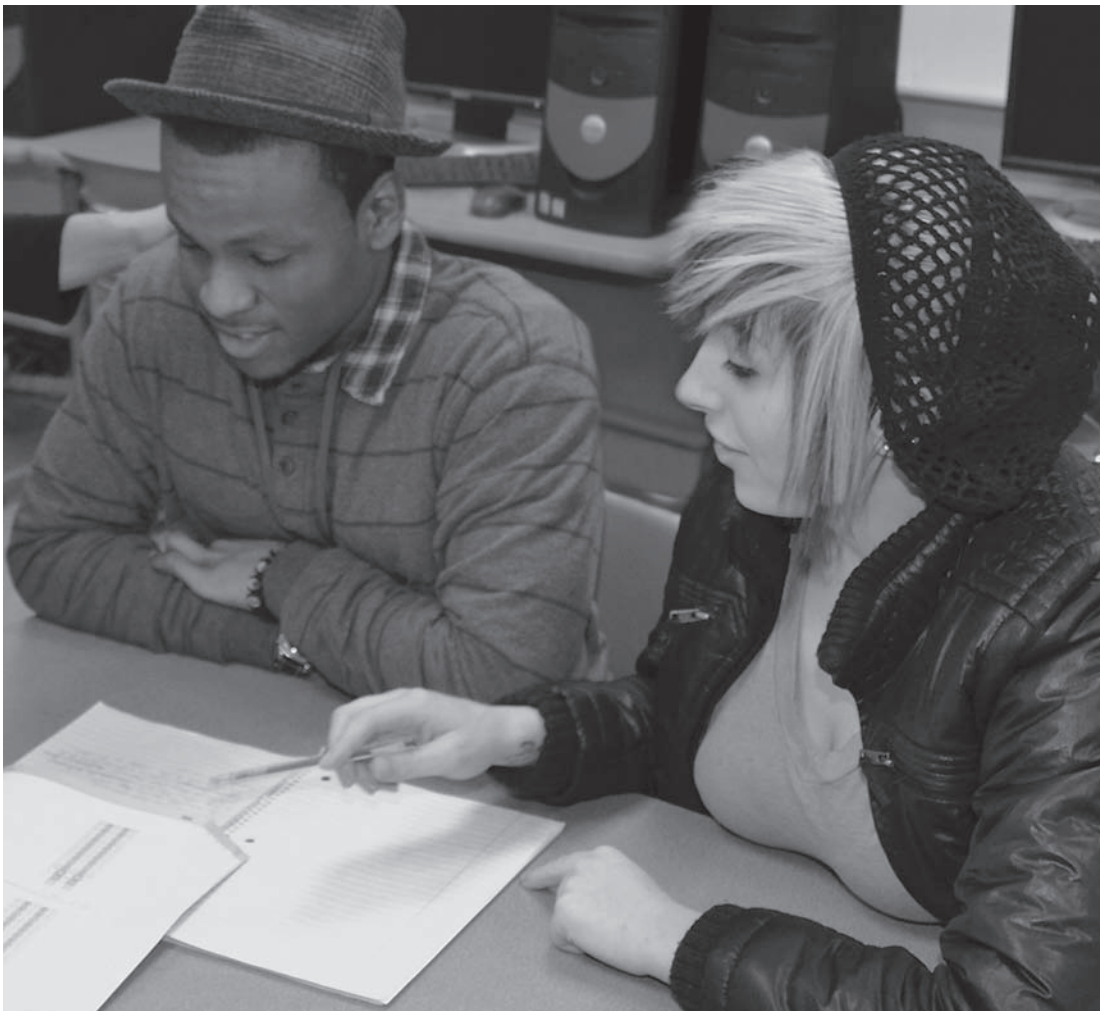


Basic Arithmetic

REVIEW

Lenoir Community College, Kinston, NC



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Example: Multiply 629×218

$$\begin{array}{r}
 629 \\
 \times 218 \\
 \hline
 5032 \\
 629 \\
 \hline
 1258 \\
 \hline
 137,122
 \end{array}$$

--1st: $629 \times 8 = 5032$
 --2nd: $629 \times 1 = 629$ (Remember to indent your answer)
 --3rd: $629 \times 2 = 1258$ (Remember to indent your answer 2 places)
 --Units are added last to obtain an answer.

Example: Find 7077 divided by 34

$$\begin{array}{r}
 208 \text{ R } 5 \\
 34 \overline{) 7077} \\
 \underline{68} \\
 77 \\
 \underline{70} \\
 277 \\
 \underline{272} \\
 5
 \end{array}$$

$34 \overline{) 70}$ (34 will go into 70 twice)
 $34 \times 2 = 68$
 68 is subtracted from 70 and the next digit is brought down.
 The process is repeated until all digits in the dividend have been brought down. The remainder is 5.

Using the Order of Operations

The Order of Operations

1. Evaluate expressions within parentheses first.
2. Perform all powers.
3. Complete all multiplication and division, working from left to right.
4. Perform addition and subtraction last, working left to right.

Example: $2 \cdot 3^2 - 3 \cdot 5 + 4$

$$\begin{array}{r}
 2 \times 3^2 - 3 \times 5 + 4 \\
 2 \times 9 - 3 \times 5 + 4 \\
 18 - 15 + 4 \\
 3 + 4 \\
 7
 \end{array}$$

1. Exponents are executed first.
2. Then multiplications.
3. Next subtraction.
4. Then addition

WHOLE NUMBER PRACTICE

1. Round to the given place
 - A) 3973 to hundreds
 - B) 253678 to ten-thousands
2. Add
 - A) $68421 + 985 + 6711$
 - B) $77 + 886 + 32785 + 8$
3.
 - A) Subtract 4867 from 5223
 - B) 5820 minus 625 equals what number?
 - C) Find the difference between 7042 and 6134
4. Multiply
 - A) 7024×352
 - B) 7432×504
5. Divide
 - A) $30572 \div 15$
 - B) $98521 \div 762$
6. Evaluate each expression using the order of operations
 - A) $3 + 5(6 - 1)$
 - B) $\frac{3(2 + 5)}{3^2 - 2}$
 - C) $7 - 2^3 \div 2 + 5$
7. Applications
 - A. Mr. Robinson drove from Los Angeles to Chicago. He drove 420 miles on Monday, 365 miles on Tuesday, and 382 miles on Wednesday. If the total distance is 1850 miles, how much further does he have to drive?
 - B. Write down 4617, multiply it by 12, divide the product by 9, and 365 to the quotient, and subtract 5521 from the sum. What is the result?
 - C. What number multiplied by 86 will give the same product as 163 multiplied by 430?
 - D. The first of four numbers is 3125, the second is greater than the first by 5108, the third is equal to the sum of the first and the second, and the fourth is equal to the sum of the third and the first. What is the sum of the four numbers?
 - E. The diameter of Mercury is 2967 miles, the diameter of Saturn is 24 times that of Mercury, and the diameter of the Sun is 12 times that of Saturn. What is the Sun's diameter?
 - F. How many 16-inch long boards can be cut from a board that is 15 feet long?
 - G. How many hours are there in 1 year?

FRACTIONS

Writing a fraction in lowest terms

Example: Reduce $\frac{6}{16}$ to lowest terms.

The numerator and denominator are written as products of primes.

Common factors that make 1 are eliminated.

$$\frac{6}{16} = \frac{\cancel{2} \times 3}{\cancel{2} \times 2 \times 2 \times 2} = \frac{3}{8}$$

Changing an improper fraction to a mixed number

Example: Write $\frac{13}{5}$ as a mixed number.

The numerator is divided by the denominator.

The quotient is the whole number; the remainder over the divisor is the fractional part.

$$\begin{array}{r} 2 \\ 5 \overline{) 13} \\ \underline{- 10} \\ 3 \end{array}$$

$$2 \frac{3}{5}$$

Changing a mixed number to an improper fraction.

Example: Write $5 \frac{3}{4}$ as an improper fraction.

The denominator is multiplied by the whole number, and the numerator is added to the result. This total is the new numerator. The denominator stays the same.

$$5 \frac{3}{4} = \frac{(4 \cdot 5) + 3}{4} = \frac{23}{4}$$

Adding fractions and mixed numbers

Example: Add $\frac{2}{7} + \frac{4}{7}$

The numerators are added and placed over the common denominator.

$$\frac{2}{7} + \frac{4}{7} = \frac{6}{7}$$

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

The LCM of 2 and 3 is calculated. The LCM of 2 and 3 is 6.

Equivalent fractions using the LCM are then calculated.

The fractions are added.

$$\begin{array}{r} \frac{1}{2} = \frac{3}{6} \\ + \frac{1}{3} = \frac{2}{6} \\ \hline \frac{5}{6} \end{array}$$

Example: Add $6\frac{1}{3} + 7\frac{2}{5}$

The fractional part should be added first.

Then the whole numbers are added.

$$\begin{array}{r} 6\frac{1}{3} = 6\frac{5}{15} \\ 7\frac{2}{5} = 7\frac{6}{15} \\ \hline \frac{11}{15} \end{array}$$

$$\begin{array}{r} 6\frac{1}{3} = 6\frac{5}{15} \\ 7\frac{2}{5} = 7\frac{6}{15} \\ \hline 13\frac{11}{15} \end{array}$$

Subtracting fractions and mixed numbers

Example: Subtract $\frac{5}{7} - \frac{3}{7}$

Numerators are subtracted, and the difference placed over the denominator.

$$\frac{5}{7} - \frac{3}{7} = \frac{2}{7}$$

Example: Subtract $\frac{5}{6} - \frac{1}{4}$

Equivalent fractions with a common denominator are calculated.

The fractions are subtracted.

$$\frac{5}{6} = \frac{10}{12}$$

$$\frac{1}{4} = \frac{3}{12}$$

$$\frac{5}{6} = \frac{10}{12}$$

$$- \frac{1}{4} = \frac{3}{12}$$

$$\frac{7}{12}$$

Example: Subtract $7\frac{1}{6} - 2\frac{5}{8}$

Equivalent fractions using the LCM are calculated.

1 is borrowed from 7 and added to $\frac{4}{24}$

The fractions are subtracted.

The resulting fraction is

$$1 + \frac{4}{24} = \frac{24}{24} + \frac{4}{24} = \frac{28}{24}$$

$$\begin{array}{r} 7\frac{1}{6} = 7\frac{4}{24} = 6\frac{28}{24} \\ 2\frac{5}{8} = 2\frac{15}{24} = \underline{2\frac{15}{24}} \\ \hline 4\frac{13}{24} \end{array}$$

Multiplying fractions and mixed numbers

Example: Multiply $\frac{2}{3} \times \frac{4}{5}$

$$\frac{2}{3} \times \frac{4}{5} = \frac{2 \times 4}{3 \times 5} = \frac{8}{15}$$

Numerators are multiplied.
Denominators are multiplied.

Example: $2\frac{1}{3} \times \frac{3}{14}$

$2\frac{1}{3}$ is written as an improper fraction then multiplied by $\frac{3}{14}$

$$2\frac{1}{3} \times \frac{3}{14} = \frac{7}{3} \times \frac{3}{14} = \frac{7 \cdot 3}{3 \cdot 2 \cdot 7} = \frac{1}{2}$$

Dividing fractions and mixed numbers

Example: Divide $\frac{2}{3} \div \frac{3}{4}$

The first fraction is multiplied by the reciprocal of the second fraction

$$\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3} = \frac{2 \times 4}{3 \times 3} = \frac{8}{9}$$

Example: Divide $3\frac{1}{4} \div \frac{2}{3}$

Mixed numbers are written as improper fractions. The first improper fraction is then multiplied by the reciprocal of the second fraction.

$$3\frac{1}{4} \div \frac{2}{3} = \frac{13}{4} \div \frac{2}{3} = \frac{13}{4} \cdot \frac{3}{2} = \frac{39}{8} \text{ or } 4\frac{7}{8}$$

Simplifying complex fractions

Example $\frac{\frac{1}{4} + \frac{3}{8}}{\frac{5}{12} + \frac{2}{3}}$

A single fraction is calculated for the numerator.

A single fraction is calculated for the denominator.

The top fraction is divided by the bottom fraction.

$$\frac{1}{4} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$$

$$\frac{5}{12} + \frac{2}{3} = \frac{5}{12} + \frac{8}{12} = \frac{13}{12}$$

$$\frac{5}{8} \div \frac{13}{12} = \frac{5}{8} \times \frac{12}{13} = \frac{15}{26}$$

Fraction Practice

1. Reduce each fraction to lowest terms.

A) $\frac{21}{36}$ B) $\frac{14}{35}$ C) $\frac{9}{216}$

2. Write each improper fraction as a mixed number.

A) $\frac{21}{4}$ B) $\frac{49}{5}$ C) $\frac{106}{9}$

3. Write each mixed number as an improper fraction.

A) $5\frac{5}{7}$ B) $6\frac{3}{4}$ C) $10\frac{3}{11}$

4. Add. Reduce your answers.

A) $\frac{2}{5} + \frac{3}{8}$ B) $\frac{2}{3} + \frac{5}{16} + \frac{1}{4}$ C) $9\frac{2}{3} + 5\frac{5}{6}$

5. Subtract.

A) $\frac{4}{9} - \frac{1}{8}$ B) $9 - \frac{11}{12}$ C) $11\frac{1}{5} - 6\frac{2}{3}$

6. Multiply. Reduce your answers.

A) $\frac{2}{5} \times \frac{3}{8}$ B) $\frac{1}{5} \times \frac{7}{8} \times \frac{5}{14}$ C) $9\frac{3}{7} \times 4\frac{2}{3}$

7. Divide. Reduce your answers.

A) $\frac{2}{3} \div \frac{6}{12}$ B) $5\frac{5}{8} \div 4$ C) $7\frac{3}{5} \div 4\frac{3}{10}$

8. Simplify.

A) $\frac{5+\frac{2}{3}}{11-\frac{1}{3}}$ B) $\frac{3\frac{1}{5}+2\frac{2}{3}}{5\frac{1}{3}}$ C) $\frac{9\frac{5}{8}+7\frac{1}{4}}{6\frac{3}{4}+4\frac{1}{8}}$

9. Applications

- A. Fred Thomson, a nurse, worked $2\frac{2}{3}$ hours of overtime on Monday, $1\frac{1}{4}$ hours on Wednesday, $1\frac{1}{3}$ hours on Friday, and $6\frac{3}{4}$ hours on Saturday. If overtime pay is \$22 per hour, what did Fred receive in overtime pay?
- B. The parents of Harper Junior High School choir members are making robes for the choir. Each robe requires $2\frac{5}{8}$ yards of material at \$8 per yard. How much will 24 choir robes cost?
- C. A fifteen foot board is cut into $3\frac{1}{2}$ foot long pieces for a bookcase. After as many pieces as possible are cut, how long is the remaining piece?
- D. Gary Waller bought $27\frac{3}{4}$ acres to develop. He made a lake out of $17\frac{2}{3}$ acres, then set aside $1\frac{3}{4}$ acres for a park. How many $\frac{1}{3}$ acre lots can he sell from the remaining acreage?
- E. The number of box car loads shipped by one factory each day during the first week of February was $2\frac{1}{2}$, $3\frac{1}{4}$, $2\frac{3}{4}$, 4, and $3\frac{3}{8}$. Determine the average number of box car loads shipped per day during this five-day period.
- F. A container with 54 cups of flour had the following amounts removed: $2\frac{1}{4}$ cups, $3\frac{1}{2}$ cups, $1\frac{3}{4}$ cups, $2\frac{1}{2}$ cups, $3\frac{1}{3}$ cups, and $1\frac{2}{3}$ cups. How much flour remains in the container?

3. Decimals

Rounding Decimals

If the digit to the right of the given digit is less than 5, that digit and all to the right of it are dropped. If the digit right of the given digit is greater than or equal to 5, the given place value is increased by 1 and all digits to the right of the given digit are dropped.

Example: Round 26.3799 to nearest hundredth

$$\begin{array}{r}
 \text{given place} \\
 \text{┌──────────┐} \\
 26.3799 \\
 \text{└──────────┘} \\
 \text{┌──────────┐} \\
 \text{└──────────┘} \quad 9 > 5 \text{ so 1 is added to given place} \\
 26.38
 \end{array}$$

Adding and Subtracting Decimals

To add or subtract decimal numbers, the numbers are written so the decimals are in vertical line. The indicated operation is performed. The decimal point is placed in the answer below the decimals in the problem.

Example: $6.05 + 12 + 0.374$

$$\begin{array}{r}
 1 \\
 6.05 \\
 12 \\
 \underline{0.374} \\
 18.424
 \end{array}$$

Example: $3.7 - 1.9715$

$$\begin{array}{r}
 16 \\
 2 \text{ } \cancel{6} \text{ } 9 \text{ } 9 \text{ } 10 \\
 3.7 \text{ } 0 \text{ } 0 \text{ } 0 \\
 \underline{1.9 \text{ } 7 \text{ } 1 \text{ } 5} \\
 1.7 \text{ } 2 \text{ } 8 \text{ } 5
 \end{array}$$

Multiplying Decimals

The numbers are multiplied as if they were whole numbers. The number of decimal places in the product is the sum of the decimal places in the factors.

Example:	21.4	1 decimal place
	<u>0.36</u>	2 decimal places
	1284	
	<u>642</u>	
	7.704	3 decimal places

Dividing Decimals

Example: $15.275 \div 3.25$

The decimal in the divisor is moved all the way to the right.

The decimal in the dividend is moved the same number of places.

The decimal in the quotient is placed over the decimal in the dividend.

$$3.25 \overline{) 15.275}$$

$$325 \overline{) 15275}$$

$$\begin{array}{r} 4.7 \\ 325 \overline{) 1527.5} \\ \underline{1300} \\ 2275 \\ \underline{2275} \\ 0 \end{array}$$

Converting Fractions to Decimals

Example: Convert $\frac{3}{8}$ to a decimal.

The numerator is divided by the denominator.

$$\begin{array}{r} .375 \\ 8 \overline{) 3.000} \end{array}$$

Example: Convert $3\frac{2}{9}$ to a decimal. Round to nearest hundredth.

The mixed number is converted to an improper fraction.

$$3\frac{2}{9} = \frac{29}{9}$$

The numerator is divided by the denominator.

$$9 \overline{) 29.000}$$

The quotient is rounded.

$$= 3.22$$

Converting Decimals to Fractions

Example: Write 0.82 as a fraction.

The place value of the last digit is used to determine the denominator.

$\begin{array}{l} \text{hundredths} \\ | \\ 0.82 \end{array}$

The decimal is written over the denominator.

$$\frac{82}{100}$$

The fraction is reduced.

$$\frac{41}{50}$$

Decimal Practice

1. Add or Subtract
 - A. $3.682 + 9.81 + 0.036$
 - B. $87 + 1.042 + 19.876 + 8.6$
 - C. $69.68 - 27.466$
 - D. $39 - 18.46$
2. Multiply
 - A. 0.074×0.81
 - B. 3.18×12
 - C. $89.11 \times .0001$
3. Divide
 - A. $35.4 \div 6$
 - B. $3.8 \div 1.7$ round to 2 decimal places
 - C. $0.52 \div 0.074$ round to 2 decimal places
4. Write as a decimal. Round to two decimal places.
 - A) $\frac{1}{6}$
 - B) $\frac{2}{70}$
 - C) $8\frac{2}{3}$
5. Write as a fraction or mixed number.
 - A) 0.45
 - B) 0.025
 - C) 13.032
6. Applications
 - A. Nancy buys a shirt for \$41.95 and a blouse for \$29.95. How much change will she receive from four \$20 bills?
 - B. Lynn had \$43.91 in her checking account at the beginning of the month. During the month, she made deposits of \$100 and \$312.45. She wrote checks for \$174.95, \$114.25, \$81.11, \$30, and \$9.50. What is her balance at the end of the month?
 - C. Lean ground round cost \$3.29/lb. What will a package weighing 1.81 pounds cost to the nearest cent?
 - D. Eastern Phone Company charges \$0.53 for the first minute and \$0.29 for each additional minute for a phone call from Atlanta to Birmingham. How much would an 8-minute call cost?
 - E. The utility bills for an apartment for a six-month period were \$162.50, \$145.83, \$179.72, \$183.46, \$171.60, and \$184.09. Determine the average monthly billing for this period.
 - F. Multiply thirty-three and eight hundredths by forty and seven tenths, and round the product to the nearest tenth.

4. RATIOS, RATES, AND PROPORTIONS

Writing Ratios and Rates

Ratios compare two quantities that have the same units. Rates compare two quantities that have different units.

Example: Write as fraction in simplest form $\frac{2 \text{ ft.}}{4 \text{ yds.}}$

$$\frac{2 \text{ ft.}}{4 \text{ yd.}} = \frac{2 \text{ ft.}}{12 \text{ ft.}} = \frac{1}{6} \quad (\text{Ratio})$$

Example: Write this comparison in simplest form: $6\frac{1}{3}$ tons to 19 acres,

$$\frac{6\frac{1}{3} \text{ tons}}{19 \text{ acres}} = \frac{\frac{19}{3} \text{ tons}}{\frac{19}{1} \text{ acres}} = \frac{19}{3} \div \frac{19}{1} = \frac{19}{3} \times \frac{1}{19} = \frac{1}{3} \text{ ton/acre} \quad (\text{Rate})$$

Determining Truth of a Proportion

Proportions express the equality of two ratios or two rates. In a proportion, if the cross products are equal, the proportion is true.

Example: Is $\frac{8}{12} = \frac{10}{15}$?

$$\begin{aligned} 8 \times 15 &= 120 \\ 12 \times 10 &= 120 \end{aligned}$$

Cross products are calculated.
Since $120 = 120$, the proportion is true.

Solving Proportions

To solve a proportion, find a number to replace the unknown so that the proportion is true.

Example: Solve $\frac{30}{40} = \frac{18}{X}$

$$\begin{aligned} 30 \times X &= 18 \times 40 \\ 30 \times X &= 720 \end{aligned}$$

Cross multiplication is used to find an equation.

$$\begin{array}{r} 24 \\ 30 \overline{) 720} \end{array}$$

Division is used to find the missing number.

Ratios, Rate, and Proportion Practice

1. A) Write the ratio $4\frac{1}{2}$ to $6\frac{3}{4}$ in simplest form.
B) Write as a ratio in simplest terms 2 feet 2 inches to 1 yard.
C) Write as a rate 175 miles in 4 hours.
2. Determine if each proportion is true or false.
A) $\frac{9}{72} = \frac{1}{32}$ B) $\frac{3.6}{0.12} = \frac{72}{24}$ C) $\frac{16 \text{ lbs}}{12 \text{ days}} = \frac{20 \text{ lbs}}{14 \text{ days}}$
3. Solve the proportions.
A) $\frac{X}{6} = \frac{3.5}{10.5}$ B) $\frac{\frac{2}{3}}{\frac{5}{8}} = \frac{6}{N}$ C) $\frac{10}{3} = \frac{x}{99}$
4. Applications
 - A. Which is the better buy in dish detergent: 20 ounces for \$1.39 or 12 ounces for 89¢?
 - B. If Jane can make 3 pairs of curtains from 10 yards of material, how much material is needed for 4 pairs of curtains?
 - C. Stan can jog $2\frac{1}{2}$ miles in $22\frac{1}{2}$ minutes. At that rate, how long will it take him to jog 8 miles?
 - D. The ratio of men to women at USM is 2 to 3. If 3600 students were enrolled last fall, how many are men?

5. Percents

Writing a Percent as a Fraction or a Decimal

Example: Write 32% as a fraction

% means per hundred.

The fraction is reduced.

$$32\% = \frac{32}{100}$$

$$\frac{8}{25}$$

Example: Write 32% as a decimal.

% is removed
by multiplying
by .01

$$32\% = 32 \times .01 = .32$$

Writing a Fraction or a Decimal as a Percent

Example: Write $\frac{3}{8}$ as a percent.

The fraction is multiplied
by 100%

The result is reduced.

$$\frac{3}{8} \times 100\% = \frac{300\%}{8} = 37\frac{1}{2}\%$$

Example: Write .63 as a percent.

$$.63 \times 100\% = 63\%$$

Solving Percent Problems

The sentence can be written using mathematical symbols.

of is written as \times (times)
 is is written as $=$ (equals)
 what is written as n (unknown)

Example: 62% of 120 is what?

$$.62 \times 120 = n$$

Multiplication: $.62 \times 120 = 74.4$

Example: What percent of 250 is 100?

$$n \% \times 250 = 100$$

Since one multiplier is missing, division is used to solve the problem.

$$250 \overline{) 100.0} \quad \begin{array}{r} .40 \\ \hline \end{array}$$

$$.40 \times 100\% = 40\%$$

Example: 12% of what amount is \$480?

$$.12 \times n = 480$$

$$.12 \overline{) 480.00} \quad \begin{array}{r} 4000 \\ \hline \end{array}$$

PERCENT PRACTICE

1. Write as a fraction.
A) 6% B) 40% C) 175%
2. Write as a decimal.
A) 56% B) 3.2% C) 560%
3. Write as a percent.
A) .6 B) 1.07 C) $\frac{3}{4}$ D) $1\frac{1}{4}$
4. Solve the proportion.
 - A. What is 10.7% of 485?
 - B. 26% of 19.5 is what?
 - C. 5 is what percent of 2000?
 - D. What percent of 12 is 24?
 - E. 4.8 is 15% of what?
 - F. 78% of what is 3.9
5. Applications
 - A. If the interest rate on a charge card is $1\frac{1}{4}\%$ on the unpaid balance and your unpaid balance this month is \$312, how much interest will you pay this month?
 - B. If the baseball team wins 78 of the 114 games that it plays, what percent has it lost?
 - C. Jenkins Appliance has a washing machine regularly priced at \$350 on sale for \$297.50. What is the discount rate?
 - D. Susan borrowed \$500 from Quick Loans for 6 months at an annual rate of 21%. How much interest did she pay on this loan?
 - E. Lou, a used car salesman, sold two cars for \$2000. On the first car he made a 25% profit, and on the other he lost 25% of the cost. How much did he make or lose in the dual transaction?

6. POWERS AND ROOTS

Evaluating Powers

Example: $2^6 = \underbrace{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}_{6 \text{ times}} = 64$

$$\sqrt{36} = 6 \text{ because } 6^2 = 36$$

Using Order of Operations

The Order of Operations

1. Expressions within parenthesis are evaluated first.
2. All powers and roots are performed.
3. All multiplication and division are completed, working from left to right.
4. Addition and subtraction are performed last, working left to right.

<p>Example: $27 \div (12 - 3) \times 2 + \sqrt{36}$</p> <p>$27 \div 9 \times 2 + \sqrt{36}$</p> <p>$27 \div 9 \times 2 + 6$</p> <p>$3 \times 2 + 6$</p> <p>$6 + 6$</p> <p>12</p>	<ol style="list-style-type: none"> 1. Operations in parenthesis are performed first. 2. Square roots are performed next. 3. Operations in parenthesis are performed first. 4. Addition is performed last.
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Powers, Roots, and Order of Operations Practice

1. Evaluate the following powers:

A) 3^4 B) $(.1)^5$ C) $(2/3)^3$

2. Evaluate the following roots:

A) $\sqrt{121}$ B) $\sqrt{400}$ C) $\sqrt{\frac{9}{16}}$

3. Evaluate the following:

A. $7 + 3 \cdot 4$

B. $(3^3 - 14) \div 2 + 3 \times 6$

C. $\sqrt{9} + 2(6 + 4) \div 5$

D. $13 - [5 - (5 - 3)]$

E. $14 - \{2[5 - (5 - 3)] + 3\}$

F. $\left(\frac{5}{6}\right)^2 \div \left(\frac{5}{12} + \frac{2}{3}\right)$

7. MEASUREMENT

Converting from one American unit to another

Example: 27 ft. = _____ yds.

The amount is multiplied by a form of 1 that contains the needed units.

Example: 2 days = _____ min.

Performing Arithmetic with Measurements

Example:
$$\begin{array}{r} 4 \text{ ft.} \quad 6 \text{ in.} \\ + 7 \text{ ft.} \quad 10 \text{ in.} \\ \hline 11 \text{ ft.} \quad 16 \text{ in.} = 12 \text{ ft.} \quad 4 \text{ in.} \end{array}$$

Columns are added separately, then regrouped.

Example:
$$\begin{array}{r} 6 \quad 21 \\ \cancel{7} \text{ lb.} \quad \cancel{5} \text{ oz.} \\ \hline 3 \text{ lb.} \quad 8 \text{ oz.} \\ 3 \text{ lb.} \quad 13 \text{ oz.} \end{array}$$

“Borrowing” is based on the appropriate unit. 1 lb. 5 oz. = 16 oz. + 5 oz. = 21 oz.

Example:
$$\begin{array}{r} 2 \text{ qt.} \quad 1 \text{ pt.} \\ \times \quad \quad \quad 5 \\ \hline 10 \text{ qt.} \quad 5 \text{ pt.} = 12 \text{ qt.} \quad 1 \text{ pt.} \end{array}$$

The amounts are multiplied, then regrouped.

Example:
$$\begin{array}{r} \underline{3 \text{ days } 15 \text{ hr. } 30 \text{ min.}} \\ 3 \text{) } 10 \text{ days } 22 \text{ hr. } 30 \text{ min.} \\ \underline{9 \text{ days}} \\ 1 \text{ day} = \underline{24 \text{ hr.}} \\ \quad \quad \quad 46 \text{ hr.} \\ \quad \quad \quad \underline{45 \text{ hr.}} \\ \quad \quad \quad 1 \text{ hr.} = \underline{60 \text{ min.}} \\ \quad \quad \quad \quad \quad 90 \text{ min.} \\ \quad \quad \quad \quad \quad \underline{90 \text{ min.}} \end{array}$$

Amounts are regrouped after each subtraction.

Converting from one metric unit to another.

Example: $4200 \text{ cm} = \underline{\quad} \text{ m}$

km hm dam m dm cm mm

2 moves left

$$4200 \text{ cm} = 42.00 \text{ m}$$

Since the problem requires two shifts left to reach the proper unit, the decimal also shifts left two places.

Example: $8 \text{ kg. } 32 \text{ g} = \underline{\quad} \text{ kg}$

kg hg dag g dg cg mg

3 moves left

$$32\text{g} = .032 \text{ kg}$$

$$8 \text{ kg} + .032 \text{ kg} = 8.032 \text{ kg}$$

Example: $4.3 \text{ l} = \underline{\quad} \text{ cl}$

kl hl dal l dl cl ml

2 moves right

$$4.3 \text{ l} = 430 \text{ cl}$$

MEASUREMENT PRACTICE

- Convert the following American measurements:
 - ft. = in.
 - 42 oz. = lb.
 - 18 pt. = gal.
- Perform the following operations:
 - 3 ft. 9 in. + 5 ft. 6 in.
 - 3 hr. 20 sec. - 1 hr. 37 min. 43 sec.
 - 5 lb. 6 oz. \times 8
 - Find the quotient of 7 lb. 5 oz. and 3
- Convert the following metric measurements:
 - 0.450 g = mg.
 - 0.37 cm = m.
 - 4 kg. 5 dag. = g.

4. Applications

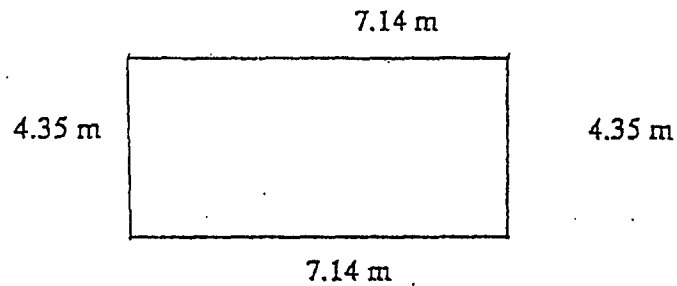
- A. An elementary school class gathered 800 aluminum cans for recycling. Four aluminum cans weigh 3 oz. Find the amount the class received if the rate of pay was \$0.75 per pound for the aluminum cans.
- B. Five boards each 1 ft. 4 in. long are cut from a board 10 ft. 5 in. long. Find the length of the remaining piece of board.
- C. Nick, a mechanic, bought oil in a 40-gallon drum. He paid \$90 for the drum. If he charges his customers \$1.35 per quart when he changes their oil, how much profit does he make on the oil?
- D. Find the total cost of a 7 kg. 300 g. turkey costing \$2.79 per kilogram.
- E. Three pieces of wire fence are cut from a 50 m. roll. The three pieces are 2 m. 40 cm., 5 m. 60 cm, and 4 m 8 cm. How much wire fence is left on the roll after the three pieces are cut?

8. GEOMETRY

Finding Perimeter

The perimeter of a convex polygon is the sum of the lengths of its sides.

Example: Find the perimeter of a rectangle 4.35 m by 7.14 m.

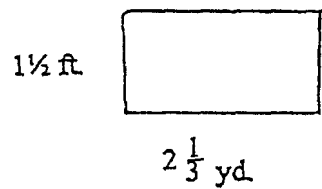


$$\begin{aligned}
 P &= 4.35 + 7.14 + 4.35 + 7.14 \\
 &= 22.98 \text{ m.}
 \end{aligned}$$

Finding the area of rectangles, squares, and triangles

Example: Find the area of a rectangle $1\frac{1}{2}$ ft. by $2\frac{1}{3}$ yd.

Area = length \times width



$$A = L \times W$$

$$A = 1\frac{1}{2} \text{ ft.} \times 2\frac{1}{3} \text{ yd.}$$

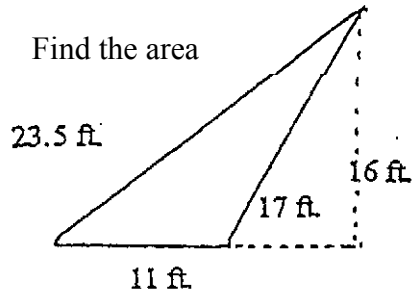
Change yd. to ft.

$$= 1\frac{1}{2} \text{ ft.} \times 7 \text{ ft.}$$

$$= \frac{3}{2} \text{ ft.} \times 7 \text{ ft.}$$

$$= \frac{21}{2} \text{ ft.}^2$$

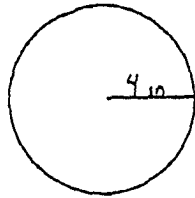
Example: Find the area



$$\begin{aligned} \text{Area} &= \frac{1}{2} \text{ height} \times \text{base} \\ &= \frac{1}{2} hb \\ &= \frac{1}{2} (16 \text{ ft.}) (11 \text{ ft.}) \\ &= 88 \text{ ft.}^2 \end{aligned}$$

Working with Circles

Example: Find the circumference and area



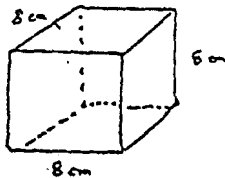
$$\begin{aligned} C &= 2\pi r \quad (3.14 \text{ is used for } \pi) \\ &= 2 (3.14) (4) \\ &= 25.12 \text{ in.} \end{aligned}$$

$$\begin{aligned} A &= \pi r^2 \\ &= (3.14) (4 \text{ in.}) (4 \text{ in.}) \\ &= 50.24 \text{ in.}^2 \end{aligned}$$

Finding the Volume of Solids

To find the volume of a rectangular solid, length, width, and height are multiplied.

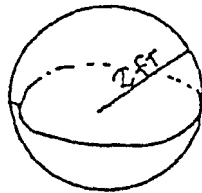
Example: Find the volume of a cube 8 cm on a side.



$$\begin{aligned} V &= L \times W \times H \\ &= (8 \text{ cm}) (8 \text{ cm}) (8 \text{ cm}) \\ &= 512 \text{ cm}^3 \end{aligned}$$

To find the volume of a sphere, $\frac{4}{3}$, π , and radius cubed are multiplied.

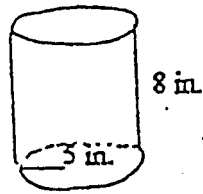
Example



$$\begin{aligned} V &= \frac{4}{3} \pi r^3 \\ V &= \frac{4}{3} (3.14) (2 \text{ ft.})^3 \\ &= \frac{4}{3} (3.14) (2 \text{ ft.}) (2 \text{ ft.}) (2 \text{ ft.}) \\ &= 33.5 \text{ ft.}^3 \end{aligned}$$

To find the volume of a right cylinder, π , radius squared, and height are multiplied.

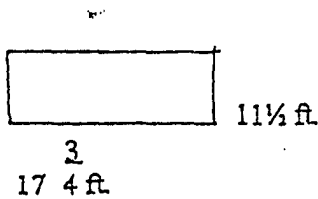
Example: Find the volume of the cylinder.



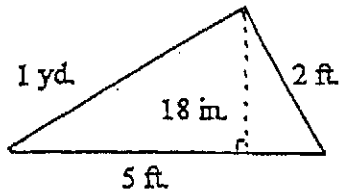
$$\begin{aligned} V &= \pi r^2 h \\ &= (3.14) (5 \text{ in.})^2 (8 \text{ in.}) \\ &= 628 \text{ in.}^3 \end{aligned}$$

GEOMETRY PRACTICE

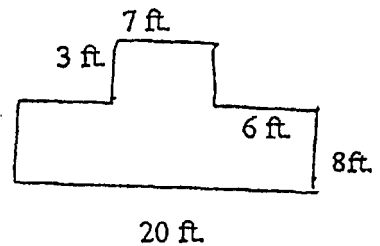
1. Find the perimeter of the following figures:



A)

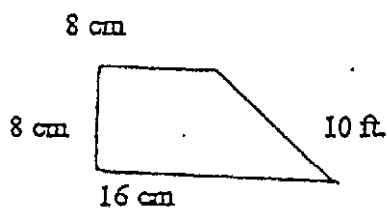


B)

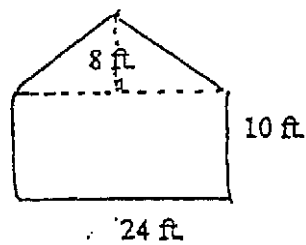


C)

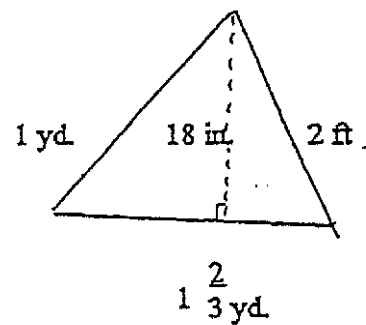
2. Find the area of the following figures:



A)

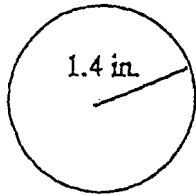


B)



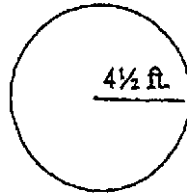
C)

3. Find the circumference and the area of each circle.



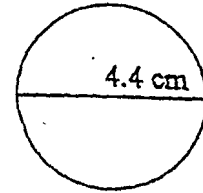
A)

C=
A=



B)

C=
A=

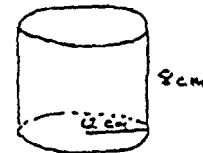
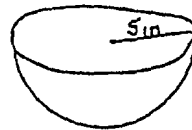
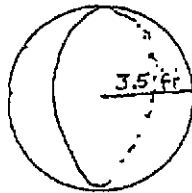
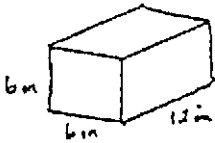


C)

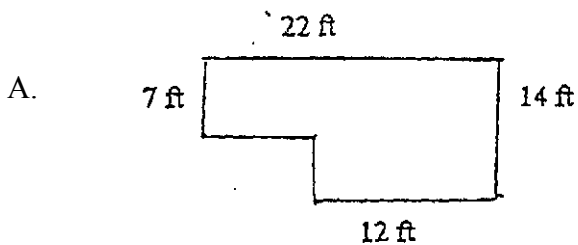
C=
A=

4. Find the volume of each of the following:

- A. Box 12 in long by 6 in wide by 6 in high
- B. Sphere with radius 3.5 ft
- C. Hemisphere (half a sphere) with radius 5 in
- D. Cylinder with diameter 12 cm and height 8 cm



5. Applications



A kitchen-dining room is shaped like the figure to the left. A baseboard is to be placed around the border of the room at a cost of \$1.10 per foot. How much will this cost?

- B. What is the height of a triangle that has a base of 14 in and an area of 49 sq in?
- C. How many gallons of water will a hot water heater shaped like a cylinder with a 1.2 ft radius and height of 4 ft hold? Note: 1 cubic foot contains 7.5 gallons of water.
- D. How many cubic yard of cement are needed for a sidewalk 3 feet wide, 4 inches thick, and 30 feet long?
- E. If the radius of a circle is doubled what happens to the area?

WHOLE NUMBER PRACTICE ANSWERS

1. A) 4000 B) 250000
2. A) 76117 B) 33756
3. A) 356 B) 5195 C) 908
4. A) 2,472,448 B) 3,745,728
5. A) 2038 R2 B) 129 R 223
6. A) 28 B) 3 C) 8
7. A) 683 miles B) 1000 C) 815
- D) 37199 E) 854,496 miles F) 11 boards
- G) 8760 hours

FRACTION PRACTICE ANSWERS

1. A) $\frac{7}{12}$ B) $\frac{2}{5}$ C) $\frac{1}{24}$
2. A) $5\frac{1}{4}$ B) $9\frac{4}{5}$ C) $11\frac{7}{9}$
3. A) $\frac{40}{7}$ B) $\frac{27}{4}$ C) $\frac{113}{11}$
4. A) $\frac{31}{40}$ B) $\frac{59}{48}$ C) $15\frac{1}{2}$
5. A) $\frac{23}{72}$ B) $8\frac{1}{12}$ C) $4\frac{8}{15}$
6. A) $\frac{3}{20}$ B) $\frac{1}{16}$ C) 44
7. A) $\frac{4}{3}$ B) $1\frac{13}{32}$ C) $1\frac{33}{43}$
8. A) $\frac{17}{32}$ B) $1\frac{1}{10}$ C) $1\frac{14}{29}$
9. A) \$264 B) \$504 C) 1 foot
- D) 25 lots E) $3\frac{7}{40}$ box care loads per day
- F) 39 cups

DECIMAL PRACTICE ANSWERS

1. A) 13.528 B) 116.518 C) 42.214 D) 20.54
2. A) 0.0599 B) 38.16 C) 0.008911
3. A) 5.9 B) 2.24 C) 7.03
4. A) 0.17 B) 0.03 C) 8.67
5. A) $\frac{9}{20}$ B) $\frac{1}{40}$ C) $13\frac{4}{125}$
6. A) \$8.10 B) \$46.55 C) \$5.95 D) \$2.56 E) \$171.20 F) 1346.4

RATIO, RATE, AND PROPORTION PRACTICE ANSWERS

1. 1) $\frac{2}{3}$ 2) $\frac{13}{18}$ 3) 43.75 miles/hour
2. A) true B) false C) false
3. A) 2 B) $\frac{45}{8}$ C) 330
4. A) 20 ounces B) $13\frac{1}{3}$ yd C) 72 minutes D) 1440 men

PERCENT PRACTICE ANSWERS

1. A) $\frac{3}{50}$ B) $\frac{2}{5}$ C) $1\frac{3}{4}$
2. A) .56 B) .032 C) 5.60
3. A) 60% B) 107% C) 75% D) 125%
4. A) 51.895 B) 5.07 C) 0.25% D) 200%
- E) 32 F) 5
5. A) 53.90 B) 31.6% C) 15% D) \$52.50
- E) lost \$267

POWERS, ROOTS AND ORDER OF OPERATIONS ANSWERS

1. A) 81 B) 0.00001 C) $\frac{8}{27}$
2. A) 11 B) 20 C) $\frac{3}{4}$
3. A) 19 B) $24\frac{1}{2}$ C) 7 D) 10 E) 5 F) $\frac{25}{39}$

MEASUREMENT PRACTICE ANSWERS

1. A) 30 B) $2\frac{5}{8}$ C) $2\frac{1}{4}$
2. A) 9 ft 3 in. B) 1 hr 22min 37 sec C) 43 lb D) 2 lb 7 oz
3. A) 450 mg B) .0037 C) 4050 g
4. A) \$28.13 B) 3 ft 9 in C) \$ 126 D) \$20.37
 E) 37.92 m

GEOMETRY PRACTICE ANSWERS

1. A) $58\frac{1}{2}$ B) 10 ft C) 62 ft
2. A) 96 cm^2 B) 336 ft^2 C) $3\frac{3}{4}\text{ ft}^2$
3. A) $C = 8.8\text{ in}$ B) $C = 28.3\text{ ft}$ C) $C = 13.8\text{ cm}$
 $A = 6.2\text{ in}^2$ $A = 63.6\text{ ft}^2$ $A = 15.2\text{ cm}^2$
4. A) 432 in^3 B) 179.5 ft^3 C) 261.667 in^3 D) 904.32 cm^3
5. A) \$79.20 B) 7 in C) 135.6 gallons D) $1\frac{1}{9}\text{ yd}^3$
 E) It becomes four times larger