Mathematics Trainee's Guide

I. Computational Skills
- A. Operations with Whole Numbers
- B. Operations with Fractions
- C. Operations with Decimals
- D. Operations with Percents

II. Ratio, Proportion, and Rates
- A. Definition of Ratio
- B. Definition of Proportion
- C. Definition of Rates and Averages
- D. Solving Proportion Problems

III. Units of Measurement
- A. English System
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- C. OSHA Standards, Time, and Currency

IV. Geometry and Formulas
- A. Linear Measurement
- B. Area
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- D. Formulas and Temperature Conversion
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Learning Objectives

Objective: To give an overview of English and metric units of measurements that are used at construction and hazardous waste sites.

Objective: To develop an understanding of hazard regulations by studying units used in OSHA (Occupational Safety and Health Association) Standards.

Objective: To explain methods of comparing measured quantities to determine ratios and rates. These values are used to express OSHA Standards.

Objective: To develop an understanding of basic math skills used at construction sites, and in the measurement of hazardous materials.

Objective: To convert fractions to decimals and decimals to fractions. An important communication skill in writing and reading reports is knowing the equivalence of fractions and decimals.

Objective: To give an overview of geometric concepts that are important at construction and hazard waste sites. The concepts are used in computing perimeter, circumference, area, and volume of objects.

Outline of Activities

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2	Operations with Whole Numbers & Decimals
3	Operations with Fractions
4	Fractions, Decimals & Percents
5	Test #1
Day	
6	Basic Word Problem Skills
7	Order of Operations/Evaluation of Variable Expressions
8	Ratios, Proportions, and Rates
9	Averaging
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11	OSHA Units
12	English System of Measurement
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14	English – Metric Conversions
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16	Linear Measurement
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24	Post-Test Review
25	Post-Test and Closing

Day 1

Pre-Test

Day 2

Operations with Whole Numbers and Decimals

Objective: To develop an understanding of basic math skills used at construction sites, and in the measurement of hazardous materials.

Activity

Working with whole numbers.

Addition

1. 985
   +437

2. 292
   579
   +315

Subtraction

3. 15,762
   - 7,549

4. 3,481
   - 865

Multiplication

5. 72
   x 39

6. 581
   x 230

Division

7. $80\overline{)735}$

8. $360\overline{)7225}$

Working with Decimals

Addition

1. 16.08 + 2.35 + 132.06 =

2.
```
    4.92
   27.05
+   9.06
```

Subtraction

3. 39.047 - 7.96 =

4.
```
  620.59
 -123.79
```

Multiplication

5. 21.4 x 0.36 =

6.
```
  3.69
 x 2.7
```

Division

7. 392 ÷ 6.9=

8. $.032\overline{)0.1344}$

Homework

1. 93.006 x 8.7 =

2. 3.08 x 2.9 =

2. 34.79 x 2.9 =

3. 8.16 + 35.2 +6.132 =

4. 96.7 – 47.39 =

5. $2.3\overline{)25.3}$

6. $6.7\overline{)140.7}$

Day 3

Operations with Fractions

Objective: To develop an understanding of fractions and the skills involving fractions used at construction sites, and in the measurement of hazardous materials.

Addition

1. $\frac{3}{8} + \frac{9}{14} =$

2. $$\begin{array}{r} 3\frac{5}{8} \\ +\ 2\frac{11}{20} \\ \hline \end{array}$$

Subtraction

3. $$\begin{array}{r} 5\frac{5}{6} \\ -\ 2\frac{3}{4} \\ \hline \end{array}$$

4. $$\begin{array}{r} 5 \\ -\ 2\frac{5}{8} \\ \hline \end{array}$$

Multiplication

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

6. $2\frac{1}{2} \times 3\frac{3}{5} =$

Division

7. $\frac{5}{8} \div \frac{4}{9} =$

8. $7\frac{7}{9} \div 5\frac{5}{6} =$

Homework

1. Find the total of $\frac{2}{3}$, $\frac{5}{6}$, and $\frac{2}{9}$

2. Subtract: $18\frac{1}{6} - 3\frac{5}{7}$

3. Subtract: $16 - 5\frac{7}{8}$

4. Multiply: $2\frac{1}{4} \times 7\frac{1}{3}$

5. Divide: $\frac{5}{6} \div \frac{5}{12}$

6. Divide: $8\frac{2}{3} \div 2\frac{3}{5}$

7. Add: $4\frac{4}{9} + 2\frac{1}{6}$

8. Add: $\frac{3}{8} + 1\frac{2}{3} + 3\frac{5}{6}$

Day 4

Fractions, Decimals & Percents

Objective: Converting fractions to decimals and decimals to fractions as well as the conversion of percents.

Sometimes measured quantities are expressed as a fraction, and other times as a decimal. An important communication skill in writing and reading reports is knowing the equivalence of fractions and decimals.

Activity

Decimals

1. Convert $\frac{3}{4}$ to a decimal.

2. Convert $2\frac{3}{4}$ to a decimal.

3. Convert .47 to a fraction.

4. Convert 7.45 to a fraction.

Percents

5. Write 25% as a fraction and as a decimal.

6. Write 425% as a fraction and as a decimal.

7. Write 0.56 as a percent.

8. Write 0.006 as a percent.

9. Write $\frac{27}{50}$ as a percent.

10. Write $\frac{2}{5}$ as a percent.

Homework

12. Convert $\frac{7}{9}$ to a decimal and a percent.

13. Convert .375 to a fraction and a percent.

14. Write 12% as a fraction and a decimal.

15. Write $\frac{2}{5}$ as a percentage and a decimal.

M & M Worksheet

This worksheet can be used to explain the relationship between fractions, decimals and percents.

1. Open a bag of M&Ms and pour out onto a paper towel.
2. Count the number of each color and record it on the worksheet in the first column.
3. Then express each of the colors as a fraction, decimal and percentage of the whole bag.
4. The last step is to add each column to reveal 1=1.00=100%

M&M Activity				
Color	#	Fraction	Decimal	Percent
Red				
Blue				
Green				
Orange				
Brown				
Yellow				
Total				

Student Names	Red	Blue	Green	Orange	Brown	Yellow
Total						
Average						

Ratio

	Red	Blue	Green	Orange	Brown	Yellow
Red						
Blue						
Green						
Orange						
Brown						
Yellow						

Day 5

Test #1

Day 6

Basic Word Problem Skills

Objective: To learn to solve word problems.

Word Problem: "What am I going to need this for?" That is the question that is so often asked by people studying mathematics. In this section and each section that follows, you will learn life applications that will help you to answer this question.

Procedures for Solving Word Problems:
Step 1: Read the problem completely.
Step 2: Determine what needs to be answered.
Step 3: Eliminate useless information.
Step 4: Determine the route or method that needs to be taken to answer the question.
Step 5: Derive or define any and all formulas that are needed for answering the problem (if any formulas are necessary).
Step 6: Complete the problem.

Helpful Hints:
*Break the problem down into terms that you can understand.
*Make sure you have enough information to answer the question.
*Drawing pictures may be helpful.

Translation of Words to Symbols

Addition (+)
the sum of
the total of
increased by
more than

Subtraction (-)
less than
the difference between

decreased by

Multiplication (x)
times
the product of
of

Division (÷)
divided by
the quotient of
the ratio of

Equals (=)
is

Activity

Directions: Translate into a mathematical expression.

1) 98 less than *y*
2) *w* divided by 12
3) *z* increased by 3
4) the product of 5 and *x*
5) 6 more than *t*
6) the difference between 12 and 9
7) the sum of 8, 9, 10
8) 12 decreased by 4
9) what is .25 of 100?
10) what is 12 times 12?

Directions: Solve the following word problem using the steps given on the previous page.

1) Stanley Builders have been contracted to build a fence around a house. The Victorian house is located in the suburbs.

   a) The front of the house requires a fence 252 feet long and the sides of the house requires 261 feet and 238 feet. What is the total number of feet needed for the front of the house?

   b) The back requires 992.48 feet. The builders only bought 798.81 feet for the back. What is the difference in what they bought and what they need?

   c) The builders bought the wood at a discount store by the foot. If they bought a total of 2288.57 feet at $ 0.13 per foot, what is the total cost?

2) A wire hose, 92.4 feet long, is bent into the shape of a square (all sides equal).

   a) What is the length on each side?

   b) 12 other wire hoses of the same size and shapes are needed. What is the total amount of wiring needed?

   c) The wire sells for 92 cents a foot at House Depot. What is the cost of the wire hose?

3) Mr. Jackson bought $662.40 worth of cement from Lash to build a pond. For this amount they received 552 bags. Mr. Jackson previously brought 1256 bags of cement to build the swimming pool.

   a) How much did each bag cost?

   b) Each bag can cover 3 square feet of the pond. The pond will be a total of 993 square feet. Will Mr. Jackson have enough cement to build the pond?

   c) Will he have enough cement to build a bird bath?

Homework

1. A land developer purchased 8 5/6 acres of land for a building project. Two and one half acres were set aside for a park. How many acres of land were left to be developed?

2. A carpenter uses a plane to take .125 of an inch from a 4.25 inch board. How wide is the board after it has been planed?

Day 7

Order of Operations/Evaluation of Variable Expressions

Objective: To help trainees understand that formulas express relationships about numbers. Given certain values, formulas are used to compute other values.

Letters of the alphabet are often used to represent numbers. A letter used in this way is called a variable. Formulas are used to make conversions and to compute other values.

Activity

Evaluate

1. $3a + bc - d$

   when $a = 2, b = 3, c = 1, d = 5$

2. $6a - 5b$

   when $a = 3, b = x$

Perimeter Formula

3. Find the value of **p**
   $p = 2l + 2w$

   when $l = 3, w=7$

Distance Formula

4. Find the value of **d**
   $d = r \times t$

   when $r = 40, t = 3$

Homework

If a=6, b=5, c=2, d=8

Evaluate:

1. a + b + c + d =_____

2. ab + cd = _____

3. d – a – c = _____

4. cd – a – b = _____

5. $c\overline{)d}$ = _____

Day 8

Ratio, Rate, & Proportion

Objective: To explain methods of comparing measured quantities. Values obtained (ratio, and rates) from such comparison are used to express OSHA Standards.

Definitions

1. **Ratio** — A comparison of two quantities that have the same units, commonly written as a fraction.

2. **Rate** — A comparison of two quantities that name different units.

3. **Proportion** — The equality of two ratios. The cross-product can be used to determine a true proportion.

The following are examples of ratios.

Example 1. $\frac{8 \text{ feet}}{10 \text{ feet}} = \frac{8}{10} = \frac{4}{5}$

Example 2. $\frac{\$6}{\$18} = \frac{6}{18} = \frac{1}{3}$

Example 3. $\frac{18 \text{ quarts}}{6 \text{ quarts}} = \frac{18}{6} = \frac{3}{1}$

The following is an example of a rate.

Example 1. $\frac{50 \text{ cm}}{3 \text{ hrs}}$

The following are examples of proportions.

Example 1.

$$\frac{5}{8} = \frac{10}{16}$$

$$5(16) = 8(10)$$
$$80 = 80$$

Example 2.

$$\frac{66}{4} = \frac{33}{2}$$

$$2(66) = 33(4)$$
$$132 = 132$$

Example 3.

$$\frac{14}{28} = \frac{17}{30}$$

$$14(30)=17(28)$$
$$420 \neq 476$$

Activity

Write each of the following as a ratio.

1. 3 parts to 7 parts

2. 16 gallons to 25 gallons

3. 12 meters to 36 meters

Write each as a rate.

4. 300 miles on 15 gallons

5. $15 for 60 minutes

Find the rate that will be the best buy on corn flakes.

6. a. 28 ounces for $3.15
   b. 18 ounces for $2.17
   c. 10 ounces for $1.49

Solve the following proportion problems.

7. Determine whether the following proportion is true or false.

$$\frac{6}{14} = \frac{18}{43}$$

8. Find the missing number.

$$\frac{5}{9} = \frac{x}{45}$$

9. Find the missing number.

$$\frac{3}{7} = \frac{8}{x}$$

Real Life Applications

Set up and solve a proportion for each problem.

10. Barbara types 240 words in 5 minutes. How many words can she type in 12 minutes?

11. A medication is given at the rate of 2 grams for every 50 pounds of body weight. How much should be given to a 175-pound person?

Homework

1. Write the comparison of 8 feet to 28 feet as a ratio in simplest form.

2. Write the comparison of 12 days to 12 days as a ratio in simplest form.

3. Write the comparison of 270 miles in 6 hours as a rate.

4. Write the comparison of $40.00 for 20 gallons as a rate.

5. Go to your kitchen cabinet or pantry and use one of the canned goods to do a rate comparison between the amount in the can and the price paid for the canned good. *

* Instructor may want student to bring cans to class for further discussion.

Day 9

Averaging

Objective: To obtain the mathematical skill of averaging which is often used in construction and hazmat sites.

DEFINITION

Average The average of a set of values is the sum of those values divided by the number of values.

Activity

Find the average of the following numbers:

1. 55, 36, 69, 68, 55, 59.

2. 79, 21, 23, 18.

3. 4, 12, 16, 8, 45.

Real Life Applications

Solve the following problems involving averages.

4. Find the average of your fellow classmates' ages.

5. Find the average of the different measurements: 42 in.,18in. ,12in. , 26 in., and 54in.

6. Find the average of the three temperature readings: 72°F, 96°F, and 81°F.

Homework

Use the M&M Activity sheet as homework. Find the average number of each color in the M&M bags.

Day 10

Test #2

Day 11

OSHA Units

Objective: To develop an understanding of hazard regulations by studying units used in OSHA Standards. Such standards are used to determine health effects.

Descriptions of common OSHA units are given below.

1. **Percent** per one hundred.

2. **Ton** 2000 pounds.

3. **Celsius** a unit of measure of temperature. Celsius may be converted to Fahrenheit using the formula $F = \frac{9}{5}C + 32^\circ$.

4. **Fahrenheit** a unit of measure of temperature. Fahrenheit may be converted to Celsius using the formula $C = \frac{5}{9}(F - 32^\circ)$.

5. **psi** pounds per square inch. The term square inch is denoted in^2.

6. **f/cc** fibers per cubic centimeter. The term cubic centimeters is denoted cm^3.

7. **ppm** parts per million.

8. **metric ton** a unit of measurement which equals 1,000 kilograms.

Example 1: Water freezes at 0° Celsius and boils at 100° Celsius.

Example 2: Water freezes at 32° Fahrenheit and boils at 212° Fahrenheit.

Example 3: A chemist found that the concentration of lead in a water sample was 5 parts per million. What fraction would represent the concentration of lead?

Solution: Five parts per million, means 5 parts out of 1,000,000. As a fraction, this is 5/1000000. We reduce this by dividing the numerator and denominator by five.
The answer is 1/200000.
Which means that for every part (or unit) if lead found in the water there is 200,000 parts of water.

Activity

1. Change .72 to percent.

Write #2 and #3 as ratios:

2. 45 lbs per 112 cm squared.

3. 93 parts of fibers 31 cm cubed

4. **Convert from Fahrenheit to Celsius:**

50 degrees

5. **Convert from Celsius to Fahrenheit:**

65 degrees

Real Life Applications

2. A chemist found that the concentration of PCBs in a water sample was 2 parts per billion. What fraction would represent the concentration of PCBs?

3. The temperature of a room was 25° Celsius. What is the temperature on the Fahrenheit scale? Use $F = \frac{9}{5}C + 32°$.

4. A large quantity generator at Shamaco Oil & Gas, Inc. generates 5,000 kilograms of waste in one week. How many metric tons do they generate in a week? In four weeks? How many tons (English unit of ton) in a week? 4 week?

Homework

1. Write as a rate in simplest form using OSHA units.

   a. 26lbs per $13in^2$.

   b. 81 parts of fiber per $27cm^3$.

   c. 5000 parts in 1,000,000 gallons of water.

2. Convert 75° Fahrenheit to Celsius.

3. Convert 120° Celsius to Fahrenheit.

Day 12

English System of Measurement

Objective: Understand and use English units (and symbols) of measurement that are used at construction and hazardous waste sites.

English Units: A measurement includes a number and a unit. In the English System of measurement, the unit of length is foot, weight is pound, and volume or capacity is quart. Tables of equivalent units can be used to perform conversions from one unit of measurement to another. The relationship within the system is given in the table below.

Common English Units of Measure

Volume
1 gallon (gal) = 4 quarts (qt)
1 quart (qt) = 2 pints (pt)
1 quart (qt) = 4 cups (c)

Length
1 foot (ft) = 12 inches (in)
1 yard (yd) = 3 feet (ft)
1 mile (mi) = 5,280 feet (ft)

Weight
1 pound (lb) = 16 ounces (oz)
1 ton = 2000 pounds (lb)

Activity

1. Convert 40 inches to feet.

2. Convert 42 inches to feet and inches.

3. 6ft 5in
   + 3ft 6in

4. 3ft 9in
   + 5ft 6in

5. 14ft 6in
   - 12ft 4in

6. 5yd 2 ft
   - 3yd 4 ft

7. Convert 2,400 lb. to tons.

8. 12gal 2qt
   + 5gal 1qt

9. 4gal 1qt
   + 2gal 3qt

10. 2 qt = _____pt

11. 3 c = _____qt

12. 8qt = _____pt

13. 36,960 ft = _____mi

14. 13 ft = _____in

Real Life Applications

15. A plumber used two pieces of copper tubing, one 3 ft. 9 in. and the other 2 ft. 6 in. Find the total length of tubing used.

16. The McDaniels are building a pool in the backyard. They will need 34 tons of cement to build the pool. Cement is sold in pounds (lbs.); how many pounds of cement do the McDaniels need?
The estimated amount of water needed for the pool is 3,202 quarts. How much is this in gallons?

17. In the Summer Olympics of 1968, Dick Fosbury built a room in the Olympic Stadium with a height of 10 feet 4 1/2 inches. How many inches high was the room?

18. The Environmental Protection Agency announced that in 1990 the textile industry in the United States released 26,116, 480 pounds of toxic chemicals into the air. How many tons were released into the air?

Homework

1. 210 in = _____ft

2. 86 yd = _____ft

3. 21 gal = _____qt

4. 36,960 ft = _____mi

5. 8 qt = _____pt

5. 13 pt =_____qt

7.
```
  3ft 67in
+4ft 88in
```

8.
```
4ft 55in
x      8
```

9. Mount McKinley in Alaska is approximately 3,848 mi high. How many feet is that?

10. A carpenter used 8 ft. 9 in., 2 ft. 7 in., and 10 in. of molding to install a window. Find the total length of molding used.

Day 13

Metric System of Measurement

Objective: Understand and use Metric units (and symbols) of measurement that are used at construction and hazardous waste sites.

The Metric System is a different system of measurement which uses meters for length, grams for weight, and liters for volume. The Metric System is used throughout the world, and in many industries in the United States. The Metric System is based on the number 10, therefore it is easier to convert between units. The following table gives the relationship within the Metric System.

Common Metric Units of Measure

Prefixes

kilo (1,000 times)

milli ($\frac{1}{1000}$ of)

centi ($\frac{1}{100}$ of)

Conversion between units in the metric system involves dividing or multiplying by powers of ten.

Length

1 kilometer (km) = 1,000 meters (m)

1 meter (m) = 100 centimeters (cm)

1 meter (m) = 1,000 millimeters (mm)

1 centimeter (cm) = 10 millimeters (mm)

Volume

1 liter (l) = 1,000 milliliters (ml)

1 kiloliter (kl) = 1,000 liters (l)

Weight

1 kilogram (kg) = 1,000 grams (g)

1 gram (g) = 1,000 milligram (mg)

Activity

1. 5.2 km = _____m

2. 462 mm = _____cm

3. 8.99 cm = _____m

4. 15.3 m = _____cm

5. 0.436 cm = _____mm

6. 36 l = _____kl

7. 8 cm =_____m

Real Life Application

8. A youth club uses 800 ml of chlorine each day for its swimming pool. How many liters of chlorine are used in a month of 30 days?

Homework

1. Convert 1.25 km to meters.

2. A carpenter needs 30 rafters, each 3 meters long. Find the total length of rafters needed. The wood is sold by the centimeter. How much wood will be required for this job?

3. Convert 3.25 l to milliliters.

4. 117 l = _____ml

5. 28.3 mg = _____g

6. 943 g = _____kg

7. 0.38 l = _____ml

9. 4.92g = _____mg

Day 14

English-Metric Conversions

Objective: Understand use and convert between metric and English units of measurement that are used at construction and hazardous waste sites.

The following table shows the relationship between the English and Metric Units. Sometimes it is necessary to convert from English to metric and vice versa.

Volume
1.06 quarts (qt) = 1 liter (l)
1 gallon (gal) = 3.8 liters (l)

Weight
2.2 pounds (lb) = 1 kilogram (kg)
1 ounce (oz) = 28.4 grams (g)

Length
1 inch (in) = 2.54 centimeters (cm)
1 foot (ft) = 0.3 meters (m)
1.1 yards (yd) = 1 meter (m)
1 mile (mi) = 1.6 kilometers (km)

Activity

Convert the following units.

1. 17.78 cm = _____ in

2. 32 mi. = _____km

3. 4.6 kg = _____lb

4. 19 l = _____gal

5. 12.1 yd = _____m

6. 6 oz = _____g

7. 2.4 m =_____ft

Homework

1. 7 ft =_____m

2. 6 in =_____cm

3. 369.2 g =_____oz

4. 5 l = _____qt

5. 7 gal =_____ l

6. 45.6 l =_____ gal

7. 8.48 qt =_____l

8. The record ski jump for women is 110 m. Convert this to feet.

9. Convert 100 feet to meters.

10. Find the number of liters in 1 gallon of punch.

Day 15

Test #3

Day 16

Linear Measurement

Objective: To learn to use geometric concepts in computing perimeter & circumference.

Plane Geometric Figures

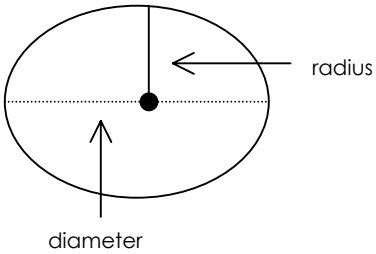
1. Perimeter

The linear measurement of the distance around an object that is enclosed by straight lines is called the perimeter. It is found by adding the length of all sides of in the case of a rectangle the formula P =2l +2w can be utilized.

2. Circumference - The distance around a circle.

The circumference is found by using the formula $C = 2\pi r$ or $C = \pi D$, where D = diameter, r = radius, and $\pi = 3.14$.

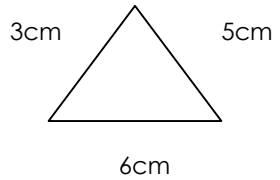
In most cases, the measurement of the sides of an object enable you to calculate perimeter. In the special case of a circle, there are no sides and therefore we use the radius and diameter of a circle. The radius extends from the point at the center of the circle to any point on the circle. The diameter, however, extends from one side of the circle and <u>must</u> pass through the center of the circle to another point on the circle (straight lines).



Activity

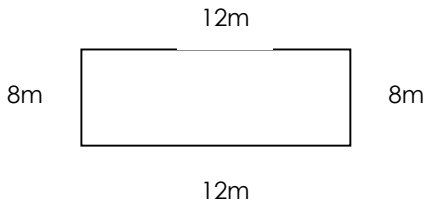
1. Perimeter of a triangle.

   p = a+b+c **Let: a = 3cm; b = 5cm; c = 6cm**



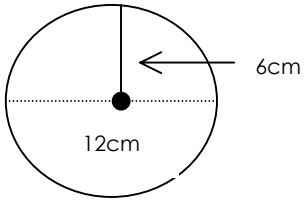
2. Perimeter of a rectangle

   p = l + w + l + w
   = 2l + 2w **Let: l = 12m; w = 8m**



3. Circumference of a circle

   C = 2πr or C = πD
   Let: r = 6cm; D = 12cm



Find the perimeter of the following geometric figures.

4. A rectangle with l = 24ft, and w = 6ft.

5. A rectangle with l = 18in and w = 48in.

6. A square with a side measuring 4in.

7. Find the circumference of a circle with r = 5ft.

Real Life Application

8. An irrigation system waters a circular field that has a 50 ft. radius. Find the circumference watered by the irrigation system. Let π =3.14.

Homework

1. Find the perimeter of a rectangle with a length of 15ft and a width of 8ft.

2. Find the circumference of a circle with radius of 5cm.

Day 17

Area and Volume

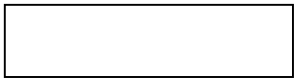
Objective: To learn to use geometric concepts in computing area and volume of objects.

Area

The measure of the amount of surface in a region. Area can be used to describe the size of a rug, a parking lot, a floor, or a wall.

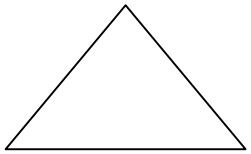
Area of a square

$A = s \times s = s^2$



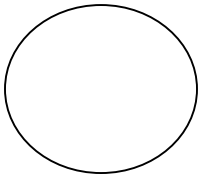
Area of a rectangle

$A = l \times w$



Area of a triangle

$A = \frac{1}{2}bh$



Area of a circle

$A = \pi r^2$

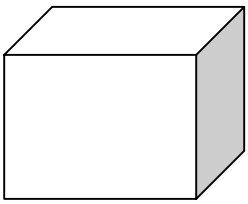
or

$A = \pi \frac{d^2}{4}$

Volume

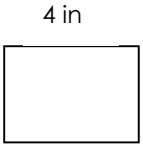
A measure of the amount of space inside of a container. Volume can be used to describe the amount of concrete delivered for the foundation of a building, the amount of gas a container holds, or the amount of water in a storage tank.

Volume =
length x width x height

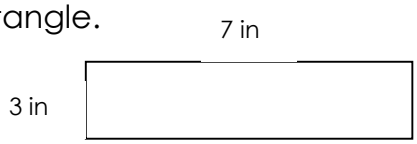


Activity

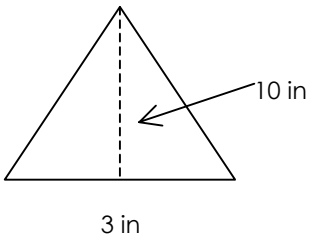
1. Find the area of the square.



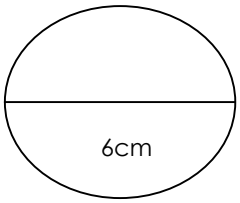
2. Find the area of the rectangle.



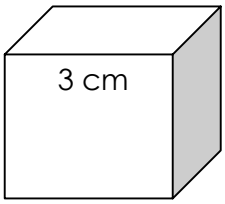
3. Find the area of the triangle.



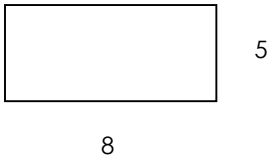
4. Find the area of the circle.



5. Find the volume of this cube.



6. Find the area.



Real Life Applications

7. A room 14ft by 16ft is carpeted. First determine the area of the room, then find how much it will cost to carpet the room if carpet is $15 per square yard.

8. Find the area of a concrete driveway with a length of 75ft. and a width of 17ft.

9. Find the area of a rectangle with a length of 15ft and a width of 8ft.

10. Find the volume of a solid rectangle with dimension l =10cm, w = 5cm, and h = 4cm.

11. New carpet is installed in a room measuring 18 feet by 14 feet. Find the area of the room in square feet.

Homework

Find the area of the:

1. Circle with radius 7 cm.

2. Triangle with base 4 inches and height 9 inches.

3. Rectangle with length 12 ft. and width 6 ft.

4. Square with side 2 inches.

5. A triangle with base = 10in, and height = 4in.

6. Find the area of a rectangular construction site that has a length of 54 yds. and a width of 30 yds.

7. How many gallons of water will fill a tank that is 18in long, 10in wide, and 9in high? Note: (one gallon = 231 in^3.)

8. Find the volume of the cube with length 4 ft, height 3 ft, and width 6ft.

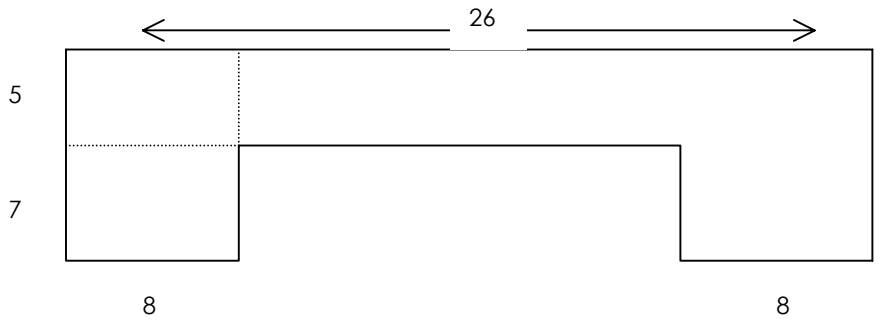
Day 18

Geometry

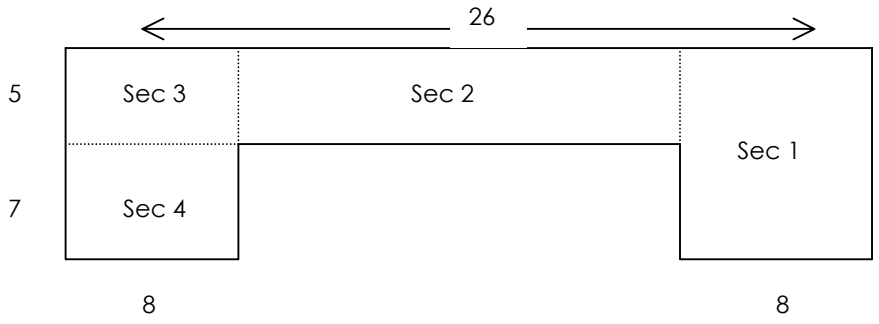
Objective: Geometric concepts are important at construction and hazard waste sites.

In the previous two sections, the concept of computing the perimeter, circumference, area and volume on objects were reviewed. This section will include all of the above concepts except it will take into consideration an object that may not be one of the standard shapes.

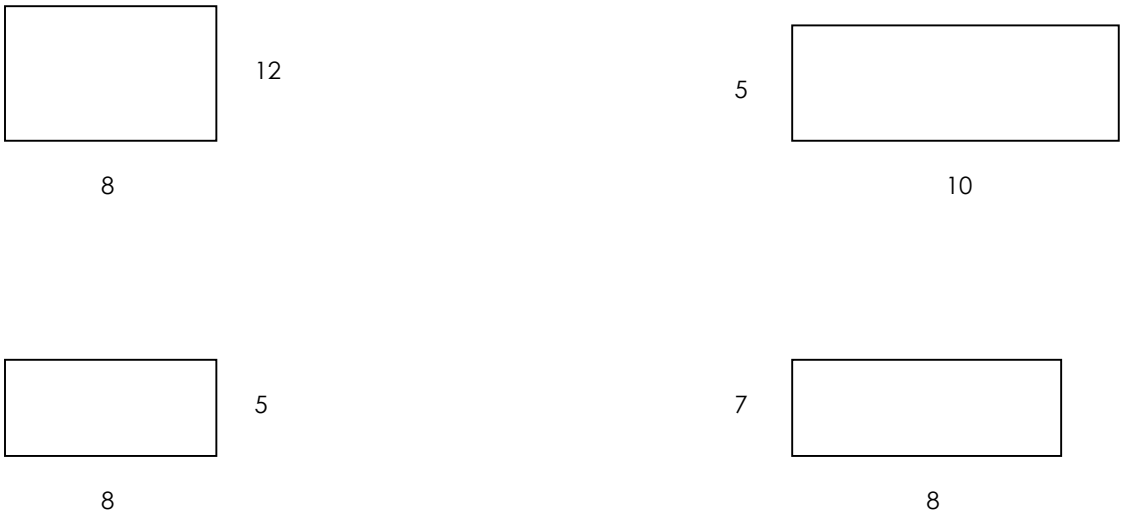
In order to calculate the area or perimeter of a figure, it is sometimes necessary to take a figure and dissect it or add to a figure for easier calculation.



Find the area & perimeter of the figure above.



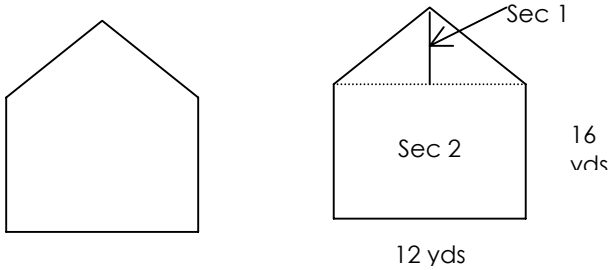
Find the area and perimeter of each section, add them together, and you will have the area and perimeter for the entire figure.



Perimeter of all figures:

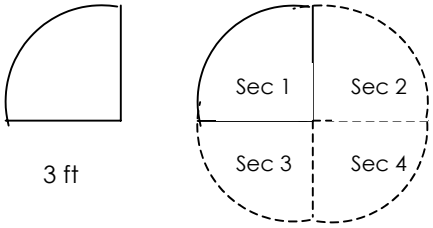
P = Sec 1 + Sec 2 + Sec 3 + Sec 4
= 40 + 30 + 26 + 30
= 126

1.) Find the area of this figure.



It is easier to calculate the area of this figure if it was broken into a triangle and rectangle. If you add the measurements of Sec 1 with the measurements of Sec 2, you will have the measurements of the entire figure.

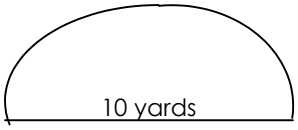
2.) Find the area and volume of this figure.



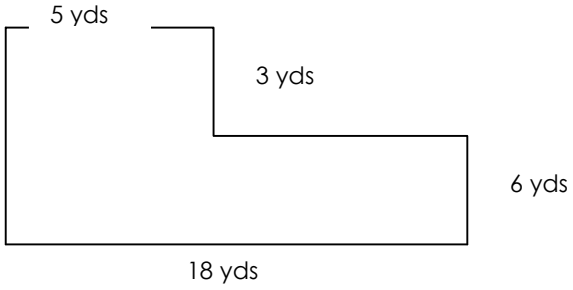
It would be easier to calculate information about this figure if you changed it to a full circle. If you find the measurement of the entire circle and by 4 you will have the measurement of one complete section which is all that is needed.

Homework

1. Ms. Jones has a driveway in the shape of a semi-circle that is to be paved. How much cement is needed to cover this area if the cement needed costs $2.04 a square yard?



2. The same company will pave the driveway of Ms. Jones' next door neighbor, Ms. Herbert. Ms. Herbert's driveway is L-shaped. How much cement is need to cover this area if the cement needed costs $1.86 a square yard? Calculate the perimeter.



Day 19

Test #4

Day 20

Types of Graphs & How to Read Graphs

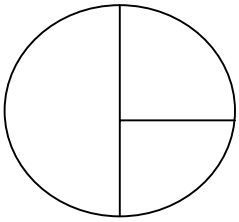
Objective: To get trainees to understand information presented in graphs.

Graphs are displays of data that provide a pictorial representation of data, or numerical information. They are frequently used because they present information in a way that is easy to read. However, if not read properly they can be misleading.

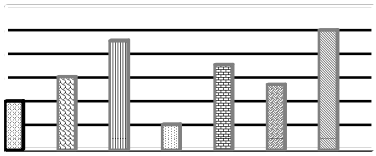
The following is a description of several graphs that are regularly use in presenting information.

Types of graphs.

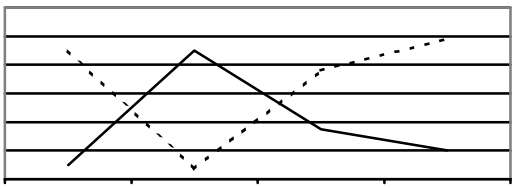
1. A circle graph represents data by the size of the section of a circle.



2. A bar graph represents data by the height of the bars.

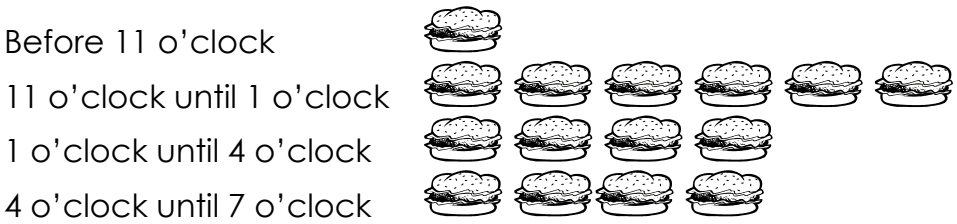


2. A line is a graph made of connected lines and the data is determined by where the line crosses.



Activity

The pictograph shows the number of hamburgers sold at a local fast-food restaurant during different times of 1 day. Each hamburger represents 50 hamburgers sold.

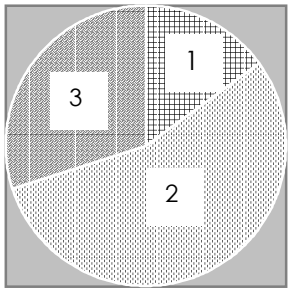


1. What was the total number of hamburgers sold during the times shown?
   a) 650 b) 950 c) 800 d) 700

2. Find the ratio of the number of hamburgers sold between 11 and 1 o'clock to the number of hamburgers sold between 4 and 7 o'clock.
   a) $\frac{11}{13}$ b) $\frac{13}{11}$ c) $\frac{12}{11}$ d) $\frac{15}{11}$

The circle graph shows the sources of income for a community college that has a total budget of $24,000,000.

Sources of Income: 1) 15% Federal Government
2) 55% State Government
3) 30% Local Funds

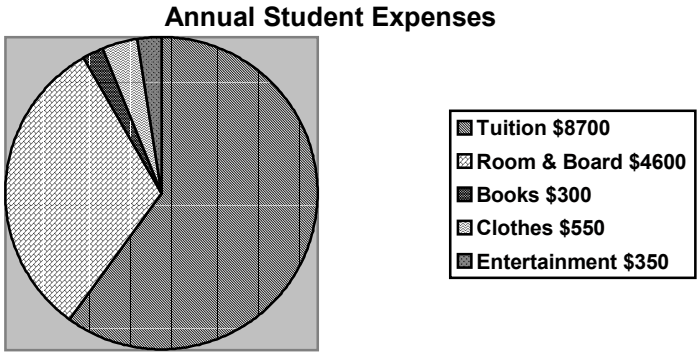


3. Find the amount of money received from the federal government.
   a) $6,3000,000 b) $7,200,000
   c) $4,200,000 d) $3,600,000

4. How much money does the college receive from local funds?
   a) $720,000 b) $7,200,000
   c) $8,200,000 d) $6,300,000

5. Find the amount of money the college received from the state government.
   a) $14,200,000 b) $1,320,000
   c) $13,200,000 d) $7,200,000

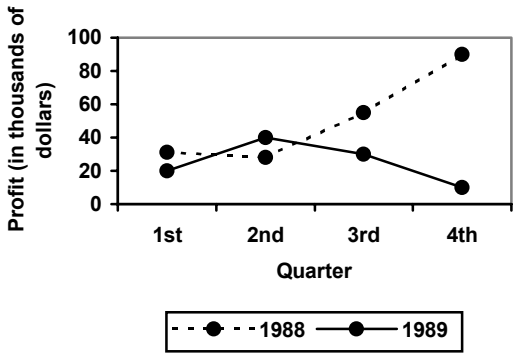
The circle graph shows the annual expenses for a student at a university.



6. What amount was spent on tuition?
   a) $300 b) $4600 c) $550 d) $8700

7. Find the ratio of the amount spent for books to the amount spent for clothes.
   a) $\frac{11}{6}$ b) $\frac{5}{11}$ c) $\frac{7}{12}$ d) $\frac{6}{11}$

The double-line graph shows quarterly profits for a laser company for the years 1988 and 1989.

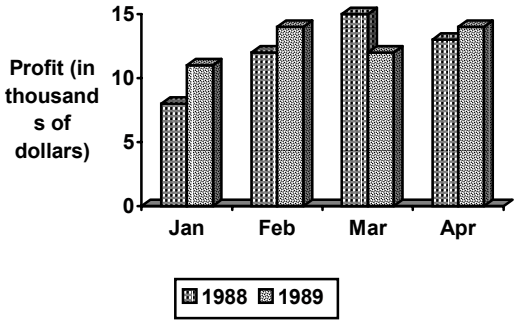


8. What is the difference in third-quarter profits for 1988 and 1989?
   a) $3000 b) $40,000 c) $30,000 d) $30

9. Find the total sales for 1989.
   a) $10,000 b) $100,000
   c) $80,000 d) $70,000

Homework

The double bar graph shows a company's monthly profits (in thousands of



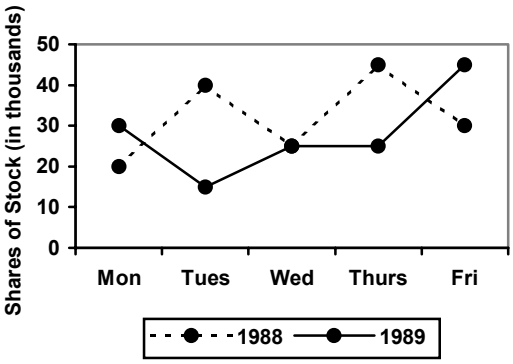
dollars) during the first 4 months of 1988 and 1989.

1. Find the difference between the 1988 and 1989 profits for the month of February.
   a) $2000 b) $200 c) $2400 d) $1500

2. What were the total profits for 1989 for the four months shown?
   a) $50,000 b) $5100 c) $51,000 d) $48,000

3. In which month did the 1988 profits exceed the 1989 profits?
   a) January b) February c) April d) March

The double-broken-line graph shows the number of shares in stock (in thousands) traded on the New York Stock Exchange for each of 5 days in 1988 and 1989.



4. Find the total number of shares of stock sold on the Tuesdays of 1988 and 1989.
   a) 25,000 b) 55,000 c) 40,000 d) 15,000

5. On what day were sales the same in both 1988 and 1989?
   a) Wednesday b) Friday c) Tuesday d) Monday

6. What is the ratio of Friday 1988's sales to Friday 1989's sales?
   a) $\frac{2}{3}$ b) $\frac{4}{9}$ c) $\frac{9}{5}$ d) $\frac{3}{5}$

Day 21

Currency

Objective: This unit requires trainees to use mathematical skills in working problems involving money. Some problems require that numbers are written as word expressions, such as check writing. Other skills such as addition and subtraction are used to balance a checking account. And a combination of mathematical skills are required to compute total hourly wages, salaries after deductions are taken, and making purchases.

Activity

Write a decimal number for each of the following expressions.

1. Six hundred seventy-two dollars and forty-three cents.

2. Seven million five hundred dollars.

When writing a check, a person must write the word name for the dollar amount of the check.

3. Write the word name for $18.39.

4. Write the word name for $0.69.

5. How much would a $90.00 stereo cost after a 25% discount?
   How much is the stereo once you add 9% tax?

Real Life Applications

Problems #6, #7, and #8 are related:

6. Marvin worked at the Rowan Construction site for 2 weeks. He worked 96 hours – 80 regular hours and 16 overtime hours. Marvin is paid $10.00 an hour for all regular hours and time and a half for overtime hours. How much is Marvin's gross pay (pay before deductions and taxes)?

7. Rowan Construction Company paid for one of Marvin's licenses to be renewed with the agreement that Marvin would pay it back out of his first check. The class cost $275.00. How much is Marvin's gross pay now after this deduction has been taken?

8. Marvin will have $216.43 deducted in taxes. What is Marvin's net pay (pay after all taxes have been deducted)?

Homework

Write a decimal number for each of the following expressions.

1. Two thousand seven hundred sixty-five dollars.

2. Write the word name for $1,965.40.

3. A person who has a checking account must balance his/her account. John Atkins had a checking account balance of $782.40 before writing checks of $64.35 and $425.20. He later makes a deposit of $304.70. Find the current checking account balance.

4. An electrician earns $3,129.60. Deductions from the check are $630.24 for federal tax, $180.92 for state tax, and $43.12 for insurance. Find the electrician's take home pay.

Day 22

Time

Objective: To learn to perform conversions from one unit of time measurement to another. Time is measured in units of seconds, minutes, hours, and days. The table of equivalent units can be used to perform these conversions.

Table of Time Units

1 minute (min) = 60 seconds (sec)

1 hour (hr) = 60 minutes (min)

1 day (da) = 24 hours (hr)

Activity

1. Convert $\frac{3}{4}$ hr to minutes.

2. Convert 5 min to seconds.

3.
```
  26 min   24 sec
+13 min   32 sec
```

4.
```
   3 min 42 sec
+  12 min 26 sec
```

5.
```
   17min  28 sec
 -   8min  17 sec
```

6.
```
  16 min  5 sec
-  8 min 13 sec
```

7. 1800 sec =_____min

8. 1600 sec =_____min

9. A project started at 5:15 p.m. and ended at 9:45 p.m. the same day. How long did the project last?

10. A construction project started 3 years ago. How many hours did the project take to be completed? (Assume 365 days in 1 year.)

Day 23

Test #5

Day 24

Post-Test Review

Day 25
Post-Test and Closing