

WIN CAREER READINESS COURSEWARE

Skill building for tomorrow's workforce... today!



Applied Mathematics *Level 5*



WIN
W-WIN.COM

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1000 Waterford Place, Kingston, TN 37763 • 888.717.9461
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Worldwide Interactive Network, Inc.
1000 Waterford Place
Kingston, Tennessee 37763 USA
Tel: (865) 717-3333
Fax: (865) 717-9461
info@w-win.com
www.w-win.com



INTRODUCTION

WIN CAREER SOLUTIONS

Hi, I'm EdWIN



Welcome to Level 5! If you started with me in Level 3 of *Applied Mathematics*, you have done well! Let me introduce myself. My name is EdWIN, and I will be your guide through this course. I remember some of you from Levels 3 and 4, but for the newcomers, let me tell you a little about the *WIN WorkKeys Instruction Solution*.

Together we will proceed through this course at your speed. Look for me, EdWIN, to pop up throughout your lessons to give you helpful tips, suggestions, and maybe even a pop quiz question or two. Don't worry, you can find the answers to pop quiz questions at the end of the course.

If the content of the lesson is something you understand, you should be able to work through it at a faster pace. On the other hand, if the material is difficult, read the text several times and then try to work the exercises one at a time. After you try one problem, look at the solution. You can learn by reviewing each step that is provided in the solution and by concentrating on the process being illustrated.



INTRODUCTION

In this level, we will concentrate on conversions and percents. You will be introduced to perimeter, area, and circumference of rectangles, triangles, and circles. Level 5 of *Applied Mathematics* builds on skills taught in Levels 3 and 4. So, please use the pretest to determine if you know these previous objectives. You are encouraged to use your calculator when needed. If you do well on the pretest, you are ready to move forward. If you have trouble with the problems, I recommend you review the material identified in the Prerequisite Skills.

It will help you to remember what you are learning if you can find time to review some part of this course everyday, even if it is for a few minutes. You will find the new material easier if you have a good understanding of the objectives we have already covered. With that said, let's move on.



OUTLINE

WIN CAREER SOLUTIONS

LESSON 1	Review of Prerequisite Skills
LESSON 2	Unit Measurements
LESSON 3	Perimeter and Area
LESSON 4	Circumference and Area of Circles
LESSON 5	Solving Percent Problems
LESSON 6	Solving Problems with Rates and Proportions
LESSON 7	Application of Word Problems
LESSON 8	Posttest
REFERENCES	Workplace Problem Solving Glossary Test-Taking Tips Formula Sheet



LESSON 1

REVIEW

Before we begin, we really should review the skills that you should already have. The following pretest contains problems which emphasize the skills you should know before you begin Level 5. The answers are provided following the test. Good luck!

**EXERCISE – PRETEST**

Instructions: *Perform the indicated operations using your calculator as needed. Round answers to the nearest hundredth.*

1. $3.52 + .04 =$ _____

2. $206.8 + .224 =$ _____

3. $0.08 - .04 =$ _____

4. $426.8 - 357.65 =$ _____

5. $42 - 36 =$ _____

6. $\frac{1}{2} + \frac{1}{2} =$ _____

7. $5 \times \frac{1}{5} =$ _____

8. $7 \div \frac{7}{5} =$ _____

9. $\frac{3}{4} - \frac{1}{4} =$ _____

10. $\frac{1}{2} \times \frac{1}{5} =$ _____



LESSON 1

11. Change $\frac{3}{4}$ to a decimal and a percent.

12. Change $\frac{2}{3}$ to a decimal and a percent.

13. Change 40% to a decimal and a fraction.

14. What is 80% of 12?

15. What is 3% of 20?



LESSON 1

WIN CAREER SOLUTIONS

16. John Smith is a newspaper printer. He needs to print 10,000 copies of papers in 36 hours. He makes \$35,000 each year and uses 120,000 ft of newsprint each week. Given this information, how many papers does he need to print per hour to meet his deadline?
17. You are shipping a box that weighs 13 pounds. Shipping charges are listed by ounces at the local mail center. How many ounces does the box weigh?



LESSON 1

18. You have a piece of pipe 1 meter long. You need a piece 37 centimeters long. How much pipe will you have left after cutting the piece you need? (Assume no waste during cutting.)
19. The temperature on Monday morning was -2°F . By noon it had warmed up to 5°F . How many degrees did the temperature change?



LESSON 1

WIN CAREER SOLUTIONS

20. A real estate agent makes commissions of \$6,500 in January, \$4,500 in February, and \$4,000 in March. Find her average monthly commission for this period.
21. A machine you operate produces 584 units during your 8-hour shift. How many units would it produce in 2 hours?

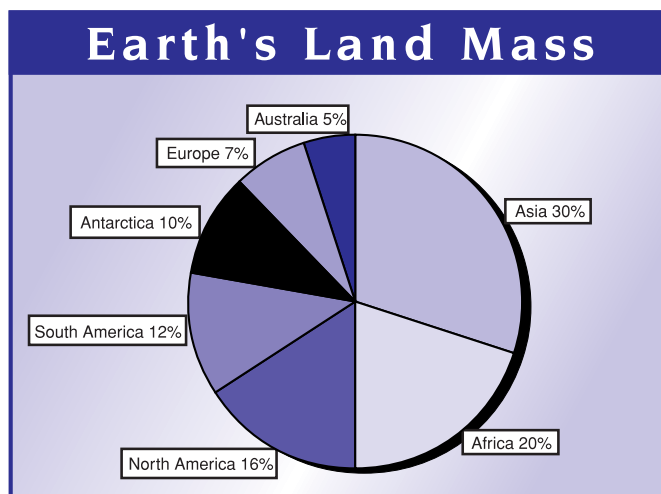


LESSON 1

22. You have purchased 9 yards of material. It takes $3\frac{7}{8}$ yards to make a jacket, $2\frac{3}{8}$ yards to make a skirt and $2\frac{1}{8}$ yards to make a pair of pants. Can you make all three without purchasing additional material? (Assume no waste in cutting.)
23. On a blueprint, a square with 20 meters per side was shown as a square with 12 centimeters per side. How long would a girder appear on the blueprint if the girder was actually 15 meters long?

24. In preparation for the basketball game, your assignment in the concession stand is to fill drink carriers which hold 40 drinks. If you expect to sell 2,520 drinks through vendors who sell in the stands, how many carriers will you have to fill?

25. What is the ratio of land mass of the largest continent to the smallest continent?





LESSON 1

ANSWERS TO PRETEST

1. $3.52 + .04 =$ _____

Answer: **3.56**

2. $206.8 + .224 =$ _____

Answer: **207.02**

3. $0.08 - .04 =$ _____

Answer: **0.04**

4. $426.8 - 357.65 =$ _____

Answer: **69.15**

5. $42 - 36 =$ _____

Answer: **6**

6. $\frac{1}{2} + \frac{1}{2} =$ _____

Answer: **1**

7. $5 \times \frac{1}{5} =$ _____

Answer: **1**

8. $7 \div \frac{7}{5} =$ _____

Answer: **5**

9. $\frac{3}{4} - \frac{1}{4} =$ _____

Answer: **$\frac{1}{2}$**

10. $\frac{1}{2} \times \frac{1}{5} =$ _____

Answer: **$\frac{1}{10}$**

11. Change $\frac{3}{4}$ to a decimal and a percent.

Answer: $\frac{3}{4} = .75 =$ **75%**



12. Change $\frac{2}{3}$ to a decimal and a percent.

Answer: $\frac{2}{3} = .67 = 67\%$

13. Change 40% to a decimal and a fraction.

Answer: $40\% = .40 = \frac{2}{5}$

14. What is 80% of 12?

Answer: $80\% \times 12 = 9.6$

15. What is 3% of 20?

Answer: $3\% \times 20 = 0.6$

16. John Smith is a newspaper printer. He needs to print 10,000 copies of papers in 36 hours. He makes \$35,000 each year and uses 120,000 ft of newsprint each week. Given this information, how many papers does he need to print per hour to meet his deadline?

Answer: 278 papers

$$10,000 \div 36 \text{ (hr)} = 277.78 \text{ or } 278 \text{ papers per hour}$$



LESSON 1

WIN CAREER SOLUTIONS

17. You are shipping a box that weighs 13 pounds. Shipping charges are listed by ounces at the local mail center. How many ounces does the box weigh?

Answer: 208 ounces

Converting a larger measure to a smaller requires multiplication.

$$13 \text{ lb} \times 16 \text{ oz} = \mathbf{208 \text{ oz}}$$

18. You have a piece of pipe 1 meter long. You need a piece 37 centimeters long. How much pipe will you have left after cutting the piece you need? (Assume no waste during cutting.)

Answer: 63 centimeters of pipe

Convert 1 meter to centimeters, decimal moves two places to the right.

$$1 \text{ m} = 100 \text{ cm}$$

$$100 \text{ cm} - 37 \text{ cm} = \mathbf{63 \text{ cm}}$$

19. The temperature on Monday morning was -2°F . By noon it had warmed up to 5°F . How many degrees did the temperature change?

Answer: 7°F

$$5 - (-)2 = 5 + 2 = \mathbf{7^{\circ}\text{F}}$$

20. A real estate agent makes commissions of \$6,500 in January, \$4,500 in February, and \$4,000 in March. Find her average monthly commission for this period.

Answer: \$5,000 average monthly commission

$$6,500 + 4,500 + 4,000 = 15,000$$

$$15,000 \div 3 = \mathbf{\$5,000 \text{ average per month}}$$



21. A machine you operate produces 584 units during your 8-hour shift. How many units would it produce in 2 hours?

Answer: **146 units in 2 hours**

$$\begin{aligned}\frac{584}{8} &= \frac{x}{2} \\ 8x &= 1,168 \\ x &= 146\end{aligned}$$

22. You have purchased 9 yards of material. It takes $3\frac{7}{8}$ yards to make a jacket, $2\frac{3}{8}$ yards to make a skirt and $2\frac{1}{8}$ yards to make a pair of pants. Can you make all three without purchasing additional material? (Assume no waste in cutting.)

Answer: $3\frac{7}{8} + 2\frac{3}{8} + 2\frac{1}{8} = 8\frac{3}{8}$ yards

You have enough to make the 3 garments since you

have 9 yards and only need $8\frac{3}{8}$ yards.

23. On a blueprint, a square with 20 meters per side was shown as a square with 12 centimeters per side. How long would a girder appear on the blueprint if the girder was actually 15 meters long?

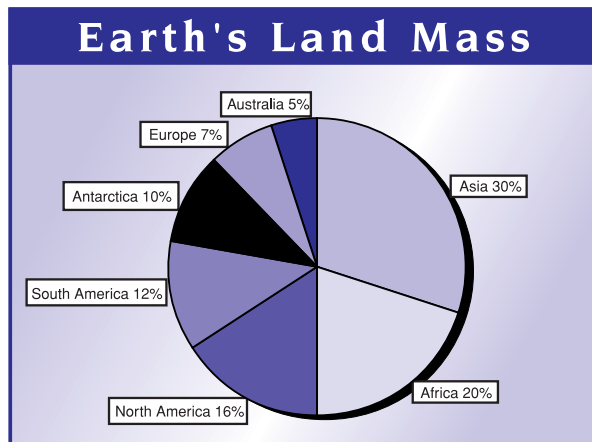
Answer: $\frac{20 \text{ m}}{12 \text{ cm}} = \frac{15 \text{ m}}{x \text{ cm}}$

$$\begin{aligned}20x &= 180 \\ x &= \mathbf{9 \text{ cm}}\end{aligned}$$

24. In preparation for the basketball game, your assignment in the concession stand is to fill drink carriers which hold 40 drinks. If you expect to sell 2,520 drinks through vendors who sell in the stands, how many carriers will you have to fill?

Answer: $2,520 \div 40 = 63$ *drink carriers*

25. What is the ratio of land mass of the largest continent to the smallest continent?



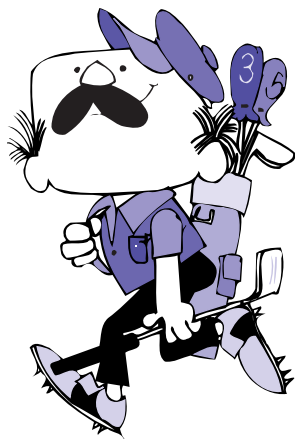
Answer: $\frac{6}{1}$ or **6:1**

UNIT MEASUREMENTS

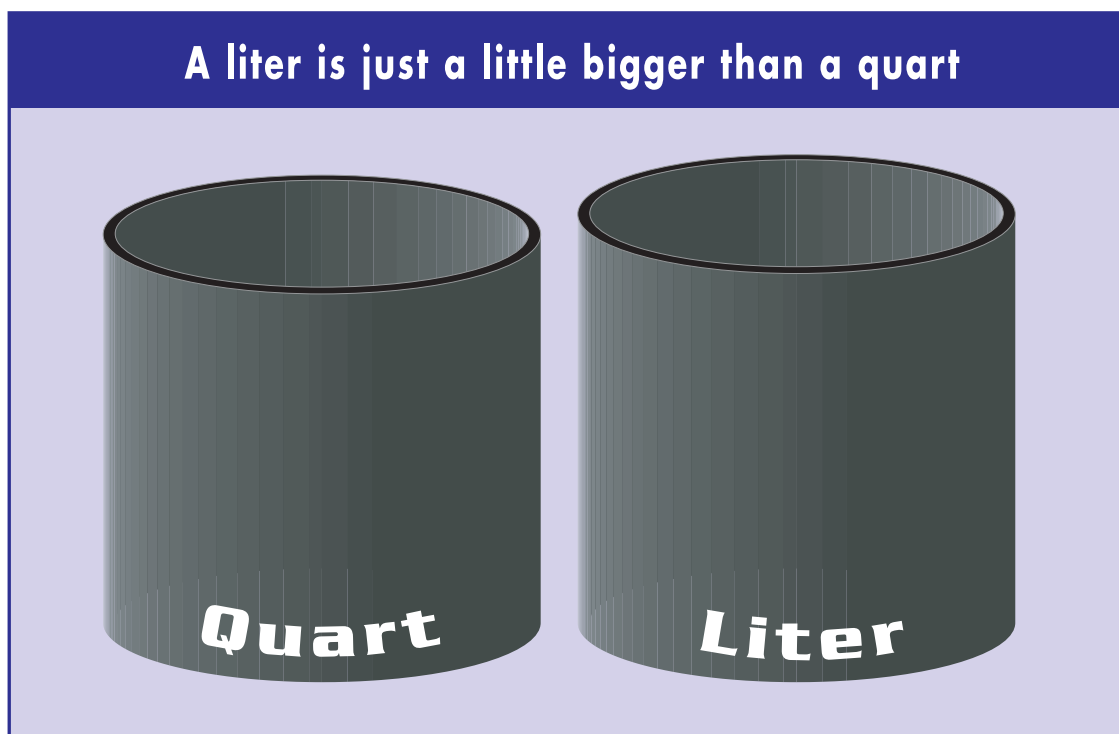
In this lesson we're going to talk about converting units of measurement and how the units are used. There are English units and metric units of measurement. We also refer to English units as the American Standard System. English units are pounds, inches, feet, cups, etc. Metric units include meters, liters, and grams.

Let's do a little comparison of the two kinds of units before we do any conversions. Most of us can visualize measurements in English units. For example, we know if we wanted to measure a door we would probably use a yard stick. Do you know, however, which metric unit you would use? A yard is comparable to a meter because a meter is just a little longer than a yard. You would also use meters for things like fabric, carpets, or buildings. Anything you would use a yard to measure, you could use a meter to measure. Now, let's think in smaller terms. An inch, for instance, might be used to measure the length of your calculator or your pencil. Centimeters are comparable to inches. A millimeter is even smaller. One millimeter is about the thickness of a dime. If you've ever been to other countries, you may have noticed that many mileage signs say kilometers instead of miles. A kilometer is a little more than half a mile.

A 230 *meter* drive...
not bad EdWIN!



Let's take a look at some liquid measurements. In the English system, you measure liquids in cups, pints, quarts, and gallons. The metric unit for liquids is the liter. A liter is just a little bigger than a quart. Five ml would be the equivalent of one teaspoon, and one cup is about 250 ml.



The English system typically measures weight in pounds and ounces while the metric system uses grams and kilograms. Football players might weigh 100 kg. A dollar bill might weigh 1 gram. A milligram is very small; it is about $\frac{1}{1000}$ of the weight of the dollar bill.

**EXERCISE – METRIC UNITS**

Instructions: *Look at some of the following statements and try to decide which metric unit you would use. As always, the answers will follow.*

LENGTH

1. Joey swam 300_____.
2. A door is 2 _____ high.
3. The paper clip is 3 _____ long.

WEIGHT

4. Justin weighs 110 _____.
5. A nickel weighs 5 _____.
6. The patient took 250 _____ of the medicine.

CAPACITY

7. The gas tank holds 50 _____.
8. EdWIN drank 250 _____ of water.



ANSWERS TO EXERCISE

LENGTH

1. Joey swam 300 _____.

Answer: *meters (m)*

2. A door is 2 _____ high.

Answer: *meters (m)*

3. The paper clip is 3 _____ long.

Answer: *centimeters (cm)*

WEIGHT

4. Justin weighs 110 _____.

Answer: *kilograms (kg)*

5. A nickel weighs 5 _____.

Answer: *grams (g)*

6. The patient took 250 _____ of the medicine.

Answer: *milligrams (mg)*

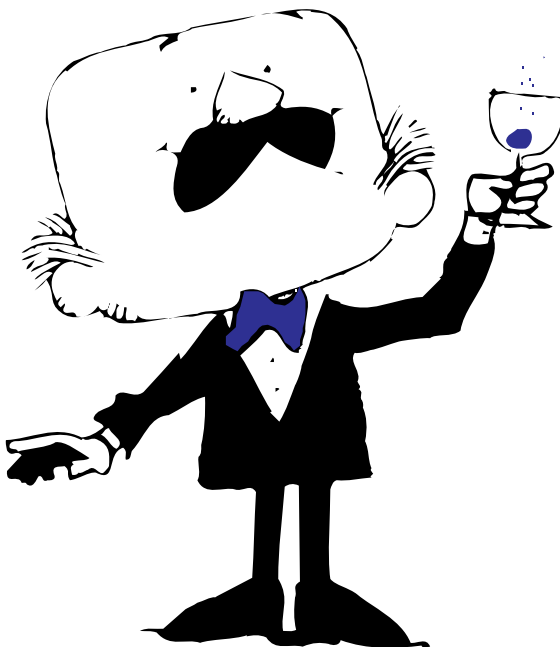
CAPACITY

7. The gas tank holds 50 _____.

Answer: *liters (l)*

8. EdWIN drank 250 _____ of water.

Answer: *milliliters (ml)*





FORMULA SHEET

(\approx indicates estimate, not equal)

UNITS OF MEASUREMENT

Distance

1 foot = 12 inches
1 yard = 3 feet
1 mile = 5,280 feet
1 mile \approx 1.61 kilometers
1 inch \approx 2.540 centimeters
1 foot \approx 0.3048 meters
1 meter = 1,000 millimeters
1 meter = 100 centimeters
1 kilometer = 1,000 meters
1 kilometer \approx 0.62 miles

Area

1 square foot = 144 square inches
1 square yard = 9 square feet
1 acre = 208.71 feet square
1 acre = 43,560 square feet

Volume

1 cup = 8 fluid ounces
1 quart = 4 cups
1 gallon = 4 quarts
1 gallon = 231 cubic inches
1 liter \approx 0.264 gallons
1 cubic foot = 1,728 cubic inches
1 cubic yard = 27 cubic feet
1 board foot = 1 inch by 12 inches by 12 inches

Weight

1 ounce \approx 28.350 grams
1 pound = 16 ounces
1 pound \approx 453.593 grams
1 milligram = 0.001 grams
1 kilogram = 1,000 grams
1 kilogram \approx 2.2 pounds
1 ton = 2,000 pounds

Temperature

$$^{\circ}\text{C} = .56(^{\circ}\text{F} - 32) \text{ or } \frac{5}{9}(^{\circ}\text{F} - 32)$$

$$^{\circ}\text{F} = 1.8(^{\circ}\text{C}) + 32 \text{ or } \left(\frac{9}{5} \times ^{\circ}\text{C}\right) + 32$$

Electricity

1 kilowatt-hour = 1,000 watt-hours

FORMULAS

Rectangle

Perimeter = $2(\text{length} + \text{width})$
area = $\text{length} \times \text{width}$

Cube

volume = $(\text{length of side})^3$

Triangle

sum of angles = 180°

$$\text{area} = \frac{1}{2}(\text{base} \times \text{height})$$

Circle

number of degrees in a circle = 360°

circumference $\approx 3.14 \times \text{diameter}$

$$\text{area} \approx 3.14 \times (\text{radius})^2$$

Cylinder

$$\text{volume} \approx 3.14 \times (\text{radius})^2 \times \text{height}$$

Cone

$$\text{volume} \approx \frac{3.14(\text{radius})^2 \times \text{height}}{3}$$

Ball

$$\text{volume} \approx \frac{4}{3} \times 3.14 \times (\text{radius})^3$$

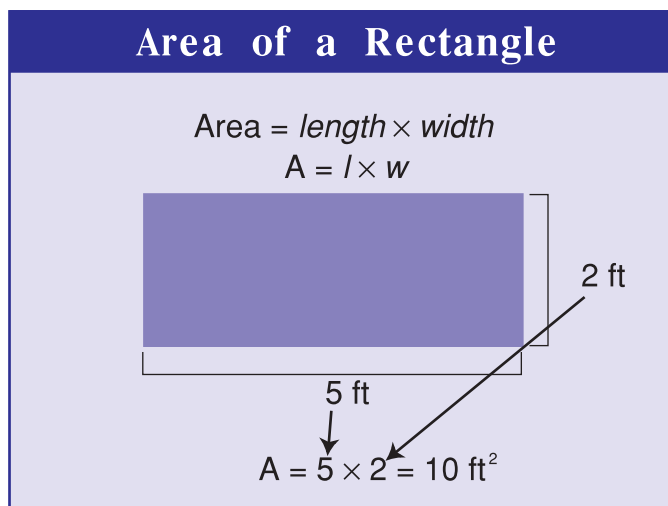
Amperage

amps = watts \div volts

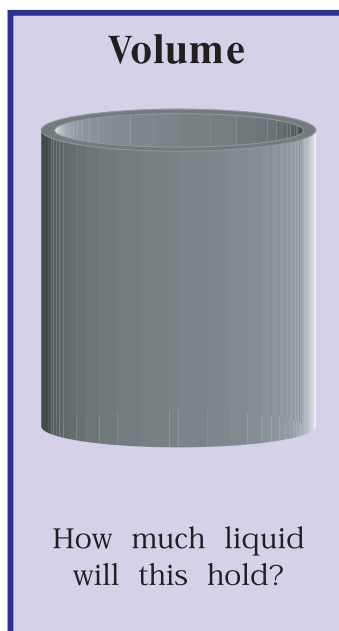
Hopefully, this discussion will help you to have a better understanding of what metric units represent. For the remainder of this lesson, we will work with some conversions. You may need the *Formula Sheet* to help you with the conversions. There will be an explanation of some of these units later in this level of *Applied Mathematics*.

Under *Distance* on your *Formula Sheet* you see equivalencies for converting between the metric and English systems. After that, you see some equivalencies for area. Area is the amount of surface within a two-dimensional figure. It is measured in square units which indicate the 2 dimensions.

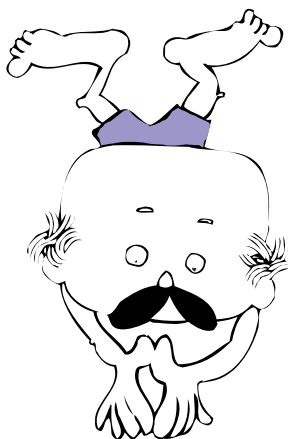
The rectangle in this figure is 2 ft wide and 5 ft in length. To determine the surface area of this figure, we multiply length \times width. The result is a measurement in square feet often indicated by ft^2 .



Next, your sheet indicates liquid equivalencies. This is called volume. Volume measures how much a container can hold. Anything that says “cubic” measures volume and may be represented by unit³ (in³, ft³, etc.).



Let's dive into metric conversions.



Near the bottom on the left side of the sheet are temperature equivalencies. These formulas indicate how to convert temperatures between Fahrenheit and Celsius. (When there are two different temperatures on the bank thermometer, one is an English measure and the other is a metric measure.) Other formulas are listed on the right-hand column. We will use these later in the course.

In Level 4, you did some conversion problems. I will do a few to refresh your memory. If you need more practice, you might go back and work in the Level 4 workbook.



LESSON 2

WIN CAREER SOLUTIONS

If you want to change 78 cubic feet to cubic yards, you must refer to your chart, unless you have some conversion formulas memorized. If you use the conversions frequently, you just might know them.

$$78 \text{ cubic feet} \times \frac{1 \text{ cubic yard}}{27 \text{ cubic feet}}$$

$$78 \div 27 = 2.9 \text{ cubic yards}$$

$$3 \text{ hours and } 20 \text{ minutes} = \underline{\hspace{2cm}} \text{ minutes}$$

$$3 \text{ hours} \times \frac{60 \text{ minutes}}{1 \text{ hour}} = 180 \text{ minutes}$$

$$180 \text{ minutes} + 20 \text{ minutes} = 200 \text{ minutes}$$

$$6 \text{ gallons} = \underline{\hspace{2cm}} \text{ quarts}$$

$$6 \text{ gallons} \times \frac{4 \text{ quarts}}{1 \text{ gallon}} = 24 \text{ quarts}$$



LESSON 2

WIN CAREER SOLUTIONS

Near the bottom of your chart, you will find the temperature equivalencies. Conversion of temperature is just a matter of substitution.

$$F^{\circ} = \frac{9}{5} C^{\circ} + 32 \qquad C^{\circ} = \frac{5}{9}(F^{\circ} - 32)$$

The formulas can be entered in your calculator.

Examples:

$$0^{\circ} C = ?^{\circ} F$$

Use formula from Formula Sheet. Substitute the given temperature for C°

$$F^{\circ} = \left(\frac{9}{5} \times 0^{\circ} \right) + 32$$

$$F^{\circ} = 0 + 32$$

$$F^{\circ} = 32^{\circ} \text{ so } 0^{\circ} C = 32^{\circ} F$$

If you know a F° measurement and need C° ,

$$100^{\circ} F = ?^{\circ} C$$

Use formula from Formula Sheet. Substitute the given temperature for F°

$$C^{\circ} = \frac{5}{9}(100^{\circ} - 32)$$

$$C^{\circ} = \frac{5}{9}(68)$$

$$C^{\circ} = \frac{340}{9}$$

$$C^{\circ} = 37.8^{\circ} \text{ so } 100^{\circ} F = 38^{\circ} C$$



LESSON 2

WIN CAREER SOLUTIONS

You substitute the degree you know into the appropriate formula. Notice the parenthesis. You must complete the operation in parenthesis first. Then you can work the last operation.

Pop Quiz: What metric unit would most likely be used to measure the length of a football field?





EXERCISE – UNIT CONVERSIONS

Instructions: *Use the Formula Sheet to make the following conversions. Round answers to the nearest tenth.*

1. 28 inches = _____ feet

2. 4.5 miles = _____ feet

3. 5 meters = _____ centimeters

4. 4 square yards = _____ square feet

5. 1,385 square inches = _____ square feet



LESSON 2

WIN CAREER SOLUTIONS

6. 7 gallons = _____ quarts
7. 81 cubic feet = _____ cubic yards
8. 81 cubic feet = _____ cubic inches
9. 5.4 pounds = _____ ounces
10. 8,045 grams = _____ milligrams



LESSON 2

Instructions: *Convert the following temperatures between Fahrenheit and Celsius. Remember you must complete the operation in the parenthesis first! Round any decimals to the nearest whole number.*

11. $7^{\circ} \text{ F} = \underline{\hspace{2cm}}^{\circ} \text{ C}$

12. $32^{\circ} \text{ F} = \underline{\hspace{2cm}}^{\circ} \text{ C}$

13. $32^{\circ} \text{ C} = \underline{\hspace{2cm}}^{\circ} \text{ F}$

14. $175^{\circ} \text{ C} = \underline{\hspace{2cm}}^{\circ} \text{ F}$

15. $85^{\circ} \text{ F} = \underline{\hspace{2cm}}^{\circ} \text{ C}$

16. $0^{\circ} \text{ C} = \underline{\hspace{2cm}}^{\circ} \text{ F}$



LESSON 2

WIN CAREER SOLUTIONS

Instructions: *Convert the following measurements of time. Round decimals to the nearest tenth.*

17. 30 minutes = _____ seconds

18. 3.5 hours = _____ minutes

19. 4 days = _____ hours

20. 5,064 minutes = _____ hours

21. 3 hours 40 minutes = _____ minutes

22. 3 hours 40 minutes = _____ hours



LESSON 2

23. Find the amount of time that lapses between 7:45 a.m. and 9:55 a.m.
24. Find the difference in time between 3:25 p.m. and 11:15 p.m.
25. How much time does Eric work if he begins at 8:30 a.m. and quits at 6:45 p.m.? (Assume no breaks.)

**ANSWERS TO EXERCISE**

1. 28 inches = _____ feet

Answer: 2.3 feet

$$28 \text{ in} \times \frac{1 \text{ ft}}{12 \text{ in}} = 2.3 \text{ ft}$$

2. 4.5 miles = _____ feet

Answer: 23,760 feet

$$4.5 \text{ miles} \times \frac{5,280 \text{ ft}}{1 \text{ mile}} = 23,760 \text{ ft}$$

3. 5 meters = _____ centimeters

Answer: 500 centimeters

$$5 \text{ m} \times \frac{100 \text{ cm}}{1 \text{ m}} = 500 \text{ cm}$$

4. 4 square yards = _____ square feet

Answer: 36 square feet

$$4 \text{ sq yd} \times \frac{9 \text{ sq ft}}{1 \text{ sq yd}} = 36 \text{ sq ft}$$

5. 1,385 square inches = _____ square feet

Answer: 9.6 square feet

$$1,385 \text{ sq in} \times \frac{1 \text{ sq ft}}{144 \text{ sq in}} = 9.6 \text{ sq ft}$$



LESSON 2

6. 7 gallons = _____ quarts

Answer: 28 quarts

$$7 \text{ gal} \times \frac{4 \text{ qt}}{1 \text{ gal}} = 28 \text{ qt}$$

7. 81 cubic feet = _____ cubic yards

Answer: 3 cubic yards

$$81 \text{ cu ft} \times \frac{1 \text{ cu yd}}{27 \text{ cu ft}} = 3 \text{ cu yd}$$

8. 81 cubic feet = _____ cubic inches

Answer: 139,968 cubic inches

$$81 \text{ cu ft} \times \frac{1,728 \text{ cu in}}{1 \text{ cu ft}} = 139,968 \text{ cu in}$$

9. 5.4 pounds = _____ ounces

Answer: 86.4 ounces

$$5.4 \text{ lb} \times \frac{16 \text{ oz}}{1 \text{ lb}} = 86.4 \text{ oz}$$

10. 8,045 grams = _____ milligrams

Answer: 8,045,000 milligrams

$$8,045 \text{ g} \times \frac{1,000 \text{ mg}}{1 \text{ g}} = 8,045,000 \text{ mg}$$



LESSON 2

WIN CAREER SOLUTIONS

11. $7^{\circ} \text{F} = \underline{\hspace{2cm}}^{\circ} \text{C}$

Answer: **-14°C**

$$C = \frac{5}{9}(7 - 32)$$

$$C = -14$$

12. $32^{\circ} \text{F} = \underline{\hspace{2cm}}^{\circ} \text{C}$

Answer: **0°C**

$$C = \frac{5}{9}(32 - 32)$$

$$C = 0$$

13. $32^{\circ} \text{C} = \underline{\hspace{2cm}}^{\circ} \text{F}$

Answer: **90°F**

$$F = \left(\frac{9}{5} \times 32 \right) + 32$$

$$F = 90$$

14. $175^{\circ} \text{C} = \underline{\hspace{2cm}}^{\circ} \text{F}$

Answer: **347°F**

$$F = \left(\frac{9}{5} \times 175 \right) + 32$$

$$F = 347$$



LESSON 2

15. $85^{\circ} \text{ F} = \underline{\hspace{2cm}}^{\circ} \text{ C}$

Answer: **29° C**

$$C = \frac{5}{9}(85 - 32)$$

$$C = 29$$

16. $0^{\circ} \text{ C} = \underline{\hspace{2cm}}^{\circ} \text{ F}$

Answer: **32° F**

$$F = \left(\frac{9}{5} \times 0 \right) + 32$$

$$F = 32$$

17. **30 minutes** = **seconds**

Answer: **$1,800 \text{ seconds}$**

$$30 \text{ min} \times \frac{60 \text{ sec}}{1 \text{ min}} = 1,800 \text{ sec}$$

18. **3.5 hours** = **minutes**

Answer: **210 minutes**

$$3.5 \text{ hr} \times \frac{60 \text{ min}}{1 \text{ hr}} = 210 \text{ min}$$

19. **4 days** = **hours**

Answer: **96 hours**

$$4 \text{ days} \times \frac{24 \text{ hr}}{1 \text{ day}} = 96 \text{ hr}$$



LESSON 2

WIN CAREER SOLUTIONS

20. 5,064 minutes = _____ hours

Answer: **84.4 hours**

$$5,064 \text{ min} \times \frac{1 \text{ hr}}{60 \text{ min}} = 84.4 \text{ hr}$$

21. 3 hours 40 minutes = _____ minutes

Answer: **220 minutes**

$$3 \text{ hr} \times \frac{60 \text{ min}}{1 \text{ hr}} = 180$$

$$180 \text{ min} + 40 \text{ min} = 220 \text{ min}$$

22. 3 hours 40 minutes = _____ hours

Answer: **3.7 hours**

$$3 \text{ hr} + 40 \text{ min} \times \frac{1 \text{ hr}}{60 \text{ min}} = 3.7 \text{ hr}$$



23. Find the amount of time that lapses between 7:45 a.m. and 9:55 a.m.

Answer: In order to subtract 45 minutes from 55 minutes, we do NOT have to convert hours to minutes since 55 is more than 45. We simply subtract hours from hours and minutes from minutes.

9 hr	55 min
-7 hr	45 min
<hr/>	
2 hr	10 min

The time between 7:45 a.m. and 9:55 a.m. is **2 hours and 10 minutes.**

Some individuals prefer to visualize a clock and mentally calculate the difference in time.



24. Find the difference in time between 3:25 p.m. and 11:15 p.m.

Answer: To find the difference in time, you must subtract (hr from hr and min from min):

Since we cannot subtract 25 minutes from 15 minutes, we will have to convert one of the 11 hours into minutes.

$$1 \text{ hr} \times \frac{60 \text{ min}}{1 \text{ hr}} = 60 \text{ min}$$

60 + 15 = 75 minutes, so

11 hours and 15 minutes can be rewritten as 10 hours and 75 minutes

Now, we are ready to subtract.

$$\begin{array}{r} 11 \text{ hr } 15 \text{ min} = 10 \text{ hr } 75 \text{ min} \\ \quad \quad \quad \underline{-3 \text{ hr } 25 \text{ min}} \\ \quad \quad \quad 7 \text{ hr } 50 \text{ min} \end{array}$$

*The time between 3:25 p.m. and 11:15 p.m. is **7 hours and 50 minutes.***



25. How much time does Eric work if he begins at 8:30 a.m. and quits at 6:45 p.m.? (Assume no breaks.)

Answer: Because this problem involves a.m. and p.m., we will break the problem into 2 parts: the time from 8:30 a.m. until noon and the time from noon until 6:45 p.m.

Part 1

Find the difference from 8:30 a.m. until noon.

12:00 (noon) may be converted to 11 hr 60 min

$$\begin{array}{r} 11 \text{ hr } 60 \text{ min} \\ - 8 \text{ hr } 30 \text{ min} \\ \hline 3 \text{ hr } 30 \text{ min} \end{array}$$

Part 2

Find the time from noon until 6:45 p.m.

$$6 \text{ hr } 45 \text{ min}$$

Combine parts 1 and 2

$$\begin{array}{r} 3 \text{ hr } 30 \text{ min} \\ + 6 \text{ hr } 45 \text{ min} \\ \hline 9 \text{ hr } 75 \text{ min} \end{array}$$

Convert 75 min to hr

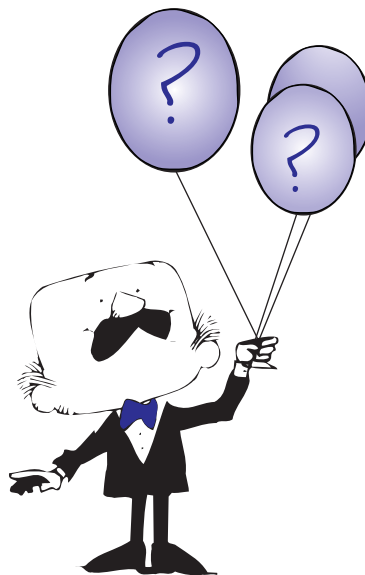
$$75 \text{ min} \times \frac{1 \text{ hr}}{60 \text{ min}} = 1 \text{ hr } 15 \text{ min}$$

$$9 \text{ hr} + 1 \text{ hr } 15 \text{ min} = 10 \text{ hr } 15 \text{ min}$$

Eric worked 10 hours and 15 minutes that day.

You will be required to convert some measures before you can solve word problems. Practice identifying problems that include conversions in the following exercise. Remember that most calculations require measures in the same unit.

Pop Quiz: Your job requires you to monitor the inventory of widgets daily. The number of widgets ordered each day last week are as follows: 92, 86, 105, 97, and 120. On an average, how many widgets are ordered per day?



**EXERCISE – APPLICATION OF UNIT CONVERSIONS**

Instructions: *Solve the following word problems. Use the Formula Sheet as needed. Round answers to the nearest hundredth.*

- 1. A piece of pipe is 14 feet long. How many inches long is this piece of pipe?**

- 2. At the decorating store where you work, one of the customers needs 634 inches of wallpaper border. To place an order for the border, you must know how many feet of border to order. How many feet of border does the customer need?**

- 3. The shipping department has requested a cubic inch measurement for each item shipped. If you are going to ship $43 \frac{1}{2}$ gallons of block filler, how many cubic inches is the shipment?**

- 4. A recipe calls for 5 cups of milk. How many ounces are equivalent? How many quarts?**



LESSON 2

WIN CAREER SOLUTIONS

5. One 50 pound package of grass seed is enough to seed 10,000 square feet of ground. If your lawn is 3 acres and you only want grass on 1.75 acres, how many square feet do you want to seed?
6. You need to buy paint for a solid traffic line 2 miles long. In order to make your purchase, you need to know how many feet are to be covered. Calculate the number of feet.
7. If a medication must be kept at a temperature of 25°C or below, what is the highest Fahrenheit temperature that is safe?
8. A worker gets paid \$7.05 per hour. How much does he get paid per minute? (*Compare your answer that has been rounded to the actual rate by multiplying both rates by 480 min.*)





LESSON 2

WIN CAREER SOLUTIONS

9. It was estimated that it would take 340 minutes to paint the cabinets in a kitchen. When the job was completed, it actually took 420 minutes. How many hours did it actually take?
10. You are paying a crew of three men \$16 per hour each to landscape some yards this weekend. If they each spend 12 hours 45 minutes, how much will the labor costs be for the job?
11. You are doubling an ice cream recipe which calls for 3 quarts of milk. How many gallons and quarts of milk should you purchase at the store?
12. You are building a deck from lumber that is 4 inches wide which has already been cut to the correct length. If you want the deck to be 14 feet 8 inches wide, how many pieces of lumber will it take to build the floor? (The 4 inch width measurement includes room for spacing of boards.)

**ANSWERS TO EXERCISE**

1. A piece of pipe is 14 feet long. How many inches long is this piece of pipe?

Answer: **168 inches**

$$14 \text{ ft} \times \frac{12 \text{ in}}{1 \text{ ft}} = 168 \text{ in long}$$

2. At the decorating store where you work, one of the customers needs 634 inches of wallpaper border. To place an order for the border, you must know how many feet of border to order. How many feet of border does the customer need?

Answer: **52.83 feet**

$$634 \text{ in} \times \frac{1 \text{ ft}}{12 \text{ in}} = 52.83 \text{ ft}$$

3. The shipping department has requested a cubic inch measurement for each item shipped. If you are going to ship $43\frac{1}{2}$ gallons of block filler, how many cubic inches is the shipment?

Answer: **10,048.5 cubic inches**

$$43\frac{1}{2} \text{ gal} \times \frac{231 \text{ cu in}}{1 \text{ gal}} = 10,048.5 \text{ cu in}$$



4. A recipe calls for 5 cups of milk. How many ounces are equivalent? How many quarts?

Answer: **40 fluid ounces or 1.25 quarts**

$$5 \text{ c} \times \frac{8 \text{ fl oz}}{1 \text{ c}} = 40 \text{ fl oz}$$

$$5 \text{ c} \times \frac{1 \text{ qt}}{4 \text{ c}} = \frac{5}{4} \text{ qt} = 1.25 \text{ qt}$$

5. One 50 pound package of grass seed is enough to seed 10,000 square feet of ground. If your lawn is 3 acres, and you only want grass on 1.75 acres, how many square feet do you want to seed?

Answer: **76,230 square feet**

$$1.75 \text{ acres} \times \frac{43,560 \text{ sq ft}}{1 \text{ acre}} = 76,230 \text{ sq ft}$$

6. You need to buy paint for a solid traffic line 2 miles long. In order to make your purchase, you need to know how many feet are to be covered. Calculate the number of feet.

Answer: **10,560 feet**

$$2 \text{ mi} \times \frac{5,280 \text{ ft}}{1 \text{ mi}} = 10,560 \text{ ft}$$

7. If a medication must be kept at a temperature of 25° C or below, what is the highest Fahrenheit temperature that is safe?

Answer: **77° F**

$$F = \left(\frac{9}{5} \times 25^\circ \right) + 32 = 77^\circ F$$

8. A worker gets paid \$7.05 per hour. How much does he get paid per minute? (*Compare your answer that has been rounded to the actual rate by multiplying both rates by 480 min.*)

Answer: 12¢ per minute

$\$7.05 \text{ per } 60 \text{ min} = 7.05 \div 60 = .1175 = \0.12 per min
In reality an employer would not round wages. An 8-hour day equals 480 minutes. If we calculate an 8-hour day at \$.12 per minute and compare it to an 8-hour day at \$.1175 per minute, we see why:

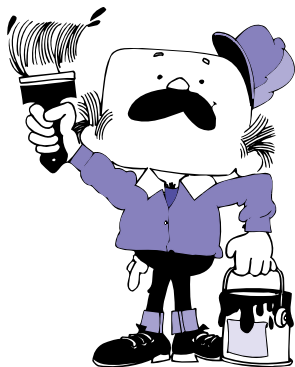
$$\begin{aligned} \$0.12 \times 480 &= \$57.60 \\ \$0.1175 \times 480 &= \$56.40 \end{aligned}$$

The employee actually earned \$56.40.

9. It was estimated that it would take 340 minutes to paint the cabinets in a kitchen. When the job was completed, it actually took 420 minutes. How many hours did it actually take?

Answer: **7 hours**

$$420 \text{ min} \times \frac{1 \text{ hr}}{60 \text{ min}} = 7 \text{ hr}$$





10. You are paying a crew of three men \$16 per hour each to landscape some yards this weekend. If they each spend 12 hours 45 minutes, how much will the labor costs be for the job?

Answer: **\$612**

Convert:

45 min to hr

$$45 \text{ min} \times \frac{1 \text{ hr}}{60 \text{ min}} = .75 \text{ hr}$$

Calculate labor costs:

$$12.75 \text{ hr} \times \$16 = \$204 \text{ per man}$$

$$\$204 \times 3 \text{ men} = \$612 \text{ for the crew}$$

11. You are doubling an ice cream recipe which calls for 3 quarts of milk. How many gallons and quarts of milk should you purchase at the store?

Answer: **1 gallon and 2 quarts are needed**

$$3 \text{ qt} \times 2(\text{double recipe}) = 6 \text{ qt}$$

$$6 \text{ qt} \times \frac{1 \text{ gal}}{4 \text{ qt}} = 1.5 \text{ gal}$$

Now convert the half gallon to quarts

$$.5 \text{ gal} \times \frac{4 \text{ qt}}{1 \text{ gal}} = 2 \text{ qt}$$

1 gallon and 2 quarts



12. You are building a deck from lumber that is 4 inches wide which has already been cut to the correct length. If you want the deck to be 14 feet 8 inches wide, how many pieces of lumber will it take to build the floor? (The 4 inch width measurement includes room for spacing of boards.)

Answer: **44 pieces of lumber**

$$14 \text{ ft} \times \frac{12 \text{ in}}{1 \text{ ft}} = 168 \text{ in}$$

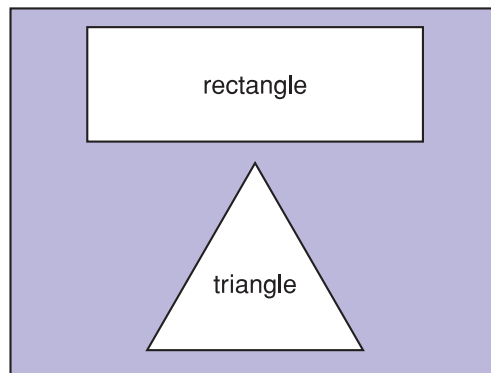
$$168 \text{ in} + 8 \text{ in} = 176 \text{ in}$$

$$176 \text{ in} \div 4 \text{ in} = 44 \text{ pieces of lumber}$$

PERIMETER AND AREA

In Lesson 3 we will discuss the concepts of area and perimeter, topics we discussed in previous levels of *Applied Mathematics*.

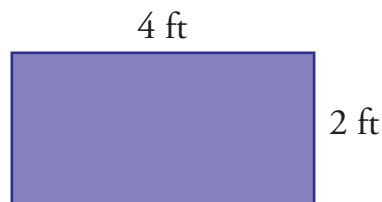
Perimeter is the measurement of the outside edges of something (i.e., perimeter would be needed for measurement of a fence or applied wallpaper border). Let's review:



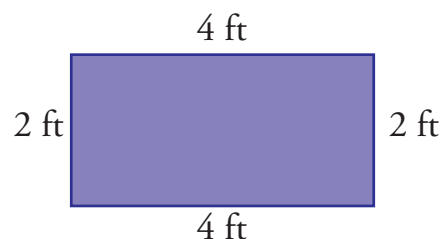
Do you use geometric shapes in your workplace?



Suppose a rectangle has a length of 4 ft and width of 2 ft.



A rectangle is the same length on opposite sides. This means the measurement of the rectangle look like this:



Since perimeter is the outside distance, we can add these numbers.

$$4 \text{ ft} + 4 \text{ ft} + 2 \text{ ft} + 2 \text{ ft} = 12 \text{ ft}$$

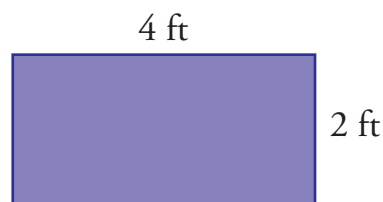
The perimeter is 12 ft. There is also a formula that you could use.

$$\text{Perimeter} = 2 \text{ times (length + width)}$$

$$P = 2(l + w)$$

You must add length and width first; then multiply the result by 2

Going back to our rectangle.



$$P = 2(l + w)$$

$$P = 2 \times (4 \text{ ft} + 2 \text{ ft})$$

$$P = 2 \times 6 \text{ ft}$$

$$P = 12 \text{ ft}$$

You do not have to memorize formulas for the ACT WorkKeys Assessment. Formulas are given in the right-hand column of the ACT handout. A copy of this Formula Sheet is located in the References at the end of your workbook.

Let's work another problem. Our rectangle has a length of 3 cm and a width of 1 cm.

$$P = 2(l + w)$$

$$P = 2 \times (3 \text{ cm} + 1 \text{ cm})$$

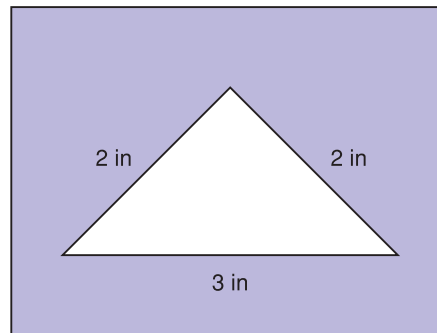
$$P = 2 \times 4 \text{ cm}$$

$$P = 8 \text{ cm}$$

Another way is:

$$P = 3 + 3 + 1 + 1 = 8 \text{ cm}$$

Finding the perimeter of a triangle is "similar" because you add the lengths of the 3 sides of the triangle. You find the distance all the way around the sides of the triangle.



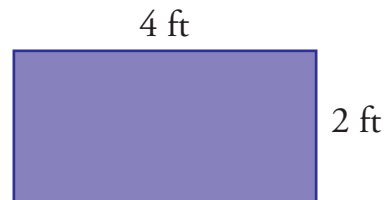
$$2 \text{ in} + 2 \text{ in} + 3 \text{ in} = 7 \text{ in}$$

The perimeter of this triangle is 7 inches.

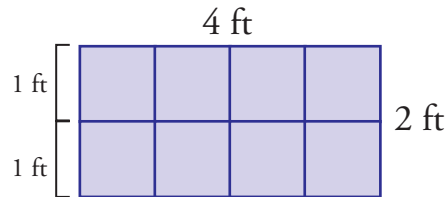
Since the sides of a triangle do not have to be equal, let a different letter represent each side. The perimeter of a triangle can be written as:

$$P = a + b + c$$

Area is different from perimeter. Area measures the surface of something (i.e., when you buy carpet you need to measure the surface of the floor). When we look at a rectangle,



area actually counts the squares inside the rectangle.



The area of this rectangle is 8 square feet. An easier way to calculate area is to use the formula rather than count the number of square units.



LESSON 3

WIN CAREER SOLUTIONS

Area = length times width

$$A = l \times w$$

4 ft



2 ft

$$A = l \times w$$

$$A = 4 \text{ ft} \times 2 \text{ ft}$$

$$A = 8 \text{ square feet}$$

This measurement is in 2 dimensions and the unit of measurement is often abbreviated as ft^2 .

Let's try another problem. Find the area of a rectangle 6 m by 2 m.

$$A = l \times w$$

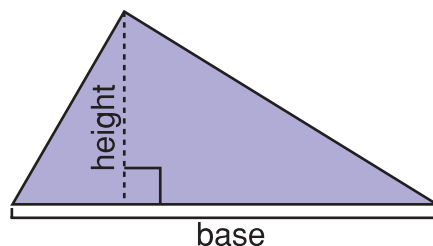
$$A = 6 \text{ m} \times 2 \text{ m}$$

$$A = 12 \text{ m}^2$$

Notice $l \times w$ is the same as $w \times l$.

$$6 \times 2 = 12 \text{ and } 2 \times 6 = 12$$

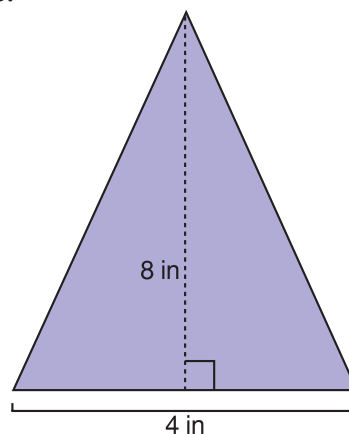
Triangles require a different formula to calculate area.



Area = one-half times base times height

$$A = \frac{1}{2}(b \times h)$$

The base is the bottom of the triangle. The height is the perpendicular line from the top point to the base of the triangle.



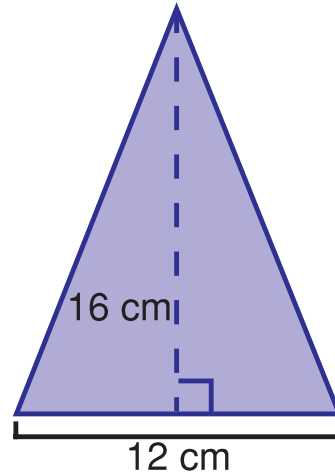
$$A = \frac{1}{2}(b \times h)$$

$$A = \frac{1}{2}(4 \text{ in} \times 8 \text{ in})$$

$$A = \frac{1}{2} \times 32 \text{ in}^2$$

$$A = 16 \text{ in}^2$$

Another problem might say: Find the area of the triangle with a base of 12 cm and a height of 16 cm.



$$A = \frac{1}{2}(b \times h)$$

$$A = \frac{1}{2}(12 \text{ cm} \times 16 \text{ cm})$$

$$A = \frac{1}{2} \times 192 \text{ cm}^2$$

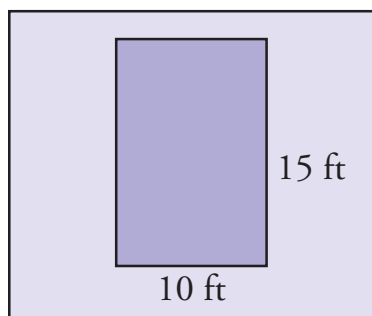
$$A = 96 \text{ cm}^2$$

The problems in the following exercise ask you to find area and/or perimeter. You may even have to decide which one you need to find. Remember what I said, perimeter is the outside and area is the surface.

EXERCISE - AREA AND PERIMETER

Instructions: *Find the area and perimeter of each figure. Refer to the Formula Sheet as needed.*

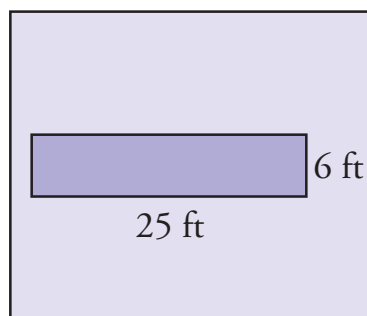
1.



Area = _____

Perimeter = _____

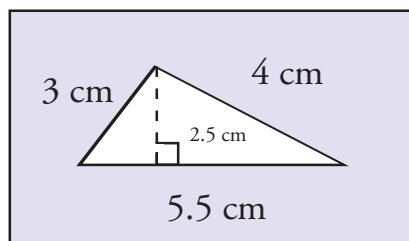
2.



Area = _____

Perimeter = _____

3.



Area = _____

Perimeter = _____



4. Carpeting is to be installed in a bedroom that is 14 feet long and 12 feet wide. What is the area of the bedroom?

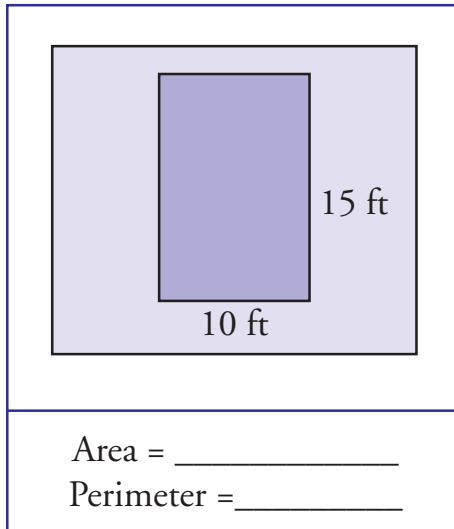
5. You plan to put a fence around a lawn that is 200 feet by 380 feet. How much fencing is needed?



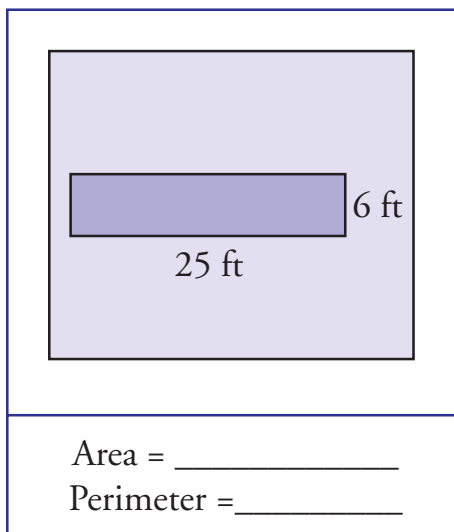
LESSON 3

WIN CAREER SOLUTIONS

6. A customer wants to know how many tiles he will need to tile his kitchen floor. If his kitchen measures 14.5 feet by 15.2 feet, and each tile is one square foot, how many tiles does he need? (Assume there is no waste.)
7. One 50 pound package of grass seed is enough to seed 10,000 square feet of ground. If your lawn is 400 feet by 285 feet, how many packages of seed do you need to purchase to seed your entire lawn?

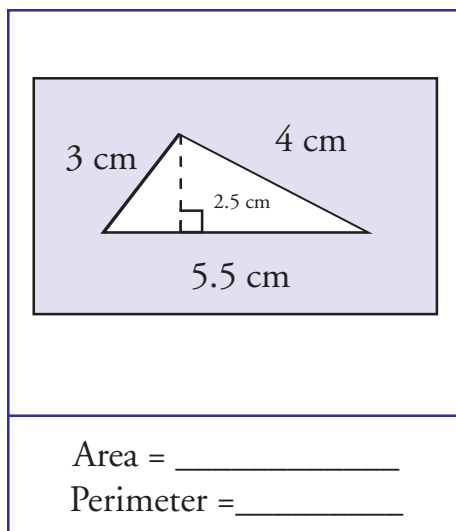
**ANSWERS TO EXERCISE****1.**

Answer: $10 \times 15 = 150 \text{ sq ft or } 150 \text{ ft}^2 \text{ (area)}$
 $2(10 + 15) = 2 \times 25 = 50 \text{ ft (perimeter)}$

2.

Answer: $6 \times 25 = 150 \text{ sq ft or } 150 \text{ ft}^2 \text{ (area)}$
 $2(25 + 6) = 2 \times 31 = 62 \text{ ft (perimeter)}$

3.



Answer: $\frac{1}{2} \times 5.5 \times 2.5 = 6.875 \text{ cm}^2 (\text{area})$

$3 + 4 + 5.5 = 12.5 \text{ cm (perimeter)}$

4. **Carpeting is to be installed in a bedroom that is 14 feet long and 12 feet wide. What is the area of the bedroom?**

Answer: $14 \times 12 = 168 \text{ sq ft}$



LESSON 3

5. You plan to put a fence around a lawn that is 200 feet by 380 feet. How much fencing is needed?

Answer: 1,160 ft (is needed for fence)

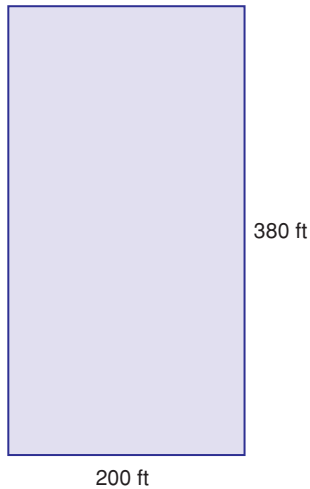
$$P = 2(l + w)$$

$$P = 2(380 + 200)$$

$$P = 2(580)$$

$$P = 1,160$$

Yard Size



6. A customer wants to know how many tiles he will need to tile his kitchen floor. If his kitchen measures 14.5 feet by 15.2 feet, and each tile is one square foot, how many tiles does he need? (Assume there is no waste.)

Answer: $A = l \times w$

$$A = 14.5 \times 15.2 = 220.4 \text{ sq ft}$$

*He needs 221 tiles since each tile is one square foot.
If each tile covered 3 square feet, we would need to divide 220.4 square feet by 3 to find we would need 74 tiles to cover the area.*

7. One 50 pound package of grass seed is enough to seed 10,000 square feet of ground. If your lawn is 400 feet by 285 feet, how many packages of seed do you need to purchase to seed your entire lawn?

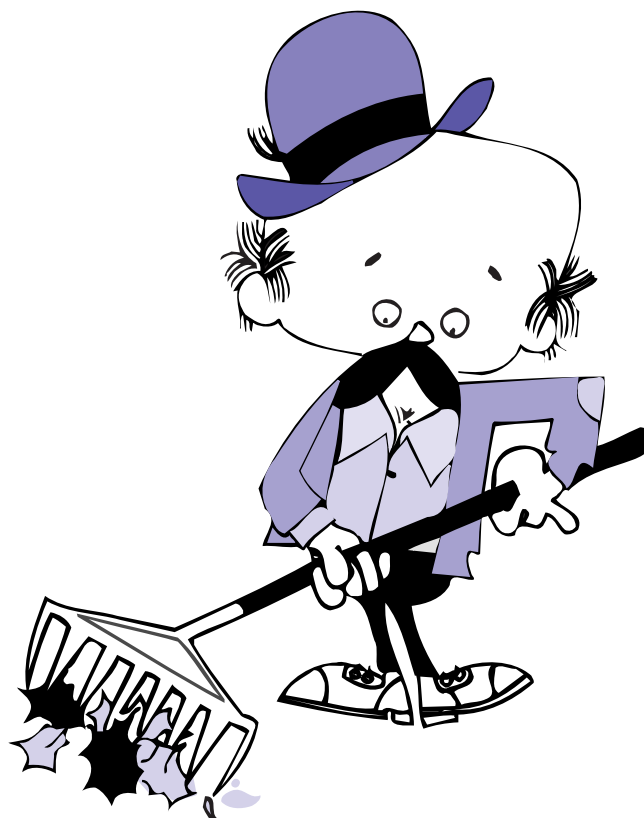
Answer: 12 packs

$$A = l \times w$$

$$A = 400 \times 285 = 114,000 \text{ ft}^2$$

$$114,000 \text{ sq ft} \div 10,000 = 11.4 \text{ packs}$$

Since you cannot buy .4 pack of seed, you will need to buy 12 packs.



CIRCUMFERENCE AND AREA OF CIRCLES

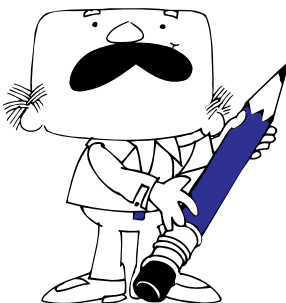
Lesson 4 is about circles. The edge of a circle is never straight, so you can't add the line segments to get perimeter. Perimeter of a circle is called circumference... that is, the distance around the circle is called the circumference. The formula for circumference is:

$$C = \pi d$$

circumference = π times diameter

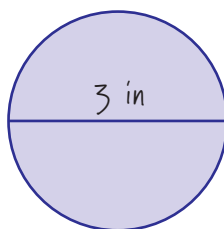
C stands for circumference.

Make a note about
using π



π (pronounced “pie”) is a symbol which stands for a nonterminating nonrepeating decimal which we estimate to be 3.14 when rounded. There may be a π button on your calculator. Press the button. You can see that the calculator is more accurate than 3.14. If you use the π key, your answers will vary slightly from mine because I will be entering 3.14 in my calculator. If you are preparing for the ACT WorkKeys Assessment, do not use the π key. The test requires that you use the 3.14 estimate.

The “d” stands for diameter. This is the distance across the circle going through the center. Suppose you have this circle.



$$C = \pi d$$

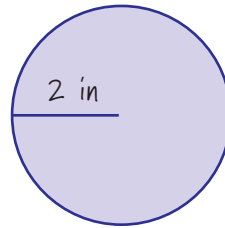
$$C = 3.14 \times 3 \text{ in} = 9.42 \text{ inches}$$

If you use your calculator, press



= 9.42 in.

Now, circles are often illustrated like this:



The diameter isn't marked. Halfway across the circle is called the radius. To find the diameter, you just double this number. The diameter is 4 in.

$$2 \times 2 \text{ in} = 4 \text{ in}$$

To calculate the circumference:

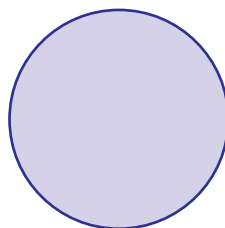
$$C = \pi d$$

$$C = \pi (4 \text{ in})$$

$$C = 12.56 \text{ in}$$

Sometimes circles indicate diameter and sometimes radius. It is not difficult to convert one to the other since the diameter is twice as large as the radius.

Area measures the surface of the circle.



The formula for area is:

$$A = \pi r^2$$

Area = π times radius squared

r^2 means r times r . There may also be a button on your calculator to square a number. It probably looks like

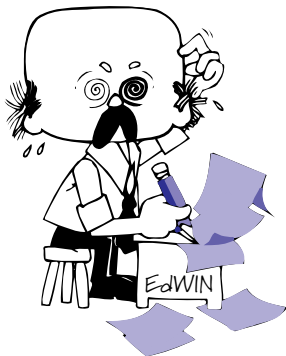
this $\boxed{x^2}$.

If the radius ($\frac{1}{2}$ of the diameter) is 12 cm then, $r^2 = 12$

$\times 12$ or 144. If you press $\boxed{1} \boxed{2} \boxed{x^2}$, you should get 144.

Now, let's put this together.

Do not be confused by parentheses. Sometimes they are used to indicate multiplication.



$$A = \pi r^2$$

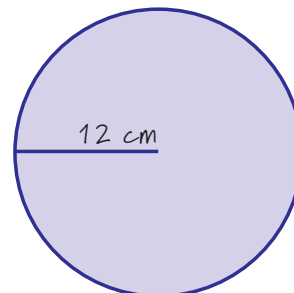
$$\text{Radius} = 12 \text{ cm}$$

$$A = \pi(12)^2 \text{ or } \pi \times (12)^2$$

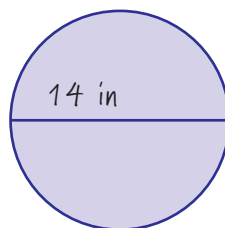
$$A = \pi(144)$$

$$A = 3.14 \times 144$$

$$A = 452.16 \text{ cm}^2$$



If I give you a diameter, you must take half of it to find the radius.



$$r = 7 \text{ in}$$

$$A = \pi r^2$$

$$A = \pi (7)^2$$

$$A = \pi(49)$$

$$A = 3.14 \times 49$$

$$A = 153.86 \text{ in}^2$$

There are some practice problems for you in the following exercise.

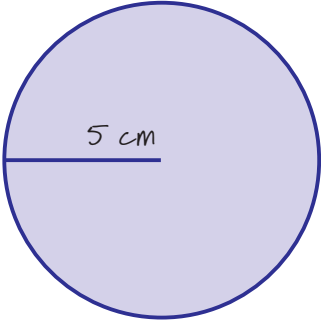


LESSON 4

EXERCISE – AREA AND CIRCUMFERENCE OF CIRCLES

Instructions: *Find the area and circumference of each circle.*

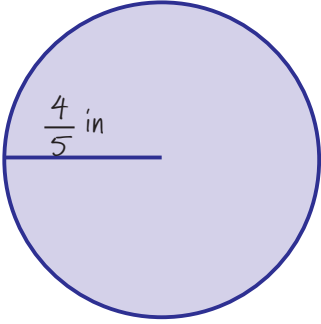
1.



A circle with a radius of 5 cm. The radius is shown as a horizontal line segment from the center to the right edge, labeled '5 cm'.

Area = _____
Circumference = _____

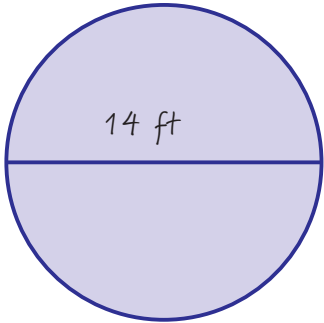
2.



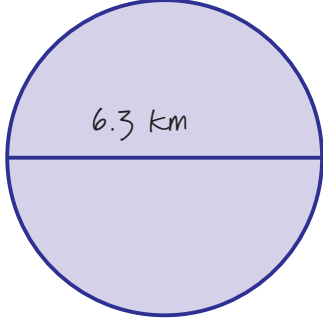
A circle with a radius of $\frac{4}{5}$ in. The radius is shown as a horizontal line segment from the center to the right edge, labeled ' $\frac{4}{5}$ in'.

Area = _____
Circumference = _____

3.


<p>Area = _____</p> <p>Circumference = _____</p>

4.

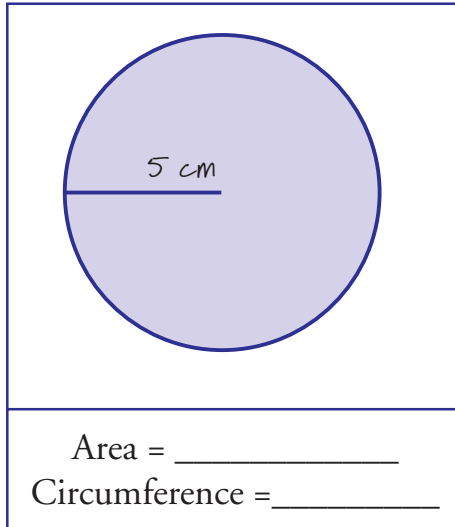

<p>Area = _____</p> <p>Circumference = _____</p>



LESSON 4

ANSWERS TO EXERCISE

1.



Answers: *Area*

$$A = \pi r^2$$

$$A = \pi(25)$$

$$\mathbf{A = 78.5 \text{ cm}^2}$$

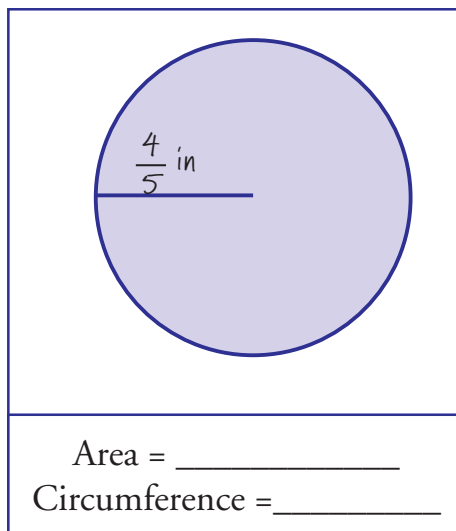
Circumference

$$C = \pi d$$

$$C = \pi(10)$$

$$\mathbf{C = 31.4 \text{ cm}}$$

2.



Answers: Area

$$A = \pi\left(\frac{4}{5}\right)^2 \text{ or } \pi(.8)^2$$

(you may calculate with decimals or fractions)

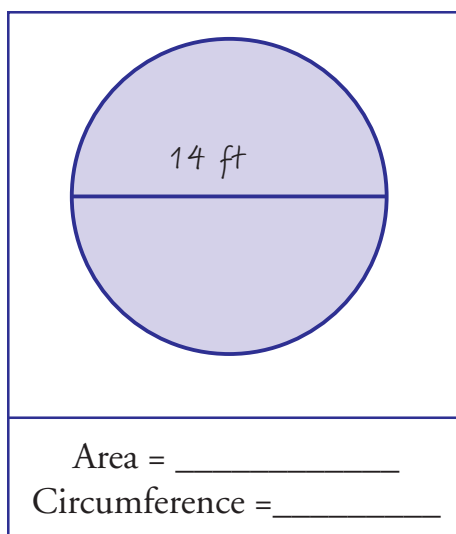
$$\mathbf{A = 2.0096 \text{ in}^2}$$

Circumference

$$C = \pi\left(1\frac{3}{5}\right) \text{ or } \pi(1.6)$$

$$\mathbf{C = 5.024 \text{ in}}$$

3.



Answers: Area

$$A = \pi(7)^2$$

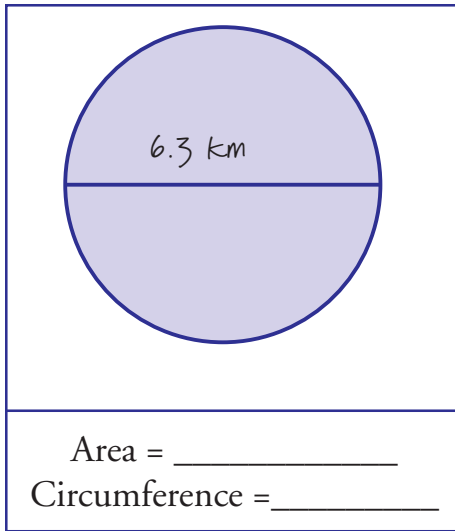
$$\mathbf{A = 153.86 \text{ ft}^2}$$

Circumference

$$C = \pi(14)$$

$$\mathbf{C = 43.96 \text{ ft}}$$

4.



Answers: Area

$$A = \pi(3.15)^2$$

$$A = 31.15665 \text{ km}^2$$

Circumference

$$C = \pi(6.3)$$

$$C = 19.782 \text{ km}$$

**SOLVING PERCENT PROBLEMS**

Lesson 5 begins with a skill with which you should already be familiar. You should have calculated percents of numbers. Remember that “of” means to multiply. If we take 20% of 80, we multiply $.20 \times 80$ which equals 16.

Now, if you remember that “is” means equal, you can write an equation to solve other percent problems.

Example 1:

39 is 20% of what?

$39 = 20\% \times N$ (You don't know what this number is so you assign a letter to it. It is an unknown variable.)

Now you have:

$39 = 20\% \times N$ (Remember doing something similar to this?)

$\frac{39}{.20} = N$ (Always divide by the number on the side of the equation with the unknown or N.)

$195 = N$

39 is 20% of 195



LESSON 5

WIN CAREER SOLUTIONS

Example 2:

20 is what percent of 80

$20 = N\% \times 80$ (divide by 80 because it's next to N)

$$\frac{20}{80} = N\%$$

$$.25 = N\%$$

Since your problem asks for a percent, you must move the decimal 2 places right. This always occurs when the problems says "what percent".

25% is your answer.

20 is 25% of 80

Example 3:

What percent of 60 is 20?

$$N\% \times 60 = 20$$

$$N\% = \frac{20}{60}$$

$$N\% = .33\ldots$$

$$N\% = 33\% \text{ (rounded)}$$

$$33\% \text{ of } 60 \text{ is } 20$$

Now that you have some examples to go by, you should practice. Complete the following exercise.

**EXERCISE – GENERIC PERCENT PROBLEMS**

Instructions: *Solve the following problems. Remember, if the problem asks “what percent,” you must convert your answer to a percent after the calculation.*

1. What is 55% of 120?

2. What is 40% of 35?

3. 84 is what percent of 96?

4. What is 45% of $\frac{4}{5}$?



5. What is 140% of 4.6?
6. 16 is what percent of 80?
7. What percent of 50 is 65?

**ANSWERS TO EXERCISE**

1. What is 55% of 120?

Answer: **66**

$$N = 55\% \times 120$$

$$66 = .55 \times 120$$

2. What is 40% of 35?

Answer: **14**

$$N = 40\% \times 35$$

$$14 = .40 \times 35$$

3. 84 is what percent of 96?

Answer: **87.5%**

$$84 = N\% \times 96$$

$$\frac{84}{96} = N\%$$

$$.875 = N\%$$

$$N\% = 87.5\%$$

4. What is 45% of $\frac{4}{5}$?

Answer: $\frac{9}{25}$

$$N = 45\% \times \frac{4}{5}$$

$$N = .36 \text{ or } \frac{36}{100} \text{ or } \frac{9}{25}$$



5. What is 140% of 4.6?

Answer: **6.44**

$$N = 140\% \times 4.6$$
$$6.44 = 1.40 \times 4.6$$

6. 16 is what percent of 80?

Answer: **20%**

$$16 = N\% \times 80$$
$$\frac{16}{80} = N\%$$
$$.20 = N\%$$
$$N\% = 20\%$$

7. What percent of 50 is 65?

Answer: **130%**

$$N\% \times 50 = 65$$
$$N\% = \frac{65}{50}$$
$$N\% = 1.30$$
$$N\% = 130\%$$



LESSON 5

WIN CAREER SOLUTIONS

Sometimes you may find it difficult to solve word problems that contain percents. If you will try using this question each time, you should find it easier.

What % of the total is some number?

If you can fill in that question, you should be able to write equations similar to the previous problems.

Example 1:

Tommy is paid by commission. He was paid \$459 for the sales of \$7,650. Find his rate of commission.

Using our sentence:

What % of total is some number

$$N\% \times \$7,650 = \$459$$

(N is what we don't know)

$$N\% \times \$7,650 = \$459$$

$$N\% = \frac{\$459}{\$7,650}$$

$$N\% = .06$$

$$N\% = 6\%$$

Tommy is paid 6% commission.

Sometimes you might be asked to find a percent increase or decrease. You should find this formula useful.

$$\% = \frac{\text{amount of increase or decrease}}{\text{original amount}}$$



Example 2:

The average number of hours worked fell from 48 to 37.4. Find the percent of decrease. (Round percentages to the nearest whole number.)

Using our formula:

$$\frac{\text{amount of increase or decrease}}{\text{original amount}}$$

The hours decreased ($48 - 37.4 = 10.6$) were 10.6. The original hours were 48.

$$\frac{10.6}{48} = .22 = 22\%$$

The percent decrease is 22%.

Example 3:

A shirt was originally marked \$75 and was sold for \$25. What was the percent of the discount? (A discount is a decrease, so use the percent decrease formula.)

$$\$75 - \$25 = \$50 \text{ discount or } \$50 \text{ off}$$

$$\begin{array}{r} 50 \text{ discount} \\ \hline 75 \text{ original price} \\ = .67 = 67\% \text{ discount} \end{array}$$

EXERCISE – APPLICATION PROBLEMS WITH PERCENTAGES

Instructions: *Solve the following percent problems. Remember, if the problem asks “what percent,” you must convert your answer to a percent after the calculation. Round decimal answers to the nearest hundredth. Round percentages to the nearest whole number.*

1. If the construction of an office building is budgeted at \$150,000 and 6% of that is allowed for painting expenses, how much can be spent on painting?
2. A solution must be 14% insecticide. If you must mix $\frac{3}{4}$ gallon of this solution, how much insecticide must you use?



LESSON 5

WIN CAREER SOLUTIONS

3. There are 45 support personnel at a company. If 35 of them have a bachelor's degree, what percent have this degree?

4. You must mark sale prices on a rack of sweaters which were originally marked \$36.99. If they are on sale for 35% off, what will be the sale price? (Round to the nearest cent.)





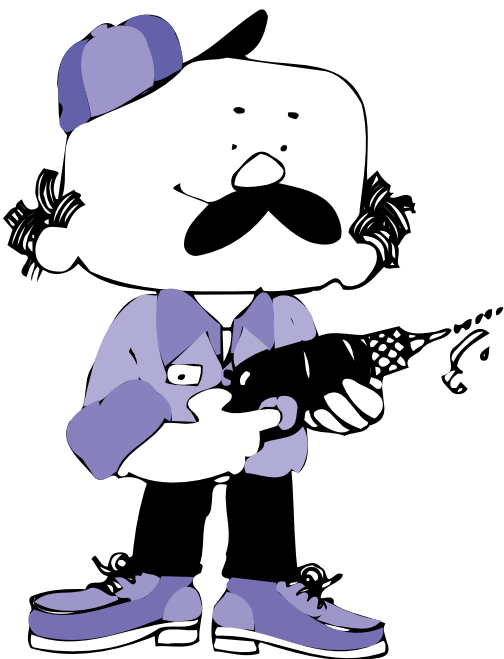
LESSON 5

WIN CAREER SOLUTIONS

5. You are paid a 13% commission on everything you sell, plus \$4.20 per hour. If you sell \$56.75 on Monday, \$345.67 on Tuesday, \$1,080.64 on Wednesday, and did not work the rest of the week, how much money did you earn that week? (You work an 8-hour day.)
6. A shirt was originally marked \$40.00, but was marked down to \$32.00. What is the percent of the discount?
7. A store paid \$350 for a couch. They sold it for \$550. What is the percent markup on the couch?



8. In problem 7, what percent of the selling price was profit?
9. The quality control office at a manufacturing plant tested 880 drills produced at the River City Plant. Of these, only 22 were defective. What percent were defective?



**ANSWERS TO EXERCISE**

1. If the construction of an office building is budgeted at \$150,000 and 6% of that is allowed for painting expenses, how much can be spent on painting?

Answer: **\$9,000**

6% of 150,000 is some number

$$.06 \times 150,000 = N$$

$$\$9,000 = N$$

\$9,000 is allotted for painting

2. A solution must be 14% insecticide. If you must mix $\frac{3}{4}$ gallon of this solution, how much insecticide must you use?

Answer: **.11 gallon**

14% of $\frac{3}{4}$ gallon is some number

$$.14 \times \frac{3}{4} = N$$

$$.11 = N$$

.11 gallon of insecticide

3. There are 45 support personnel at a company. If 35 of them have a bachelor's degree, what percent have this degree?

Answer: **78%**

What % of total is some number

What % of 45 is 35

$$N\% \times 45 = 35$$

N% = 78% have bachelor's degrees



4. You must mark sale prices on a rack of sweaters which were originally marked \$36.99. If they are on sale for 35% off, what will be the sale price? (Round to the nearest cent.)

Answer: **\$24.04 is the sale price**

35% of \$36.99 is some number

$$.35 \times \$36.99 = N$$

$$\$12.95 = N$$

\$12.95 is the discount or amount off of original price.

$$\$36.99 \text{ (original price)} - \$12.95 \text{ (discount)} = \$24.04$$

5. You are paid a 13% commission on everything you sell, plus \$4.20 per hour. If you sell \$56.75 on Monday, \$345.67 on Tuesday, \$1,080.64 on Wednesday, and did not work the rest of the week, how much money did you earn that week? (You work an 8-hour day.)

Answer: **\$293.60**

Total Sales:

$$\$56.75 + \$345.67 + \$1,080.64 = \$1,483.06$$

Commission:

$$13\% \text{ of } \$1,483.06 = N$$

$$.13 \times 1,483.06 = N$$

$$\$192.80 = N$$

Hourly Wages:

$$8 \text{ (hr day)} \times 3 \text{ (days)} = 24 \text{ hours}$$

$$24 \text{ (hr)} \times \$4.20 \text{ (per hour)} = \$100.80$$

Money Earned:

$$\$192.80 + \$100.80 = \$293.60$$



6. A shirt was originally marked \$40.00, but was marked down to \$32.00. What is the percent of the discount?

Answer: **20%**

What percent of \$40.00 is \$8?

$$N\% \times \$40 = \$8$$

$$N\% = \frac{8}{40}$$

$$N\% = .2$$

$$N\% = 20\% \text{ discount}$$

or

$$\$40 - \$32 = \$8 \text{ decrease}$$

$$\frac{\$8 \text{ (decrease)}}{\$40 \text{ (original price)}} = .2$$

$$.2 = 20\%$$

7. A store paid \$350 for a couch. They sold it for \$550. What is the percent markup on the couch?

Answer: **57% markup**

$$\$550 - \$350 = \$200 \text{ increase}$$

$$\frac{200 \text{ (increase)}}{350 \text{ (original price)}}$$

$$.57 = 57\% \text{ markup}$$



LESSON 5

8. In problem 7, what percent of the selling price was profit?

Answer: **36%**

What percent of \$550 is \$200?

$$N\% \times \$550 = \$200$$

$$N\% = \frac{200}{550} = .36$$

$$N\% = 36\% \text{ profit}$$

9. The quality control office at a manufacturing plant tested 880 drills produced at the River City Plant. Of these, only 22 were defective. What percent were defective?

Answer: **2.5% were defective**

What percent of 880 is 22?

$$N\% \text{ of } 880 = 22$$

$$N\% = \frac{22}{880} = .025$$

$$N\% = 2.5\% \text{ defective or } 3\% \text{ rounded to the nearest whole number}$$

SOLVING PROBLEMS WITH RATES AND PROPORTIONS

Ratios are comparisons of two numbers. Ratios can be written several different ways.

4:5

4 to 5

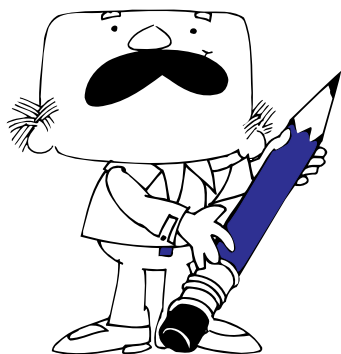
$\frac{4}{5}$

These are the 3 ways to write the same ratio which compares 4 to 5. This ratio could describe a situation in which there are 4 females and 5 males in a room, but it could also be equivalent to the ratio of 40 females and 50 males in a room. The ratio of females to males is 40:50 or 4:5.

This ratio could also be expressed as a percent.

The ratio $\frac{4}{5}$ is equivalent to .80 which equals 80%.

Important Information



What does “percent” actually mean? 4 out of 5 is equivalent to 80 out of 100. Anytime a number is given as a percent, it is actually a comparison of the number to 100.

Percent numbers can be written as fractions and as decimals.

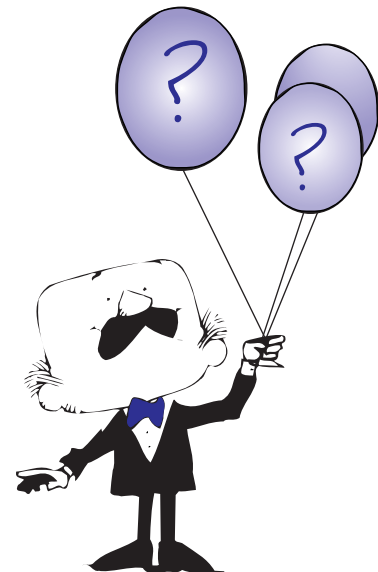
Here are some common fraction and decimal equivalencies.

We can use these ratios to solve proportions. You have already worked these in a previous lesson, let’s review.

Some Common Conversions

Percent	Decimal	Fraction
25%	.25	$\frac{1}{4}$
$33\frac{1}{3}\%$.33	$\frac{1}{3}$
50%	.50	$\frac{1}{2}$
$66\frac{2}{3}\%$.67	$\frac{2}{3}$
75%	.75	$\frac{3}{4}$
100%	1.00	1

Pop Quiz: You work in a paint shop that uses paper with a special coated finish. There are 200 sheets per package of the coated paper. A customer has requested this special coated paper for a job requiring 572 sheets of paper. There are only 2 full packs of coated paper in stock, but you notice 2 open packages of paper. If one is labeled $\frac{1}{4}$ full and the other has 32 sheets in it, do you have enough coated paper to complete the order?



Example:

If it takes 8 gallons of paint to paint 3 offices, how many gallons will it take to paint 21 offices?

When we set up a proportion, we use two fractions or ratios.

$$\frac{8 \text{ gallons}}{3 \text{ offices}} = \frac{N \text{ gallons}}{21 \text{ offices}}$$

Notice that each fraction is identical in the units used. (gallons on top, offices on bottom)

(Remember that we cross multiply proportions.)

$$3N = 8 \times 21$$

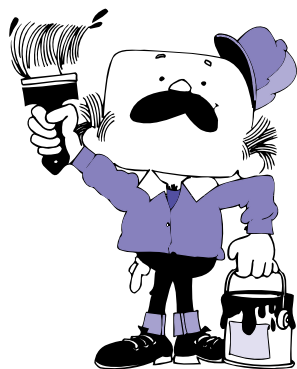
$$3N = 168$$

$$N = 56$$

56 gallons of paint for 21 offices

If you need more examples, refer to Level 4 of *Applied Mathematics*.

The following exercise will allow you to practice solving and setting up proportions. Good luck!!



**EXERCISE – PROPORTIONS**

Instructions: *Solve these proportions. Round decimals to the nearest tenth.*

1. $\frac{4}{9} = \frac{x}{15}$

2. $\frac{8}{x} = \frac{4}{3}$

3. A car goes 50 mph for 4.4 hours. How far does it travel?

4. While working at a bakery, you are asked to prepare 6 tubs of icing. You know that it takes 11 pounds of sugar to make 2 tubs. How much sugar is needed for 6 tubs?



LESSON 6

WIN CAREER SOLUTIONS

5. The office manager can type 89 words per minute. How long would it take her to type a document containing 1,045 words?

6. A quality control worker has tested 50 products. Of these, only 6 have defects. If 1,260 products are produced in one day, how many defective products would be expected in a day's production?

7. A trip 50 miles out of town takes 45 minutes. If the same person drives another 120 miles at the same rate, how many hours will it take?

8. The human resource office uses 3 cases of toner for its copy machine every 6 weeks. A case of toner contains 4 cartridges and each cartridge can produce about 1,000 copies. How many cases of toner would you expect the human resource office to use in a year?
9. Fertilizer must be mixed with water in a 1:4 ratio. If you use 3 cups of fertilizer, how much water would be needed?
10. Ally and Marty are in charge of cleaning floors in 120 offices. Ally can clean 15 floors in an hour while her co-worker can clean 18 in the same amount of time. How many floors can they clean in 30 minutes if they work together?

**ANSWERS TO EXERCISE**

1. $\frac{4}{9} = \frac{x}{15}$

Answer: **6.7**

$$9x = 60$$

$$x = 6\frac{2}{3} \text{ or round to } 6.7$$

2. $\frac{8}{x} = \frac{4}{3}$

Answer: **6**

$$4x = 24$$

$$x = 6$$

3. **A car goes 50 mph for 4.4 hours. How far does it travel?**

Answer: **220 miles**

$$\frac{50 \text{ mi}}{1 \text{ hr}} = \frac{x \text{ mi}}{4.4 \text{ hr}}$$

$$1x = 220$$

$$x = 220 \text{ miles}$$



4. While working at a bakery, you are asked to prepare 6 tubs of icing. You know that it takes 11 pounds of sugar to make 2 tubs. How much sugar is needed for 6 tubs?

Answer: **33 lb of sugar is needed**

$$\frac{11 \text{ lb of sugar}}{2 \text{ tubs}} = \frac{x \text{ lb of sugar}}{6 \text{ tubs}}$$
$$2x = 66$$
$$x = 33 \text{ lb of sugar}$$

5. The office manager can type 89 words per minute. How long would it take her to type a document containing 1,045 words?

Answer: **11.7 minutes**

$$\frac{89 \text{ words}}{1 \text{ min}} = \frac{1,045 \text{ words}}{x \text{ min}}$$
$$89x = 1045$$
$$x = 11.7 \text{ minutes}$$

6. A quality control worker has tested 50 products. Of these, only 6 have defects. If 1,260 products are produced in one day, how many defective products would be expected in a day's production?

Answer: **151.2 defective products**

$$\frac{50 \text{ products}}{6 \text{ defective}} = \frac{1,260 \text{ products}}{x \text{ defective}}$$
$$50x = 7,560$$
$$x = 151.2 \text{ defective products}$$



7. A trip 50 miles out of town takes 45 minutes. If the same person drives another 120 miles at the same rate, how many hours will it take?

Answer: **1.8 hours**

$$\frac{50 \text{ mi}}{45 \text{ min}} = \frac{120 \text{ mi}}{x \text{ min}}$$

$$50x = 5,400$$

$$x = 108 \text{ minutes}$$

$$108 \text{ min} \times \frac{1 \text{ hr}}{60 \text{ min}} = 1.8 \text{ hours}$$

(The problem asks for the answer in hours)

8. The human resource office uses 3 cases of toner for its copy machine every 6 weeks. A case of toner contains 4 cartridges and each cartridge can produce about 1,000 copies. How many cases of toner would you expect the human resource office to use in a year?

Answer: **26 cases**

$$\frac{3 \text{ cases}}{6 \text{ weeks}} = \frac{x \text{ cases}}{52 \text{ weeks (in one year)}}$$

$$6x = 156$$

$$x = 26 \text{ cases}$$



9. Fertilizer must be mixed with water in a 1:4 ratio. If you use 3 cups of fertilizer, how much water would be needed?

Answer: **12 cups needed**

$$\frac{1 \text{ fertilizer}}{4 \text{ cups water}} = \frac{3 \text{ cups fertilizer}}{x \text{ cups water}}$$

$$1x = 12$$

$$x = 12 \text{ cups of water}$$

10. Ally and Marty are in charge of cleaning floors in 120 offices. Ally can clean 15 floors in an hour while her co-worker can clean 18 in the same amount of time. How many floors can they clean in 30 minutes if they work together?

Answer: First change 1 hr to minutes.

Ally:

$$\frac{15 \text{ floors}}{60 \text{ min}} = \frac{x \text{ floors}}{30 \text{ min}}$$

$$60x = 450$$

$$x = 7.5 \text{ floors}$$

Marty:

$$\frac{18 \text{ floors}}{60 \text{ min}} = \frac{x \text{ floors}}{30 \text{ min}}$$

$$60x = 540$$

$$x = 9 \text{ floors}$$

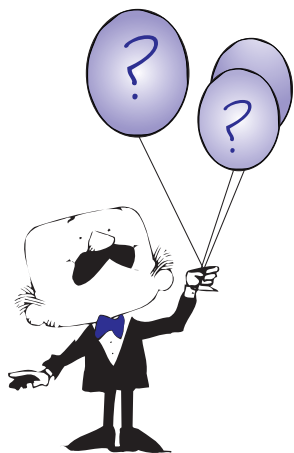
Together they can clean:

$$7.5 + 9 = 16.5 \text{ or } 16\frac{1}{2} \text{ floors together in 30 minutes}$$

APPLICATION OF WORD PROBLEMS

Lesson 7 deals with some very practical problems. In Lesson 7 we will practice how to fill out forms, choose the best circumstances in a mathematical situation, and eliminate unnecessary information in problems.

Pop Quiz: You work at the Pool Palace. If you sell a pool with inside dimensions of 45 feet by 90 feet by 13.5 feet deep, how many gallons of water are needed to fill the pool?



WIN CAREER SOLUTIONS

The information for forms and balance sheets must be selected from your problem and placed on the sheet.

For example:

Suppose your family is trying to stay on a budget. You have a list of expense items and a budget amount. You must record the actual amount spent in your budget chart.

Budget	Item	Actual Amount
\$75	Electric Bill	
\$375	House Payment	
\$225	Food	
\$185	Car Payment	
\$55	Telephone	
\$240	Miscellaneous	

All you really have are receipts for various items.

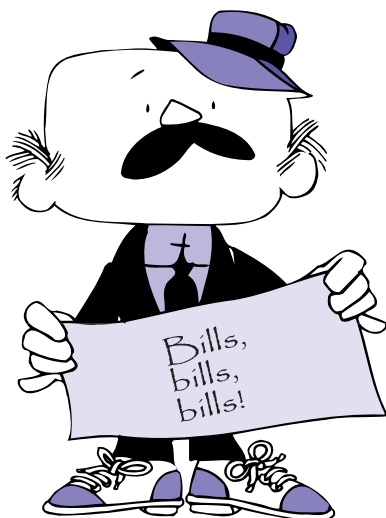
Receipts	Amount
Telephone	\$68
Electric	\$71
Grocery	\$25
Grocery	\$48
Grocery	\$60
Grocery	\$72
Shoes	\$25
House	\$375
Car	\$185
Christmas gift	\$45
Mom's birthday gift	\$38

You now have to decide what goes in the actual amount category. You have to decide what is miscellaneous (shoes, gifts).

Budget	Item	Actual Amount
\$75	Electric Bill	\$71
\$375	House Payment	\$375
\$225	Food	$\$25 + \$48 + \$60 + \$72 = \$205$
\$185	Car Payment	\$185
\$55	Telephone	\$68
\$240	Miscellaneous	$\$25 + \$45 + \$38 = \108

Now, you can review your budget and see where you need to reduce spending.

See if you can fill out the forms in the following exercise.



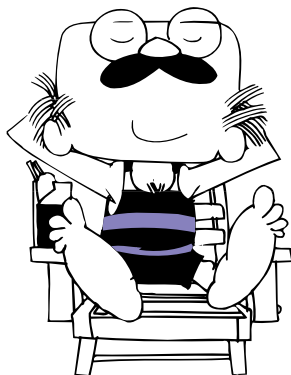
**EXERCISE – FORMS**

Instructions: *Use the appropriate information to complete the forms.*

1. Calculating Income:

Happy Smith owns a hobby shop. She sells everything from craft supplies to baking needs to remote control airplanes. Happy is thinking of selling her shop and needs to show a potential buyer an income statement for last month. She had weekly sales totals of \$3,354.56, \$3,378.90, \$2,341.33, and \$5,644.23. She spent \$8,965.30 on merchandise, \$450 on rent, and paid Jack \$356.75 for working on the weekends. She also paid \$45 to create a newspaper ad and paid \$52 a week for it to run each Sunday. Fill out the form so the potential buyer may know how much money Happy is making.

EdWIN's hobby...





HAPPY'S HOBBIES	
Monthly Income Statement	
Total Sales	1. _____
Expenses	
Cost of Merchandise	2. _____
Rent	3. _____
Employee Expenses	4. _____
Advertising	5. _____
Miscellaneous	6. _____
Total Expenses	7. _____
Net Income	8. _____



LESSON 7

WIN CAREER SOLUTIONS

2. Tammy is depositing three checks into her checking account. Fill out her deposit slip if she has checks for \$101.23, \$10.19, and \$56.13. Tammy wishes to receive \$25 back in cash.

CHECKING DEPOSIT			
Carl Sublett 1232 Main St. Kingwood, PA 43212			
DATE _____ 19 ____			
_____ Signature if cash is received from deposit			
Bank of Atlantic Salem, NC Member FNBC			
1234567: 56565 1234			
CURRENCY			
COIN			
C H E C K S			
Total from other side			
SUB-TOTAL			
TOTAL ITEMS	LESS CASH RECEIVED		
	TOTAL DEPOSIT		



ANSWERS TO EXERCISE

1. Calculating Income:

Happy Smith owns a hobby shop. She sells everything from craft supplies to baking needs to remote control airplanes. Happy is thinking of selling her shop and needs to show a potential buyer an income statement for last month. She had weekly sales totals of \$3,354.56, \$3,378.90, \$2,341.33, and \$5,644.23. She spent \$8,965.30 on merchandise, \$450 on rent, and paid Jack \$356.75 for working on the weekends. She also paid \$45 to create a newspaper ad and paid \$52 a week for it to run each Sunday. Fill out the form so the potential buyer may know how much money Happy is making.

Answer:

Weekly Sales

\$3,354.56
3,378.90
2,341.33
<u>5,644.23</u>
\$14,719.02

Expenses:

\$8,965.30	merchandise
\$450.00	rent
\$356.75	employee
\$253.00	newspaper ad (1 month = 4 weeks)
	\$45 + \$52 × 4 (weeks) = \$253.00
<u>\$10,025.05</u>	



WIN CAREER SOLUTIONS

Net Income would be:

$$\$14,719.02 - \$10,025.05 = \$4,693.97$$

Her business made **\$4,693.97** that month.

HAPPY'S HOBBIES*Monthly Income Statement*

Total Sales	1. <u>14,719.02</u>
Expenses	
Cost of Merchandise	2. <u>8,965.30</u>
Rent	3. <u>450.00</u>
Employee Expenses	4. <u>356.75</u>
Advertising	5. <u>253.00</u>
Miscellaneous	6. <u>0</u>
Total Expenses	7. <u>10,025.05</u>
Net Income	8. <u>4,693.97</u>



LESSON 7

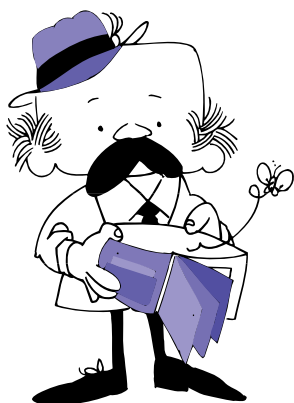
WIN CAREER SOLUTIONS

2. Tammy is depositing three checks into her checking account. Fill out her deposit slip if she has checks for \$101.23, \$10.19, and \$56.13. Tammy wishes to receive \$25 back in cash.

CHECKING DEPOSIT			
Carl Sublett 1232 Main St. Kingwood, PA 43212			
DATE _____ 19 ____			
<u>Tammy Jones</u> Signature if cash is received from deposit			
Bank of Atlantic Salem, NC Member FNBC			
1234567: 56565 1234			

CURRENCY			
COIN			
CHECKS		101	23
		10	19
		56	13
Total from other side			
SUB-TOTAL		167	55
TOTAL ITEMS	LESS CASH RECEIVED	25	00
	TOTAL DEPOSIT	142	55

Seems like I have more
withdrawals than
deposits. Know what I
mean?





LESSON 7

WIN CAREER SOLUTIONS

Sometimes you have to make decisions based on the available information. This means that sometimes you may have to do more than one calculation in a problem and then decide what is best for you or your situation. Let me work an example and then you can work some on your own.

You are replacing some plumbing and need a five foot piece of $1\frac{1}{2}$ inch PVC pipe. You could buy a 10 foot piece for \$2.99 or you could buy a custom piece for \$0.69 a foot. Which way should you buy the pipe and how much will it cost?

\$0.69 per foot would be $0.69 \times 5 \text{ ft} = \3.45

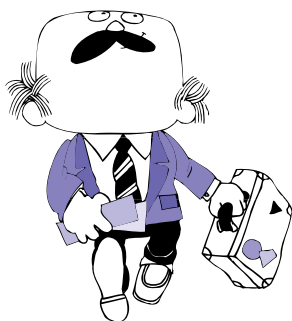
The 10 foot piece is only \$2.99.

It would be cheaper to buy the larger piece. You have to decide which is better for you. PVC is easy to cut and most homes have the required tools to cut the pipe. If the pipe were copper or iron, it would be more difficult to cut and a custom pipe may be the answer even if it costs more.

**EXERCISE – DECISION PROBLEMS**

Instructions: *Complete the necessary calculations to make the requested decisions. Round answers to the nearest cent.*

- 1. You are going to call on a client out of town. After you arrive at the airport, you need to rent a car. There are two rental car agencies at the terminal, so you ask each for rate information. Speedy Rent-A-Car charges \$39.95 per day plus \$0.20 per mile. The other company, Drive-A-Way, charges \$29.95 per day plus \$0.35 per mile. If you only need the car for two days and you approximate that you will drive about 150 miles, which will be the better deal? Under what conditions is each a better deal?**



WIN CAREER SOLUTIONS

- 2. A friend of yours has asked you to gather price information on at least three child care options for her to consider. She is only going to work 4 hours a day, 5 days a week, so she will only need the service for 5 hours a day. You found that Kiddie-Keepers charges \$85.00 per week, while a local church provides a daily mother's day out program which is only \$3.00 per hour. You also found an individual who keeps children in her home for \$14.00 a day. If they all provide meals and the same quality of care, which would be the better choice?**
- 3. You always work at least forty hours a week and you get paid \$8.25 per hour plus double-time for overtime. Your supervisor has offered you a different job. He wants to put you on a straight salary of \$330 per week. How will this affect your income?**



4. Your supervisor asks you to have a 36 exposure roll of film developed. He knows that he will need double prints on 9 of the pictures. The film development company you use gives your company a discount for double prints. If you have double prints made of the whole roll, they offer a 15% discount. The regular price for double prints is \$0.45 per exposure and the regular price for single prints is \$0.32 per exposure. You must decide which would be the most economical way to get the film developed - double prints of the whole roll to begin with or single prints at first then get 9 reprints at \$0.51 each later. What will be the cost using the least expensive method?

ANSWERS TO EXERCISE

Decisions are subjective. Necessary calculations are provided and suggestions for decisions are included.

1. You are going to call on a client out of town. After you arrive at the airport, you need to rent a car. There are two rental car agencies at the terminal, so you ask each for rate information. Speedy Rent-A-Car charges \$39.95 per day plus \$0.20 per mile. The other company, Drive-A-Way, charges \$29.95 per day plus \$0.35 per mile. If you only need the car for two days and you approximate that you will drive about 150 miles, which will be the better deal? Under what conditions is each a better deal?

Answer: *Speedy Rent-A-Car has a better deal.*

SPEEDY	DRIVE-A-WAY
$\$39.95 \times 2 \text{ (days)} = \79.90	$\$29.95 \times 2 \text{ (days)} = \59.90
$+ \$0.20 \times 150 \text{ (miles)} = \30.00	$+ \$0.35 \times 150 \text{ (miles)} = \52.50
$\$79.90 + \$30.00 = \$109.90$	$\$59.90 + \$52.50 = \$112.40$
\$109.90	\$112.40

If the trip took longer, Drive-A-Way might be the best deal. With the same mileage, but with one additional day, the Drive-A-Way price would be \$142.35 and Speedy would be \$149.85. Making effective decisions takes planning.



2. A friend of yours has asked you to gather price information on at least three child care options for her to consider. She is only going to work 4 hours a day, 5 days a week, so she will only need the service for 5 hours a day. You found that Kiddie-Keepers charges \$85.00 per week, while a local church provides a daily mother's day out program which is only \$3.00 per hour. You also found an individual who keeps children in her home for \$14.00 a day. If they all provide meals and the same quality of care, which would be the better choice?

Answer: $5 \text{ hours daily} \times 5 \text{ days} = 25 \text{ hours}$

Kiddie-Keepers	Church	Individual
\$85.00	$\$3 \times 25 \text{ (hours)} = \75	$\$14 \times 5 \text{ (days)} = \70

The individual care would cost \$70. This would be less than the two options. Based on a financial decision, the **individual care is the best deal**. Location could affect the cost, so it should be considered.

3. You always work at least forty hours a week and you get paid \$8.25 per hour plus double-time for overtime. Your supervisor has offered you a different job. He wants to put you on a straight salary of \$330 per week. How will this affect your income?

Answer:

<u>Salary</u>	<u>Hourly</u>
\$330	$\$8.25 \times 40 = \330

This is the same salary, but you must remember that if you are on a straight salary, you won't get any money for overtime. Strictly based on immediate finances, the **hourly rate job is the best choice**. However, in making this decision there may be other factors to consider. If the job is temporary and provides experience that increases your personal marketability you might consider it.

4. Your supervisor asks you to have a 36 exposure roll of film developed. He knows that he will need double prints on 9 of the pictures. The film development company you use gives your company a discount for double prints. If you have double prints made of the whole roll, they offer a 15% discount. The regular price for double prints is \$0.45 per exposure and the regular price for single prints is \$0.32 per exposure. You must decide which would be the most economical way to get the film developed - double prints of the whole roll to begin with or single prints at first then get 9 reprints at \$0.51 each later. What will be the cost using the least expensive method?

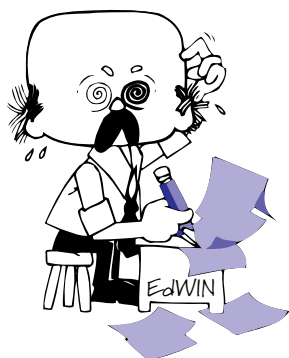
Answer: Option 1 – Double prints whole roll $\rightarrow 36 \times .45 = \16.20
 $\$16.20 \times 15\%$ (discount) = $\$2.43$
 $\$16.20 - \$2.43 = \$13.77$

Option 2 – Single $\rightarrow 36 \times .32 = \11.52
 Reprints $\rightarrow (9 \times .51) = \4.59
 $\$11.52$ (single) + $\$4.59$ (reprints) = $\$16.11$

It's cheaper to get doubles of the whole roll but only with the 15% discount.

The last part of this lesson touches on something that we have already discussed. Sometimes a problem asks you for some information and throws in a lot of extra tidbits that you don't even need to solve the problem. Since we've already been doing this occasionally, we'll jump right into the exercises. As always, I have shown my work following the exercises. You may need to peek if you need a jump start.

Decide what information is necessary to solve the problem. Ignore extra tidbits.



EXERCISE – FINDING EXTRANEOUS INFORMATION

Instructions: Solve the following problems. Round answers to the nearest tenth.

- 1. You want to calculate your gas mileage for a recent business trip. The odometer read 59,863 prior to leaving on Monday when you filled the tank with gas. On Tuesday when you filled the tank, the odometer read 60,178. It took 12.4 gallons to fill the tank on Monday, and 14.6 gallons to fill up on Tuesday. What was your mileage per gallon?**
- 2. A customer is purchasing a vinyl floor for the kitchen and one bathroom in his house. He tells you the kitchen measures 150 square feet, the bathroom measures 80 square feet, and each of the two bedrooms measures 132 square feet. How many square feet of flooring must he buy?**

- 3. You work in two different departments. One of your supervisors wants to get a raise of \$0.55 an hour approved for you. If you work 21 hours in one department where you get paid \$7.65 per hour and 17 hours in the other department where you get paid \$6.45 per hour, how many hours do you work all together?**
- 4. You are balancing your checkbook. The total of your checks written is \$651.34 and the total of your deposits is \$856.44. According to your checkbook, the balance is \$336.06, but the bank has a balance of \$364.05. What is the difference in the two balance amounts?**



ANSWERS TO EXERCISE

1. You want to calculate your gas mileage for a recent business trip. The odometer read 59,863 prior to leaving on Monday when you filled the tank with gas. On Tuesday when you filled the tank, the odometer read 60,178. It took 12.4 gallons to fill the tank on Monday, and 14.6 gallons to fill up on Tuesday. What was your mileage per gallon?

Answer: When you think about it, you really don't need to know how much gas you put in the car at the start of the trip. However, it is important to notice that the tank was filled.

You traveled 315 miles on the 14.6 gallons.

$$315 \div 14.6 = 21.6$$

*Your car traveled at a rate of **21.6 miles per gallon**.*

2. A customer is purchasing a vinyl floor for the kitchen and one bathroom in his house. He tells you the kitchen measures 150 square feet, the bathroom measures 80 square feet, and each of the two bedrooms measures 132 square feet. How many square feet of flooring must he buy?

Answer: Kitchen 150 sq ft
Bathroom 80 sq ft

You're only buying flooring for the kitchen and bathroom.

*150 + 80 = **230 sq ft of flooring** is what you need.*



3. You work in two different departments. One of your supervisors wants to get a raise of \$0.55 an hour approved for you. If you work 21 hours in one department where you get paid \$7.65 per hour and 17 hours in the other department where you get paid \$6.45 per hour, how many hours do you work all together?

Answer: This problem only wants to know how many hours you work.

$$21 + 17 = 38$$

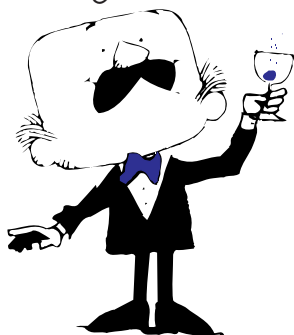
*You work **38 hours**.*

4. You are balancing your checkbook. The total of your checks written is \$651.34 and the total of your deposits is \$856.44. According to your checkbook, the balance is \$336.06, but the bank has a balance of \$364.05. What is the difference in the two balance amounts?

Answer: The bank's balance is \$364.05. Your balance is \$336.06.

*The difference is **\$27.99**.*

Congratulations!



Well, you have now completed this level of *Applied Mathematics*. Congratulations!! I hope you did not find it too difficult. Now, if you feel confident enough, complete the Posttest. If you still feel doubtful, go back and review the information in Level 5. Take the Posttest until you make a good score. Personally, I think 95% is pretty good, but why not go for 100%? Good luck... I know you can do it.

Answers for the Posttest questions are provided at the end of the workbook... but don't peek! Your score will not be accurate and it will not reflect whether or not you have learned the information in this course thoroughly!!



EXERCISE – POSTTEST

Instructions: *Complete the following conversions. (Round final answers to the nearest tenth.)*

1. 5 gallons = _____ liters

2. 4.6 feet = _____ meters

3. $6\frac{1}{2}$ pounds = _____ grams

4. 78 kilometers = _____ feet

5. A man from London, England wants to purchase some paint from you, but he is only familiar with metric measurements. He says he needs 7 liters of paint. How many gallons does he need?



6. A rectangle with length of 45 cm and width of 30 cm.

7. A circle with a diameter of 16 in.

8. A triangle with a base of 18 m and a height of 20 m.



POSTTEST

WIN CAREER SOLUTIONS

9. Find the circumference in problem #7.

10. Find the perimeter in problem #6.



Instructions: *Solve the following problems using your problem solving strategies.*

12. 12 is what percent of 24?

13. You need to buy edging to put around a round flower bed you are creating. If the flower bed is 13 feet wide, how much edging do you need?



14. You need to buy fertilizer for the flower bed in problem #13. If one package will fertilize 10 square feet, how many packages do you need to buy?
15. A formal garden at the Biltmore Estate has a large, circular fish pool with a 72 foot radius. What is the distance around the outside edge of the pool?



16. You bought a cellular phone and signed a one year contract. In your contract, you agreed to a monthly service charge of \$12.50 plus phone calls. The charge for phone calls made during peak hours of 7 a.m. to 7 p.m. is \$0.50 per call and the charge for calls made during off-peak hours is \$0.30 per call. Your contract is about to expire and you are contemplating another program in which off-peak calls are free. The monthly service is \$15.00 and peak hour rates are \$0.60 per call. If you have been averaging 15 daytime calls and 8 evening calls per month, which plan would be your best deal?
17. It takes 26 man hours to produce 4 cases of hair brushes. A company named Split Ends orders 40 cases of shampoo, 4 cases of hair spray, 16 cases of nail polish, and 10 cases of hair brushes. They will pick up the shipment, so there are no shipping costs incurred. How many man hours are necessary to produce the number of hair brushes ordered?



18. Jim bought a 13 in TV at Circuit City for \$259.50. The next day he saw an advertisement from another store for the same TV at \$234.95. If he takes the advertisement to Circuit City, they will refund the difference. How much would Jim get back?
19. Speedy Rent-A-Car rents an intermediate size car at a daily rate of \$44.95 plus \$0.39 per mile. Drive-A-Way charges \$39.99 per day plus \$0.45 per mile. If you are planning an overnight visit with your parents, which rental agency has the best deal for your 752 mile trip?



POSTTEST

WIN CAREER SOLUTIONS

20. Bill's checkbook balance was \$342.00. He wrote a check for \$52.20 to Mike's Grocers and a check for \$19.32 to Buy-All Mart. On 2-10 he deposited his payroll check for \$252.13. Use this information to fill out Bill's checkbook record.

RECORD ALL CHANGES OR CREDITS THAT AFFECT YOUR ACCOUNT										
Number	Date	Description of Transaction	Payment/Debit (-)	T	Fee (if any) (-)	Deposit/Credit (+)	Balance			
Previous Balance							342	00		

**ANSWERS TO EXERCISE**

1. 5 gallons = _____ liters

Answer: **18.9 liters**

$$5 \text{ gal} \times \frac{1 \text{ l}}{.264 \text{ gal}} = 18.9$$

2. 4.6 feet = _____ meters

Answer: **1.4 m**

$$4.6 \text{ ft} \times \frac{.3048 \text{ m}}{1 \text{ ft}} = 1.4$$

3. $6\frac{1}{2}$ pounds = _____ grams

Answer: **2,948.4 g**

$$6\frac{1}{2} = 6.5$$
$$6.5 \text{ lb} \times \frac{453.593 \text{ g}}{1 \text{ lb}} = 2,948.4$$



4. 78 kilometers = _____ feet

Answer: **255,340.8 ft**

$$78 \text{ km} \times \frac{.62 \text{ mi}}{1 \text{ km}} = 48.36 \text{ miles}$$

$$48.36 \text{ mi} \times \frac{5,280 \text{ ft}}{1 \text{ mi}} = 255,340.8 \text{ feet}$$

5. A man from London, England wants to purchase some paint from you, but he is only familiar with metric measurements. He says he needs 7 liters of paint. How many gallons does he need?

Answer: He will need **2 gallons** of paint.

$$7 \text{ liter} \times \frac{.264 \text{ gal}}{1 \text{ l}} = 1.848$$

1.8 gallons. He will need to purchase 2 gallons.

Instructions: Find the area of the following.

6. A rectangle with length of 45 cm and width of 30 cm.

Answer: **1,350 cm²**

$$A = l \times w$$

$$A = 45 \times 30$$

$$A = 1,350 \text{ cm}^2$$

7. A circle with a diameter of 16 in.

Answer: **201.0 in²**

$$A = \pi r^2$$

$$A = 3.14 \times 8^2 = 200.96$$



8. A triangle with a base of 18 m and a height of 20 m.

Answer: **180 m²**

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

$$A = \frac{1}{2} \times 18 \times 20 = 180$$

9. Find the circumference in problem #7.

Answer: **50.2 in**

$$C = \pi d$$

$$C = 3.14 \times 16 = 50.24$$

10. Find the perimeter in problem #6.

Answer: **150 cm**

$$P = 2(l + w)$$

$$P = 2(45 + 30)$$

$$P = 2(75) = 150$$

11. What is 80% of 350?

Answer: **280**

$$N = 80\% \times 350$$

$$N = 280$$



12. 12 is what percent of 24?

Answer: **50%**

$$12 = N\% \times 24$$

$$N\% = \frac{12}{24}$$

$$N\% = .5$$

$$N\% = 50\%$$

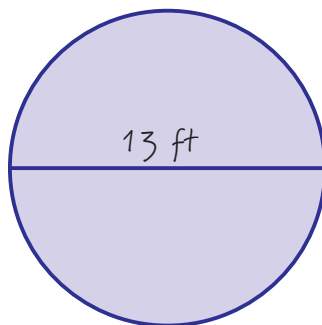
13. You need to buy edging to put around a round flower bed you are creating. If the flower bed is 13 feet wide, how much edging do you need?

Answer: **40.8 ft**

$$C = \pi d$$

$$C = 3.14 \times 13 = 40.82$$

$$C = 40.8 \text{ ft}$$





14. You need to buy fertilizer for the flower bed in problem #13. If one package will fertilize 10 square feet, how many packages do you need to buy?

Answer: You will need to buy **14 packages** since you cannot buy .3 of a package.

$$A = \pi r^2$$

$$A = 3.14 \times (6.5)^2$$

$$A = 3.14 \times 42.25$$

$$A = 132.665 \text{ sq ft of bed}$$

$$132.7 \div 10 = \mathbf{13.3 \text{ packages}}$$

15. A formal garden at the Biltmore Estate has a large, circular fish pool with a 72 foot radius. What is the distance around the outside edge of the pool?

Answer: **452.2 feet**

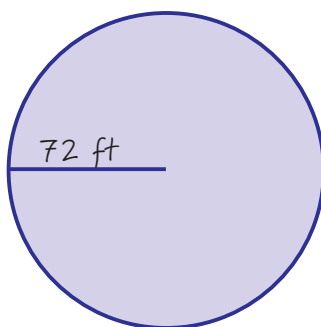
$$C = \pi d$$

$$d = 72 \times 2$$

$$C = \pi(144)$$

$$\mathbf{d = 144}$$

$$\mathbf{C = 452.2 \text{ ft}}$$





16. You bought a cellular phone and signed a one year contract. In your contract, you agreed to a monthly service charge of \$12.50 plus phone calls. The charge for phone calls made during peak hours of 7 a.m. to 7 p.m. is \$0.50 per call and the charge for calls made during off-peak hours is \$0.30 per call. Your contract is about to expire and you are contemplating another program in which off-peak calls are free. The monthly service is \$15.00 and peak hour rates are \$0.60 per call. If you have been averaging 15 daytime calls and 8 evening calls per month, which plan would be your best deal?

Answer: Current plan average cost:

$$12.50 + .50 \times 15 \text{ (peak)} + .30 \times 8 \text{ (off-peak)}$$
$$12.50 + 7.50 + 2.40 = \$22.40$$

New plan average cost:

$$15.00 + .60 \times 15 \text{ (peak)} + 0 \text{ (off-peak)}$$
$$15.00 + 9.00 = \$24.00$$

If you expect your average number of calls to remain the same, you would probably be better off to stay with your plan. If, however, you expect your number of evening calls to increase, you might consider the new plan.

17. It takes 26 man hours to produce 4 cases of hair brushes. A company named Split Ends orders 40 cases of shampoo, 4 cases of hair spray, 16 cases of nail polish, and 10 cases of hair brushes. They will pick up the shipment, so there are no shipping costs incurred. How many man hours are necessary to produce the number of hair brushes ordered?

Answer: Eliminate extra information

$$\frac{26 \text{ man hours}}{4 \text{ cases}} = \frac{x \text{ man hours}}{10 \text{ cases}}$$

$$4x = 260$$

$$x = \mathbf{65 \text{ man hours}}$$



18. Jim bought a 13 in TV at Circuit City for \$259.50. The next day he saw an advertisement from another store for the same TV at \$234.95. If he takes the advertisement to Circuit City, they will refund the difference. How much would Jim get back?

Answer: $\$259.50 - \$234.95 = \text{\$24.55 refund}$

19. Speedy Rent-A-Car rents an intermediate size car at a daily rate of \$44.95 plus \$0.39 per mile. Drive-A-Way charges \$39.99 per day plus \$0.45 per mile. If you are planning an overnight visit with your parents, which rental agency has the best deal for your 752 mile trip?

Answer: **Speedy Rent-A-Car**

$$\begin{aligned} &44.95 \times 2 \text{ (days)} + .39 \times 752 \text{ (miles)} \\ &89.90 + 293.28 \\ &\$383.18 \end{aligned}$$

Drive-A-Way

$$\begin{aligned} &39.99 \times 2 \text{ (days)} + .45 \times 752 \text{ (miles)} \\ &79.98 + 338.40 \\ &\$418.38 \end{aligned}$$

Speedy Rent-A-Car is the cheaper fare. You might consider flying. Really, when you consider your time and if there are any discount fares, it could be that flying is your best choice since the rental fares are not cheap!



POSTTEST

WIN CAREER SOLUTIONS

20. Bill's checkbook balance was \$342.00. He wrote a check for \$52.20 to Mike's Grocers and a check for \$19.32 to Buy-All Mart. On 2-10 he deposited his payroll check for \$252.13. Use this information to fill out Bill's checkbook record.

Answer:

RECORD ALL CHANGES OR CREDITS THAT AFFECT YOUR ACCOUNT										
Number	Date	Description of Transaction	Payment/Debit (-)		T	Fee (if any) (-)	Deposit/Credit (+)		Balance	
Previous Balance									342	00
101		Mike's Grocers	52	20					289	80
102		Buy-All Mart	19	32					270	48
	2-10	Deposit					252	13	522	61



CALCULATING YOUR SCORE

WIN CAREER SOLUTIONS

Calculate your score counting the number of questions you answered correctly. Divide the number of your correct answers by 20. Change the decimal answer to a percent by moving the decimal two places to the right.

Example: If you got 19 out of the 20 questions correct

$$\begin{array}{r} .95 \\ 20 \overline{) 19.0} \\ \underline{18.0} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

Number of correct answers

$.95 = 95\%$ Excellent!



Well, how did you do on the Posttest? If you scored 95% or higher, you have a reasonable chance to pass Level 5 of the ACT WorkKeys® *Applied Mathematics* assessment. Remember the basic steps for solving mathematics problems. Take your time and think about each question, and you will do fine. But, you may want to complete Level 6 with me before you take the Assessment. Hope to see you there.

Now don't be discouraged if you scored below 95%. There is a lot of information to remember. Practice the exercises in this course along with *Other Strategies* at the end of Lesson 1. You can do it! And, your enhanced work skills will pay off in the long run.

Take time to review the *Workplace Problem Solving Glossary* and *Test-Taking Tips* provided at the end of this workbook. Good luck improving your work skills and attaining your goals!

You should be proud of
your progress!





WORKPLACE PROBLEM SOLVING GLOSSARY

The following is a partial list of words that has been compiled for you to review before taking the ACT WorkKeys® *Applied Mathematics* assessment. The assessment consists of approximately 33 application (word) problems that focus on realistic workplace situations. It is important that you are familiar with common workplace vocabulary so that you may interpret and determine how to solve the problems.

Annual - per year

Asset - anything of value

Budget - estimate of income and expenses

Capital - money, equipment, or property used in a business by a person or corporation

Capital gain (loss) - difference between what a capital asset costs and what it sells for

Commission - an agent's fee; payment based on a percentage of sales

Contract - a binding agreement

Convert - to change to another form

Deductions - subtractions

Denominate number - numbers with units i.e., 5 feet, 10 seconds, 2 pounds

Depreciation - lessening in value

Difference - answer to a subtraction

Discount - reduction from a regular price

Dividend - money a corporation pays to its stockholders

Expense - cost



Fare - price of transportation

Fee - a fixed payment based on a particular job

Fiscal year - 12-month period a corporation uses for bookkeeping purposes

Gross pay - amount of money earned

Gross profit - gross pay less immediate cost of production; difference in sales price of item or service and expenses attributed directly to it

Interest - payment for use of money; fee charged for lending money

Interest rate - rate percent per unit of time i.e., 7% per year

Liquid Asset - current cash or items easily converted to cash

Markup - price increase

Measure - a unit specified by a scale, such as an inch

Net pay - take-home pay; amount of money received after deductions

Net profit (income) - actual profit made on a sale, transaction, etc., after deducting all costs from gross receipts

Overtime - payment for work done in addition to regular hours

Per - for each

Percent off - fraction of the original price that is saved when an item is bought on sale

Product - answer to a multiplication problem

Profit - income after all expenses are paid

Proportion - an equation of 2 ratios that are equal



Quotient - answer to a division problem

Rate - a ratio or comparison of 2 different kinds of measures

Ratio - a comparison of 2 numbers expressed as a fraction, in colon form, or with the word “to”

Regular price - price of an item not on sale or not discounted

Return rate - percentage of interest or dividends earned on money that is invested

Revenue - amount of money a company took in (interest, sales, services, rents, etc.)

Salary - a fixed rate of payment for services on a regular basis

Sale price - price of an item that has been discounted or marked down

Sum - answer to an addition problem

Yield - amount of interest or dividends an investment earns



EDWIN'S TEST-TAKING TIPS

Preparing for the test . . .

Complete appropriate levels of the *WIN Instruction Solution* self-study courses. Practice problems until you begin to feel comfortable working the word problems.

Get a good night's rest the night before the test and eat a good breakfast on test day. Your body (specifically your mind) works better when you take good care of it.

You should take the following items with you when you take the ACT WorkKeys® *Applied Mathematics* assessment: (1) pencils; pens are not allowed to be used on the test; it is a good idea to have more than one pencil since the test is timed and you do not want to waste time sharpening a broken pencil lead; and (2) your calculator; be sure your batteries are strong if you do not have a solar-powered calculator and that your calculator is working properly.

Allow adequate time to arrive at the test site. Being in a rush or arriving late will likely upset your concentration when you actually take the test.

About the test . . .

The test is comprised of approximately 33 multiple-choice questions. All test questions are in the form of word problems which are applicable to the workplace. You will not be penalized for wrong answers, so it is better to guess than leave blanks. You will have 45 minutes to complete the test.

The test administrator will provide a *Formula Sheet* exactly like the one provided in this workbook. You will not be allowed to use scratch paper, but there is room in your assessment booklet to work the problems.

***During the test . . .***

Listen to instructions carefully and read the test booklet directions. Do not hesitate to ask the administrator questions if you do not understand what to do.

Pace yourself since this is a timed test. The administrator will let you know when you have 5 minutes left and again when you have 1 minute remaining. Work as quickly as possible, but be especially careful as you enter numbers into your calculator.

If a problem seems too difficult when you read it, skip over it (temporarily) and move on to an easier problem. Be sure to put your answers in the right place. Sometimes skipping problems can cause you to get on the wrong line, so be careful. You might want to make a mark in the margin of the test, so that you will remember to go back to any skipped problems.

Since this is a multiple-choice test, you have an advantage answering problems that are giving you trouble. Try to eliminate any unreasonable answers and make an educated guess from the answers you have left.

If the administrator indicates you have one minute remaining and you have some unanswered questions, be sure to fill in an answer for every problem. Your guess is better than no answer at all!

If you answer all of the test questions before time is called, use the extra time to check your answers. It is easy to hit the wrong key on a calculator or place an answer on the wrong line when you are nervous. Look to see that you have not accidentally omitted any answers.



Dealing with math anxiety . . .

Being prepared is one of the best ways to reduce math or test anxiety. Study the list of key words for solving word problems. If your problem does not include any key words, see if you can restate the problem using your key words. Feeling like you know several ways to try to solve problems increases your confidence and reduces anxiety.

Do not think negatively about the test. The story about the “little engine that could” is true. You must, “think you can, think you can, think you can.” If you prepare yourself by studying problem solving strategies, there is no reason why you cannot be successful.

Do not expect yourself to know how to solve every problem. Do not expect to know immediately how to work word problems when you read them. Everyone has to read and reread problems when they are solving word problems. So, don’t get discouraged; be persistent.

Prior to the test, close your eyes, take several deep breaths, and think of a relaxing place or a favorite activity. Visualize this setting for a minute or two before the test is administered.

During the test if you find yourself tense and unable to think, try the following relaxation technique:

1. Put feet on floor.
2. Grab under your chair with your hands. (hope there are no surprises!)
3. Push down with your feet and up on your chair at the same time - hold for 5 seconds.
4. Relax 5 seconds (especially try to relax your neck and shoulders).
5. Repeat a couple of times as needed, but do not spend the entire 45 minutes of the test trying to relax!

Studying with a partner is another way to overcome math anxiety. Encouragement from each other helps to increase your confidence.

**FORMULA SHEET***(\approx indicates estimate, not equal)***UNITS OF MEASUREMENT****Distance**

1 foot = 12 inches
1 yard = 3 feet
1 mile = 5,280 feet
1 mile \approx 1.61 kilometers
1 inch \approx 2.540 centimeters
1 foot \approx 0.3048 meters
1 meter = 1,000 millimeters
1 meter = 100 centimeters
1 kilometer = 1,000 meters
1 kilometer \approx 0.62 miles

Area

1 square foot = 144 square inches
1 square yard = 9 square feet
1 acre = 208.71 feet square
1 acre = 43,560 square feet

Volume

1 cup = 8 fluid ounces
1 quart = 4 cups
1 gallon = 4 quarts
1 gallon = 231 cubic inches
1 liter \approx 0.264 gallons
1 cubic foot = 1,728 cubic inches
1 cubic yard = 27 cubic feet
1 board foot = 1 inch by 12 inches by 12 inches

Weight

1 ounce \approx 28.350 grams
1 pound = 16 ounces
1 pound \approx 453.593 grams
1 milligram = 0.001 grams
1 kilogram = 1,000 grams
1 kilogram \approx 2.2 pounds
1 ton = 2,000 pounds

Temperature

$$^{\circ}\text{C} = .56(^{\circ}\text{F} - 32) \text{ or } \frac{5}{9}(^{\circ}\text{F} - 32)$$

$$^{\circ}\text{F} = 1.8(^{\circ}\text{C}) + 32 \text{ or } \left(\frac{9}{5} \times ^{\circ}\text{C}\right) + 32$$

Electricity

1 kilowatt-hour = 1,000 watt-hours

FORMULAS**Rectangle**

Perimeter = $2(\text{length} + \text{width})$
area = $\text{length} \times \text{width}$

Cube

volume = $(\text{length of side})^3$

Triangle

sum of angles = 180°

$$\text{area} = \frac{1}{2}(\text{base} \times \text{height})$$

Circle

number of degrees in a circle = 360°
circumference $\approx 3.14 \times \text{diameter}$
area $\approx 3.14 \times (\text{radius})^2$

Cylinder

volume $\approx 3.14 \times (\text{radius})^2 \times \text{height}$

Cone

$$\text{volume} \approx \frac{3.14(\text{radius})^2 \times \text{height}}{3}$$

Ball

$$\text{volume} \approx \frac{4}{3} \times 3.14 \times (\text{radius})^3$$

Amperage

amps = watts \div volts



ANSWERS TO POP QUIZ

WIN CAREER SOLUTIONS

POP QUIZ QUESTION ANSWER KEY

1. Page 29 – meters

2. Page 43 – 100 widgets averaged per day

3. Page 91 – No, you do not have enough coated paper.

2 full packs = 400 sheets

$$\frac{1}{4} \text{ full} \rightarrow \frac{1}{4} \text{ of } 200 = 50 \text{ sheets}$$

$$400 + 50 + 32 = 482 \text{ total number of sheets}$$

$$572 \text{ (needed)} - 482 \text{ (in stock)} = 90 \text{ sheets needed}$$

4. Page 101 – 408, 997 gallons of water

$$45 \text{ ft} \times 90 \text{ ft} \times 13.5 \text{ ft} = 54,675 \text{ ft}^3$$

Convert to inches (see formula sheet)

$$54,675 \text{ cu ft} \times \frac{1,728 \text{ cu in}}{1 \text{ cu ft}} = 94,478,400 \text{ in}^3$$

$$94,478,400 \text{ cu in} \times \frac{1 \text{ gal}}{231 \text{ cu in}}$$

408, 997 gallons of water

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Worldwide Interactive Network, Inc.
1000 Waterford Place
Kingston, TN 37763
Toll-free 888.717.9461
Fax 865.717.9461
www.w-win.com