S. I. C. S. PAK

Series: Explorations
Grade: 9
Number: CM1-725
Cluster: Consumer and Homemaking Education Related Occupations
Area: Consumerism
Title: Little Bitty Pieces
By: H. Burton Tingle
Sahuarita High School
Date: May, 1972
This is a volume of teacher-developed units to supplement the textbook in a first-year algebra course. The unit consist mainly of statements of objectives and student worksheet: with some examples and references to the textbook given as aids. Major topics covered are basic operations with signed rational numbers and with polynomials, factorization of natural numbers and polynomials, solution of first and second degree equations, graphing, and radicals. Related volumes in the series are SE 016 615, SE 016 616, and SE 016 618. (LS)
Activity

1. Give 6 fractions that are equal to each of the fractions below.
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Title: Little Bitty Pieces

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COURSE TITLE: ALGEBRA

Objectives:

1. Given any set of numbers to be added and/or subtracted and/or multiplied and/or divided, you should be able to give the correct answer with 90% accuracy—whether they have grouping symbols or not.

2. You should be able to give in writing the correct definition of a variable.

3. Given a set of equations with one variable, you should be able to tell what number the variable stands for with 90% accuracy.

4. Given a set of equations with 2 or more variables and the numbers the variables represents, you should be able to give the value of the expression with 90% accuracy.

5. Given a set of variables, you should be able to add and subtract them with 80% accuracy.

6. You should be able to add, subtract, multiply, and divide signed numbers with 90% accuracy.

7. You should be able to find the absolute of a set of integers with 95% accuracy.

8. Given any set of equations with only one variable and that variable in the first degree only, and all numbers being rational, you should be able to find the solutions with 80% accuracy.
9. You should be able to add, subtract, multiply and divide signed numbers with 90% accuracy.

10. You should be able to find the absolute of a set of integers with 95% accuracy.

11. Given any set of polynomials, you should be able to add them together with 80% accuracy.

12. Given any set of polynomials, you should be able to subtract them with 80% accuracy.

13. Given any set of polynomials, you should be able to multiply them with 80% accuracy.

14. Given any set of polynomials, you should be able to divide them with 80% accuracy.

15. Given any set of algebraic fractions, you should be able to add, subtract, multiply or divide them with 80% accuracy.

16. Given any set of algebraic fractions, you should be able to reduce them to lowest terms with 90% accuracy.

17. Given any set of real number, you should be able to express them in simplest radical form with 80% accuracy.

18. Given any set of real numbers, you should be able to add, subtract, multiply and divide them; and give the answer in simplest terms with 80% accuracy.

19. Given any set of points, you should be able to graph them on a rectangular coordinate system with 90% accuracy.

20. Given any set of equations of lines in two dimensions, you should be able to graph them with 90% accuracy.

21. Given any set of equations of lines in two dimensions, you should be able to identify the slope and the intercept with 80% accuracy.
22. Given any quadratic equation with rational co-efficients, you should be able to find the solutions with 80% accuracy.

23. Given any set of pairs of linear equations you should be able to solve them simultaneously with 80% accuracy.

24. Given any pair of linear equations, you should demonstrate your knowledge of addition method by using it to find the correct solution.

25. Given any pair of linear equations, you should demonstrate your knowledge of Cramer’s Rule by using it to find the correct solution.
OBJECTIVES

1. Given any fraction, you should be able to write at least 5 other fractions that mean the same thing as the given fraction.

2. Given any geometric figure with equal dividing marks on it, you should be able to shade in any given fractional part with 90% accuracy.

3. Given any quantity of objects, you should be able to write down how many objects are in any given fractional part of the total quantity with 90% accuracy.

4. Given any fractions in which the numerator and denominator are less than 10,000, you should be able to reduce the fraction to lowest terms with 90% accuracy.

5. Given any positive whole number, you should be able to give its prime factorization with 100% accuracy.

6. Given any set of polynomials in which each term has a common factor, you should be able to factor out that largest common factor with 90% accuracy.

7. Given any set of polynomials which are represented as the difference of 2 squares, you should be able to factor them with 90% accuracy.

8. Given any set of polynomials which are perfect square trinomials, you should be able to factor them with 90% accuracy.

9. Given any set of polynomials which factor as the product of 2 binomials, you should be able to find those factors with 80% accuracy.

10. Given any quadratic equation with rational coefficients, you should be able to find the solutions with 80% accuracy.

11. Given any fraction, you should be able to write it as a decimal number with 90% accuracy.

12. Given any decimal number, you should be able to write it as a fraction in lowest terms with 90% accuracy.
RATIONALE

It would be nice if all our figuring could be done with whole numbers; but many times, we need to talk about parts of things—like part of a dollar, part of a day, pieces of a pie, etc., etc. As a matter of fact, we would probably use pieces or parts more than whole numbers.

Therefore, as a consumer, FRACTIONS are of great importance.

BEHAVIORAL OBJECTIVES

1. Given any fraction, you should be able to write at least 5 other fractions that mean the same thing as the given fraction.

2. Given any geometric figure with equal dividing marks on it, you should be able to shade in any given fractional part with 90% accuracy.

3. Given any quantity of objects, you should be able to write down how many objects are in any given fractional part of the total quantity with 90% accuracy.

4. Given any fractions in which the numerator and denominator are less than 10,000, you should be able to reduce the fraction to lowest terms with 90% accuracy.
Pre-Test

1. Write 5 fractions that are equal to \( \frac{1}{2} \).

2. Write 5 fractions that are equal to \( \frac{2}{3} \).

3. Reduce these fractions to lowest terms.

\[
\frac{2}{10} \quad \frac{6}{10} \quad \frac{6}{8} \quad \frac{15}{20}
\]

4. Shade in \( \frac{1}{2} \) of the following figure.

5. Shade in \( \frac{1}{3} \) of the following figure.

6. Shade in \( \frac{3}{4} \) of the following figure.

7. Draw a circle around \( \frac{1}{2} \) of the circle below.

\[
\circ \quad \circ \quad \circ \quad \circ \quad \circ \quad \circ
\]

8. Draw a circle around \( \frac{2}{5} \) of the squares below.

\[
\square \quad \square \quad \square \quad \square \quad \square \quad \square \quad \square \quad \square \quad \square \quad \square \quad \square
\]

9. \( \frac{1}{2} \) of 20 = __

10. \( \frac{3}{4} \) of 12 = __

11. \( \frac{3}{5} \) of 20 = __

12. \( \frac{5}{6} \) of 24 = __

You must get 13 correct to skip over this package.
Activity

FRACTION is the word we use to denote a part of something. A fraction is written using 2 numbers, one above the other. The bottom number is the denominator and indicates how many equal parts the whole quantity is to be divided into. The top number is called the numerator and indicates how many of the equal parts are being talked about.

Example 1: \( \frac{1}{2} \) means that there are 2 equal parts and that we are considering 1 of them.

Then, \( \frac{1}{2} \) of \[ \square \] is \[ \square \] dividing it into 2 equal parts and taking 1 of them.

\( \frac{1}{2} \) of 8 = 4 because 8 divided into 2 equal parts gives 4 in each part and one of the gives 4.

Example 2: \( \frac{2}{3} \) means that there are 3 equal parts and we are considering 2 of them.

\( \frac{2}{3} \) of \[ \bigcirc \] is \[ \bigcirc \] dividing it into 3 equal parts and taking 2 of them.

\( \frac{2}{3} \) of 12 = 8 because 12 divided into 3 equal parts gives 4 in each part and 2 of them gives 8.
Use your pencil to shade one-half \( \frac{1}{2} \) of each of the figures.
Draw a circle around half of each of the sets below.

1. \[ \begin{array}{cccc}
    \bigcirc & \bigcirc & \bigcirc & \bigcirc \\
\end{array} \]

2. \[ \begin{array}{cccccc}
    \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc \\
\end{array} \]

3. \[ \begin{array}{cccc}
    \square & \square & \square & \square \\
\end{array} \]

4. \[ \begin{array}{cccc}
    \hexagon & \hexagon & \hexagon & \hexagon \\
\end{array} \]

5. \[ \begin{array}{ccccccc}
    \hexagon & \hexagon & \hexagon & \hexagon & \hexagon & \hexagon & \hexagon \\
\end{array} \]

6. \[ \begin{array}{cccc}
    \bigcirc & \bigcirc & \bigcirc & \bigcirc \\
\end{array} \]

7. \[ \begin{array}{cccc}
    \triangle & \triangle & \triangle & \triangle \\
\end{array} \]

8. \[ x x x x x x x x x x x x x \]

Using the information that you obtained above, answer the following questions.

9. \( \frac{1}{2} \) of 4 =

10. \( \frac{1}{2} \) of 6 =

11. \( \frac{1}{2} \) of 8 =

12. \( \frac{1}{2} \) of 10 =

13. \( \frac{1}{2} \) of 2 =

14. \( \frac{1}{2} \) of 12 =

15. \( \frac{1}{2} \) of 14 =

16. \( \frac{1}{2} \) of 18 =
ACTIVITY

1. $\frac{1}{2}$ of 20 = 
2. $\frac{1}{2}$ of 10 = 
3. $\frac{1}{3}$ of 30 = 
4. $\frac{1}{4}$ of 16 = 
5. $\frac{1}{5}$ of 20 = 
6. $\frac{1}{6}$ of 24 = 
7. $\frac{1}{7}$ of 14 = 
8. $\frac{1}{8}$ of 16 = 
9. $\frac{1}{9}$ of 18 = 
10. $\frac{1}{10}$ of 100 = 
11. $\frac{1}{11}$ of 22 = 
12. $\frac{1}{12}$ of 12 = 
13. $\frac{3}{12}$ of 12 = 
14. $\frac{5}{12}$ of 12 = 
15. $\frac{2}{3}$ of 30 = 
16. $\frac{3}{4}$ of 16 = 
17. $\frac{2}{5}$ of 20 = 
18. $\frac{5}{6}$ of 24 = 
19. $\frac{3}{7}$ of 14 = 
20. $\frac{5}{8}$ of 16 = 
21. $\frac{4}{9}$ of 18 = 
22. $\frac{3}{10}$ of 100 = 
23. $\frac{4}{11}$ of 22 = 
24. $\frac{7}{12}$ of 12 =
As you can see, the same amount of each figure has been shaded in. This means that $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, and $\frac{4}{8}$ are really the same fraction but have different "names". Then, which one shall we use?

In giving an answer, we will agree to use $\frac{1}{2}$, because it is in "lowest terms", and the others are not.
ACTIVITY

Use these figures to find 3 other names for the lowest terms fraction $\frac{1}{3}$

\[
\begin{align*}
\frac{1}{3} & \\
\end{align*}
\]

Use these figures to find 3 other names for the lowest terms fraction $\frac{1}{4}$

\[
\begin{align*}
\frac{1}{4} & \\
\end{align*}
\]

Use these figures to find 3 other names for the lowest terms fraction $\frac{2}{3}$

\[
\begin{align*}
\frac{2}{3} & \\
\end{align*}
\]
Activity

1. Give 6 fractions that are equal to each of the fractions below:

\[
\frac{1}{2}, \frac{1}{3}, \frac{3}{4}, \frac{2}{5}, \frac{3}{7}, \frac{4}{5}, \frac{7}{16}
\]
Suppose you had a fraction like $\frac{4}{8}$, $\frac{3}{12}$, $\frac{5}{30}$, $\frac{54}{96}$ etc. and you wanted to know what the lowest terms fraction was without using a picture. Or, say you had a fraction and you didn't know if it was in lowest terms or not.

We can find the answer by reducing the fraction. There are two ways to reduce fractions. One is by division, and the other is by prime factorization.

**Example 1:** Reduce $\frac{4}{8}$ to lowest terms. Find the largest number that will divide into 8 and 4. The number is 4. 4 goes into 4 1 time, and 4 goes into 8 2 times, so $\frac{4}{8} = \frac{1}{2}$.

**Example 1a:** Reduce $\frac{4}{8}$ to lowest terms. The prime factorization of 4 = 2 x 2, and the prime factorization of 8 = 2 x 2 x 2. Now you already know that $\frac{2}{2} = 1$ so you get $\frac{1}{2}$ again. $\frac{4}{8} = \frac{2 \times 2}{2 \times 2 \times 2} = \frac{1 \times 1 \times 1}{1 \times 1 \times 2} = \frac{1}{2}$

**Example 2:** Reduce $\frac{18}{44}$ to lowest terms. The largest number that will go into 18 and 24 is 6. 6 goes into 18 3 times and 6 goes into 24 4 times so $\frac{18}{24} = \frac{3}{4}$ in lowest terms.
Example 2a: Reduce $\frac{18}{24}$ to lowest terms, by using prime factorization.

\[
\frac{18}{24} = \frac{2 \times 3 \times 3}{2 \times 2 \times 2 \times 3} = \frac{3}{4}
\]

Reduce each of these fractions showing both methods.

1. $\frac{7}{14}$

2. $\frac{8}{14}$

3. $\frac{50}{85}$

4. $\frac{12}{18}$

5. $\frac{18}{45}$

6. $\frac{40}{175}$

7. $\frac{36}{90}$

8. $\frac{34}{51}$

9. $\frac{21}{49}$

10. $\frac{22}{77}$
Reduce each fraction to lowest terms by the prime factorization method. Show all work.

1. \(\frac{2}{4}\)  
2. \(\frac{3}{6}\)  
3. \(\frac{4}{4}\)  
4. \(\frac{5}{15}\)  
5. \(\frac{6}{10}\)  
6. \(\frac{15}{20}\)  
7. \(\frac{16}{20}\)  
8. \(\frac{18}{27}\)  
9. \(\frac{20}{24}\)  
10. \(\frac{7}{21}\)  
11. \(\frac{8}{16}\)  
12. \(\frac{6}{14}\)  
13. \(\frac{8}{30}\)  
14. \(\frac{10}{50}\)  
15. \(\frac{26}{39}\)  
16. \(\frac{45}{72}\)  
17. \(\frac{100}{345}\)  
18. \(\frac{45}{70}\)  
19. \(\frac{550}{700}\)  
20. \(\frac{87}{117}\)  
21. \(\frac{98}{147}\)  
22. \(\frac{56}{1000}\)  
23. \(\frac{63}{144}\)  
24. \(\frac{90}{711}\)
Shade in $\frac{1}{2}$ of the circles below.

Shade in $\frac{3}{4}$ of the squares below.

Shade in $\frac{1}{3}$ of the circles below.

Shade in $\frac{3}{4}$ of the circles below.

Shade in $\frac{5}{6}$ of the hexagons below.
ACTIVITY

Change each improper fraction to a mixed number or a whole number.

1. \(\frac{17}{5}\)  
2. \(\frac{3}{2}\)  
3. \(\frac{8}{3}\)  
4. \(\frac{9}{4}\)  
5. \(\frac{7}{2}\)  
6. \(\frac{5}{2}\)  
7. \(\frac{18}{9}\)  
8. \(\frac{12}{5}\)  
9. \(\frac{22}{3}\)  
10. \(\frac{11}{3}\)

Change each mixed number to an improper fraction.

11. \(3\frac{1}{2}\)  
12. \(4\frac{1}{4}\)  
13. \(9\frac{1}{2}\)  
14. \(1\frac{5}{8}\)  
15. \(1\frac{2}{3}\)  
16. \(7\frac{3}{4}\)  
17. \(11\frac{1}{4}\)  
18. \(12\frac{1}{2}\)  
19. \(2\frac{3}{8}\)  
20. \(8\frac{2}{3}\)
SERIES: Exploration
GRADE: 9
NUMBER: GM1-729
CLUSTER: Consumer and Homemaking Education Related Occupations
AREA: Consumerism
TITLE: It's got a Dot
BY: H. Burton Tingle
SAHUARITA HIGH SCHOOL
DATE: May, 1972
RATIONALE

Since our money system is in decimals, and money is the basis for all our consumerism, it seems that knowledge of decimals is of maximum importance. Why, even your car’s speedometer (Odometer) is calibrated in decimals.

Decimals will become even more important when the United States takes on the metric system of measurement.

In this package, you will be introduced to decimals.

BEHAVIORAL OBJECTIVES

1. Given any fraction, you should be able to write it as a decimal number with 90% accuracy.

2. Given any decimal number, you should be able to write it as a fraction in lowest terms with 90% accuracy.
PRE-TEST

1. Write $\frac{3}{10}$ as a decimal

2. Write $\frac{2}{100}$ as a decimal

3. Write $\frac{35}{100}$ as a decimal

4. Write $1\frac{5}{10}$ as a decimal

5. Write $\frac{223}{1000}$ as a decimal

6. Write $14\frac{5}{1000}$ as a decimal

7. Write $.5$ as a fraction in lowest terms.

8. Write $.063$ as a fraction in lowest terms.

9. Write $\frac{1}{4}$ as a decimal

10. Write $\frac{3}{5}$ as a decimal

(you must get 9 correct to skip over this package)
INFORMATION SOURCES

1. Listen to the teacher presentation and/or

2. Read INTRODUCTION TO SECONDARY SCHOOL MATHEMATICS
   Volume 1, part II Unit 38, chapter 9

If you still have trouble or need extra practice, consult the following books.

A. INTRODUCTION TO SECONDARY SCHOOL MATHEMATICS p. 309-315
B. MAKING MATHEMATICS WORK p. 83-85
C. FUNDAMENTALS OF MATHEMATICS p. 125-129
We have special notation for fractions with denominators which are powers of 10. They are written with a dot called a decimal point. Numbers that are written this way are called decimal numbers—or just decimals.

Example 1: \(\frac{2}{10}\) is written .2

Example 2: \(\frac{23}{100}\) is written .23

Example 3: \(\frac{471}{1000}\) is written .471

Example 4: \(\frac{5}{100}\) is written .05

Write each of the following fractions as decimal numbers.

1. \(\frac{5}{10}\)
2. \(\frac{7}{10}\)
3. \(\frac{141}{10}\)
4. \(\frac{62}{100}\)
5. \(\frac{4}{100}\)
6. \(\frac{6}{1000}\)
7. \(\frac{51}{100}\)
8. \(\frac{17}{1000}\)
9. \(\frac{89}{10}\)
10. \(\frac{3426}{10}\)
11. \(\frac{404}{100}\)
12. \(\frac{6014}{100}\)
Write these decimal numbers as fractions with denominators which are powers of 10.

1. \( \frac{3}{10} \)
2. \( \frac{3}{100} \)
3. \( \frac{72}{1000} \)
4. \( \frac{72}{1000} \)
5. \( \frac{734}{1000} \)
6. \( \frac{26}{1000} \)
7. \( \frac{675}{1000} \)
8. \( \frac{404}{10000} \)
9. \( \frac{444}{1000} \)
10. \( \frac{888888}{1000000} \)
11. \( \frac{367432}{1000000} \)
12. \( \frac{677864}{1000000} \)

Write these decimal numbers as lowest term fractions.

13. \( \frac{6}{10} \)
14. \( \frac{45}{100} \)
15. \( \frac{2}{10} \)
16. \( \frac{8}{10} \)
17. \( \frac{80}{100} \)
18. \( \frac{800}{1000} \)
19. \( \frac{4}{10} \)
20. \( \frac{40}{100} \)
21. \( \frac{400}{1000} \)
22. \( \frac{45}{10} \)
23. \( \frac{1010}{100} \)
24. \( \frac{765}{100} \)
ACTIVITY

Write these words as decimal numbers.

1. two-tenths
2. six and seven-tenths
3. nineteen and thirteen-hundredths
4. forty six and five-hundredths
5. four hundred twenty and nine-thousandths

Change these fractions to fractions with a denominator of 10 or 100, then express it as a decimal.

1. \( \frac{1}{2} = \_\_\_ \) = \( \frac{3}{4} = \_\_\_ \) = \( \frac{7}{20} = \_\_\_ \) = \( \frac{11}{20} = \_\_\_ \)
2. \( \frac{1}{5} = \_\_\_ \) = \( \frac{3}{5} = \_\_\_ \) = \( \frac{4}{5} = \_\_\_ \) = \( \frac{1}{4} = \_\_\_ \) = \( \frac{1}{25} = \_\_\_ \) = \( \frac{1}{20} = \_\_\_ \)
3. \( \frac{1}{10} \) = \( \frac{3}{10} = \_\_\_ \) = \( \frac{4}{10} = \_\_\_ \) = \( \frac{5}{10} = \_\_\_ \)
4. \( \frac{7}{100} \) = \( \frac{1}{100} \) = \( \frac{1}{100} \) = \( \frac{1}{100} \) = \( \frac{1}{100} \) = \( \frac{1}{100} \) = \( \frac{1}{100} \) = \( \frac{1}{100} \) = \( \frac{1}{100} \) = \( \frac{1}{100} \) = \( \frac{1}{100} \)
RATIONAL

There are two main reasons why we need to factor polynomials: one is for finding the solutions to quadratic equations and the other is for reducing fractions with polynomials in the numerator and denominator. As an algebraic process, factoring is very important as it is used in a lot of advanced math courses.

BEHAVIORAL OBJECTIVES

1. Given any positive whole number, you should be able to give its prime factorization with 100% accuracy.
2. Given any set of polynomials in which each term has a common factor, you should be able to factor out that largest common factor with 90% accuracy.
3. Given any set of polynomials which are represented as the difference of 2 squares, you should be able to factor them with 90% accuracy.
4. Given any set of polynomials which are perfect square trinomials, you should be able to factor them with 90% accuracy.
5. Given any set of polynomials which factor as the product of 2 binomials, you should be able to find those factors with 80% accuracy.
PRE_EVALUATION

1. Give the prime factorization of 90.

2. Give the prime factorization of 100.

3. Factor: \( x^2 - 2x \)

4. Factor: \( 5x + 15x^3 \)

5. Factor: \( x^2 - 4 \)

6. Factor: \( a^4 - b^8 \)

7. Factor: \( x^2 + 6x + 8 \)

8. Factor: \( x^2 + 6x + 9 \)

9. Factor: \( x^2 - 10x - 24 \)

10. Factor: \( (x + 2)a^2 - 4(x + 2) \)

You must get 9 correct to skip over this package
INFORMATION SOURCES

1. Listen to the Teacher Presentation.
2. Read Chapter 7 in the Textbook.
ACTIVITY

Give the prime factorization of each of these numbers.

1. 10
2. 20
3. 30
4. 40
5. 50
6. 60
7. 70
8. 80
9. 500
10. 600
11. 640
12. 550
13. 630
14. 910
15. 4,450
Activity

Factor these polynomials by factoring out the largest common monomial factor.

1. $2x + 4$
2. $4x + 2$
3. $6x^2 + 12$
4. $5x + 20$
5. $11 + 33x$
6. $9a^2 + 28a$
7. $6x^2 + 5x$
8. $x^2 + 2x^3$
9. $4x^2 + 3x$
10. $3a^3 + 5a^5$
11. $4x^2 + 8x$
12. $9a^3 + 3a^4$
13. $6z^2 + 12z^3$
14. $2x + 4 + 6x^2$
15. $3x^3 + 6x^2 - 9x$
16. $4x^4 + 8x^3 - 12x^2$
17. $6x^3 + 3x^4 + 3x^5$
18. $7x + 14x^5 - 7x^4$
19. $x^4 + x^6 + x$
20. $3x^3 + 4x^5 + 6x^7$
21. $8x^4 + 24x + 4x^6$
22. $9x^2 + 18x^4 + 6x^3$
23. $z^2 + zx + 3z^3x$
24. $5x^3 - 3x + 9x^2 - x^5$
25. $4x^3 + 16x^2 - 8x^8 + 12x$
26. $5x^{10} + 20x^3 + 45x^5 - 15x^7$
ACTIVITY

Factor these differences of squares completely

1. $x^2 - 1$
2. $x^2 - 4$
3. $x^2 - 9$
4. $x^2 - 16$
5. $x^2 - 25$
6. $x^2 - 36$
7. $x^2 - 49$
8. $x^2 - 81$
9. $x^2 - 144$
10. $x^2 - 121$
11. $x^2 - 400$
12. $x^2 - 256$
13. $a^2 - b^2$
14. $a^4 - c^2$
15. $a^4 - x^6$
16. $x^6 - 25$
17. $x^4 - a^{10}$
18. $c^8 - 4$
19. $m^4 - 25n^2$
20. $4x^2 - 9z^2$
21. $(x + 2)^2 - 16$
22. $(x + 3)^2 - s^2$
23. $(x - a + b)^2 - 64$
24. $(x + b)^2 - (c + 2)^2$
ACTIVITY

Factor these perfect square trinomials completely.

1. \(x^2 + 2x + 1\)  
2. \(x^2 + 4x + 4\)  
3. \(x^2 + 6x + 9\)  
4. \(x^2 + 8x + 16\)  
5. \(x^2 + 10x + 25\)  
6. \(x^2 + 12x + 36\)  
7. \(x^2 + 14x + 49\)  
8. \(x^2 + 16x + 64\)  
9. \(x^2 + 18x + 81\)  
10. \(x^2 + 20x + 100\)  
11. \(x^2 + 22x + 121\)  
12. \(x^2 + 24x + 144\)  
13. \(x^2 + 2xy + y^2\)  
14. \(x^2 + 6xb + 9b^2\)  
15. \(16x^2 + 24x + 9\)  
16. \(4x^2 - 12x + 9\)  
17. \(9x^2 - 12x + 4\)  
18. \(25x^2 + 20x + 4\)  
19. \(36x^2 - 60x + 25\)  
20. \(49x^2 + 14x + 1\)  
21. \(64a^2 + 48a + 9\)  
22. \(121x^2 - 44x + 4\)  
23. \(100x^2 + 60xy + 9y^2\)  
24. \(169x^2 + 286xy + 121y^2\)
Factor these differences of squares

1. \( \frac{1}{4} - a^4 \)
2. \( a^20 - 36 \)
3. \( \frac{1}{9} - a^2 \)
4. \( 25 - 4x^2 \)
5. \( 9x^4 - 4y^2 \)
6. \( 4y^2 - 9x^4 \)
7. \( 25x^4 - 81t^4 \)
8. \( 16x^2 - 9t^6 \)
9. \( 49x^6 - 64 \)
10. \( a^4 - b^4 \)
11. \( b^4 - 81 \)
12. \( 16b^4 - 81t^4 \)

Factor these perfect square trinomials

13. \( x^2 + 18x + 81 \)
14. \( x^2 - 16x + 64 \)
15. \( x^2 - 22x + 121 \)
16. \( x^2 - 24x + 144 \)
17. \( x^2 - 26x + 169 \)
18. \( 4a^2 + 12a + 9 \)
19. \( 9x^2 - 24x + 16 \)
20. \( 4a^2 + 8ab + 4b^2 \)
21. \( k^2 - 4a^2 + 4 \)
22. \( 16a^4 - 8a^2 + 1 \)
23. \( 25a^2 - 100a + 100 \)
24. \( 36x^4 - 24x^2 + 4 \)

Factor these polynomials

25. \( 2x + 4x^2 \)
26. \( x + 2x \)
27. \( 9a^2 + 18ab \)
28. \( m^2n + m^2a \)
29. \( rst + st^2 \)
30. \( 3rt + 6rt^2 \)
31. \( ab + 3a \)
32. \( 6a^2 + 18ab + 4b^2 \)
33. \( 12ab + 16ab^2 + 20abc \)
34. \( 5s^2t - 10st^2 + 5s^2t^2 \)
**ACTIVITY**

In each of the problems below, find the 2 numbers whose product is the number in column A and whose sum is the number in column B.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
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<tr>
<td>24</td>
<td>-40</td>
<td>-3</td>
</tr>
</tbody>
</table>
ACTIVITY

Factor these polynomials into a product of two binomials.

1. \(x^2 + 7x + 10\)  
13. \(x^2 + 2x - 8\)

2. \(x^2 + 7x + 12\)  
14. \(x^2 - 2x - 8\)

3. \(x^2 - 8x + 15\)  
15. \(x^2 + 3x - 10\)

4. \(x^2 + 10x + 16\)  
16. \(x^2 + x - 12\)

5. \(x^2 + 14x + 24\)  
17. \(x^2 - 2x - 15\)

6. \(x^2 - 11x + 24\)  
18. \(x^2 - x - 20\)

7. \(x^2 + 10x + 24\)  
19. \(x^2 + 6x - 7\)

8. \(x^2 - 8x + 12\)  
20. \(x^2 - x - 2\)

9. \(x^2 - 9x + 14\)  
21. \(x^2 - 4x - 5\)

10. \(x^2 + 5x + 6\)  
22. \(x^2 - 6 - 30\)

11. \(x^2 - 6x + 5\)  
23. \(x^2 + 2x - 35\)

12. \(x^2 - 5x + 4\)  
24. \(x^2 - 3x - 40\)
ACTIVITY

Factor each of these polynomials completely

1. $x^2 - 10x - 24$

2. $x^3 + 4x^2 - 21x$

3. $x^4 - 16$

4. $x^8 - 16$

5. $(x^2 - y^2)x^2 + 2x(x^2 - y^2) + 1(x^2 - y^2)$

6. $(x^2 - 1)(x^2) - (x^2 - 1)$

7. $(x^2 + 3x + 2)(x^2) - 4(x^2 + 3x + 2)$

8. $5a^2 + 6a^3 + a^4$

9. $(a^2 + 1)a + (a^2 + 1) - 2$

10. $(m^2 - n^2)(2) + 1(m^2 - n^2)$
RATIONALE

So far, we have solved linear or first degree equations. If the variable is squared, it becomes a second degree equation. Any new problems appear with the variable squared. This means, according to the fundamental theorem of algebra, that it has 2 solutions. Finding those 2 solutions is the work of this package.

BEHAVIORAL OBJECTIVES

1. Given any quadratic equation with rational coefficients, you should be able to find the solutions with 80% accuracy.
Pre-Evaluation

Find the solutions to each of these quadratic equations.

1. $x^2 - 9 = 0$
2. $x^2 - 4 = 0$
3. $x^2 + x + 9 = 0$
4. $x^2 + 2x + 1 = 0$
5. $x^2 - 4x - 5 = 0$
6. $x^2 + 2x - 15 = 0$
7. $2x^2 + x - 6 = 0$
8. $2x^2 + 5x - 1 = 0$
9. $4x^2 = 2x + 3$
10. $\frac{3x^2}{2} + 4x = .3$

You must get 9 correct to skip over this package.
INFORMATION SOURCES

1. Listen to the Teacher Presentation.
2. Read Chapter 13 in the Textbook.
Find the solutions to these quadratic equations by factoring.

1. \( x^2 - 16 = 0 \)
2. \( x^2 - 25 = 0 \)
3. \( 2x^2 - 2 = 0 \)
4. \( x^2 - 9 = 0 \)
5. \( x^2 - 1 = 0 \)
6. \( 3x^2 - 300 = 0 \)
7. \( x^2 = 36 \)
8. \( x^2 + 4x + 4 = 0 \)
9. \( x^2 + 10x + 25 = 0 \)
10. \( x^2 - 12x - 36 = 0 \)
11. \( x^2 - 20x + 100 = 0 \)
12. \( x^2 + 16x + 64 = 0 \)
13. \( x^2 + 24x + 144 = 0 \)
14. \( x^2 - 4x + 4 = 0 \)
15. \( 4x^2 - 9 = 0 \)
16. \( 9x^2 = 1 \)
17. \( 9x^2 - 4 = 0 \)
18. \( 16x^2 - 9 = 0 \)
19. \( 25x^2 = 4 \)
20. \( 16x^2 - 25 = 0 \)
21. \( 81x^2 = 1 \)
22. \( 4x^2 + 12x + 9 = 0 \)
23. \( 9x^2 - 30x + 25 = 0 \)
24. \( 16x^2 - 8x + 1 = 0 \)
25. \( 25x^2 + 20x + 4 = 0 \)
26. \( 25x^2 + 60x + 36 = 0 \)
27. \( 9x^2 - 12x + 4 = 0 \)
28. \( 4x^2 + 40x + 100 = 0 \)
Find the solutions to these quadratic equations by factoring. Show all work.

1. \(x^2 - 7x + 12 = 0\)
2. \(x^2 - 8x + 15 = 0\)
3. \(x^2 - 11x + 24 = 0\)
4. \(x^2 - 10x + 16 = 0\)
5. \(x^2 - 8x + 12 = 0\)
6. \(x^2 - 5x = -4\)
7. \(x^2 - 6x + 8 = 0\)
8. \(2x^2 - 15x + 18 = 0\)
9. \(3x^2 - 11x = -10\)
10. \(4x^2 - 8x + 3 = 0\)
11. \(x^2 + 8x + 12 = 0\)
12. \(x^2 + 7x + 10 = 0\)
13. \(x^2 + 5x + 4 = 0\)
14. \(x^2 + 11x = -1\)
15. \(x^2 + 5x + 6 = 0\)
16. \(x^2 + 9x + 20 = 0\)
17. \(x^2 + 10x + 24 = 0\)
18. \(x^2 + 14x + 24 = 0\)
19. \(2x^2 + 7x + 6 = 0\)
20. \(5x^2 + 8x + 3 = 0\)
21. \(x^2 + 2x - 15 = 0\)
22. \(x^2 - 3x - 10 = 0\)
23. \(x^2 - 7x - 18 = 0\)
24. \(x^2 - 5x - 24 = 0\)
25. \(2x^2 - x - 6 = 0\)
26. \(3x^2 + 5x - 12 = 0\)
Find the solutions to these quadratic equations by completing the square. Show all work.

1. $x^2 + 6x = 7$

2. $x^2 - 2x = -7$

3. $x^2 - 2x = 3$

4. $x^2 + 4x = 5$

5. $x^2 + 10x = -9$

6. $x^2 - 12x = 13$

7. $x^2 + 3x = 2$

8. $x^2 - 5x = \frac{23}{4}$

9. $x^2 + x = \frac{3}{4}$

10. $x^2 + 7x = \frac{15}{4}$

11. $x^2 + 4x = 6$

12. $x^2 + 6x = 10$

13. $x^2 + 2x = 0$

14. $x^2 + 8x = 14$
15. \( x^2 + 12x + 12 = 0 \)

16. \( x^2 - 10x + 2 = 0 \)

17. \( x^2 + 2x - 2 = 0 \)

18. \( x^2 + 6x - 11 = 0 \)

19. \( x^2 - 5x + 1 = 0 \)

20. \( x^2 - 3x - 2 = 0 \)
Solve these quadratic equations by completing the square. Show all work.

1. \(2x^2 + 4x - 10 = 0\)

2. \(3x^2 - 4x - 18 = 0\)

3. \(2x^2 + 8x - 10 = 0\)

4. \(4x^2 + 8x - 4 = 0\)

5. \(3x^2 - 9x - 12 = 0\)

6. \(5x^2 - 15x = 20\)

7. \(5x^2 - 10x - 6 = 0\)

8. \(2x^2 - 6x - 7 = 0\)

9. \(3x^2 - 12x = 1\)

10. \(2x^2 - 2x = 5\)

11. \(6x^2 - 12x = 1\)

12. \(10x^2 + 30x = 5\)
13. \(2x^2 + 3x = 2\)

14. \(3x^2 - 4x = 1\)

15. \(5x^2 - x - 2 = 0\)

16. \(4x^2 - 6x - 6 = 0\)

17. \(7x^2 - 8x = 14\)

18. \(2x^2 - 17x + 1 = 0\)
Solve these equations by the quadratic formula. Show all work and leave answers in simplest possible terms.

1. \(x^2 + 4x + 4 = 0\)  
2. \(x^2 - 12x - 36 = 0\)  
3. \(x^2 + 10x + 25 = 0\)  
4. \(x^2 - 20x + 100 = 0\)  
5. \(4x^2 + 12x + 9 = 0\)  
6. \(x^2 - 11x + 24 = 0\)  
7. \(x^2 - 7x + 12 = 0\)  
8. \(x^2 - 5x = -4\)  
9. \(x^2 - 10x + 16 = 0\)  
10. \(2x^2 - 15x = -18\)  
11. \(4x^2 - 8x + 3 = 0\)  
12. \(x^2 + 7x + 10 = 0\)  
13. \(x^2 + 5x + 4 = 0\)  
14. \(x^2 + 11x = -18\)
<table>
<thead>
<tr>
<th>Problem</th>
<th>Equation</th>
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<tbody>
<tr>
<td>1.</td>
<td>$x^2 - 2x - 15 = 0$</td>
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<tr>
<td>2.</td>
<td>$2x^2 - x - 6 = 0$</td>
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<tr>
<td>3.</td>
<td>$x^2 + 10x + 24 = 0$</td>
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<tr>
<td>4.</td>
<td>$3x^2 - 11x = 0$</td>
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<tr>
<td>5.</td>
<td>$x^2 - 7x - 12 = 0$</td>
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<tr>
<td>6.</td>
<td>$2x^2 - 6x - 7 = 0$</td>
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<td>7.</td>
<td>$x^2 - 3x - 10 = 0$</td>
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<tr>
<td>8.</td>
<td>$2x^2 + 3x - 2 = 0$</td>
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<tr>
<td>9.</td>
<td>$2x^2 - x - 6 = 0$</td>
</tr>
<tr>
<td>10.</td>
<td>$3x^2 + 5x - 1 = 0$</td>
</tr>
<tr>
<td>11.</td>
<td>$3x^2 + 5x = 12$</td>
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<tr>
<td>12.</td>
<td>$4x^2 - 7x - 4 = 0$</td>
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</tbody>
</table>
COURSE TITLE: ALGEBRA

PACKAGE TITLE: WE GOTTA SPLIT UP

by

H. Burton Tingle
RATIONAL

There are two main reasons why we need to factor polynomials:

1. It is for finding the solutions to quadratic equations and the
other is for reducing fractions with polynomials in the
numerator and denominator.

As an algebraic process, factoring is very important as it
is used in a lot of advanced math courses.

BEHAVIORAL OBJECTIVES

1. Given any positive whole number, you should be able to give
its prime factorization with 100% accuracy.
2. Given any set of polynomials in which each term has a common
factor, you should be able to factor out that largest common
factor with 90% accuracy.
3. Given any set of polynomials which are represented as the
difference of 2 squares, you should be able to factor them
with 90% accuracy.
4. Given any set of polynomials which are perfect square trinomials,
you should be able to factor them with 90% accuracy.
5. Given any set of polynomials which factor as the product of
2 binomials, you should be able to find those factors with
80% accuracy.
PRE EVALUATION

1. Give the prime factorization of 90.

2. Give the prime factorization of 100.

3. Factor: $x^2 + 2x$

4. Factor: $5x + 15x^3$

5. Factor: $x^2 - 4$

6. Factor: $a^4 - b^8$

7. Factor: $x^2 + 6x + 8$

8. Factor: $x^2 + 6x + 9$

9. Factor: $x^2 - 10x - 24$

10. Factor: $(x + 2)a^2 - 4(x + 2)$

You must get 9 correct to skip over this package
ILLUSTRATION SOURCES

1. Listen to the Teacher Presentation.
2. Read Chapter 7 in the Textbook.
ACTIVITY

Give the prime factorization of each of these numbers.

1. 10
2. 20
3. 30
4. 40
5. 50
6. 60
7. 70
8. 80
9. 500
10. 500
11. 640
12. 550
13. 630
14. 910
15. 4,450
Activity

Factor these polynomials by factoring out the largest common monomial factor.

1. \(2x + 4\)
2. \(4x + 2\)
3. \(6x^2 + 12\)
4. \(5x + 20\)
5. \(11 + 33x\)
6. \(9a^2 + 28a\)
7. \(6x^2 + 5x\)
8. \(x^2 + 2x^3\)
9. \(4x^2 + 3x\)
10. \(3a^3 + 5a^5\)
11. \(4x^2 + 8x\)
12. \(9a^3 + 3a^4\)
13. \(6z^2 + 12z^3\)
14. \(2x + 4 + 6x^2\)
15. \(3x^3 + 6x^2 - 9x\)
16. \(4x^4 + 8x^3 - 12x^2\)
17. \(6x^3 + 3x^4 + 3x^5\)
18. \(7x + 14x^5 - 7x^4\)
19. \(x^4 + x^6 + x\)
20. \(3x^3 + 4x^5 + 6x^7\)
21. \(8x^4 + 24x + 4x^6\)
22. \(9x^2 + 18x^4 + 6x^3\)
23. \(z^2x^2 + zx + 3z^3x\)
24. \(5x^3 - 3x + 9x^2 - x^5\)
25. \(4x^3 + 16x^2 - 8x^8 + 12x\)
26. \(5x^{10} + 20x^3 + 45x^5 - 15x^7\)
### ACTIVITY

Factor these differences of squares completely

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<td>12.</td>
<td>$x^2 - 256$</td>
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## ACTIVITY

Factor these perfect square trinomials completely.

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<td>12.</td>
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<td>$x^2 + 2xy + y^2$</td>
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<td>14.</td>
<td>$x^2 + 6xb + 9b^2$</td>
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<td>21.</td>
<td>$64a^2 + 48a + 9$</td>
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<td>22.</td>
<td>$121x^2 - 44x + 4$</td>
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<td>23.</td>
<td>$100x^2 + 60xy + 9y^2$</td>
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<tr>
<td>24.</td>
<td>$169x^2 + 286xy + 121y^2$</td>
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</table>
Factor these differences of squares

1. $\frac{1}{4} - a^{14}$
2. $a^{20} - 36$
3. $\frac{1}{9} - a^{2}$
4. $25 - 4x^{2}$
5. $9x^{4} - 4y^{2}$
6. $4y^{2} - 9x^{4}$

Factor these perfect square trinomials

13. $x^{2} + 18x + 81$
14. $x^{2} - 16x + 64$
15. $x^{2} - 22x + 121$
16. $x^{2} - 24x + 144$
17. $x^{2} - 26x + 169$
18. $4a^{2} + 12a + 9$
19. $9x^{2} - 24x + 16$
20. $4a^{2} + 8ab + 4b^{2}$
21. $t^{2} - 4a^{2} + 4$
22. $16a^{4} - 8a^{2} + 1$
23. $25a^{2} + 100a + 100$
24. $36x^{4} - 24x^{2} + 4$

Factor these polynomials

25. $2x + 4x^{2}$
26. $x + 2x$
27. $9a^{2} + 18ab$
28. $m^{2}n + n^{2}m$
29. $rst + st^{2}$
30. $3rt + 6rt^{2}$
31. $ab + 3a$
32. $6a^{2} + 18ab + 4b^{2}$
33. $12ab + 16a^{2}b^{2} + 20abc$
34. $5s^{2}t = 10st^{2} + 5s^{2}t^{2}$
### ACTIVITY

In each of the problems below, find the 2 numbers whose product is the number in column A and whose sum is the number in column B.

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<th>B</th>
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<tr>
<td>24</td>
<td>-40</td>
<td>-3</td>
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</tbody>
</table>
ACTIVITY

Factor these polynomials into a product of two binomials.

1. \(x^2 + 7x + 10\)  
2. \(x^2 + 7x + 12\)  
3. \(x^2 + 6x + 15\)  
4. \(x^2 + 10x + 16\)  
5. \(x^2 + 14x + 24\)  
6. \(x^2 - 11x + 24\)  
7. \(x^2 + 10x + 24\)  
8. \(x^2 + 8x + 12\)  
9. \(x^2 - 9x + 14\)  
10. \(x^2 + 5x + 6\)  
11. \(x^2 - 6x + 5\)  
12. \(x^2 - 5x + 4\)  
13. \(x^2 + 2x - 8\)  
14. \(x^2 - 2x - 8\)  
15. \(x^2 + 3x - 10\)  
16. \(x^2 + x - 12\)  
17. \(x^2 - 2x - 15\)  
18. \(x^2 - x - 20\)  
19. \(x^2 + 6x - 7\)  
20. \(x^2 - x - 2\)  
21. \(x^2 - 4x - 5\)  
22. \(x^2 - x - 30\)  
23. \(x^2 + 2x - 35\)  
24. \(x^2 - 3x - 40\)
Factor each of these polynomials completely

1. \(x^2 - 10x - 24\)

2. \(x^3 + 4x^2 - 21x\)

3. \(x^4 - 16\)

4. \(x^8 - 16\)

5. \((x^2 - y^2)x^2 + 2x(x^2 - y^2) + 1(x^2 - y^2)\)

6. \((x^2 - 1)(x^2) - (x^2 - 1)\)

7. \((x^2 + 3x + 2)(x^2) - 4(x^2 + 3x + 2)\)

8. \(5a^2 + 6a^3 + a^4\)

9. \((a^2 + 1) a + (a^2 + 1) - 2\)

10. \((m^2 - n^2)(2) + 1(m^2 - n^2)\)
ACTIVITY

read p. 271

1. What is a county agent?

2. What kind of work do they do?

3. In years to come, will we need more or fewer county agents? Why?
SAHUARITA HIGH SCHOOL
CAREER
CURRICULUM
PROJECT

COURSE TITLE: ALGEBRA
PACKAGE TITLE: HE'S IN THERE SOMEPLACE
BY
H. Burton Tingle
RATIONAL

Of all the topics in algebra, solution of equations is the most important. As a matter of fact, algebra is the solution of equations. The solution of equations has many practical uses and the better you know it, the more you can use it.

BEHAVIORAL OBJECTIVES

1. Given any set of equations with only 1 variable and that variable in the first degree only; and all numbers being rational, you should be able to find the solutions with 80% accuracy.
Pre-Evaluation

Solve for the unknown variable

1. \(x + 2 = 3\)
2. \(x - 14 = 19\)
3. \(5x = 60\)
4. \(\frac{x}{6} = 36\)
5. \(2x + 7 = 31\)
6. \(\frac{x}{2} - 11 = 46\)
7. \(3x - 7 + x = 11 - 4x\)
8. \(6x + \frac{2}{3} + 11 = 0 - \frac{5x}{3} + 1\)
9. \(12.1x - \frac{3}{4} + \frac{5}{3} = \frac{2x}{3} - .6 + .2x\)
10. \(30 - x + 1.7 - \frac{2x}{5} = 14.2 - .2x\)

You must get 10 correct to skip over this package.
1. Look at the filmstrip presentation on solution of linear equations

2. Read chapter 3 in the textbook
Solve each equation. Show every step, and check your work.

<table>
<thead>
<tr>
<th></th>
<th>Equation</th>
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<th>Equation</th>
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<tbody>
<tr>
<td>1</td>
<td>( x + 7 = 9 )</td>
<td>13</td>
<td>( x + 7 = 5 )</td>
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<tr>
<td>2</td>
<td>( x + 6 = 19 )</td>
<td>14</td>
<td>( x + 5 = 1 )</td>
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<tr>
<td>3</td>
<td>( d + 4 = 54 )</td>
<td>15</td>
<td>( x + 11 = 7 )</td>
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<tr>
<td>4</td>
<td>( x + 3 = 27 )</td>
<td>16</td>
<td>( x + 78 = 75 )</td>
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<td>5</td>
<td>( s + 3 = 3 )</td>
<td>17</td>
<td>( x + 108 = 100 )</td>
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<tr>
<td>6</td>
<td>( z + 67 = 108 )</td>
<td>18</td>
<td>( x + 354 = 187 )</td>
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<tr>
<td>7</td>
<td>( 88 + x = 467 )</td>
<td>19</td>
<td>( s + 2,340 = 200 )</td>
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<tr>
<td>8</td>
<td>( y + 567 = 679 )</td>
<td>20</td>
<td>( 567 + a = 342 )</td>
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<tr>
<td>9</td>
<td>( t + 3.4 = 7.8 )</td>
<td>21</td>
<td>( x + 4.56 = 3.54 )</td>
</tr>
<tr>
<td>10</td>
<td>( x + 4.56 = 8.97 )</td>
<td>22</td>
<td>( v + 3.761 = 3 )</td>
</tr>
<tr>
<td>11</td>
<td>( f + 3.006 = 5.002 )</td>
<td>23</td>
<td>( x + 5 = 4.607 )</td>
</tr>
<tr>
<td>12</td>
<td>( x + 13.56 = 56 )</td>
<td>24</td>
<td>( x + \frac{3}{4} = \frac{1}{2} )</td>
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<tr>
<td>Solve each equation. Show all work and check your work.</td>
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<tr>
<td>1. ( x - 9 = 10 )</td>
<td>13. ( x - 4.56 = 7.07 )</td>
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<tr>
<td>2. ( x - 10 = 3 )</td>
<td>14. ( c - 4.5 = 5.4 )</td>
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<tr>
<td>3. ( x - 7 = 8 )</td>
<td>15. ( z - 4 = -4 )</td>
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<td>4. ( d - 7 = 3 )</td>
<td>16. ( x - 3 = -5 )</td>
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<td>5. ( a - 3 = 5 )</td>
<td>17. ( x - 5 = -8 )</td>
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<td>6. ( x - 45 = 19 )</td>
<td>18. ( x - 11 = -3 )</td>
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<td>7. ( w - 34 = 1 )</td>
<td>19. ( x - 5 = -7 )</td>
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<tr>
<td>8. ( s - 345 = 190 )</td>
<td>20. ( x - 10 = -8 )</td>
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<tr>
<td>9. ( x - 178 = 3 )</td>
<td>21. ( x - 3.2 = -2.3 )</td>
<td></td>
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<tr>
<td>10. ( x - 4 = 879 )</td>
<td>22. ( x - 3.405 = -0.007 )</td>
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<tr>
<td>11. ( x - 2,345 = 10 )</td>
<td>23. ( x = -3.4 + 4.1 )</td>
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<tr>
<td>12. ( x - .98 = 1.2 )</td>
<td>24. ( x - \frac{2}{3} = \frac{5}{7} )</td>
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</tbody>
</table>
Solve each equation. Show all work and check your answers.

1. $3x = 15$
2. $5x = 60$
3. $4x = 56$
4. $7x = 91$
5. $6x = 48$
6. $7x = 28$
7. $3x = 111$
8. $9x = 216$
9. $10x = 340$
10. $12x = 1728$
11. $80x = 4000$
12. $60x = 780$
13. $4x = -16$
14. $5x = -70$
15. $-3x = 45$
16. $-2x = -46$
17. $5x = -480$
18. $-x = -5$
19. $-3.1x = -9.3$
20. $-.09x = 1.008$
21. $.6x = .00246$
22. $8x = 1.032$
23. $-4.2x = 34.4786$
24. $4.3x = -.00172$
Solve for the unknown variable. Show all work and check your answers.

1. \( \frac{x}{5} = 4 \)
2. \( \frac{x}{7} = 5 \)
3. \( \frac{b}{7} = 7 \)
4. \( \frac{x}{7} = 12 \)
5. \( \frac{x}{5} = 11 \)
6. \( \frac{x}{2} = 98 \)
7. \( \frac{x}{7} = 66 \)
8. \( \frac{x}{3} = 88 \)
9. \( \frac{z}{7} = 33 \)
10. \( \frac{a}{8} = 786 \)
11. \( \frac{x}{5} = 11 \)
12. \( \frac{s}{5} = 2.00 \)
13. \( \frac{s}{14} = 8 \)
14. \( \frac{a}{8} = 8.1 \)
15. \( \frac{x}{7} = \frac{4}{3} \)
16. \( \frac{x}{12} = \frac{5}{6} \)
17. \( \frac{x}{3} = -2 \)
18. \( \frac{x}{2} = -6 \)
19. \( \frac{x}{5} = -7 \)
20. \( \frac{w}{7} = -8 \)
21. \( \frac{t}{6} = -16 \)
22. \( \frac{x}{4} = -20 \)
23. \( \frac{x}{3} = -67 \)
24. \( \frac{f}{43} = -567 \)
25. \( \frac{x}{1} = -4 \)
26. \( \frac{x}{1} = -907 \)
27. \( \frac{y}{3} = 56 \)
28. \( \frac{x}{17} = -4305 \)
29. \( \frac{x}{2} = -791 \)
30. \( \frac{d}{8} = -57.789 \)
31. \( \frac{x}{172} = -3098.11 \)
32. \( \frac{x}{.07} = -.0098 \)
When we combine the four operations as shown on the preceding page, or use any of them to manipulate an equation with variables in a special way, we are solving the equation; when the number has been found, it can be checked by putting it back into the original equation in place of the variable.

Example 1: \(3x + 2 = 17\)

\[
\begin{align*}
3x + 2 - 2 &= 17 - 2 & \text{(Subtracting 2 from both sides)} \\
3x &= 15 \\
\frac{3x}{3} &= \frac{15}{3} & \text{(Dividing both sides by 3)} \\
x &= 5 & \text{(Simplifying)}
\end{align*}
\]

\(3(5) + 2 = 17\)

\(15 + 2 = 17\) \(17 = 17\) \(\text{(Check)}\)

Solve these equations and check each one. Show every step.

1. \(2x + 3 = 15\)

Check \(5. \quad 3x + \frac{1}{3} = 6\)

2. \(5x + 10 = 50\)

Check \(6. \quad \frac{2x}{3} + 3 = 4\)

3. \(\frac{3}{2} + 7 = 18\)

Check \(7. \quad \frac{3x}{2} - 4 = 1\)

4. \(\frac{x}{3} - 2 = 4\)

Check \(8. \quad \frac{3x}{4} + \frac{4}{3} = \frac{1}{6}\)
Below are several equations to which solutions are given. Check each one to see if the given solution is correct.

1. \( x + 5 = 8; \ x = 2 \)  
2. \( 7x = 40; \ x = \frac{40}{7} \)  
3. \( 5 - x = 2; \ x = 2 \)  
4. \( 3x - 2 = 10; \ x = 5 \)  
5. \( 4x + 3 = 23; \ x = 20 \)  
6. \( 6x - 2 = 22; \ x = 4 \)  
7. \( 7x + 3 = 45; \ x = 6 \)  
8. \( 10x - 8 = 92; \ x = 10 \)  

Solve each equation and check. Show every step.

9. \( 4x + 3 = 31 \)  
10. \( 7x + 5 = 19 \)  
11. \( 3x + 13 = 28 \)  
12. \( 2x - 10 = 8 \)  
13. \( 8x - 21 = 299 \)  
14. \( \frac{x}{2} + 3 = 8 \)  
15. \( \frac{x}{3} + 7 = 11 \)  
16. \( \frac{x}{4} + 8 = 8 \)  
17. \( \frac{x}{7} - 4 = 0 \)  
18. \( \frac{x}{10} - 57 = 134 \)
Solve each equation. Show all work and check your answers.

1. \(3x + 3 = 27\)  
2. \(5x + 4 = 54\)  
3. \(4x + 5 = 1\)  
4. \(7x - 3 = 5\)  
5. \(6x - 7 = 3\)  
6. \(\frac{x}{8} - 45 = 19\)  
7. \(\frac{x}{7} - 3.2 = -2.3\)  
8. \(\frac{x}{5} - 10 = -8\)  
9. \(\frac{s}{5} + 3.4 = 7.8\)  
10. \(\frac{x}{\frac{1}{2}} + 6 = 19\)
Solve each equation. Show all work and check your answers.

1. \( x + x = 6 \)

2. \( 2x + x = 6 \)

3. \( 5x + 2x = 21 \)

4. \( 4x + 4x = 24 \)

5. \( 3x + 2x = 25 \)

6. \( 4x + 2x = 60 \)

7. \( 7x + 3x = 70 \)

8. \( 6x + 6x = 96 \)

9. \( 5x - 2x = 18 \)

10. \( 6x - 5x = 17 \)

11. \( 3x - x = 10 \)

12. \( 89x - 9x = 1.60 \)

13. \( 5.6x - .6x = .02 \)

14. \( 45x - 40x = 1.0025 \)

15. \( 6.8x - 5.7x = .121 \)

16. \( 7x - 9x = 28 \)
1. Solve each equation. Show all work and check your answers.

1. \( x = 6 - x \)

2. \( 2x = 6 - x \)

3. \( 5x = 21 - 2x \)

4. \( 4x = 24 - 4x \)

5. \( 3x = 25 - 2x \)

6. \( 4x = 60 - 2x \)

7. \( 7x = 70 - 3x \)

8. \( 6x = 96 - 6x \)

9. \( 5x = 18 + 2x \)

10. \( 6x = 17 + 5x \)

11. \( 3x = 10 + x \)

12. \( 89x = 1.60 + 9x \)

13. \( 5.6x = 0.02 + 0.6x \)

14. \( 45x = 1.0025 + 40x \)

15. \( 6.8x = 0.121 + 5.7x \)

16. \( 7x = 28 + 9x \)
Find the numeral which makes each open sentence true. Show every step and check your work.

1. \( x - 12 = 23 \)

2. \( x + 17 = 30 \)

3. \( k + \frac{1}{2} = 5 \)

4. \( \frac{m}{3} = 51 \)

5. \( \frac{1}{x} = \frac{2}{3} \)

6. \( 2x + 3 = x + 8 \)

7. \( 3x + 7 = 19 \)

8. \( x - 7^2 = 7 \)

9. \( 12 + 3 = x - 3 \)

10. \( \frac{3}{4} + z = \frac{11}{5} \)

11. \( 3x + 7 = -x + 14 \)
Solve each equation. Show all work and check your answers. Give each answer in lowest terms.

1. \( \frac{2x}{3} = 8 \)

2. \( \frac{5x}{6} = 10 \)

3. \( \frac{4x}{3} = 20 \)

4. \( \frac{3x}{5} = 9 \)

5. \( \frac{3x}{10} = 9 \)

6. \( \frac{5x}{11} = 5 \)

7. \( \frac{11x}{12} = \frac{88}{12} \)

8. \( \frac{7x}{3} = \frac{1}{2} \)

9. \( \frac{9x}{4} = \frac{3}{2} \)

10. \( \frac{6x}{5} = \frac{5}{8} \)

11. \( \frac{9x}{14} = \frac{2}{7} \)

12. \( \frac{7x}{5} = \frac{3}{8} \)
Solve each equation. Show all work. It is not necessary to check your answer except for your own good.

1. \(3x + 2 = x + 12\)

2. \(5x - 8 = 2x - 32\)

3. \(2x - 2 - x = 8 - 4x\)

4. \(5x + x + 3 = x - 3\)

5. \(7x + x - 2x = -2 - 12 - 2\)

6. \(9 - 2x + 2 = 4 + 2x + 1\)

7. \(5 + x - 3 + x = x - 2\)

8. \(6x - 3 = 2x + 8 - x\)

9. \(5.3x - 3.4 + x = 7.1 + 1.3x\)

\[
\frac{3x}{4} - \frac{5}{6} - \frac{2}{5} + \frac{x}{2} - \frac{2x}{3}
\]
Solve each equation. Show all work and check your answers.

1. \( x + x = 5 + 7 \)

2. \( 3x + 2x = 17 - 2 \)

3. \( 4x + 3x = 56 + 8 - 7 - 1 \)

4. \( 6x - 2x - x = 40 + 0 + 5 \)

5. \( 7x + 2x - 4x = 46 + 10 - 6 \)

6. \( 3.4x + x - .4x = 15 - .7 + 1.7 \)

7. \( 5.1x + 3x - 1.1x = 5.6 + .6 - 2 \)

8. \( \frac{3x}{4} + \frac{5x}{3} - \frac{x}{2} = \frac{7}{8} - \frac{5}{6} \)
Solve each equation and show all work.

1. \( x = 5 + 7 - x \)

2. \( 3x = 17 - 2 - 2x \)

3. \( x = 56 + 8 - 7 - 1 - 3x \)

4. \( 6x = 40 + 5 + 2x + x \)

5. \( 7x = 46 + 10 - 6 - 2x + 4x \)

6. \( 3.4x = 15 - .7 + 1.7 + .4x - x \)

7. \( 5.1x = 5.6 + .6 - 2 + 1.1x - 3x \)

8. \( \frac{3x}{4} = \frac{7}{8} - \frac{5}{6} - \frac{5x}{3} + \frac{x}{2} \)
Solve each equation for the unknown variable. Show all work. Check your answers.

1. \(3x + 5 = 2x - 11\)

2. \(4x + 4 - x = 2x - 6\)

3. \(-3x - 4 - x = -6 - 2x\)

4. \(5x - .6 = 4.5x - 1\)

5. \(4x + 3 - 2x = -x\)

6. \(3x - 7x - x = -3 - 4\)

7. \(5 - 5.6 + 7.1 = -x - x\)

8. \(34x - 13 = 13 - x - 13 + x\)

9. \(\frac{3x}{2} + \frac{3}{4} = \frac{2x}{4} - \frac{5}{7}\)

10. \(\frac{t}{2} - \frac{3t}{2} - \frac{3}{5} = \frac{t}{2} - \frac{5}{3}\)
Solve each equation.

1. $3x + 3 - x - 1 = 2x - x + 4$

2. $-2 - x + 1 = 4x - 3 - x - 2$

3. $-4 - x - 4 - x = -x - 4$

4. $7x + 3 + x + 2 = 7 + 2x + 4$

5. $6 - 3x - 2x + 1 = -x + 2 - 1$

6. $3.4 + 1.2x - \frac{1}{3} + \frac{7}{2} = 4.5 + \frac{3}{4} - x$
Remembering the fact that when two fractions are equal, i.e., \( \frac{a}{b} = \frac{c}{d} \), solve these problems for the unknown variable. Show all your work. Do not use decimals.

Example: \( \frac{3}{4} = \frac{x}{12} \)

\[
\begin{align*}
4x &= 36 \\
x &= 9
\end{align*}
\]

1. \( \frac{5}{6} = \frac{10}{x} \)
2. \( \frac{6}{17} = \frac{x}{43} \)
3. \( \frac{5}{59} = \frac{1}{x} \)
4. \( \frac{4}{39} = \frac{1}{x} \)
5. \( \frac{11}{100} = \frac{100}{x} \)
6. \( \frac{5}{28} = \frac{8}{2x} \)
7. \( \frac{6}{15} = \frac{1}{x} \)
8. \( \frac{8}{29} = \frac{x}{32} \)
9. \( \frac{14}{3} = \frac{x}{1} \)
10. \( \frac{6}{22} = \frac{9}{x} \)
11. \( \frac{17}{x} = \frac{10}{41} \)
12. \( \frac{15}{x} = \frac{4}{47} \)
Read page 96.

1. What is a machinist

2. Where might a machinist work in the area around us?

3. In the article on page 96, what did the machinist use algebra for?
COURSE TITLE: ALGEBRA
PACKAGE TITLE: WE'RE GONNA HAVE TO OPERATE
BY
MR. TINGLE
RATIONALE

Addition, Subtraction, Multiplication and Division of polynomials does not have much practical use in itself, except as an algebraic process. It is, however, a very necessary part of algebra and will be used directly in some of the topics to follow.

BEHAVIORAL OBJECTIVES

1. Given any set of polynomials, you should be able to add them together with 80% accuracy.

2. Given any set of polynomials, you should be able to subtract them with 80% accuracy.

3. Given any set of polynomials, you should be able to multiply them with 80% accuracy.

4. Given any set of polynomials, you should be able to divide them with 80% accuracy.
PRE-EVALUATION

1. \((x + 4) + (x + 7) =

2. \((2x^2 + 3x - 4) + (x^2 + 5) =

3. \((7x - 4) - (2x + 3)

4. \((5x^2 - 3x) - (2x^2 - 5x + 4) =

5. \((2x + 3) (x - 4) =

6. \((3x^2 + 2x - 1) (5x - 2) =

7. \((x^2 + 7x + 12) \div (x + 3) =

8. \(x^4 + 2x^3 + x^2 + 4x - 2 \div x^2 + 2 =

9. \((2x - 3)^3 =

10. \(4abc + 8abc^2 + 12a^2b^2c^2 \div 4ab =

You must get 9 correct to skip over this package.
INFORMATION SOURCES

1. Listen to the teacher presentation.
2. Read Chapter 6 in the textbook.
### ACTIVITY 1

Add these polynomials.

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<tbody>
<tr>
<td>1.</td>
<td>x + 2</td>
<td>7.</td>
<td>3x^2 + 2x + 1</td>
</tr>
<tr>
<td></td>
<td>x + 3</td>
<td></td>
<td>2x^2 + 3x + 4</td>
</tr>
<tr>
<td>2.</td>
<td>x + 5</td>
<td>8.</td>
<td>5x^2 + 6x - 3</td>
</tr>
<tr>
<td></td>
<td>x + 6</td>
<td></td>
<td>4x^2 + 2x - 4</td>
</tr>
<tr>
<td>3.</td>
<td>x - 4</td>
<td>9.</td>
<td>6x^2 + 7x + 5</td>
</tr>
<tr>
<td></td>
<td>x - 3</td>
<td></td>
<td>-4x^2 - 3x - 2</td>
</tr>
<tr>
<td>4.</td>
<td>x - 8</td>
<td>10.</td>
<td>10x^2 + 6x - 11</td>
</tr>
<tr>
<td></td>
<td>x + 2</td>
<td></td>
<td>-5x^2 - 5x - 5</td>
</tr>
<tr>
<td>5.</td>
<td>x^2 - 11</td>
<td>11.</td>
<td>-7x^3 + 6x^2 + 5x - 3</td>
</tr>
<tr>
<td></td>
<td>x^2 + 3</td>
<td></td>
<td>2x^3 + 4x + 2</td>
</tr>
<tr>
<td>6.</td>
<td>x^2 - x</td>
<td>12.</td>
<td>6.4x^2 - 3.1x + 4.8</td>
</tr>
<tr>
<td></td>
<td>x^2 - x</td>
<td></td>
<td>2.1x^2 + 2.3x - 6.9</td>
</tr>
</tbody>
</table>
ACTIVITY 2

Add these polynomials and arrange the terms in the answer in proper order.

1. \((5x^2 + 6x + 3) + (2x - 8)\)
2. \((5x - 3x^2 - 1) + (5x^2 - 6x)\)
3. \((4x) + (3x^2 - 2x - 1)\)
4. \((6x^3 + 2x) + (4x^2 + 3x + 1)\)
5. \((9x^2 - 3x) + (3x^3 - 2x)\)
6. \((4x + 1) + (2x + 4x^2 + 2)\)
7. \((2x + 3) + (x^2 + 2x) + (3x^2 + 4)\)
8. \((5x^3 - 6) + (2x^2 + 3x) + (5x^2 - 3)\)
9. \((3x^2 + 2x - 1) + (6x - 3) + (2x^2)\)
10. \((6x^3 - 5x) + (3x^2 - 5x) + (5x - 2)\)
11. \((x) + (2x^2 - 3x) + (x - 2) + (6x + 1)\)
12. \((2x^4) + (6x^3 - 2x + 1) + (5) + (2x - x^2)\)
ACTIVITY 3

Subtract the bottom polynomial from the top polynomial.

1. $8x + 4$
   $2x + 1$

2. $5x + 3$
   $2x + 2$

3. $6x + 4$
   $4x + 2$

4. $7x + 10$
   $5x + 5$

5. $8x + 2$
   $4x + 1$

6. $9x + 9$
   $3x + 3$

7. $3x - 5$
   $2x - 4$

8. $6x - 8$
   $x + 5$

9. $3x^2 + 2x - 4$
   $x^2 - x + 2$

10. $-4x^2 + 6x - 3$
    $-2x^2 - 4x + 1$

11. $3x^2 + 6x - 5$
    $5x^2 + 8x + 7$

12. $5x^2 + 11x - 3$
    $6x^2 - 4x + 3$
ACTIVITY 4

Subtract these polynomials and put the terms of the answer in proper order.

1. \((3x^2 + 4) = (x + 2)\)

2. \((5x^3 - 2x) - (x^2 + 1)\)

3. \((6x^3 + 2x - 3) - (5x^2 + x + 2)\)

4. \((2x + 1) - (x^2 + 3x + 6)\)

5. \((9x^3 - 6x^2 - 7x + 1) - (x^3 + 2x - x^2 + 3)\)

6. \((14x + 2x^2 - 1) - (3x^2 - 4x)\)

7. \((11x^4 - 6x^2 + 3) - (2x^4 - 6x - 4)\)

8. \((5x^3 + 6x^2 - 1) - (8x^3 - 1 + 2x^2 + x)\)

9. \((6x^2 + x^3 - x) - (1 + 3x + 4x^2)\)

10. \((9x^6 + 3x^4 + 2x + 1) - (5 + 3x^2 + 4x - x^4)\)

11. \((11x^2 + 2x^4 + 3x - 1) - (2x^3 - 3x + 2x^4 + 1)\)

12. \((2x^2 + 3x - 2) - (4x^3 + x^5 + x)\)
ACTIVITY 5

Work:

p. 204: 1-24
p. 206: 1-20
p. 207: 1-20
### Activity 6

Multiply these polynomials.

1. $(x + 5)(x + 2)$
2. $(x + 6)(x + 4)$
3. $(x + 2)(x + 6)$
4. $(x + 7)(x + 5)$
5. $(x + 8)(x + 9)$
6. $(x + 9)(x + 3)$
7. $(x + 2)(x + 1)$
8. $(m + 3)(m + 4)$
9. $(a + 3)(a + 5)$
10. $(a + 4)(a + 8)$
11. $(b + 6)(b + 9)$
12. $(r + r + 12)$
13. $(2x + 1)(3x + 2)$
14. $(2x + 2)(3x + 1)$
15. $(4x + 3)(5x + 1)$
16. $(6x + 2)(4x + 1)$
17. $(2x + 3)(4x + 4)$
18. $(7x + 1)(8x + 1)$
19. $(9x + 2)(2x + 1)$
20. $(6x + 4)(11x + 3)$
21. $(12x + 5)(4x + 11)$
22. $(2x + 5)(2x + 3)$
23. $(3x + 3)(2x + 2)$
24. $(6x + 3)(11x + 7)$
ACTIVITY 7

Multiply these polynomials.

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

Multiply these polynomials.

1. \((3x + 2)(2x - 3)\)
2. \((4x + 1)(3x - 2)\)
3. \((5x - 1)(2x + 3)\)
4. \((6x + 1)(4x - 2)\)
5. \((11x - 2)(2x + 1)\)
6. \((4x + 7)(2x - 1)\)
7. \((3x + 4)(4x - 5)\)
8. \((11x - 3)(2x + 6)\)
9. \((4x - 5)(x + 1)\)
10. \((5x - 4)(x + 2)\)
11. \((6x - 3)(2x + 1)\)
12. \((4x + 8)(2x - 4)\)
13. \((3x^2 + 2x + 1)(x + 2)\)
14. \((x^2 + 5x + 1)(x + 4)\)
15. \((2x^2 - 5x + 6)(x - 3)\)
16. \((4x^2 + 21)(2x - 3)\)
17. \((3x^2 + 4x + 2)(4x^2 + 6x + 1)\)
18. \((2x^2 - 3x - 1)(x^2 + x + 4)\)
19. \((3x^3 + 6x^2 + x - 2)(2x^2 + 11x - 3)\)
20. \((5x^2 + 2x + 6)(3x^3 - x^2 - 2x - 1)\)
ACTIVITY 9

Divide these polynomials.

1. \( x + 3 \) \( \frac{x^2 + 7x + 12}{x^2 + 11x + 30} \)
2. \( x + 5 \) \( \frac{x^2 + 11x + 30}{x + 7} \)
3. \( x - 2 \) \( \frac{x^2 - 6x + 8}{x^2 - 13x + 42} \)
4. \( x + 5 \) \( \frac{x^2 + 12x + 35}{x + 7} \)
5. \( x - 7 \) \( \frac{x^2 - 13x + 42}{x + 9} \)
6. \( x + 9 \) \( \frac{x^2 + 15x + 54}{x^2 + 4x - 12} \)
7. \( x + 4 \) \( \frac{x^2 + x - 12}{x + 6} \)
8. \( x - 7 \) \( \frac{x^2 - 4x - 21}{x^2 + 4x - 12} \)
9. \( x + 6 \) \( \frac{x^2 + 4x - 12}{x^2 - 2x - 1} \)
10. \( x^2 - 2x - 1 \) \( \frac{x^3 + x^2 - 7x - 3}{x^4 + 4x^3 + 6x^2 + 5x = 2} \)
11. \( x^2 + 3x + 2 \) \( \frac{2x^5 + 4x^4 + 4x^3 + 8x^2 + 12x}{2x^2 + 4x} \)
ACTIVITY 10

Give each answer in simplest terms.

1. \((5x^4 - 3.1x^3 + 6.4x^2 + x; + (0.1x^4 - 3.2x + 1.8x^3))\)

2. \((1/2x^3 - 3/4x^2 + 1/3x - 2) - (2/3x + 4/5x^3 - x^2 - 1/4)\)

3. \((.2x^3 + .5x^2 - 3.4) (5x - .1 + 2x^2)\)

4. \(x^2 + 2x + 4 \overline{x^4 - 3x^2 - 14x - 12}\)
ACTIVITY 11

1. Read p. 224
2. Read p. 235

1. Who was Ahmes?
2. What was his probable occupation?
3. What is a merchandiser?
See p. 232 and p. 233 for an exercise in negative exponents.
COURSE TITLE: ALGEBRA

PACKAGE TITLE: THEY'VE GONE OPPOSITE DIRECTIONS

BY

H. Burton Tingle
RATIONALE

In grade school, you probably were taught that you couldn't subtract big numbers from small numbers. In algebra that is a necessity. The answers you get are called negative numbers. If you look at the number line in the classroom, you will see negative numbers to the left side of zero.

Negative numbers are an important part of mathematics, and an understanding of them is necessary for mastery of algebra.

Negative numbers and positive numbers are called signed numbers.

BEHAVIORAL OBJECTIVES

1. You should be able to add, subtract, multiply and divide signed numbers with 90% accuracy.

2. You should be able to find the absolute of a set of integers with 95% accuracy.
PRE-EVALUATION

1. $8 + 7 =$
2. $-8 - 3 =$
3. $-10 + 4 =$
4. $5 - 3 - 11 =$
5. $\times (-3) =$
6. $(-4) (-5) =$
7. $(-3) (-1) (-2) =$
8. $0 - 3 - 4 =$
9. $-(-2) =$
10. $-(7 - 4) =$

11. $-? (2 - 6 + 3 - 2) =$
12. $\div 3 =$
13. $\div -$ =
14. $-24 \div 3 =$
15. $-30 \div -$ =
16. $4 - (3 + 1 - 5) =$

You must get 10 correct to skip over this package.
INFORMATION SOURCES

1. Listen to the teacher presentation
2. Read Chapter 4 in the textbook
Looking at the numberline posted in the classroom, you will see that there are the regular whole numbers and some other numbers to the left of them with subtraction lines in front of them. These are called Negative Numbers. They can be used in certain numeral representations such as 10° below zero = -10°, a loss of $100 = -$100, etc. Negative numbers are also obtained when larger numbers are subtracted from smaller numbers. -7 - 7 = -2.

If up is positive, to the right is positive, and North and East are positive, represent each of these expressions by either a positive or negative signed number. (Zero is neither positive nor negative)

1. 5 miles North
2. 6 feet down
3. 8 km West
4. a loss of $5.00
5. a deposit of $25.00
6. 10° below freezing
7. 7½ miles East
8. 2,100 miles South
9. a debt of $35.00
10. a 6 yard gain in football

11. 5 miles South, then 2 miles North, then 3 miles South.
12. a gain of 3 yards, then a loss of 16 yards, then a gain of 4 yards.
13. Deposit of $25, then withdraw $4, then withdraw $19.
14. 10 miles East, then 8 miles West, then 2 miles West.
15. 3,000 feet up, then 1 thousand feet down, then 700 feet down
16. Lose $4, win $5, lose $8, lose $2, win $8
17. 3 miles South, then South 4 times that far
18. Lose $1.50, then win twice as much
19. Gain 4 yards, then lose 5 times as much
20. Earn $5, then pay 7 times as much, then earn $18
Give each answer in simplest terms.

1. $5 - 3 =
2. $3 - 5 =
3. $56 - 17 =
4. $17 - 56 =
5. $19 - 8 =
6. $8 - 19 =
7. $5 - 5 =
8. $-5 + 5 =
9. $0.7 - 0.7 =
10. $-0.7 + 0.7 =
11. $45.6 - 45.6 =
12. $-45.6 + 45.6 =
13. $-3 - 3 - 3 =
14. $3 + 3 + 3 =
15. $13 + 13 + 13 =
16. $-13 - 13 - 13 =
17. $3.4 + 5.1 + 5.6 =
18. $-3.4 - 5.1 - 5.6 =
19. $3 + 4 - 2 =
20. $-3 -4 + 2 =
21. $7 - 9 + 3 =
22. $-7 + 9 - 3 =
23. $5 + 8 + 10 =
24. $-5 - 8 + 10 =
25. $6 - 5 + 4 - 2 =
26. $6 + 4 - (5 + 2) =
27. $6 + 4 - 5 - 2 =
28. $7 - 8 - 3 + 10 =
29. $7 + 10 - (8 + 3) =
30. $7 + 10 - 8 - 3 =
31. $-8 - 3 + 7 + 10 =
32. $(10 - 8) + (7 - 3) =
33. $5 - 3 + 2 - 1 =
34. $56 - 39 - 11 + 44 =
35. $-23 + 17 - 7 + 13 =
36. $4 - 4 + 4 =
37. $4 - 4 - 4 =
38. $23 + 89 - 89 + 7 =
39. $34 + 17 - 3 - 34 =
40. $56 + 109 - 56 + 1 =
41. $67.8 + .56 + 1 - 67.8 =
42. $-4 - 4 - 4 - 4 =
43. $-6 - 6 - 6 - 6 - 6 =
44. $-8 + 8 - 8 + 8 - 8 + 8 =
45. $-45 + 46 - 5 + 4 - 3 =
46. $89 + 76 - 75 - 88 =
47. $3.4 - 3.40 + 5.06 - 5 =
48. $8.7 - 7.8 - 6.5 + 5.6 =
When two positive numbers are multiplied together, the answer is positive. When two negative numbers are multiplied together, the answer is positive. When a positive number is multiplied by a negative number, the answer is negative. The same rules are true for division.

Using the above rules, express each of the following in simplest terms.

1. \(5 \times 6 = \) ______
2. \(-4 \times 3 = \) ______
3. \(8 \div -4 = \) ______
4. \(-5 \div -3 = \) ______
5. \(5 \times -7 \times -2 = \) ______
6. \((-17) \div -3 = \) ______
7. \(6 \times -1 \times -2 = \) ______
8. \(4 \times -2 \times 4 \times -3 = \) ______
9. \((6) \times (-6) \times (1) = \) ______
10. \(-2 \times -2 \times -2 = \) ______
11. \(7 \times 7 \times -1 = \) ______
12. \(4 \times 8 \times 8 = \) ______
13. \(-3 \times -3 \times 3 = \) ______
14. \(-2 \times (4 - 7) = \) ______
15. \(3 \times (7 - 4) = \) ______
16. \(4 \times (9 - 11) = \) ______
17. \((1 - 2) \times (2 - 1) = \) ______
18. \((8 - 11) \div (-6) = \) ______
19. \(78 \times (89 - 90) = \) ______
20. \(-4 \times (-7 + 7) = \) ______
21. \(+6 \times (+4 + 3) = \) ______
1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

10. 

11. 

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\[ \text{NN-4} \]
1. \(4 + 4 = \)  
2. \(-4 - 4 = \)  
3. \(-4 + 4 = \)  
4. \(4 - 4 = \)  
5. \(5 + 5 = \)  
6. \(-5 - 5 = \)  
7. \(-5 + 5 = \)  
8. \(5 - 5 = \)  
9. \(3.4 + 3.4 = \)  
10. \(-3.4 - 3.4 = \)  
11. \(-3.4 - 3.4 = \)  
12. \(3.4 - 3.4 = \)  
13. \(467 + 476 = \)  
14. \(-467 - 476 = \)  
15. \(476 - 467 = \)  
16. \(467 - 476 = \)  
17. \(5 + 3 = \)  
18. \(-5 - 3 = \)  
19. \(3 - 5 = \)  
20. \(5 - 3 = \)  
21. \(11 + 7 = \)  
22. \(-11 - 7 = \)  
23. \(11 - 7 = \)  
24. \(7 - 11 = \)  
25. \(-67 - 34 = \)  
26. \(7 + 5 = \)  
27. \(5 + 7 = \)  
28. \(-5 - 7 = \)  
29. \(-7 - 5 = \)  
30. \(7 - 5 = \)  
31. \(5 - 7 = \)  
32. \(-7 + 5 = \)  
33. \(-5 + 7 = \)  
34. \(7.6 + 7.61 = \)  
35. \(-7.6 - 7.61 = \)  
36. \(7.61 - 7.6 = \)  
37. \(7.6 - 7.61 = \)  
38. \(-7.61 + 7.6 = \)  
39. \(-7.6 + 7.61 = \)  
40. \(45 + 67 = \)  
41. \(67 + 45 = \)  
42. \(-67 - 45 = \)  
43. \(-45 - 67 = \)  
44. \(67 - 45 = \)  
45. \(45 - 67 = \)  
46. \(-67 + 45 = \)  
47. \(-45 + 67 = \)  
48. \(4 + 4 + 4 = \)  
49. \(-4 - 4 - 4 = \)  
50. \(4 - 4 + 4 = \)
<p>| | | |</p>
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<td>26.</td>
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<tr>
<td>2.</td>
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<td>9.</td>
<td>$-60 \div -5 = \phantom{0}$</td>
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<td>14.</td>
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<td>15.</td>
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<td>$-111 \div 3 = \phantom{0}$</td>
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1. $4 \times 5 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 26. 11 \times -8 = \\
2. $7 \times 8 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 27. -7 \times 13 = \\
3. $9 \times 7 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 28. -6 \times -14 = \\
4. $6 \times 8 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 29. 7 \times 67 = \\
5. $7 \times 7 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 30. -78 \times 0 = \\
6. $3 \times 88 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 31. -45 \times 1 = \\
7. $7 \times 66 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 32. -89 \times -1 = \\
8. $9 \times 66 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 33. -67 \times -1 = \\
9. $7 \times 33 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 34. -67 \times 6 = \\
10. $9 \times 88 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 35. 78 \times -6 = \\
11. $6 \times 7 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 36. 786 \times 4 = \\
12. $7 \times 6 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 37. 67 \times -34 = \\
13. $6 \times -7 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 38. -43 \times 90 = \\
14. $-6 \times 7 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 39. -560 \times 20 = \\
15. $-6 \times -7 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 40. -789 \times 10 = \\
16. $12 \times 7 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 41. 42 \times -409 = \\
17. $7 \times 12 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 42. -765 \times -50 = \\
18. $-7 \times 12 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 43. 16 \times -25 = \\
19. $7 \times -12 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 44. 34 \times -50 = \\
20. $-7 \times -12 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 45. 5,578 \times 40 = \\
21. $5 \times 11 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 46. -6.9 \times -1.2 = \\
22. $11 \times 5 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 47. 4.005 \times -0.6 = \\
23. $-5 \times 11 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 48. 46.00 \times 2.0 = \\
24. $-11 \times 5 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 49. .007 \times -11 = \\
25. $-4 \times -9 = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 50. -1.003 \times -1.003 = \\

Name ________________
NN - 8

ACTIVITY

Work page 122: 1 - 12
page 127: 1 - 17

NN - 9

ACTIVITY

Work page 137: 1 - 20
page 141: 19 - 34
ACTIVITY

1. \( 3 - 4 = \)
2. \( 6 - 2 - 3 = \)
3. \( 5 + 2 - 5 = \)
4. \( 4 + (-1) = \)
5. \( 4 - 1 = \)
6. \( 4 - (+1) = \)
7. \( 4 + 1 = \)
8. \( 4 - (-1) = \)
9. \( 6 + 7 = \)
10. \( 6 + (-7) = \)
11. \( 6 - (+7) = \)
12. \( 6 - (-7) = \)
13. \( (+10) = \)
14. \( (-10) = \)
15. \( (+10) = \)
16. \( -(+10) = \)
17. \( -3 - 11 = \)
18. \( -3 - (-11) = \)
19. \( -3 + (-11) = \)
20. \( -3 + (+11) = \)
21. \( 4 + 1 + 2 + 3 = \)
22. \( 4 - (-1) - (-2) - (-3) = \)
23. \( 5 - 3 + 6 - 2 = \)
24. \( 5 + (-3) - (-6) + (-2) = \)
25. \( 5 - (+3) + (+6) - (+2) = \)
26. \( 7 - 3 + \frac{1}{3} - 1 + 6 = \)
27. \( 6 - (-4) + (-3) = \)
28. \( 6 - 5 + (-3) = \)
29. \( 14 - 3 + (-2) = \)
30. \( 4(3 - 5) = \)
31. \( -3(2) - 3 + 2 = \)
32. \( 4(-1)(-2)^2 = \)
33. \( (-2)^3(-1) = \)
34. \( -\frac{1}{2}(5 + 2 - 1) = \)
35. \( -(6 - 3 + 2) = \)
36. \( -2 \div 2(4 - 3 - 10) = \)
37. \( -6 - 2(-3) = \)
38. \( 5 - 8(2 - 3)^2 = \)
39. \( -6 + \overline{2}(5 - 1) + 3 = \)
40. \( 4 - 3 + (-2)(1 - \frac{1}{2}) = \)
NN-11

1. \(|-2| = \)
2. \(|2| = \)
3. \(|-6| = \)
4. \(|6| = \)
5. \(|-14| = \)
6. \(|-14| = \)
7. \(|3 - 4| = \)
8. \(|2 + 4| = \)
9. \(|6 - 7| = \)
10. \(|5| - |-2| = \)
11. \(|2| - |-4| = \)
12. \(|-3| - |-2| = \)
13. \(|2| + |-4| = \)
14. \(|6 - 8| = \)
15. \(|18 - 6| = \)
16. \(|19 - 12| = \)
17. \(|12 - 9| = \)
18. \(|14 - 10| = \)
19. \(|10 - 14| = \)
20. \(|7 - 7| = \)

ACTIVITY

21. \(|8| - |6| = \)
22. \(|6| - |8| = \)
23. \(|3| - |2| = \)
24. \(|2| - |3| = \)
25. \(|5| - |3| = \)
26. \(|3| - |5| = \)
27. \(|9| - |-2| = \)
28. \(|3| + |2| - |6| = \)
29. \(|7| - |-8| = \)
30. \(2| - |-1| = |2| = \)
31. \(|16| + |-2| = \)
32. \|-2| - |-1| = |5| = \)
33. \(4 - |-2| = \)
34. \(6 + |1 - 2| = \)
35. \(5 - 8| - |6| = \)
36. \(|4 - 3 + 1| = \)
37. \(|8 - 14| = |2| = \)
38. \(|9 - 5| = |6| + 2 = \)
39. \(3 + 3 |9| = \)
40. \(|-2| + |-4| - 1 = \)
**ACTIVITY**

**Signed numbers-Magic Squares**

See if you can find the missing numbers. Each column, row, and diagonal should have the same sum.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
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<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td>-6</td>
<td></td>
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</tbody>
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<td>12</td>
<td>4</td>
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<td>8</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>-3</td>
<td>8</td>
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<tr>
<td>6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>-1</td>
<td>-4</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>10</td>
<td>-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>
Read p. 151

What are some jobs in which an electrical engineer might work?

What training is necessary to be an electrical engineer?
QUEST

See if you can make up your own magic square with signed numbers. Make it as big as you can, but remember the properties that it must have.
SAHUARITA HIGH SCHOOL

CAREER

CURRICULUM

PROJECT

COURSE TITLE: ALGEBRA

PACKAGE TITLE: THE MASKED NUMBERS RIDE AGAIN

by

H. Burton Tingle
RATIONALE

Algebra is the language of all mathematics and since variables is the language of algebra, it is of maximum importance that you understand the use of variables. A good understanding of variables is the most important thing in algebra and if you understand them well, algebra will be easy. Knowledge of variables also will afford you an easy method of solving many practical problems.

BEHAVIORAL OBJECTIVES

1. You should be able to give in writing the correct definition of a variable.
2. Given a set of equations with one variable, you should be able to tell what number the variable stands for with 90% accuracy.
3. Given a set of equations with 2 or more variables, and the numbers the variables represent, you should be able to give the value of the expression with 90% accuracy.
4. Given a set of variables, you should be able to add and subtract them with 80% accuracy.
PRE-EVALUATION

1. If \( x + 2 = 5 \) what number does \( x \) stand for?

2. If \( 5x = 20 \) what number does \( x \) stand for?

3. If \( \frac{x}{2} = 12 \) what number does \( x \) stand for?

4. If \( a = 2, b = 3 \) and \( c = 1 \), evaluate \( \frac{a + b}{c} \)

5. If \( a = 0, b = 1 \) and \( c = -1 \), evaluate \( \frac{a + b}{bc} \)

6. \( x + 2x = \)

7. \( 3x - x = \)

8. \( 8x + 2x - 3x + x = \)

9. If \( W = \frac{E^2}{R} \) what is \( W \) when \( E \) is 110 and \( R \) is 35?

10. If \( I = \frac{E}{R + r} \) what is \( I \) if \( E = 2.4 \), \( R = 1.5 \) and \( r = .03 \)

You must get 9 correct to skip over this package.
INFORMATION SOURCES

1. Listen to the Teacher Presentation.
2. Read Chapter 2 in the Textbook.
ACTIVITIES

1. Each of these problems is called a variable equation because they have a variable which stands for some number. In each problem, tell what number the variable stands for.

1. $x + 1 = 3$
2. $a + 7 = 10$
3. $x + b = 8$
4. $5 + t = 15$
5. $r + 1 = 24$
6. $8 - x = 4$
7. $y - 10 = 2$
8. $m - 6 = 0$
9. $14 - 9 = a$
10. $9 - a = 9$
11. $5x = 20$
12. $10x = a$
13. $6x = 2$
14. $a = 3$
15. $9x = 63$
16. $11 \div m = 1$
17. $6a = x$
18. $12a = 2$
19. $k = 10$
20. $r = 3.6$
A variable is a letter that stands for a number. In these problems tell what number the variable stands for.

1. \( x + 5 = 6 \)
2. \( 7 - a = 4 \)
3. \( 3 \times b = 12 \)
4. \( x + \frac{1}{2} = 3 \)
5. \( y + \cdot 2 = .2 \)

Let \( a = 1 \), \( b = 2 \), \( c = 3 \), \( d = 0 \) and evaluate these variable expressions.

11. \( a + b = \)
12. \( c + d = \)
13. \( c - a = \)
14. \( b \times a = \)
15. \( d \times b = \)
16. \( b \times b = \)
17. \( a \times b \times c = \)
18. \( c \div a = \)
19. \( b \div d = \)
20. \( a \div b = \)
21. \( d \times b \times a = \)
22. \( c - b = \)
23. \( \frac{a + b}{c} = \)
24. \( \frac{c + d}{b} = \)
25. \( \frac{a + a}{a} = \)
26. \( \frac{b + b}{b} = \)
27. \( \frac{c + c}{c} = \)
28. \( \frac{a + b}{c + d} = \)
29. \( \frac{b - a}{c \times a} = \)
30. \( \frac{b \times c}{a \times a} = \)
31. \( \frac{b + c}{b \times c} = \)
32. \( \frac{b + b + c}{a \times b} = \)
II. When variables are written next to each other without any signs between them, it is understood that they are to be multiplied together.

Example 1: abc means \(axbxc\)

If the variables are enclosed in parentheses or other grouping symbols and written next to each other without any signs between them, it is also understood that they are to be multiplied.

Example 2: \((a)(b)(c)\) means \(axbxc\)

If a variable appears next to a parenthesis without any signs between them, it is understood to mean multiplication.

Example 3: \(ab\)cd means \(axbxcxd\)

Let \(a = 0, b = 1, c = 3, d = 2\) and evaluate these variable expressions:

1. \(a b = \_\)
2. \(b c = \_\)
3. \(d a = \_\)
4. \(a c = \_\)
5. \(b d = \_\)
6. \(c d = \_\)
7. \(a a = \_\)
8. \(b b = \_\)
9. \(c c = \_\)
10. \(d d = \_\)
11. \(a (b c) = \_\)
12. \((a) b c = \_\)
13. \(b (c) d = \_\)
14. \(a (a + c) = \_\)
15. \(b (a + b) = \_\)
16. \(a b (c) d = \_\)
17. \(b (c)(d + a) = \_\)
18. \((a + b)(c + d) = \_\)
19. \((b + 3)(2) = \_\)
20. \(2 (a)(3)(b) = \_\)
21. \(\frac{(a + b) c = \_}{d}\)
22. \(\frac{(b + 2) c = \_}{c}\)
23. \(\frac{c (d) 3 = \_}{3b}\)
24. \(\frac{4 b c d = \_}{2b}\)
25. \(\frac{5 c d = \_}{b c}\)
26. \(\frac{4 (a + b) c = \_}{c d}\)
27. \(\frac{6 b c d = \_}{2 a}\)
III. Let $a = 3$, $x = 7$, $t = 10$ and evaluate these variable expressions.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a + 4$</td>
<td>7</td>
</tr>
<tr>
<td>$4a$</td>
<td>12</td>
</tr>
<tr>
<td>$7 + x$</td>
<td>17</td>
</tr>
<tr>
<td>$7x$</td>
<td>49</td>
</tr>
<tr>
<td>$8 + t$</td>
<td>18</td>
</tr>
<tr>
<td>$8t$</td>
<td>80</td>
</tr>
<tr>
<td>$a + 7$</td>
<td>10</td>
</tr>
<tr>
<td>$7a$</td>
<td>21</td>
</tr>
<tr>
<td>$8 + x$</td>
<td>15</td>
</tr>
<tr>
<td>$8x$</td>
<td>56</td>
</tr>
<tr>
<td>$a + 12$</td>
<td>15</td>
</tr>
<tr>
<td>$12a$</td>
<td>36</td>
</tr>
<tr>
<td>$t + 10$</td>
<td>20</td>
</tr>
<tr>
<td>$10t$</td>
<td>100</td>
</tr>
<tr>
<td>$t + \frac{1}{2}$</td>
<td>10.5</td>
</tr>
<tr>
<td>$\frac{1}{2}(t)$</td>
<td>5</td>
</tr>
<tr>
<td>$x + 0.5$</td>
<td>7.5</td>
</tr>
<tr>
<td>$0.5x$</td>
<td>3.5</td>
</tr>
<tr>
<td>$0.6a$</td>
<td>1.8</td>
</tr>
<tr>
<td>$9 + x$</td>
<td>16</td>
</tr>
<tr>
<td>$9x$</td>
<td>63</td>
</tr>
<tr>
<td>$0.71 + t$</td>
<td>17.71</td>
</tr>
<tr>
<td>$0.71t$</td>
<td>71</td>
</tr>
<tr>
<td>$0.82 + x$</td>
<td>15.82</td>
</tr>
<tr>
<td>$0.82x$</td>
<td>12</td>
</tr>
<tr>
<td>$a + \frac{3}{4}$</td>
<td>3.75</td>
</tr>
<tr>
<td>$\frac{3}{4}(a)$</td>
<td>2.25</td>
</tr>
<tr>
<td>$x + \frac{5}{8}$</td>
<td>7.25</td>
</tr>
<tr>
<td>$\frac{5}{8}(x)$</td>
<td>6.25</td>
</tr>
</tbody>
</table>
IV. Each of the problems on this page are called variable expressions. Let $a = 2$, $b = 3$, $c = 1$ and evaluate these variable expressions.

1. $a + b =$
2. $c + b =$
3. $4 + a =$
4. $5 - c =$
5. $c + 2 + b =$
6. $4 - a + b =$
7. $a + b - c =$
8. $9 (a + b ) =$
9. $a (b + c ) =$
10. $c (a + b ) =$
11. $(a + b ) ÷ c =$
12. $3a (b + c ) =$
13. $c (b - a ) =$
14. $a^2 =$
15. $b^2 =$
16. $a^3 =$
17. $c^5 =$
18. $c^k (a^k + 1) =$
19. $a b (a + b) =$
20. $c (a + b)^2 =$
21. $(a + c)(a + c) =$
22. $b^3 (a c) =$
23. $b (a - c)^2 =$
24. $(b - 3)^3 =$
25. $(a b c)^2 =$
26. $(a + b)(a)^2 =$
27. $\frac{b + c}{a} =$
28. $(a + b + c)^3 =$
ACTIVITIES

V. Evaluate these variable equations.

1. Total Resistance of a circuit connected in parallel--

\[
R_t = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}
\]

Find if \( R_1 = 100 \) \( R_2 = 120 \) \( R_3 = 150 \)

2. Kilowatt load of an electric circuit--

\[
Kw = \frac{ExI}{1000}
\]

Find Kw if \( E = 230 \) and \( I = 124 \)

3. Current for batteries connected in series--

\[
A = \frac{nE}{R + nr}
\]

Find \( A \) if \( n = 3 \), \( E = 1.5 \), \( R = 12 \) and \( r = .1 \)

4. Degrees Fahrenheit to degrees centigrade--

\[
C = \frac{5}{9} (F - 32)
\]

Find \( C \) if \( F = 86^\circ \)

5. Taper pin diameter in gears formula--

\[
d = D - \frac{L \times 0.25}{12}
\]

Find \( d \) if \( D = 0.375 \), \( L = 4 \)
6. Distance an object falls in the earth's gravity--

\[ s = \frac{1}{2} gt^2 \]

Find \( s \) if \( g = 32.2 \) and \( t = 10 \)

7. Horsepower of any piston engine--

\[ HP = \frac{PLN}{33,000} \]

Find HP if \( P = 125 \), \( L = 2.75 \), \( A = 10 \) and \( N = 3000 \)

8. Resistance of an electrical conductor--

\[ R = \frac{kl}{d^2} \]

Find \( R \) if \( k = 10.37 \), \( l = 200 \) and \( d = 25 \)

9. Distance traveled--

\[ d = rt \]

Find \( d \) if \( r = 70 \) and \( t = 3 \)

10. Interest--

\[ I = prt \]

Find \( I \) if \( p = 400 \), \( r = .05 \) and \( t = 2 \)
Find the value of each of the following expressions, by letting the variables have the indicated values.

\( x = 3 \)

1. \( 7 + x = \)
2. \( 7x = \)
3. \( 9 + x = \)
4. \( 9x = \)

\( x = 5 \)

15. \( 12 - x + 4 = \)
16. \( 12 + 4 - x = \)

\( x = 5 \)

3. \( 9 + x = \)
4. \( 9x = \)

\( x = 19 \)

17. \( 34 - x + 46 = \)
18. \( 34 + 46 - x = \)

\( c = 6 \)

5. \( 6 + c = \)
6. \( 6c = \)

\( d = 7.3 \)

19. \( 6.7 + d - 3.4 = \)
20. \( 6.7 - 3.4 + d = \)

\( s = 5.6 \)

7. \( 9.8 + s = \)
8. \( 9.8s = \)

\( x = 5.67 \)

21. \( 7.8 + 6.07 - x = \)
22. \( 7.8 - x + 6.07 = \)

\( y = \frac{2}{3} \)

9. \( 12 + y = \)
10. \( 12y = \)

\( y = \frac{93}{4} \)

23. \( 20\frac{1}{3} + y - 19\frac{3}{8} = \)
24. \( 20\frac{1}{3} - 19\frac{3}{8} + y = \)

\( t = 76 \)

25. \( 5,679 - x + 789 = \)
26. \( 789 + 5,679 - x = \)

\( x = \frac{3}{5} \)

13. \( \frac{5}{6} + x = \)
14. \( \frac{5}{6}x = \)

\( y = 3t \)

27. \( 5t - y + 18t = \)
28. \( 5t + 18t - y = \)
VI. Let \( a = 1, \ b = 3, \ c = \frac{1}{2} \) and evaluate each of the following variable expressions.

1. \( a + a \)  
2. \( b + b \)  
3. \( 3b + 3b \)  
4. \( 5b + 6b \)  
5. \( 2c + 4c \)  
6. \( 7a + 2a \)  
7. \( a + 2a + a \)  
8. \( 2c + 6c \)  
9. \( 6a + a + a \)  
10. \( 5a - 2a \)  
11. \( 6c - 4c \)  
12. \( 6b - 2b - b \)  
13. \( 7c - 5c - c \)  
14. \( 11a - 3a + 2a \)  
15. \( 3.6b - 1.8b + b \)  
16. \( 2.8b \)
VII. Using the preceding page as a help, combine the variable terms into simplest possible terms.

1. \(2a + 2a\)  
2. \(5a + 2a\)  
3. \(5m + 2m\)  
4. \(10a - 3a\)  
5. \(4a - 4a\)  
6. \(10x + 2x\)  
7. \(x + 2x\)  
8. \(3y + 7y\)  
9. \(48x - 32x\)  
10. \(17y - 8y\)  
11. \(10m + 23m\)  
12. \(47a - 39a\)  
13. \(16a - 9a\)  
14. \(16a + 25a\)  
15. \(18a + 181a\)  
16. \(a + 2a + 4a\)  
17. \(6b + 7b - 2b\)  
18. \(11b - 3b - b\)  
19. \(x - x + 2x + 3x\)  
20. \(5x - 3x + x\)  
21. \(4x - 2x - 3x - x\)  
22. \(13x - 2x + x\)  
23. \(11x + 5x - 10x\)  
24. \(15x - 10x - 5x\)  
25. \(14y - 11y + y\)  
26. \(20x - 19x + 2x\)  
27. \(37x - 9x - 10x\)  
28. \(42a - 22a - 3a\)  
29. \(12a + 13a - 20a\)  
30. \(10a - 9a + a\)
1. \[ x + x = \]  
2. \[ 3x + 2x = \]  
3. \[ 4x + 3x = \]  
4. \[ 6x - 2x - x = \]  
5. \[ 7x + 2x - 4x = \]  
6. \[ 3.4x + x - .4x = \]  
7. \[ 5 + 7 = \]  
8. \[ 17 - 2 = \]  
9. \[ 56 + 8 - 7 - 1 = \]  
10. \[ 40 + 0 + 5 = \]  
11. \[ 46 + 10 - 6 = \]  
12. \[ 15 - .7 + 1.7 = \]  
13. \[ 5.1x + 3x - 1.1x = \]  
14. \[ 5.6 + .6 - 2 = \]  
15. \[ \frac{3x}{4} + \frac{5x}{3} - \frac{x}{2} = \]  
16. \[ \frac{7}{8} - \frac{5}{6} = \]
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<td>1.</td>
<td>$3x = 1$</td>
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<td>2.</td>
<td>$4y = 1$</td>
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<td>$.8x = 1$</td>
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<td>$\frac{3}{4} a = 1$</td>
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<td>$45z = 1$</td>
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<td>9.</td>
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<td>$\frac{3}{5} x = 1$</td>
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<td>11.</td>
<td>$5 \times \frac{2}{5}$</td>
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<td>$\frac{4}{7} \times 7$</td>
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<td>$8 \times \frac{7}{8}$</td>
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<td>15.</td>
<td>$.3 \times 10$</td>
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<td>$.5 \times 10$</td>
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<td>$\frac{3(2)}{3}$</td>
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<td>18.</td>
<td>$\frac{5(5)}{5}$</td>
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<td>$\frac{7(4)}{4}$</td>
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<td>$\frac{5(9)}{9}$</td>
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<td>21.</td>
<td>$\frac{4(3)}{4}$</td>
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<td>22.</td>
<td>$\frac{3.4(5.1)}{5.1}$</td>
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<td>23.</td>
<td>$\frac{31(.9)}{31}$</td>
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<td>24.</td>
<td>$4 \times \frac{1}{4} \times 3$</td>
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<td>25.</td>
<td>$5 \times \frac{1}{5} \times 2$</td>
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<td>26.</td>
<td>$6 \times \frac{1}{6} \times 5$</td>
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<td>$4 \times \frac{3}{4}$</td>
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<td>$5 \times \frac{2}{5}$</td>
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<td>$6 \times \frac{5}{6}$</td>
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<td>30.</td>
<td>$7 \times \frac{1}{7} \times 3$</td>
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<td>31.</td>
<td>$8 \times \frac{1}{8} \times 5$</td>
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<td>32.</td>
<td>$2 \times \frac{1}{2} \times 7$</td>
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<td>33.</td>
<td>$7 \times \frac{3}{7}$</td>
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<td>34.</td>
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<td>35.</td>
<td>$2 \times \frac{7}{2}$</td>
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<td>36.</td>
<td>$3 \times \frac{1}{3}$</td>
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<td>37.</td>
<td>$4 \times \frac{m}{4}$</td>
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<td>38.</td>
<td>$5 \times \frac{6k}{5}$</td>
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<td>39.</td>
<td>$6 \times \frac{r}{6}$</td>
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<td>40.</td>
<td>$7 \times \frac{5h}{7}$</td>
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### ACTIVITIES

VIII. Let \( r = 2 \), \( s = 3 \) and evaluate each of these variable expressions.

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<tbody>
<tr>
<td>1.</td>
<td>3 ((2r))</td>
<td>16.</td>
<td>(6r)</td>
<td></td>
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<tr>
<td>2.</td>
<td>4 ((3s))</td>
<td>17.</td>
<td>(12s)</td>
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<td>3.</td>
<td>5 ((2r))</td>
<td>18.</td>
<td>(10r)</td>
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<td>4.</td>
<td>3 ((6r))</td>
<td>19.</td>
<td>(18r)</td>
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<td>5.</td>
<td>4 ((5s))</td>
<td>20.</td>
<td>(20s)</td>
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<td>6.</td>
<td>4 ((2s))</td>
<td>21.</td>
<td>(8s)</td>
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<td>7.</td>
<td>8 ((3r))</td>
<td>22.</td>
<td>(24r)</td>
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<td>8.</td>
<td>6 ((5r))</td>
<td>23.</td>
<td>(30r)</td>
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<td>9.</td>
<td>3 ((5s))</td>
<td>24.</td>
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<td>10.</td>
<td>4 ((6r))</td>
<td>25.</td>
<td>(24r)</td>
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<td>11.</td>
<td>4 ((7r))</td>
<td>26.</td>
<td>(28r)</td>
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<td>12.</td>
<td>9 ((3r))</td>
<td>27.</td>
<td>(27r)</td>
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<td>13.</td>
<td>10 ((3s))</td>
<td>28.</td>
<td>(30s)</td>
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<td>14.</td>
<td>11 ((2s))</td>
<td>29.</td>
<td>(22s)</td>
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<td>15.</td>
<td>6 ((2s))</td>
<td>30.</td>
<td>(12s)</td>
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</table>
ACTIVITIES

IX. Express each of the following in simplest terms. No answer has a parenthesis.

1. 3 (4x)
2. 7 (8x)
3. (8) 3x
4. (3)(2x)
5. (7) 5t
6. 9 (7a)
7. 11 (5a)
8. 12 (4a)
9. 13 (3x)
10. 15 (4)(x)
11. 6 (3)(x)
12. 6 (x)(3)
13. x (4)(7)
14. 3x (7)
15. x (3)(12)
16. 3 (x)(.3)
17. .2x (2)
18. (7x)(3)
19. 4 (2)(x)(.1)
20. (2x)(2)(3)(4)
21. 4 (x)(2)
22. 5 (x)(2)
23. 5x5
24. 5x5
25. .5x (.7)
26. 9 (6)(1x)
27. 7 (7)(x)(.2)
28. (.2)(.2)(x)
29. (.3)(.1)(3x)
30. 4 (.2)(.01x)
31. (x)(1)(.2)(3)
Give each answer in simplest terms.

1. \(3(x)(3) = \)  
2. \(3x + 5x = \)  
3. \(4(3)c = \)  
4. \(5x - 3x = \)  
5. \(5(3)(2)d = \)  
6. \(4s - 2s = \)  
7. \(7a - 4a = \)  
8. \((C)(3)(6) = \)  
9. \(w(2)(1) = \)  
10. \(3s(4) = \)  
11. \(3d + 5.3d = \)  
12. \(5a(2)(2)(1) = \)  
13. \(5(x + 2x) = \)  
14. \(7(3s - 2s) = \)  
15. \(4(5x + 2x) = \)  
16. \(2.3(3a + 2a) = \)  
17. \(6(4.3a + 7.4a) = \)  
18. \(3(4.5a - .6a) = \)  
19. \((3 + 2)(a + a) = \)  
20. \((4 - 3)(2x + 3x) = \)  
21. \((5 + 1)(3z - 2z) = \)  
22. \(.4(x + 2x)10 = \)  
23. \(3(4c + 2c)2 = \)  
24. \(5x(4) = \)  
25. \(5.3x + 3.4x = \)  
26. \(6.7k - 3.9k = \)  
27. \(a + a + a = \)  
28. \(3z - z - z = \)  
29. \(6b - 5b - b = \)  
30. \(3s - 5s + 4s = \)  
31. \(a(a) = \)  
32. \(3s + (2)(2)s = \)  
33. \(7b - 2b + b = \)  
34. \(5t + t + t + t = \)  
35. \(x - x - x + x = \)  
36. \(t(t)t(t) = \)  
37. \(x + x + x + x + x = \)  
38. \(7(3)(s)(2) = \)  
39. \(6x(x) = \)  
40. \(5d - d - d = \)  
41. \(5h + (h)3 = \)  
42. \(3(x + x - x) = \)  
43. \(c(4 + 4 - 7) = \)  
44. \(g(7.6 - 7.5) = \)  
45. \(a(3 + 2 - 4)a = \)  
46. \(x[3 + 2 + (2x - x) - 5] = \)
Express each of the following in simplest terms.

1. \(3s - 2s = \) 25. \(-1.1 + 6 = \)
2. \(-1 - 5 = \) 26. \(4.9 \div 7 = \)
3. \(-4x - 4x = \) 27. \(2.3x + 1.7x = \)
4. \(4 + 4 = \) 28. \(1 + 4 = \)
5. \(8 \div -8 = \) 29. \(5 \div 4 = \)
6. \(2x \div 4x = \) 30. \(\frac{2x + 2x}{3} = \)
7. \(6x - 5x = \) 31. \(\frac{-13 + 4}{3} = \)
8. \(-10 + 3 = \) 32. \(\frac{-23 \div 4}{12} = \)
9. \(-5b - 2b + 2b = \) 33. \(-5 - 3 + 5 = \)
10. \(3 + 3 = \) 34. \(5 - .6 + 2.1 = \)
11. \(6 \div -5 = \) 35. \(11 + 3 - 3.4 = \)
12. \(+5 - 2 = \) 36. \((7)(-4) = \)
13. \(7x - 2x = \) 37. \(-4 + 3 - 2 = \)
14. \(-1 - 3 = \) 38. \(9 + 7 - 8 = \)
15. \(-4 \div 5 = \) 39. \(4x - 2x - x = \)
16. \(3x - 4x = \) 40. \(7b + 2b - 11b = \)
17. \(-x - x = \) 41. \(2.3x - 2x - .1x = \)
18. \(-10 \div -2 = \) 42. \(x - x - x = \)
19. \(8x - 2x = \) 43. \(6c + c - c + c = \)
20. \(6x - 2x = \) 44. \(5 - 8 - 11 = \)
21. \(-4 - 4 = \) 45. \(-5 - 17 = \)
22. \(-8 \div -4 = \) 46. \(-4.5 + 5.1 - .72 = \)
23. \(5.6z - .6z = \)
24. \(5z + 2z = \)
ACTIVITY

Read p. 62

1. How was Vieta able to break the Spanish secret war code?

2. If he was a lawyer, why was he using algebra?

3. Compare to page 33!

4. Using some special code language make up a secret message.

5. What are some requirements for espionage (spying) work?
1. A worker in a factory produces parts as follows: 442, 297, 649, 315, 774, 197, and 145 pieces. What was the total number of articles produced?

2. The weight of six machines are 3274 lbs., 4572 lbs., 1719 lbs., 453 lbs., 11452 lbs., and 2244 lbs. Find the total weight.

3. Five sums of $5633, $7474, $9763 and $3392 are invested in a concern. What is the total investment?

4. On a certain job the following lengths of steel were used: 221 inches, 197 inches, 34 inches, 107 inches, 347 inches, 239 inches, and 146 inches. Find the total length.

5. A tool crib had the following items in stock: 239 toolbits, 347 drills, 562 2-inch washers, 747 cotter pins and 658 Whitney keys. Find the total number of articles.

6. A pattern maker used the following lengths of wood in making a pattern: 67 inches, 22 inches, 38 inches, 45 inches, 7 inches and 13 inches. Find the length of material used.

7. When checking the time for a certain die job, the card showed these items: 143 hours on lathe, 246 hours on milling, 47 hours on grinder and 15 hours of hardening. What was the total amount of time required for this job?

8. A foremen paid his workmen these wages for a 40-hour week: $72.00, $98.00, $84.00, $67.00, $59.00 and $107.00. What was the total amount paid?

9. A machinist cut the following lengths of chain for a certain job: 105 feet, 1784 feet, 98 feet, 663 feet, 454 feet, 8974 feet, and 27 feet. What was the total length used?

10. It is desired to cut several pieces from a 1" diameter rod. If the lengths are to be 7", 12", 14", 31", and 3", what will be the total length of rod required?

11. From a piece of hexagon stock that is 1" across flats, 5 pieces are to be cut off, not including waste. If the pieces are 11", 19", 13", 23", and 15", what is the total length of rod required?

12. In a stock room an inventory of items included 5 milling cutters, 17 cut-off tools, 23 spur gears and 49 mill files. How many pieces were included in the inventory?

13. It is desired to lay out a group of machines in a straight line. If two feet are to be allowed between each machine and there are 5 machines of 12, 7, 8, 13, and 15 feet lengths, what is the total length of the line?
14. A stock room has 6 boxes of No. 10 hex head cap screws. If the boxes contain 144, 72, 89, 159, 603, and 302 screws respectively, how many screws of this size are in stock?

15. Seven individually powered machines have motors drawing 150, 760, 852, 675, 92, 92, and 440 watts each. What is the total wattage used when: (a) the total shop is in operation? (b) the three smallest motors are running? (c) the three largest motors running?

16. It is necessary to turn in time cards for each job completed during the week so that the cost for each job can be calculated. If a man worked on 4 jobs requiring 632, 945, 89, and 665 minutes respectively, how many minutes did he work on these jobs during the week? How many minutes?

17. What were the total deductions from a man's pay check if the items deducted were: $1.89 for old age assistance, $8.00 for taxes, $2.25 for union dues, $1.50 for hospitalization and $8.09 for bonds?
1. Four bricklayers employed on a job each laid the following number of bricks in one day: 1st bricklayer, 925 bricks; 2nd, 1075 bricks; 3rd, 1035 bricks; 4th, 1150 bricks. What was the total number of bricks laid that day?

2. A mason purchased the following number of bags of cement at different dates in the month: 235 bags, 160 bags, 62 bags, 24 bags, 175 bags. How many bags of cement should he be billed for?

3. The costs of the material and labor for building a concrete sidewalk were as follows: $26 for sand, $52 for gravel, $90 for cement, and $85 for the labor. What was the total material and labor cost for the job?

4. A bricklayer was paid the following sums of money in one month for wages: $44, $52, $48, and $37. What was the total sum he received?

5. A contractor paid $480 for brick, $3 for lime, $8 for cement, and $5 for sand. What was the total cost of the materials?

6. A mason gave separate estimates on the following items: building foundation walls for house $375, building a chimney $95, laying concrete sidewalks $75, building concrete stairs $85. What was the estimate for all of the work?

7. Find the total price to be charged for digging a cellar if $32 was allowed for the hire of horses and carts, $75 for labor, and a charge of $40 was made for use of equipment and the supervision of the work.

8. In figuring the cost of mason work on a certain job the mason allowed $250 for concrete work, $125 for brick work, $115 for excavating, and $225 for plastering. What was his total estimate for the job?

9. A contractor separated his estimate on a job as follows: excavating $130, concrete work $285, grading the grounds $90, brick work $105. What was his total estimate?

10. Three bricklayers laid the following amounts of face brick in one day: 1st bricklayer, 675 bricks, 2nd bricklayer, 725 bricks; the 3rd bricklayer, 685 bricks. How many bricks were laid by these men?
11. A contractor received the following amounts of common bricks on a job at different dates: 5,000 bricks, 2,500 bricks, 5,000 bricks, and 7,500 bricks. How many bricks did he receive in all?

12. A mason paid $27 for 6 wheelbarrows, $15 for a dozen mortar hoes, and $15 for a dozen shovels. What was the total cost of the equipment purchased?

13. A mason paid $23 for flue lining, $67 for brick, $5 for sand, $9 for cement and $3 for limestone. What was the total cost of the material purchased?

14. Find the cost of laying a concrete sidewalk if the cement cost $40, sand $12, gravel $18, and the labor came to $32.

15. In figuring the cost of a job the mason allowed $165 for excavating a cellar, $310 for concrete work, $250 for brick work, $325 for plastering, and $125 for grading the lot. What was the estimate for the job?

16. Weight slips on five loads of 1" crushed stone delivered in one day on a certain job were 6125 lbs., 6090 lbs., 6215 lbs., 5995 lbs., and 6165 lbs. What was the total weight of stone that the contractor would be billed for on that day?

17. A mason contractor specializing on boiler settings placed the following order for firebricks: 3250 stretchers, 185 No. 1 side arches, 95 No. 2 side arches, 110 No. 1 end wedges, 37 end skews, 125 splits, 40 soaps, and 14 feather edges. How many firebricks were on that order?

18. The deliveries of fibered gypsum, by a mason's supply dealer to a plastering contractor on various jobs, were as follows: June 1st, 42 bags; June 3rd, 9 bags; June 14th, 87 bags; June 18th, 128 bags; July 19th, 13 bags; July 21st, 54 bags; July 25th, 27 bags; and July 28th, 95 bags. How many bags of fibered gypsum did he receive during each month?
12. The cost of magnet wire for a motor repair shop during 3 months was as follows: 200 lbs. of #17 S C E, (single cotton enamel) $58.00; 250 lbs. of #16 S C E, $55.00; 50 lbs. of #21 S C E, $19.00; 30 lbs. of S C E, $24.00. What was the total cost of magnet wire during this period?

13. BX cable in the following amounts was used on an apartment house job: 625 ft., 785 ft., 140 ft., 310 ft., 325 ft. and 120 ft. What was the total amount used on the job?

14. A residence has lamps and appliances in its various rooms which have the following wattage: living room, 150 w. (watts); dining room, 125 w; bathroom, 75 w. What is the total load when all lamps and appliances are operating?

15. The following number of BX cable clips were used during a given period: 250, 125, 65, 48, 96, 92, 28, 42, 106, 140, and 24. What was the total number of BX cable clips used during this period?

16. An electrical contractor received during the first quarter of the year the following quantities of #14 D.B.R.C. (double braided rubber covered) wire: January 1, 7500 ft. of white solid wire; March 1, 10,750 ft. of black solid wire and 4500 ft. of w-ite solid wire. What was the total number of feet of white, black and stranded wire received during this period?
1. When taking inventory, the following lots of 4" X 3/8" BX connector were found in five different bins: 176, 264, 375, 234 and 116. What was the total number of connectors in all bins?

2. In eight different boxes there are the following number of 3/4" #8 F.H. (flat head) bright wood screws: 124, 72, 36, 92, 38, 64, 74, and 67 respectively. What is the total no.?

3. In wiring eight houses the electricians find that they must install 68, 58, 89, 72, 59, 69, and 57 outlets respectively. How many outlets must be roughed-in all together?

4. In the course of 4 months an electrician used the following switch outlet boxes on different jobs: 56, 9, 86, 36, 93, 105, 42 and 56. What is the total number used?

5. The following materials were charged to a wiring job: meter board, $2.00; meter switch, $8.00; conduit, $4.00; #8 wire, $1.00; BX cable, $25.00; conduit fittings, $3.00; outlet boxes, $4.00; switches, $3.00; fixtures, $65.00 and $2.00 for tape, solder, staples and pipe clips. What was the total amount charged for materials?

6. An electrician took out of stock at different times the following amounts of BX: 500', 125', 250', 90', 38', 65', 84', 225', and 125' respectively. What was the total number of feet of BX taken out?

7. From 2 barrels of dry cells 325 cells were placed in the stock room, 45 cells were placed on the shelf in the show room and 18, 25, 30, 24, and 6 dry cells were sold. What was the total number of cells packed?

8. A factory department has 10 motors of 75, 30, 200, 40, 25, 15, 5, 125, 150, and 175 hp. (horsepower.) What is the combined horsepower of the 10 motors?

9. An electrical supply house purchased in separate lots 35, 40, 125, 200, 75, 90, 20, and 30 lbs. of solder. What was the total number of pounds of solder purchased?

10. During a certain year the monthly consumption of current in kilowatt hours in a certain house was as follows: Jan., 45; Feb., 40; Mar., 42; Apr., 38; May, 37; June, 32; July, 31; Aug., 33; Sept., 38; Oct., 40; Nov., 42; Dec., 58. Find the total consumed during the year.

11. A school has twelve electrical circuits which have a capacity of 545, 650, 750, 1820, 2462, 2571, 1360, 1540, 793 watts respectively. What is the total number of watts consumed when all these circuits are being used under their total loads?
1. In wiring a trailer the following lengths of wire were used: 6', 3', 8', and 10'. What was the total length of wire used?

2. In repairing a car the following number of new bolts were necessary: 5 head bolts, 8 oil pan bolts, 3 fender bolts, and 6 different cover bolts. How many bolts were used in all?

3. In taking inventory the following spark plugs were checked: 100-14 M.M. plug, 72-1/7" plugs and 15-10 M.M. plugs. What was the total number of plugs on inventory?

4. A mechanic ordered the following lengths of brake lining: one piece 15" long, one piece 8", one piece 10", one piece 11", one piece 16", one piece 9", two pieces 12". What total length of lining was required for the job?

5. On five different trips an automobile is driven 33 miles, 27 miles, 19 miles, 42 miles, and 24 miles. What is the total mileage driven?

6. What is the total gasoline consumption for one week if a driver uses 10 gals. on Sunday, 6 gals. on Monday, 2 gals. on Tuesday, 9 on Wednesday, 8 on Thursday, 3 gals. on Friday, and 12 gals. on Saturday?

7. A mechanic removes 27 nuts from the cylinder head, 34 nuts from the oil pan and 9 nuts from the fly-wheel housing. What is the total number of nuts removed?

8. The headlights draw 10 amperes of current, the ignition coil draws 4 amps., the taillights draw 2 amps, the car heater 8 amps. What is the total amperage draw from the battery?

9. An automotive stock clerk has 53 one-half inch castellated nuts in stock. He orders 864 additional nuts. How many does he then have in stock?

10. The driver drove his car 129 miles to one city, 134 miles to another, and 219 miles home. What was the total mileage driven?
1. What is the total floor space in a basement with a recreation room, store room and laundry containing 286 sq. ft., 91 sq. ft., 164 sq. ft. respectively?

2. A carpenter put on 348 sq. ft. of shingles the first day, 430 sq. ft. the second and 368 ft. the third. How many square feet of shingles did he put on in three days?

3. Find the total number of square inches of plywood in four pieces containing 640 sq. in., 1,126 sq. in., 719 sq. in. and 1,340 sq. in.

4. A contractor paid bills of $2,465, $765, $1,446, $1,011, and $1,610 for materials. What was the total cost of the materials?

5. In making five excavations, the following cubic yards of earth were removed: 5,040; 6,070; 7,940; 11,424 and 5,216. Find the total number of cubic yards removed.

6. Three deliveries of 1" X 6" matched roofers were as follows: 2,450 bd. ft. (board feet), 2,760 bd. ft., and 2,875 bd. ft. What was the total number of bd. ft. delivered?

7. A carpenter laid 1,300 wood shingles the first day, 1,400 the second and 1,500 the third. How many sq. ft. did he apply?

8. In a certain house, a builder applied 528 sq. ft. (square feet) of gypsum wall board in the kitchen, 640 sq. ft. in the living room and 580 sq. ft. in the dining room. How many sq. ft. did he apply?

9. A contractor bought 14,500 bd. ft. of 1" native pine, 1,250 bd. ft. of 2" spruce and 1,450 bd. ft. of 3" hemlock. How many bd. ft. of lumber did he buy in all?

10. The material for a bar cost as follows: lumber $476.00; masonry $148.00; hardware $62.00 and painting $85.00. What was the total cost of materials?

11. In estimating the finished flooring for a house, a contractor listed the room areas as follows: living room 168 sq. ft.; dining room 152 sq. ft.; bedroom 142 sq. ft.; hall 45 sq. ft. and kitchen 125 sq. ft. What was the total area to be floored?

12. For building a house, the following items of framing timber were ordered: 472 bd. ft. of 2" X 4" studs; 1,627 bd. ft. of 2" X 10" joists; 827 bd. ft. 2" X 6" stock; 572 bd. ft. of 2" X 8" stock. How many bd. ft. of framing timber were ordered?

13. How many lineal feet of 1" X 6" ribband are needed for a building 26' by 42'.
### ACTIVITY #1

<table>
<thead>
<tr>
<th>1. 13 inches</th>
<th>2. 270 feet</th>
<th>3. 261 sq. inches</th>
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</thead>
<tbody>
<tr>
<td>16 inches</td>
<td>140 feet</td>
<td>1094 sq. inches</td>
</tr>
<tr>
<td>8 inches</td>
<td>368 feet</td>
<td>644 sq. inches</td>
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<tr>
<td>24 inches</td>
<td>609 feet</td>
<td>1326 sq. inches</td>
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<tr>
<td>11 inches</td>
<td>306 feet</td>
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<tr>
<td>23 inches</td>
<td>224 feet</td>
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</table>

<table>
<thead>
<tr>
<th>4. 1312 cu. inches</th>
<th>5. 1600 yards</th>
<th>6. 23 sq. feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>644 cu. inches</td>
<td>914 yards</td>
<td>1116 sq. feet</td>
</tr>
<tr>
<td>31 cu. inches</td>
<td>83 yards</td>
<td>2492 sq. feet</td>
</tr>
<tr>
<td>3609 cu. inches</td>
<td>1144 yards</td>
<td>3844 sq. feet</td>
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<tr>
<td>243 cu. inches</td>
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</table>

<table>
<thead>
<tr>
<th>7. 3002 sq. yards</th>
<th>8. $12,492</th>
<th>9. 431 pounds</th>
</tr>
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<tbody>
<tr>
<td>994 sq. yards</td>
<td>2,063</td>
<td>1243 pounds</td>
</tr>
<tr>
<td>681 sq. yards</td>
<td>3,876</td>
<td>709 pounds</td>
</tr>
<tr>
<td>2411 sq. yards</td>
<td>9,432</td>
<td>1652 pounds</td>
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</table>

<table>
<thead>
<tr>
<th>10. 3602 gallons</th>
<th>11. 15,642 cu. yards</th>
<th>12. 5,148 B.t.u.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1306 gallons</td>
<td>8,431 cu. yards</td>
<td>12,648 B.t.u.</td>
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<tr>
<td>3914 gallons</td>
<td>13,092 cu. yards</td>
<td>7,968 B.t.u.</td>
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<tr>
<td>3010 gallons</td>
<td>15,842 cu. yards</td>
<td>26,606 B.t.u.</td>
</tr>
<tr>
<td>984 gallons</td>
<td>4,467 cu. yards</td>
<td>7,644 B.t.u.</td>
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<tr>
<td></td>
<td></td>
<td>34,046 B.t.u.</td>
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</table>
1. A piece of board 38 inches long was cut from a board 72 inches long. What is the length of the remaining piece?

2. How many square feet of plywood remain from an original supply of 10,000 square feet after 6,973 square feet have been used?

3. It was necessary to use 6,493 bricks from a pile containing 8,640. How many bricks were left?

4. A basement floor space containing 14,650 sq. ft. How much space remains to be painted after 6,842 sq. ft. have been covered?

5. A contract for excavating called for the removal of 40,000 cu. yds. of earth. How much remained after removing 7,643 cu. yds?

6. A lumber man had 632,000 bd. ft. (board feet) of native pine. If he sold 328,582 bd. ft., how many bd. ft. remained?

7. A carpenter built a veranda by contract for $450.00. His material, labor and other costs totaled $365.00. What was his profit?

8. A contractor bought 6,000 bd. ft. of oak flooring. He used 1,928 bd. ft. on the one house and 1,850 bd. ft. on another. How much flooring had he left?

9. The balance in a contractor's checking account in a certain bank is $1,176.00. If he withdraws $321.00, what will his balance be?
NEW PROBLEMS

1. A machinist had 4,763 feet of 1" stock. After using 2,895 feet, how much remained?

2. In ten years the number of factory workers in a city increased from 31,467 to 257,289. What was the increase?

3. A man's pay before deductions was $93.00. His deductions were insurance $7.00, dues $3.00, social security $4.00, and taxes $18.00. What was his take-home pay?

4. Four pieces measuring 49 inches, 72 inches, 27 inches and 36 inches are cut from a steel bar that was 192 inches long. Allowing a total of 1" for waste in cutting, what is the length of the piece remaining?

5. Which is larger, the sum of 239, 473, 892, 652 and 378, or the sum of 972, 643, 179, 233 and 462, and by how much?

6. There were 275 gallons of cutting oil in a tank. The first week 45 gallons were used, the second week 38 gallons, the third week 29 gallons and the fourth week 24 gallons. How much oil had to be ordered to fill the tank?

7. Taxes on a group of factory buildings amounted to $1,973,462. Taxes for the same group three years later amounted to $3,456,231. Find the increase.

8. A machinist had $6,748 with which to build a shop. The garage cost $1,789, the land cost $1,500, the building $5,690 and other expenses amounted to $363. How much money must he have borrowed to complete the building?

9. A contractor paid $3,640 for a new truck. He had $9,647 in the bank. What was his bank balance after he paid for the truck?
ACTIVITY #3

Multiply the following quantities:

1. 16 inches
   \[ \times 44 \]

2. 56 feet
   \[ \times 17 \]

3. 254 sq. inches
   \[ \times 16 \]

4. 352 sq. feet
   \[ \times 75 \]

5. 1,809 cu. inches
   \[ \times 62 \]

6. 2,834 sq. yards
   \[ \times 170 \]

7. 659 cu. yards
   \[ \times 212 \]

8. 350 hours
   \[ \times 521 \]

9. $1,205
   \[ \times 51 \]

10. 1,872 cu. inches
    \[ \times 109 \]

11. 1,257 gallons
    \[ \times 857 \]

12. $16,005
    \[ \times 77 \]
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<th>ACTIVITY #2</th>
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<tr>
<td>1</td>
<td>120 inches</td>
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<tr>
<td></td>
<td>- 43 inches</td>
</tr>
<tr>
<td>2</td>
<td>1,473 feet</td>
</tr>
<tr>
<td></td>
<td>- 611 feet</td>
</tr>
<tr>
<td>3</td>
<td>909 yards</td>
</tr>
<tr>
<td></td>
<td>- 640 yards</td>
</tr>
<tr>
<td>4</td>
<td>1,636 sq. in.</td>
</tr>
<tr>
<td></td>
<td>- 703 sq. in.</td>
</tr>
<tr>
<td>5</td>
<td>3.469 sq. ft.</td>
</tr>
<tr>
<td></td>
<td>- 983 sq. ft.</td>
</tr>
<tr>
<td>6</td>
<td>3,091 sq. yds.</td>
</tr>
<tr>
<td></td>
<td>- 993 sq. yds.</td>
</tr>
<tr>
<td>7</td>
<td>12,643 cu. yds.</td>
</tr>
<tr>
<td></td>
<td>- 7,123 cu. yds.</td>
</tr>
<tr>
<td>8</td>
<td>16,298 lbs.</td>
</tr>
<tr>
<td></td>
<td>- 3,696 lbs.</td>
</tr>
<tr>
<td>9</td>
<td>23,122 cu. ft.</td>
</tr>
<tr>
<td></td>
<td>- 10,069 cu. ft.</td>
</tr>
<tr>
<td>10</td>
<td>$14,254.00</td>
</tr>
<tr>
<td></td>
<td>- $9,676.00</td>
</tr>
<tr>
<td>11</td>
<td>$25,150.00</td>
</tr>
<tr>
<td></td>
<td>- $11,909.00</td>
</tr>
</tbody>
</table>
SAHUARITA HIGH SCHOOL
CAREER
CURRICULUM
PROJECT

COURSE TITLE: ALGEBRA

PACKAGE TITLE: COMPLICATIONS HAVE DONE SET IN

by
H. Burton Tingle
RATIONALE

You already know now to work with some kinds of fractions because of your knowledge of arithmetic. Now there are some fractions with polynomials in them that we need to be able to work with. They behave very much like ordinary arithmetic fractions and are another part of the algebraic process that can be better used the more you know about them.

In this package, you will be studying algebraic fractions.

BEHAVIORAL OBJECTIVES

1. Given any set of algebraic fractions you should be able to reduce them to lowest terms with 90½ accuracy.

2. Given any set of algebraic fractions, you should be able to add, subtract, multiply or divide them with 80½ accuracy.
PRE-TEST

Give each answer in simplest terms.

1. \( \frac{10abc}{2ab} \)

2. \( \frac{5abc}{10a^2b^2} \)

3. \( \frac{ax - ab}{x^2 - b^2} \)

4. \( \frac{x^2 + 3x - 18}{x^2 - 6x + 9} \)

5. \( \frac{5abc}{2mn} \times \frac{10mn^2}{5b^2} \)

6. \( \frac{12abc}{5xyz} \div \frac{3ac^2}{10yz^2} \)

7. \( \frac{12ab}{5} + \frac{6ab}{10} \)

8. \( \frac{5}{2x} + \frac{3}{4x^2} \)

9. \( \frac{\frac{5a^2b}{7rs} \times \frac{10s^2}{ab} \div \frac{2ab}{20r}}{2} \)

10. \( \frac{x^2 + 7x + 10}{x^2 + 7x + 12} \div \frac{x^2 + 5x + 4}{x^2 - 4} \)

11. \( \frac{2}{a + 1} + \frac{a - 1}{a + 1} \div \frac{3}{a + 1} \)

12. \( \frac{2}{3 + x} - \frac{x}{x - 3} \)

13. \( \frac{2x}{a^2b^2} - \frac{5x}{a - a^2b^2} \)

14. \( \frac{2x}{x^2 + 3x - 10} + \frac{3}{x^2 + 6x + 5} + \frac{x}{x^2 - x - 2} \)

You must get 13 correct to skip over this package.
INFORMATION SOURCES

1. Listen to the teacher presentation
2. Read Chapter 8 in the textbook
ACTIVITY I

Reduce each of these fractions to lowest terms.

1. \( \frac{5xyz}{xy} \)

2. \( \frac{7x^2y^2}{2xy} \)

3. \( \frac{10a^2b}{5ab^2} \)

4. \( \frac{6abc}{12abc} \)

5. \( \frac{14a^2b^2c^2}{10a^3b^c} \)

6. \( 2x^2 \)

7. \( \frac{8abc}{10a^2b^c} \)

8. \( \frac{1}{2} \)

9. \( \frac{8x^2y^2z^2}{8x^2y^2z} \)

10. \( \frac{16abcd}{4a^2b^2c^d} \)
ACTIVITY 2

Reduce each of the following to lowest terms.

1. \(\frac{3x^2 + 2x}{x}\)

2. \(\frac{4x + 2}{2}\)

3. \(\frac{5x^3 + 10x^2 + 15x}{5x}\)

4. \(\frac{2x^4 + 4x^5 + 8x}{2x^2}\)

5. \(\frac{3x^2 + 9x^3}{3x}\)

6. \(\frac{4a^2 + 5ab}{2ab}\)

7. \(\frac{10ra + 5ra^2}{5r^2a}\)

8. \(\frac{2a^2 + 4a + 6a^3}{2a^4}\)

9. \(\frac{3a^2 - 4a}{2}\)

10. \(\frac{x^2 + 3x - 4}{x - 1}\)

11. \(\frac{x^2 - 5x + 4}{x - 4}\)

12. \(\frac{x^2 + 7x + 12}{x + 3}\)

13. \(\frac{x^2 - 2x - 15}{x - 5}\)

14. \(\frac{x^2 - 16}{x + 4}\)

15. \(\frac{x^2 - 25}{x^2 - x - 20}\)

16. \(\frac{x^2 - 4x - 21}{x^2 - 5x - 14}\)

17. \(\frac{2x^2 - 5x + 3}{2x^2 - x - 3}\)

18. \(\frac{6x^2 - x - 2}{3x^2 + 7x - 6}\)
ACTIVITY #3

Give each answer in simplest terms.

1. \( \frac{2}{3} \times \frac{5}{7} = \)

2. \( \frac{3}{8} \times \frac{9}{10} = \)

3. \( \frac{4}{5} \times \frac{2}{3} = \)

4. \( \frac{6}{7} \times \frac{3}{5} \times 2 = \)

5. \( \frac{1}{2} \times \frac{3}{4} \times \frac{1}{7} = \)

6. \( \frac{1}{2} \times \frac{2}{3} \times \frac{5}{7} = \)

7. \( \frac{3}{4} \times \frac{6}{7} \times \frac{3}{18} = \)

8. \( \frac{3}{10} \times \frac{12}{5} \times \frac{2}{7} = \)

9. \( \frac{26}{45} \times \frac{9}{13} \times \frac{15}{16} = \)

10. \( \frac{110}{31} \times \frac{27}{44} = \frac{77}{20} \)

ACTIVITY 4

Work p. 293, 294: 1 - 45
ACTIVITY 5

1. $\frac{1}{2} \div \frac{2}{3} =$

2. $\frac{3}{4} \div \frac{1}{5} =$

3. $\frac{1}{2} \div 4 =$

4. $3 \div \frac{1}{4} =$

5. $\frac{3}{5} \div \frac{2}{3} =$

6. $\frac{3}{7} \div \frac{9}{10} =$

7. $\frac{3}{10} \div \frac{3}{5} =$

8. $2 \div \frac{1}{4} =$

9. $2 \div \frac{2}{3} =$

10. $\frac{4}{15} \div \frac{2}{3} =$

ACTIVITY 6

Work p. 295, 296: 1 - 29

ACTIVITY 7

Work p. 296, 297: 1 - 20
ACTIVITY 8

Work p. 298, 299: 1 - 20

ACTIVITY 9

Give each answer in simplest terms.

1. \( \frac{1}{2} + \frac{1}{3} \)

2. \( \frac{3}{4} + \frac{5}{7} \)

3. \( \frac{2}{5} - \frac{1}{5} \)

4. \( \frac{2}{3} + \frac{1}{8} - \frac{2}{9} \)

5. \( \frac{1}{11} + \frac{2}{3} - \frac{1}{4} \)

6. \( \frac{1}{30} + \frac{1}{18} \)

7. \( \frac{9}{10} - \frac{3}{45} \)

8. \( \frac{7}{50} + \frac{9}{100} \)

9. \( \frac{3}{50} - \frac{1}{64} + \frac{2}{75} \)

10. \( \frac{3}{65} + \frac{1}{100} - \frac{1}{90} \)

ACTIVITY 10

Work p. 301, 302: 1 - 38
ACTIVITY 11

Change each mixed number to an improper fraction and each improper fraction to a mixed number.

1. $2\frac{1}{2}$
2. $3\frac{2}{3}$
3. $5\frac{5}{7}$
4. $12\frac{2}{11}$
5. $45\frac{23}{25}$

6. $\frac{7}{3}$
7. $\frac{3}{4}$
8. $\frac{5}{4}$
9. $\frac{22}{3}$
10. $\frac{373}{19}$

ACTIVITY 12

Work p. 303: 1 - 24

ACTIVITY 13

Work p. 305: 1 - 27

ACTIVITY 14

Work p. 307: 1 - 25
ACTIVITY 15

Work p. 309: 1 - 15

People who work in what occupations would normally be concerned with interest problems.

ACTIVITY 16

Work p. 311: 1 - 10

People who work with mixtures and solutions need to have a knowledge of __________, in addition to algebra.

What kinds of occupations could they work in?

ACTIVITY 18: Work p. 318: 1 - 8

ACTIVITY 19: Read p. 320, p. 331

What is a home economist?

Name three different occupations that a home economist could work in.

Why did Lilivati have her name in an ancient algebra book?
Work with the divisibility properties of integers on pages 328, 329, and 330.

Check these numbers for divisibility by: 3 4 5 6 7 9 11
(answer yes or no)

<table>
<thead>
<tr>
<th>Number</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>9</th>
<th>11</th>
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COURSE TITLE: ALGEBRA

PACKAGE TITLE: THAT AIN'T NATURAL

by

H. Burton Tingle
RATIONALE

You already know how to work with whole numbers, both positive and negative; and with fractions. Now there are some numbers called irrational numbers that you need to be able to work with. Sometimes, they are called radical numbers, or just radicals. Together with the integers, they make up a set of numbers called the real number system. They are a necessity for solving second degree equations.

In this package, you will be working with real numbers.

BEHAVIORAL OBJECTIVES

1. Given any set of real numbers, you should be able to express them in simplest radical form with 80% accuracy.

2. Given any set of real numbers, you should be able to add, subtract, multiply and divide them; and give the answer in simplest terms with 80% accuracy.
PRE-TEST

Give each answer in simplest terms.

1. \( \sqrt{64} \)

2. \( \sqrt{48} \)

3. \( \sqrt{6000} \)

4. \( \sqrt{6050} \)

5. \( \sqrt{2} \times \sqrt{10} \)

6. \( \sqrt{20} \times \sqrt{15} \)

7. \( 3 \sqrt{5} - 8 \sqrt{5} \)

8. \( \sqrt{12} + \sqrt{27} \)

9. \( \sqrt{\frac{3}{5}} \)

10. \( \sqrt{\frac{9}{8}} \)

11. \( \frac{\sqrt{2}}{\sqrt{6}} \)

12. \((\sqrt{8} + \sqrt{2})(\sqrt{6} + \sqrt{3})\)

13. \((\sqrt{5} - \sqrt{2})^2\)

14. \(\frac{\sqrt{6} + \sqrt{3}}{\sqrt{2} + \sqrt{5}}\)

15. \(\frac{\sqrt{10} + 2\sqrt{3}}{\sqrt{5} - \sqrt{8}}\)

You must get 14 correct to skip over this package.
1. Listen to the teacher presentation

2. Read Chapter 11 in the textbook

3. Memorize the following rules

   A. Definition of root: $\sqrt[n]{x} = b \iff b^n = x$

   B. First law of radicals: $\sqrt[n]{xy} = \sqrt[n]{x}\sqrt[n]{y}$

   C. Second law of radicals: $\sqrt[n]{\frac{x}{y}} = \frac{\sqrt[n]{x}}{\sqrt[n]{y}}$

   D. Agreement #1: Never leave a fraction under a radical sign

   E. Agreement #2: Never leave a radical sign in the denominator of a fraction
## ACTIVITY

Square each of these numbers

<p>| | | | |</p>
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<tr>
<th></th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>(1)</td>
<td>16</td>
<td>(0.7)</td>
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<td>(2)</td>
<td>17</td>
<td>(0.09)</td>
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<td>(3)</td>
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<td>(0.1)</td>
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<td>(14)</td>
<td>29</td>
<td>(9\frac{9}{16})</td>
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<tr>
<td>15</td>
<td>(15)</td>
<td>30</td>
<td>(2\frac{3}{4})</td>
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</table>
ACTIVITY

Give the square root of each of these numbers.

1. \( \sqrt{4} \)  
2. \( \sqrt{9} \)  
3. \( \sqrt{25} \)  
4. \( \sqrt{36} \)  
5. \( \sqrt{64} \)  
6. \( \sqrt{81} \)  
7. \( \sqrt{49} \)  
8. \( \sqrt{1} \)  
9. \( \sqrt{16} \)  
10. \( \sqrt{100} \)  
11. \( \sqrt{121} \)  
12. \( \sqrt{169} \)  
13. \( \sqrt{225} \)  
14. \( \sqrt{400} \)  
15. \( \sqrt{625} \)  
16. \( \sqrt{0.01} \)  
17. \( \sqrt{0.0001} \)  
18. \( \sqrt{49} \)  
19. \( \sqrt{0.04} \)  
20. \( \sqrt{0.0009} \)  
21. \( \sqrt{16} \)  
22. \( \sqrt{0.00004} \)  
23. \( \sqrt{0.0025} \)  
24. \( \sqrt{\frac{4}{9}} \)  
25. \( \sqrt{\frac{16}{61}} \)  
26. \( \sqrt{\frac{2}{16}} \)  
27. \( \sqrt{\frac{25}{49}} \)  
28. \( \sqrt{\frac{1}{4}} \)  
29. \( \sqrt{\frac{1}{100}} \)  
30. \( \sqrt{\frac{49}{10,000}} \)
ACTIVITY

Express each of the following in simplest radical form.

1. \( \sqrt{9} \)  
2. \( \sqrt{16} \)  
3. \( \sqrt{25} \)  
4. \( \sqrt{49} \)  
5. \( \sqrt{64} \)  
6. \( \sqrt{100} \)  
7. \( \sqrt{144} \)  
8. \( \sqrt{52} \)  
9. \( \sqrt{60} \)  
10. \( \sqrt{18} \)  
11. \( \sqrt{27} \)  
12. \( \sqrt{45} \)  
13. \( \sqrt{54} \)  
14. \( \sqrt{63} \)  
15. \( \sqrt{90} \)  
16. \( \sqrt{32} \)  
17. \( \sqrt{80} \)  
18. \( \sqrt{48} \)  
19. \( \sqrt{50} \)  
20. \( \sqrt{72} \)  
21. \( \sqrt{108} \)  
22. \( \sqrt{120} \)  
23. \( \sqrt{75} \)  
24. \( \sqrt{140} \)  
25. \( \sqrt{99} \)  
26. \( \sqrt{88} \)  
27. \( \sqrt{150} \)  
28. \( \sqrt{125} \)  
29. \( \sqrt{136} \)  
30. \( \sqrt{98} \)
Multiply, and give each answer in simplest terms.

1. \( \sqrt{3} \times \sqrt{7} \)
2. \( \sqrt{2} \times \sqrt{3} \)
3. \( \sqrt{5} \times \sqrt{7} \)
4. \( \sqrt{3} \times \sqrt{7} \)
5. \( \sqrt{5} \times \sqrt{7} \)
6. \( \sqrt{2} \times \sqrt{3} \)
7. \( \sqrt{3} \times \sqrt{7} \)
8. \( \sqrt{5} \times \sqrt{7} \)
9. \( \sqrt{5} \times \sqrt{7} \)
10. \( \sqrt{3} \times \sqrt{7} \)
11. \( \sqrt{x} \times \sqrt{x} \)
12. \( \sqrt{3a} \times \sqrt{3a} \)
13. \( \sqrt{x^2} \times \sqrt{y^2} \)
14. \( \sqrt{12a^2} \times 3 \sqrt{3a} \)
15. \( x \sqrt{5x} \times y \sqrt{2x} \)
16. \( 2 (2 + \sqrt{2}) \)
17. \( 3 (4 - \sqrt{2}) \)
18. \( \sqrt{2} (2 + \sqrt{3}) \)
19. \( 3 (4 - \sqrt{2}) \)
20. \( \sqrt{2} (2 + \sqrt{3}) \)
21. \( (2 + \sqrt{3})(3 + \sqrt{2}) \)
22. \( (1 - \sqrt{2})(3 - \sqrt{3}) \)
23. \( (\sqrt{2} + \sqrt{3})(\sqrt{5} - \sqrt{6}) \)
24. \( (\sqrt{2} + \sqrt{3})(\sqrt{5} - \sqrt{6}) \)
25. \( (\sqrt{2} + \sqrt{3})(\sqrt{5} - \sqrt{6}) \)
26. \( x(\sqrt{x} + \sqrt{y}) \)
27. \( 3a(\sqrt{2a^2} + \sqrt{4a}) \)
28. \( \sqrt{xy}(\sqrt{x^2} - \sqrt{y^2}) \)
29. \( (3 + x)(\sqrt{x} + 3) \)
30. \( (\sqrt{a} + \sqrt{b})(\sqrt{c} + \sqrt{d}) \)
ACTIVITY

Rationalize the denominators on each of these problems.

1. \( \frac{1}{\sqrt{3}} \)

2. \( \frac{1}{\sqrt{2}} \)

3. \( \frac{3}{\sqrt{3}} \)

4. \( \frac{5}{\sqrt{5}} \)

5. \( \frac{3}{\sqrt{6}} \)

6. \( \frac{7}{\sqrt{8}} \)

7. \( \frac{\sqrt{3}}{\sqrt{3}} \)

8. \( \frac{\sqrt{5}}{\sqrt{10}} \)

9. \( \frac{\sqrt{6}}{\sqrt{12}} \)

10. \( \frac{\sqrt{5}}{\sqrt{15}} \)

11. \( \frac{\sqrt{15}}{\sqrt{20}} \)

12. \( \frac{1}{1 + \sqrt{2}} \)

13. \( \frac{2}{3 - \sqrt{5}} \)

14. \( \frac{3}{6 + \sqrt{3}} \)

15. \( \frac{\sqrt{3}}{\sqrt{3} - \sqrt{2}} \)

16. \( \frac{\sqrt{2} - \sqrt{3}}{\sqrt{3} + \sqrt{5}} \)

17. \( \frac{\sqrt{12} - \sqrt{27}}{\sqrt{3} - \sqrt{6}} \)

18. \( \frac{\sqrt{x} - \sqrt{y}}{a\sqrt{b} - a\sqrt{d}} \)
ACTIVITY

Work p. 405: 1 - 12

ACTIVITY

Work p. 315: 1 - 20

ACTIVITY

Work p. 420: 1 - 20
ACTIVITY

Read P. 424, p. 433

1. What are some of the problems facing civic planners of today?

2. Draw a sketch of what you would think is the ideal layout of a city of 100,000 people.
Express each answer in simplest terms.

1. \( \sqrt{8} \)
2. \( \sqrt{32} \)
3. \( \sqrt[4]{27x^4} \)
4. \( \sqrt[8]{125x^8} \)
5. \( \sqrt[4]{4x} \times \sqrt[4]{2x} \)
6. \( (\sqrt[4]{2x})^5 \)
7. \( \frac{2}{\sqrt[3]{3}} \)
8. \( \frac{\sqrt{2}}{\sqrt[3]{3}} \)
9. \( \frac{\sqrt[3]{8x^5}}{\sqrt[4]{2x^2}} \)
10. \( \frac{1}{\sqrt{3} + \sqrt{2}} \)
COURSE TITLE: ALGEBRA

PACKAGE TITLE: NOW THERE'S T'0 OF 'EM

by

H. Burton Tingle
Rationale

So far, we have solved linear or first degree equations. If the variable is squared, it becomes a second degree equation. Many times problems appear with the variable squared. This means, according to the fundamental theorem of algebra, that it has 2 solutions. Finding those 2 solutions is the work of this package.

Behavioral Objectives

1. Given any quadratic equation with rational coefficients, you should be able to find the solutions with 80% accuracy.
Pre-Evaluation

Find the solutions to each of these quadratic equations.

1. \( x^2 - 9 = 0 \)
2. \( x^2 - 4 = 0 \)
3. \( x^2 + 6x + 9 = 0 \)
4. \( x^2 + 2x + 1 = 0 \)
5. \( x^2 - 4x - 5 = 0 \)
6. \( x^2 + 2x - 15 = 0 \)
7. \( 2x^2 + x - 6 = 0 \)
8. \( 2x^2 + 5x - 1 = 0 \)
9. \( 4x^2 - 2x + 3 \)
10. \( \frac{3x^2}{2} + 4x = 3 \)

You must get 9 correct to skip over this package.
INFORMATION SOURCES

1. Listen to the teacher presentation
2. Read Chapter 13 in the textbook
Find the solutions to these quadratic equations by factoring.

1. \( x^2 - 16 = 0 \)
2. \( x^2 - 25 = 0 \)
3. \( 2x^2 - 2 = 0 \)
4. \( x^2 - 64 = 0 \)
5. \( x^2 - 81 = 0 \)
6. \( 3x^2 - 300 = 0 \)
7. \( x^2 = 36 \)
8. \( x^2 + 4x + 4 = 0 \)
9. \( x^2 + 10x + 25 = 0 \)
10. \( x^2 - 12x - 36 = 0 \)
11. \( x^2 - 20x + 100 = 0 \)
12. \( x^2 + 18x = -81 \)
13. \( x^2 + 16x + 64 = 0 \)
14. \( x^2 + 24x + 144 = 0 \)
15. \( 4x^2 - 9 = 0 \)
16. \( 9x^2 = 1 \)
17. \( 9x^2 - 4 = 0 \)
18. \( 16x^2 - 9 = 0 \)
19. \( 25x^2 = 4 \)
20. \( 16x^2 - 25 = 0 \)
21. \( 81x^2 = 1 \)
22. \( 4x^2 + 12x + 9 = 0 \)
23. \( 9x^2 - 30x + 25 = 0 \)
24. \( 16x^2 - 8x + 1 = 0 \)
25. \( 25x^2 + 20x + 4 = 0 \)
26. \( 25x^2 + 60x + 36 = 0 \)
27. \( 9x^2 - 12x + 4 = 0 \)
28. \( 4x^2 + 40x + 100 = 0 \)
Find the solutions to these quadratic equations by factoring. Show all work.

1. \( x^2 - 7x + 12 = 0 \)
2. \( x^2 - 8x + 15 = 0 \)
3. \( x^2 - 11x + 24 = 0 \)
4. \( x^2 - 10x + 16 = 0 \)
5. \( x^2 - 8x + 12 = 0 \)
6. \( x^2 - 5x = -4 \)
7. \( x^2 - 6x + 8 = 0 \)
8. \( 2x^2 - 15x + 18 = 0 \)
9. \( 3x^2 - 11x = -10 \)
10. \( 4x^2 - 8x + 3 = 0 \)
11. \( x^2 + 8x + 12 = 0 \)
12. \( x^2 + 7x + 10 = 0 \)
13. \( x^2 + 5x + 4 = 0 \)
14. \( x^2 + 11x = -18 \)
15. \( x^2 + 5x + 6 = 0 \)
16. \( x^2 + 9x + 20 = 0 \)
17. \( x^2 + 10x + 24 = 0 \)
18. \( x^2 + 14x + 24 = 0 \)
19. \( 2x^2 + 7x + 6 = 0 \)
20. \( 5x^2 + 8x + 3 = 0 \)
21. \( x^2 + 2x - 15 = 0 \)
22. \( x^2 - 3x - 10 = 0 \)
23. \( x^2 - 7x - 18 = 0 \)
24. \( x^2 - 5x - 24 = 0 \)
25. \( 2x^2 - x - 6 = 0 \)
26. \( 3x^2 + 5x - 12 = 0 \)
Find the solutions to these quadratic equations by completing the square. Show all work.

1. \(x^2 + 6x = 7\)  
2. \(x^2 + 8x = -7\)  
3. \(x^2 - 2x = 3\)  
4. \(x^2 + 4x = 5\)  
5. \(x^2 + 10x = -9\)  
6. \(x^2 - 12x = 13\)  
7. \(x^2 + 3x = 2\)  
8. \(x^2 - 5x = 2\frac{3}{4}\)  
9. \(x^2 + x = \frac{3}{4}\)  
10. \(x^2 + 7x = \frac{15}{4}\)  
11. \(x^2 + 4x = 6\)  
12. \(x^2 + 6x = 10\)  
13. \(x^2 + 2x = 0\)  
14. \(x^2 + 8x = 14\)
Solve these quadratic equations by completing the square. Show all work.

1. \(2x^2 + 4x - 10 = 0\)  
7. \(5x^2 - 10x - 6 = 0\)

2. \(3x^2 + 6x - 18 = 0\)  
8. \(2x^2 - 6x - 7 = 0\)

3. \(2x^2 + 8x - 10 = 0\)  
9. \(3x^2 - 12x = 1\)

4. \(4x^2 + 8x - 4 = 0\)  
10. \(2x^2 - 2x = 5\)

5. \(3x^2 - 9x - 12 = 0\)  
11. \(6x^2 - 12x = 1\)

6. \(5x^2 - 15x = 20\)  
12. \(10x^2 + 30x = 5\)
13. \(2x^2 + 3x = 2\)

14. \(3x^2 - 4x = 1\)

15. \(5x^2 - x - 2 = 0\)

16. \(4x^2 - 6x - 6 = 0\)

17. \(7x^2 - 8x = 14\)

18. \(2x^2 - 17x + 1 = 0\)
Solve these equations by the quadratic formula. Show all work and leave answers in simplest possible terms.

1. \( x^2 + 4x + 4 = 0 \)
2. \( x^2 - 12x + 36 = 0 \)
3. \( x^2 + 10x + 25 = 0 \)
4. \( x^2 - 20x + 100 = 0 \)
5. \( 4x^2 + 12x + 9 = 0 \)
6. \( x^2 - 11x + 24 = 0 \)
7. \( x^2 - 7x + 12 = 0 \)
8. \( x^2 - 5x = -4 \)
9. \( x^2 - 10x + 16 = 0 \)
10. \( 2x^2 - 15x = -18 \)
11. \( 4x^2 - 8x + 3 = 0 \)
12. \( x^2 + 7x + 10 = 0 \)
13. \( x^2 + 5x + 4 = 0 \)
14. \( x^2 + 11x = -18 \)
15. \( x^2 + 5x + 6 = 0 \)

23. \( x^2 - 5x = 24 \)

16. \( x^2 + 9x + 20 = 0 \)

24. \( x^2 - 4x - 12 = 0 \)

17. \( x^2 + 10x + 24 = 0 \)

25. \( 3x^2 - 11x = -16 \)

18. \( x^2 + 2x - 15 = 0 \)

26. \( 5x^2 - x = 2 \)

19. \( x^2 - 7x - 18 = 0 \)

27. \( 2x^2 - 6x - 7 = 0 \)

20. \( x^2 - 3x - 10 = 0 \)

28. \( 2x^2 + 3x - 2 = 0 \)

21. \( 2x^2 - x - 6 = 0 \)

29. \( 3x^2 + 5x - 1 = 0 \)

22. \( 3x^2 + 5x = 12 \)

30. \( 4x^2 - 7x - 4 = 0 \)

\[ x = \phantom{0} \]
ACTIVITY

Read p.

What is an actuary?

What branches of mathematics do actuaries use most for their calculations?

Who do actuaries usually work for?
COURSE TITLE: ALGEBRA
PACKAGE TITLE: WE GOTTA FIND THAT TRAIL

by

H. Burton Tingle
RATIONALE

Graphing has many different practical applications, depending upon the type of graph. Graphing of lines and other curves and finding where they cross each other is of particular interest in surveying, missile trajectories, and many other areas. Also, there are many properties of lines and curves which can be seen from graphs. In this package, you will be graphing points and lines.

BEHAVIORAL OBJECTIVES

1. Given any set of points, you should be able to graph them on a rectangular coordinate system with 90% accuracy.
2. Given any set of equations of lines in two dimensions, you should be able to graph them with 90% accuracy.
3. Given any set of equations of lines in two dimensions, you should be able to identify the slope and the y-intercept with 90% accuracy.
PFR-TEST

On the given axes below, graph each of these points and label them:

A. (3,4)  B. (-2, -4)  C. (3, -1)  D. (-2, 1)
E. (9, -4)  F. (3, 0)  G. (0, 5)  H. (-2, 0)

Draw at least two points that lie on each of these lines.
1. $2x - y + 1 = 0$
2. $\frac{3x}{2} + 2y - 3 = 0$
1. Listen to the teacher presentation.
2. Read Chapter 9 in the textbook.
On the given set of coordinate axes, graph each of the following points and label it properly.

1. (3, 4)  
2. (2, 5)  
3. (7, 1)  
4. (2, -5)  
5. (2, -2)  
6. (5, -3)  
7. (-3, 4)  
8. (-5, 6)  
9. (-10, 1)  
10. (-2, 4)  
11. (-8, -4)  
12. (-1, -2)  
13. (-4, -5)  
14. (-3, -10)  
15. (0, -2)  
16. (2, 0)  
17. (0, 2)  
18. (-3, 0)  
19. (0, 0)  
20. (0, 7)
Plot each of the following points and join them with a straight line:

<table>
<thead>
<tr>
<th>Point</th>
<th>(x, y)</th>
<th>Point</th>
<th>(x, y)</th>
<th>Point</th>
<th>(x, y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>(3, -4)</td>
<td>10.</td>
<td>(-5, 12)</td>
<td>15.</td>
<td>(-3, 1)</td>
</tr>
<tr>
<td>2.</td>
<td>(-7, -4)</td>
<td>11.</td>
<td>(-8, 1)</td>
<td>16.</td>
<td>(-5, -3)</td>
</tr>
<tr>
<td>3.</td>
<td>(-5, -4)</td>
<td>12.</td>
<td>(-2, 5)</td>
<td>17.</td>
<td>(-3, -2)</td>
</tr>
<tr>
<td>4.</td>
<td>(-5, 0)</td>
<td>13.</td>
<td>(-3, 0)</td>
<td>18.</td>
<td>(-2, -1)</td>
</tr>
<tr>
<td>5.</td>
<td>(1, 3)</td>
<td>14.</td>
<td>(-3, -3)</td>
<td>19.</td>
<td>(-2, -3)</td>
</tr>
<tr>
<td>6.</td>
<td>(-2, 3)</td>
<td>15.</td>
<td>(-5, -3)</td>
<td>20.</td>
<td>(-10, -6)</td>
</tr>
<tr>
<td>7.</td>
<td>(2, 3)</td>
<td>16.</td>
<td>(-3, 1)</td>
<td>21.</td>
<td>(0, -3)</td>
</tr>
<tr>
<td>8.</td>
<td>(3, 3)</td>
<td>17.</td>
<td>(-3, 3)</td>
<td>22.</td>
<td>(0, 3)</td>
</tr>
<tr>
<td>9.</td>
<td>(3, 1)</td>
<td>18.</td>
<td>(-3, -1)</td>
<td>23.</td>
<td>(0, -1)</td>
</tr>
<tr>
<td>10.</td>
<td>(3, 0)</td>
<td>19.</td>
<td>(-3, 0)</td>
<td>24.</td>
<td>(0, 0)</td>
</tr>
</tbody>
</table>

...
If we know two points on a line exactly one line. For a line of best fit in each problem choose four.

1. \((2,4), (1,4)\)       6. \((7,6); (-3,7)\)
2. \((4,3), (-6,1)\)      7. \((3,0); (2,4)\)
3. \((0,1); (3,0)\)       8. \((-2, -1); (4,2)\)
4. \((2, 1); (4,4)\)      9. \((-2, -1); (4,3)\)
5. \((2, y); (6,5)\)      10. \((-4,3); (0, 2)\)

If the slope of a line is defined to be the rise of the line divided by the run of the line, give the slope of each of the lines you have graphed.

1. ___ 2. ___ 3. ___ 4. ___ 5. ___ 6. ___ 7. ___ 8. ___

9. ___ 10. ___
ACTIVITY

Each of the equations below is called a linear equation because its graph is a line. By substitution, find some points on each line and check the accuracy.

1. \( x + y - 2 = 0 \)
2. \( 2x - y + 1 = 0 \)
3. \( 4x + 2y = 5 \)
4. \( x - y = 0 \)
5. \( \frac{x}{2} + y = 4 \)
6. \( \frac{x}{2} + \frac{2y}{3} = 1 \)
ACTIVITY

By substitution, find some points on each of these lines, and graph them carefully.

1. \( x - y - 3 = 0 \)
2. \( 2x + y - 2 = 0 \)
3. \( 2x - 4y - 4 = 0 \)
4. \( 3x + 5y + 10 = 0 \)

Then, from the above graphs, what is the slope of line 12?

of line 2?

of line 3?

of line 10?

Where do the above lines cross the y-axis:

Line 1?

Line 2?

Line 3?

Line 4?
ACTIVITY

1. Solve the following equation for x:
   
   \( -y - 3 = 0 \)

2. Solve the following equation for y:
   
   \( x + y - 10 = 0 \)

3. Check answers to the last two problems on the
   accompanying sheet.

4. Determine the slope and y-intercept of each of the following
   linear equations without graphing.

5. \( 2x - 3y - 3 = 0 \)
6. \( 4x + 2y + 1 = 0 \)
7. \( 5x - 8y + 2 = 0 \)
8. \( 4x - y - 2 = 0 \)
9. \( 7x - 3y = 0 \)
10. \( \frac{5x - y}{3} = 1 \)
11. \( \frac{3x + y}{3} = 2 \)

\[ \boxed{X} \]
ACTIVITY

Graph each pair of lines and find out where they cross each other.

1. \( x - y \) and \( 2x + y - 3 = 0 \)
2. \( 2x - y \) and \( y + 3x - 5 = 0 \)
3. \( x = 2y \) and \( x - 3y + 1 = 0 \)
4. \( x + y = 1 \) and \( 2x + y = 3 \)
5. \( 2x - y + 4 = 0 \) and \( x + 2y = -7 \)
ACTIVITY

Read p. 365

What was Rene' Descartes occupation before he devoted his life to studying and learning?

Read p. 333

What is a cardiogram

People in what occupation design and build cardiographs?

People in what occupations would be most likely to use cardiograms?
COURSE TITLE: ALGEBRA

PACKAGE TITLE: WE GONNA GET 'EM TOGETHER

by

H. Burton Tingle
RATIONALE

Many times, in one problem, there will be several numbers which have to be worked with, and the order that you work with them will make a difference. This is the reason for using grouping symbols.

In this package, you will be studying order of operations and the use of grouping symbols.

Behavioral Objectives

Given any set of numbers to be added and/or subtracted and/or multiplied and/or divided, you should be able to give the correct answer with 90% accuracy—whether they have grouping symbols or not.
PRE-EVALUATION

1. $4 + 3 \times 2 =$

2. $\times 2 + 2 =$

3. $3 + 2 (1 + 3) =$

4. $5 + 2 \times -1 - 2 =$

5. $8 \div 4 \div 2 \times 1 =$

6. $4 + 3 \times 2 \div 1 + 1 - 3 =$

7. $4 + 2 + 1 - 3 \times 1 \div 1 =$

8. $2 + (3 + 2) - 4 (3 + 1) =$

9. $3 + (2 + 1 (4 - 3) - 2 + 1 =$

10. $5 + (4 + 2 + 2) \ 7 - 3 (1 + 1) + 9 + 1 =$

You must get 9 correct to skip over this package.
Information Sources

1. Listen to the teacher presentation.
2. Read Chapter 1 in the textbook.
Find each answer. Try to do it without asking any questions. Do not compare answers.

1. $3 \times 4 + 2 = \underline{26}$
2. $3 + 3 \times 2 = \underline{11}$
3. $8 \div 4 + 4 = \underline{12}$
4. $12 - 8 + 2 = \underline{6}$
5. $14 + 8 + 2 = \underline{24}$
6. $20 \div 10 \div 2 = \underline{1}$
7. $40 \div 8 + 2 = \underline{9}$
8. $7 - 5 - 2 = \underline{0}$
9. $8 + 4 \div 2 = \underline{10}$
10. $8 \times 4 + 3 = \underline{35}$
11. $10 - 3 - 2 = \underline{5}$
12. $10 + 3 \times 2 = \underline{16}$
13. $100 \times 4 \div 2 = \underline{200}$
14. $8 + 9 \div 3 = \underline{11}$
15. $12 \div 3 \times 4 = \underline{16}$
16. $40 \div 10 - 2 = \underline{2}$
17. $20 - 4 \div 2 = \underline{19}$
18. $60 + 3 \div 3 = \underline{63}$
19. $18 - 3 \div 3 = \underline{15}$
20. $18 - 11 - 2 = \underline{5}$
21. $8 \div 2 + 1 = \underline{5}$
22. $3 \div 2 - 1 = \underline{1}$
23. $4 - 2 \div 2 = \underline{3}$
24. $8 - 3 + 2 = \underline{7}$
25. $12 \div 4 \div 2 = \underline{1.5}$
26. $4 - 3 + 2 = \underline{3}$
27. $4 \times 4 + 2 = \underline{22}$
28. $5 \div 1 + 4 = \underline{9}$
29. $3 - 2 + 1 = \underline{2}$
30. $2 + 3 \div 2 = \underline{3.5}$
31. $9 - 3 \div 1 = \underline{6}$
32. $14 + 2 \div 4 = \underline{15.5}$
33. $2 + 3 - 2 = \underline{3}$
34. $4 + 5 \div 2 = \underline{6}$
35. $2 \div 1 \times 5 = \underline{10}$
36. $10 - 4 \div 2 = \underline{9}$
37. $11 - 2 - 3 = \underline{6}$
38. $24 \div 4 + 2 = \underline{11}$
39. $2 \div 2 \div 2 = \underline{0.25}$
40. $9 + 2 \div 2 = \underline{10}$
Parentheses around 2 numbers mean that those two numbers are to be considered as one number; or do what is in the parenthesis first.

Example 1. \(3 \times (4 + 3)\) means \(3 \times 7 = 21\) because \((4 + 3) = 7\).

Find each answer.

<table>
<thead>
<tr>
<th>Number</th>
<th>Equation</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>((3 \times 4) + 2 = )</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>(3 + (3 \times 2) = )</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>((8 \div 4) + 4 = )</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>((12 - 8) + 2 = )</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>(14 + (8 + 2) = )</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>(20 \div (10 \div 2) = )</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>(40 \div (8 + 2) = )</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>((7 - 5) - 2 = )</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>((8 + 4) \div 2 = )</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>(8 \times (4 + 3) = )</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>(10 - (3 - 2) = )</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>((10 + 3) \times 2 = )</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>(100 \times (4 \div 2) = )</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>((8 + 9) \div 3 = )</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>((12 \div 3) \times 4 = )</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>(40 \div (10 - 2) = )</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>(20 - (4 \div 2) = )</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>((60 + 3) \div 3 = )</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>(18 - (3 \div 3) = )</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>(18 - (11 - 2) = )</td>
<td></td>
</tr>
</tbody>
</table>
G-3

Find each answer

1. \(3 \times (4 + 2) = \) __________
2. \((3 + 3) \times 2 = \) __________
3. \(\frac{8}{2} (4 + 4) = \) __________
4. \(12 - (8 + 2) = \) __________
5. \((14 + 8) + 2 = \) __________
6. \((20 \div 10) \div 2 = \) __________
7. \((40 \div 8) + 2 = \) __________
8. \(7 - (5 - 2) = \) __________
9. \(8 + (4 \div 2) = \) __________
10. \((8 \times 4) + 3 = \) __________
11. \((10 - 3) - 2 = \) __________
12. \(10 + (3 \times 2) = \) __________
13. \((100 \times 4) \div 2 = \) __________
14. \(8 + (9 \div 3) = \) __________
15. \(12 \div (3 \times 4) = \) __________
16. \((40 \div 10) - 2 = \) __________
17. \((20 - 4) \div 2 = \) __________
18. \(60 + (3 \div 3) = \) __________
19. \((18-3) \div 3 = \) __________
20. \((18 - 11) - 2 = \) __________
21. \(8 \div (2 + 1) = \) __________
22. \((3 \div 2) - 1 = \) __________
23. \((4 - 2) \div 2 = \) __________
24. \(8 - (3 + 2) = \) __________
25. \((12 \div 4) \div 2 = \) __________
26. \((4 - 3) + 2 = \) __________
27. \((4 \times 4) + 2 = \) __________
28. \(5 \div (1 + 4) = \) __________
29. \(3 - (2 + 1) = \) __________
30. \(2 + (3 \div 2) = \) __________
31. \((9 - 3) \div 1 = \) __________
32. \((14 + 2) \div 4 = \) __________
33. \(2 + (3 - 2) = \) __________
34. \((4 + 5) \div 2 = \) __________
35. \(2 \div (1 \times 5) = \) __________
36. \(10 - (4 \div 2) = \) __________
37. \((11 - 2) - 3 = \) __________
38. \((24 \div 4) + 2 = \) __________
39. \(2 \div (2 \times 2) = \) __________
40. \((9 + 2) \div 2 = \) __________
Sometimes numbers appear without any grouping symbols. Because of this, we make the following agreement: Always multiply and divide before adding and subtracting. If there are only addition and subtraction signs, or only multiplication and division signs, proceed from left to right.

Example 1: \(5 \times 2 + 3 = 13\) because we multiply before adding.

Example 2: \(5 - 3 + 2 - 1 + 1 = 4\) proceeding from left to right.

Example 3: \(5 + 2 \times 4 - 10 \div 2 + 1 = 9\) multiplying and dividing first, then adding and subtracting from left to right.

Find each answer

1. \(3 \times 4 + 2 = \) __________
2. \(3 + 3 \times 2 = \) __________
3. \(6 \div 4 + 4 = \) __________
4. \(12 - 8 + 2 = \) __________
5. \(14 + 8 + 2 = \) __________
6. \(20 \div 10 \div 2 = \) __________
7. \(40 \div 8 + 2 = \) __________
8. \(7 - 5 - 2 = \) __________
9. \(8 + 4 \div 2 = \) __________
10. \(8 \times 4 + 3 = \) __________
11. \(10 - 3 - 2 = \) __________
12. \(10 + 3 \times 2 = \) __________
13. \(100 \times 4 \div 2 = \) __________
14. \(8 + 9 \div 3 = \) __________
15. \(12 \div 3 \times 4 = \) __________
16. \(40 \div 10 - 2 = \) __________
17. \(20 - 4 \div 2 = \) __________
18. \(60 + 3 \div 3 = \) __________
19. \(18 - 3 \div 3 = \) __________
20. \(18 - 11 - 2 = \) __________
21. \(8 \div 2 + 1 = \) __________
22. \(3 \div 2 - 1 = \) __________
23. \(4 - 2 \div 2 = \) __________
24. \(8 - 3 + 2 = \) __________
25. \(12 \div 4 \div 2 = \) __________
26. \(4 - 3 + 2 = \) __________
27. \(4 \times 4 + 2 = \) __________
28. \(5 \div 1 + 1 = \) __________
29. \(3 - 2 + 1 = \) __________
30. \(2 + 3 \div 2 = \) __________
31. \(9 - 3 \div 1 = \) __________
32. \(14 + 2 \div 1 = \) __________
33. \(2 + 3 - 2 = \) __________
34. \(4 + 5 \div 2 = \) __________
35. \(2 \div 1 \times 5 = \) __________
36. \(10 - 4 \div 2 = \) __________
37. \(11 - 7 - 3 = \) __________
38. \(24 \div 4 + 2 = \) __________
39. \(2 \div 2 \times 2 = \) __________
40. \(9 + 2 \div 2 = \) __________
ACTIVITY

Work page 22: 1 - 24

ACTIVITY

Work page 24: 1 - 32
Sometimes, it is necessary to use other grouping symbols besides parentheses. They are brackets, [ ], and braces, { }. Generally speaking, they mean the same thing as parentheses; but are used to avoid confusion. When more than one grouping symbol is used, begin simplifying from the inside out.

Example 1: \[ 2 \times \left\{ \frac{3 + 4 + [3 \times (4 - 2)] + 2}{3} \right\} = \]
\[ = 2 \times \left\{ \frac{3 + 4 + [3 \times 2] + 2}{3} \right\} = \]
\[ = 2 \times \left\{ \frac{3 + 4 + 6 + 2}{3} \right\} = 30 \]

Find each answer:

1. \[ [5 + 3 \times (2 + 1)] = \]
2. \[ \left\{ \frac{6 - (3 \div 1) + 1 \times (2 + 3)}{3} \right\} = \]
3. \[ [14 - (2 \div 1) + 4] = \]
4. \[ 3 + [4 + (3 \times 2) + 2] = \]
5. \[ [3 + 2 + (2 \times 3) - (1 \div 1) + 1] = \]
6. \[ [8 + 3 + (4 \times 5) - 3 + 2] = \]
7. \[ [9 + 2 \times [3 - (1 \times 2) + 4]] + 2 = \]
8. \[ [4 + 3 \times (2 + 1) + [2 \times (1 + 3)]] - 1 = \]
9. \[ 3 + [2 + 3 \times [4 + 2(2 - 1)]] + 3] = \]
10. \[ 6 \times \left[ 10 - [2 + 4 \times (3 \div 3) + 1] + 1 \times (3 - 3) \right] = \]
11. \[ [4 + 3 \times (2 + 1) + [2 \times (1 + 3) - 2]] = \]
12. \[ 10 \times [4 + 4 + [3 \times (2 + 2) - 2] + 3 \times (1 + 4)] = \]
13. \[ 3 \times [2 - (9 \div 9) + 2 \times (3 + 2)] - 11 = \]
ACTIVITY

Read p. 25, p. 32, p. 33.

1. What mathematics symbols were given to us by Thomas Harriot?

2. What was his profession, other than mathematics?

3. What do people in that profession do?

4. Name at least 3 different types of jobs that a surveyor might do.

5. How much education, particularly in mathematics, does a person need to be a surveyor? (Give your source of information)

6. What is cryptography?

7. Name at least two types of jobs where cryptography might be of use.