^{10}$

10.  $-x^{14}$

11.  $3x^{13}$

12.  $72x^9$

13.  $x^{15}$

14.  $\frac{x^{20}}{16}$

15.  $\frac{x^3}{8}$

16.  $\frac{2}{x^5y^3}$

17.  $\frac{y^6}{16x^8}$

18.  $9x^2$

## II. Factoring Trinomials

Example 1: Factor  $x^2 + 10x + 24$

$$\begin{aligned}
 &= \underline{x^2 + 4x} + \underline{6x + 24} \\
 &= x(x+4) + 6(x+4) \quad \text{→ The GCF is now the binomial } (x+4) \\
 &= (x+4)(x+6)
 \end{aligned}$$

factor out the GCF from each pair.  
 These multiply to give us  $24x^2$  & add to give us  $10x$ .

Remember from Algebra I:

$$\begin{array}{c}
 24x^2 \\
 \diagdown \quad \diagup \\
 4x \quad 6x
 \end{array}$$

Example 2: Factor  $w^2 - 10w + 9$

$$\begin{aligned}
 &= \underline{w^2 - 9w} - \underline{w + 9} \\
 &= w(w-9) - 1(w-9) \\
 &= (w-9)(w-1)
 \end{aligned}$$

$$\begin{array}{c}
 w^2 - 10w + 9 \\
 \diagdown \quad \diagup \\
 -9w \quad -w
 \end{array}$$

Factor the trinomial.

1.  $x^2 + 10x + 16$

2.  $y^2 + 6y + 5$

$$3. \quad z^2 - 7z + 12$$

$$4. \quad x^2 - 10x - 11$$

$$5. \quad y^2 + 2y - 63$$

$$6. \quad z^2 - 5z - 36$$

$$7. \quad x^2 + 8x + 7$$

$$8. \quad b^2 - 7b + 10$$

$$9. \quad w^2 - 12w - 13$$

$$10. \quad p^2 + 10p + 25$$

$$11. \quad m^2 - 10m + 24$$

$$12. \quad y^2 - 5y - 24$$

$$13. \quad a^2 + 13a + 36$$

$$14. \quad n^2 + 2n - 48$$

$$15. \quad z^2 - 14z + 40$$

Example 3: Solve the equation  $n^2 - 4n = 21$ .

$$\begin{aligned} n^2 - 4n - 21 &= 0 \\ n^2 - 7n + \underline{3n - 21} &= 0 \\ n(n-7) + 3(n-7) &= 0 \\ (n-7)(n+3) &= 0 \\ n-7=0 &\quad \text{or} \quad n+3=0 \\ n=7 &\quad \text{or} \quad n=-3 \end{aligned}$$

$\begin{array}{c} -2 | n^2 \\ \swarrow \quad \searrow \\ -7n \quad 3n \end{array}$

**Solve the equation.**

16.  $x^2 + 30 = 11x$

**Answers**

1.  $(x + 8)(x + 2)$

2.  $(y + 5)(y + 1)$

3.  $(z - 3)(z - 4)$

4.  $(x + 1)(x - 11)$

5.  $(y - 7)(y + 9)$

6.  $(z + 4)(z - 9)$

7.  $(x + 7)(x + 1)$

8.  $(b - 5)(b - 2)$

9.  $(w - 13)(w + 1)$

10.  $(p + 5)^2$

11.  $(m - 6)(m - 4)$

12.  $(y - 8)(y + 3)$

13.  $(a + 9)(a + 4)$

14.  $(n - 6)(n + 8)$

15.  $(z - 10)(z - 4)$

16. 6, 5

### **III. Factor the trinomial when $a$ is not 1**

**Factor the trinomial. Remember to factor out a GCF and/or negative one if the first term is negative.**

1.  $-x^2 - 3x + 28$

2.  $-p^2 + 8p - 12$

3.  $-m^2 - 13m - 40$

4.  $2y^2 + 15y + 7$

5.  $3a^2 - 13a + 4$

6.  $5d^2 - 18d - 8$

7.  $6c^2 + 7c + 2$

8.  $10n^2 - 26n + 12$

$$9. \quad 12w^2 + 8w - 15$$

$$10. \quad -2b^2 - 5b + 12$$

$$11. \quad -3r^2 - 17r - 10$$

$$12. \quad -4s^2 + 6s + 4$$

### Answers

$$1. \quad -(x - 4)(x + 7)$$

$$2. \quad -(p - 2)(p - 6)$$

$$3. \quad -(m + 8)(m + 5)$$

$$4. \quad (2y + 1)(y + 7)$$

$$5. \quad (3a - 1)(a - 4)$$

$$6. \quad (5d + 2)(d - 4)$$

$$7. \quad (3c + 2)(2c + 1)$$

$$8. \quad 2(5n - 3)(n - 2)$$

$$9. \quad (2w + 3)(6w - 5)$$

$$10. \quad -(b + 4)(2b - 3)$$

$$11. \quad -(r + 5)(3r + 2)$$

$$12. \quad -2(s - 2)(2s + 1)$$

#### IV. Adding Fractions with Unlike Denominators

Example 1: Add  $\frac{2}{3} + \frac{1}{4}$

$$\begin{aligned}\frac{2 \cdot 4}{3 \cdot 4} + \frac{1 \cdot 3}{4 \cdot 3} &= \frac{8}{12} + \frac{3}{12} \\ &= \frac{11}{12}\end{aligned}$$

Example 2: Add  $\frac{1}{8} + \frac{3}{4}$

$$\begin{aligned}\frac{1}{8} + \frac{3 \cdot 2}{4 \cdot 2} &= \frac{1}{8} + \frac{6}{8} \\ &= \frac{7}{8}\end{aligned}$$

Add. Write in simplest form.

1.  $\frac{1}{2} + \frac{1}{3}$

2.  $\frac{3}{8} + \frac{1}{4}$

3.  $\frac{2}{5} + \frac{3}{10}$

4.  $\frac{2}{3} + \frac{1}{4}$

5.  $\frac{2}{7} + \frac{2}{3}$

6.  $\frac{1}{6} + \frac{5}{9}$

$$7. \quad \frac{3}{4} + \frac{7}{12}$$

$$8. \quad \frac{3}{4} + \frac{2}{6}$$

$$9. \quad \frac{4}{8} + \frac{6}{12}$$

$$10. \quad \frac{3}{5} + \frac{2}{7}$$

$$11. \quad \frac{1}{3} + \frac{5}{8}$$

$$12. \quad \frac{3}{7} + \frac{10}{12}$$

### **Answers**

$$1. \quad \frac{5}{6}$$

$$2. \quad \frac{5}{8}$$

$$3. \quad \frac{7}{10}$$

$$4. \quad \frac{11}{12}$$

$$5. \quad \frac{20}{21}$$

$$6. \quad \frac{13}{18}$$

$$7. \quad 1\frac{1}{3}$$

$$8. \quad 1\frac{1}{12}$$

$$9. \quad 1$$

$$10. \quad \frac{31}{35}$$

$$11. \quad \frac{23}{24}$$

$$12. \quad 1\frac{11}{42}$$

## V. Add and Subtract Rational Expressions

**Example 1:** Add and Subtract with the same denominator

$$\text{a. } \frac{2}{5x} + \frac{8}{5x} = \frac{10}{5x} \\ = \frac{2}{x}$$

$$\text{b. } \frac{11r}{r-7} - \frac{3r-5}{r-7} = \frac{11r-3r+5}{r-7} \\ = \frac{8r+5}{r-7}$$

Find the sum or difference.

$$1. \quad \frac{x+3}{7x} + \frac{x-2}{7x}$$

$$2. \quad \frac{5x+7}{3x-4} - \frac{2x-9}{3x-4}$$

**Example 2:** Find the LCD of rational expressions

$$\text{a. } \frac{3x}{x^2-5x+6}, \quad \frac{x+2}{x^2-7x+10} \\ (\underline{x-3})(\underline{x-2}) \quad (\underline{x-5})(\underline{x-2})$$

$$\text{LCD: } (x-2)(x-3)(x-5)$$

$$\text{b. } \frac{1}{2x-1}, \quad \frac{7}{4x-5}$$

$$\text{LCD: } (2x-1)(4x-5)$$

Find the LCD of the rational expressions.

$$3. \quad \frac{3}{10x^2}, \quad \frac{x+7}{15x^5}$$

$$4. \quad \frac{9}{3x-1}, \quad \frac{2x}{x+6}$$

$$5. \quad \frac{8x}{(x+5)^2}, \quad \frac{4x+1}{x^2+8x+15}$$

**Example 3: Add expressions with different denominators.**

$$\frac{\frac{11}{12x^2} + \frac{15}{16x^5}}{\text{LCD: } \frac{4 \cdot 3 \cdot x^2}{4 \cdot 4 \cdot x^2 \cdot x^3}}$$

$$\begin{aligned} &= \frac{\frac{11}{12x^2} \cdot 4x^3}{12x^2 \cdot 4x^3} + \frac{\frac{15}{16x^5} \cdot 3}{16x^5 \cdot 3} \\ &= \frac{44x^3}{48x^5} + \frac{45}{48x^5} \\ &= \frac{44x^3 + 45}{48x^5} \end{aligned}$$

**Example 4: Subtract expressions with different denominators.**

$$\begin{aligned} \frac{12}{x+2} - \frac{4x}{x-3} &= \frac{12(x-3)}{(x+2)(x-3)} - \frac{4x(x+2)}{(x-3)(x+2)} \\ &= \frac{12x-36 - 4x^2 - 8x}{(x+2)(x-3)} \\ &= \frac{-4x^2 + 4x - 36}{(x+2)(x-3)} \\ &= \frac{-4(x^2 - x + 9)}{(x+2)(x-3)} \end{aligned}$$

You want to  
factor at the end  
to see if you can  
simplify.

**Find the sum or difference.**

6.  $\frac{7}{18r^2} + \frac{12}{9r^3}$

7.  $\frac{x}{x^2-2x-15} + \frac{3}{x^2-9}$

$$8. \quad \frac{t+1}{t-7} - \frac{t-2}{t+3}$$

$$9. \quad \frac{11}{2x} + \frac{4}{7x}$$

$$10. \quad \frac{8}{3x^3} - \frac{5}{12x}$$

$$11. \quad \frac{8x}{x-5} - \frac{3x}{x+2}$$

$$12. \quad \frac{x}{6x-5} + \frac{1}{5x-3}$$

$$13. \quad \frac{4}{x^2-7x} - \frac{3}{x}$$

$$14. \quad \frac{5}{x^2} + \frac{x+3}{x-1}$$

$$15. \quad \frac{x+3}{x-1} + \frac{x+2}{x+1}$$

$$16. \quad \frac{2x}{x^2-3x} + \frac{x+4}{x-3}$$

$$17. \quad \frac{1}{x^2+5x+4} - \frac{1}{x^2-16}$$

**Answers**

$$1. \quad \frac{2x+1}{7x}$$

$$2. \quad \frac{3x+16}{3x-4}$$

$$3. \quad 30x^5$$

$$4. \quad (3x-1)(x+6)$$

$$5. \quad (x+5)^2(x+3)$$

$$6. \quad \frac{7r+24}{18r^3}$$

$$7. \quad \frac{x^2-15}{(x+3)(x-3)(x-5)}$$

$$8. \quad \frac{13t-11}{(t-7)(t+3)}$$

$$9. \quad \frac{85}{14x}$$

$$10. \quad \frac{32-5x^2}{12x^3}$$

$$11. \quad \frac{x(5x+31)}{(x-5)(x+2)}$$

$$12. \quad \frac{5x^2+3x-5}{(6x-5)(5x-3)}$$

$$13. \quad \frac{-3x+25}{x(x-7)}$$

$$14. \quad \frac{x^3+3x^2+5x-5}{x^2(x-1)}$$

$$15. \quad \frac{2x^2+5x+1}{(x-1)(x+1)}$$

$$16. \quad \frac{(x+6)}{(x-3)}$$

$$17. \quad \frac{-5}{(x+1)(x+4)(x-4)}$$