WorkKeys®

TARGETS FOR INSTRUCTION

Locating Information

ACT®

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Locating Information Skills

The WorkKeys Locating Information skill is the skill people use when they work with workplace graphics such as charts, graphs, tables, forms, flowcharts, diagrams, floor plans, maps, and instrument gauges. People use this skill when they find information in a graphic or insert information into a graphic. They also use it when they compare, summarize, and analyze information found in related graphics. At the lowest level, individuals look for information in simple graphics and fill in information that is missing from simple graphics. At the highest level, individuals may use the information in one or more complex graphics to draw conclusions and make decisions.

As our world becomes more data oriented, being able to use graphics becomes more important because information is often presented graphically. In fact, according to Carnevale, Gainer, and Meltzer (1990), "On the job, workers spend an average of one and a half to two hours per workday reading forms, graphs, charts, schematics, manuals, and computer terminals." In today's computer- and Internet-based business environments, the pervasiveness of images and information availability has increased the use of this skill. Locating and using information—especially the relevant information that exists among the clutter of available information—is now a foundational skill for success in our society.

There are no universally accepted rules concerning the use of various graphics and the terminology used in talking about them. In this overview, you will find definitions of terms as they are used in the WorkKeys System, notes on the formats and strategies used in the *Locating Information* assessment, and detailed descriptions of the skills covered.

Definitions and Attributes of Graphics

Graphics can be used to present information in a more efficient manner than straight text or numbers. A visual representation of an idea, process, procedure, object, or event can eliminate redundancy and allow us to recognize particular relationships between pieces of information. These relationships include comparison, change, arrangement, procedure, quantity, and attributes.

Although nearly all graphics can be designed to show most of these relationships, certain types of graphics are more effective for certain relationships. The information encountered by employees in the workplace may not be displayed in the most effective form, but it is useful to understand the purposes of each type of graphic.

■ **Comparison** can be more easily illustrated through a graphic than through straight text. For example, we can understand differences at a glance when we

compare proportions of a whole in a circle graph (also called a pie chart), quantities in a bar graph, or attributes in a table.

- **Change** is easier to determine when visually depicted by bar, column, and line graphs, which allow the user to extract data ranging from specific details to major trends.

- **Arrangement** can be shown in charts, diagrams, engineering drawings, maps, layouts, and floor plans. The floor plan of a house can more efficiently and clearly depict arrangement than a verbal description of the same house.

- **Procedures** can be graphically displayed in flowcharts, in tables, and even in forms. Instead of words such as *first, next,* and *finally,* relative placement of the various elements can be used to show order and relative importance.

- **Quantity** is commonly depicted in graphics. All types of graphs, tables, gauges, and forms can be used to display quantities.

- **Attributes** or characteristics of a person or thing can be shown in forms, tables, and graphs. For example, a form may be used to show the color of a sweater being ordered, a table may display various models of cars that were sold, and a circle graph may depict the age groups of people who attended baseball games last year.

In graphics such as tables, forms, bar and column graphs, line graphs, and circle graphs, some of the information depicted can be moved around without changing the meaning. For example, any two segments in a circle graph can usually be exchanged without altering the data being presented.

The specific configuration of elements is important in spatial graphics. In graphics such as diagrams, engineering drawings, maps, layouts, and floor plans, moving any of the information changes the meaning of the graphic. For example, changing any detail in the floor plan of a house, such as moving the bathroom or making it a mirror image of the original, means it depicts a different house.

CHARTS AND GRAPHS

Circle Graphs (Pie Charts)

Circle graphs are always quantitative and are used to illustrate proportions by showing a whole broken into parts. The total of the various parts must add up to 100%. Circle graphs can be used, for example, to show proportions of different parts of a workforce; the breakdown of total sales, as in Figure A; or the relative costs of a product's components.
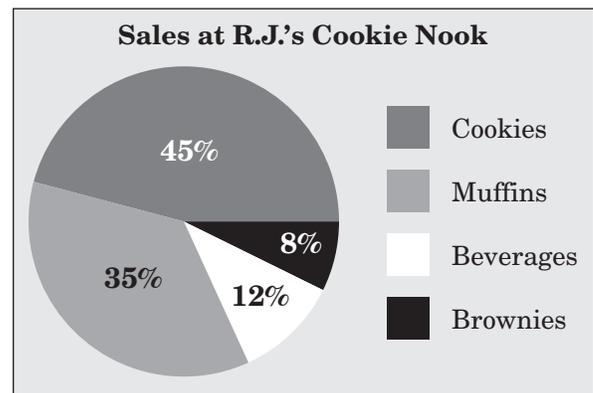
Figure A

Column and Bar Graphs

Column and bar graphs quantify categories of information along horizontal and vertical axes. The categories should either be labeled or referenced by a key. In a column graph, these categories are quantified along a vertical axis with a uniform scale, as in Figure B. Bar graphs, such as the one in Figure C, use the horizontal axis as the uniform scale and the vertical axis for the categories of information. By presenting different categories of information on one axis, as in Figure B, a graph can be used to show comparison; by using one axis to designate time periods, as in Figure C, a graph can demonstrate the amount and rate of change in one type of information.

Sales of bottled water at Zoom Mart (June)

Figure B

Sales of Sparkle Pure (June-August)
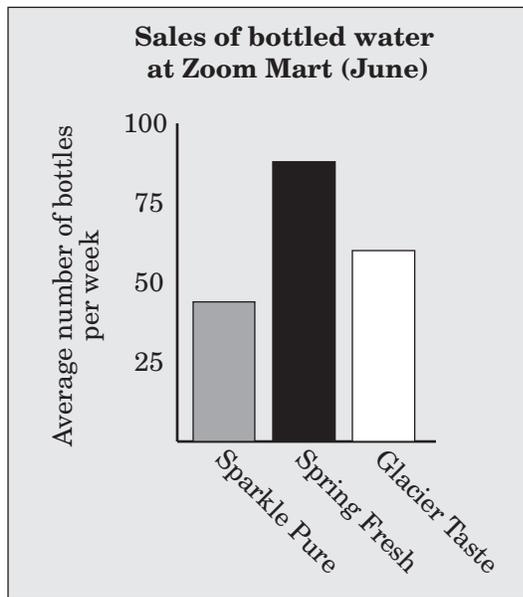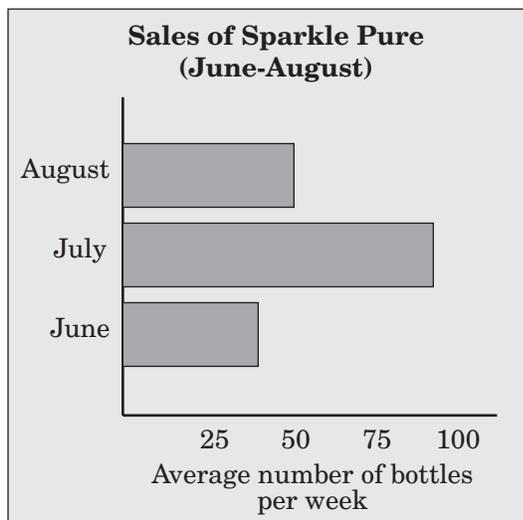
Figure C

To show both change and comparison, information is sometimes combined on a double column graph, as in Figure D.

Bottled water sales at Zoom Mart (June-August)
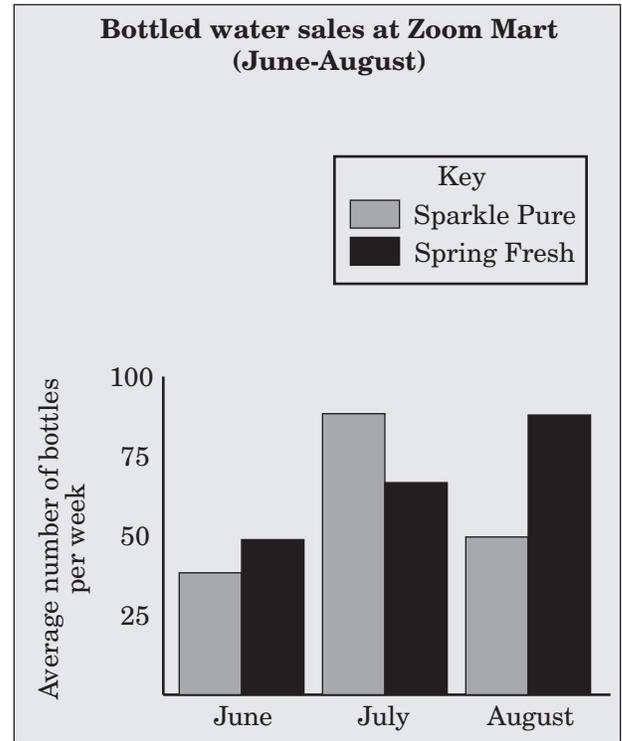
Figure D

Bar and column graphs are also very useful in graphing negative numbers that go below or beyond the horizontal or vertical axis, as in Figure E.

Profits – Acme Shipping
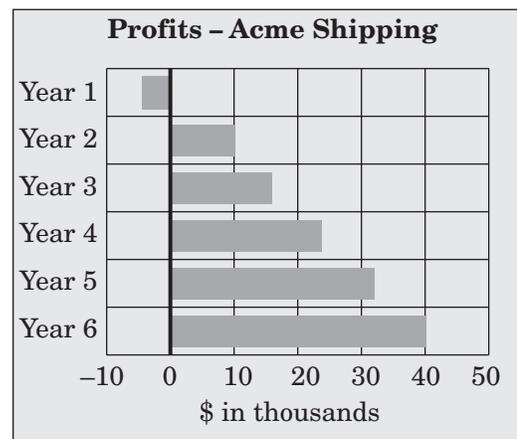
Figure E

Line Graphs

Line graphs use vertical and horizontal axes; one axis represents quantity and the other usually represents time. Line graphs are intended to show *continuous* information; that is, every point along the line should be a plotting symbol representing accurate information. The vital signs monitors attached to hospital patients emit a "strip" or "strip chart" with a line graph that accurately records and depicts continuous data, including heart rate and blood pressure.

However, what appears to be a line graph is often no more than a bar graph with the plotting symbols connected. An important skill in interpreting graphics is understanding whether the visual impression is actually supported by the data. This problem will be discussed further under "Interpreting and Evaluating Graphs" on page 9.

Line graphs are most effective in showing change and trends. When used in the workplace, they commonly depict such information as sales trends, stock market prices, and the changing characteristics of a workforce. Comparisons can also be demonstrated by using more than one line on the same graph, as in Figure F. A key is essential to these graphs.
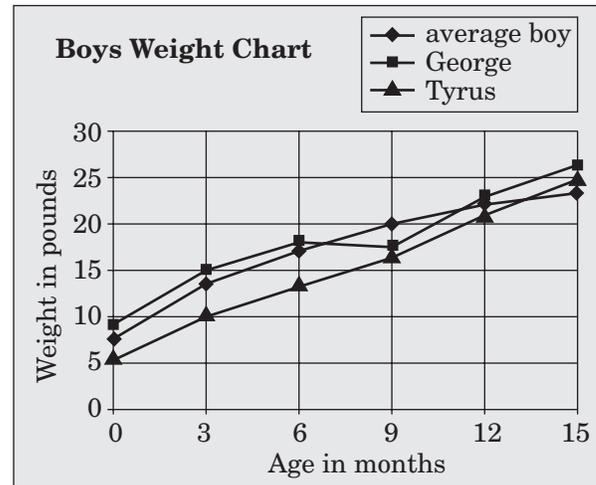
Figure F

Tables

Tables show data (related facts, figures, values, etc.) arranged for convenience of reference in a compact, orderly sequence of rows and columns. Tables do not present information as graphically as do other charts and graphs, but they are more flexible and can be used to present many kinds of information. Although a strength of tables is the ability to easily convey technical and financial data, tables in the workplace are not always well organized, making them even more of a challenge to employees. Tables can display quantities (see Figure G), comparisons, change, proportion, and attributes; generally, no particular category or detail is emphasized visually in a table. Tables store a great deal of data, and an employee's task is frequently to retrieve and use accurate and pertinent data from a table.

Cubic Yards of Concrete Needed for Concrete Slab				
Thickness ⇒ Area ⇓	2 inches	4 inches	6 inches	8 inches
50 sq ft	.31 cu yd	.62 cu yd	.93 cu yd	1.24 cu yd
100 sq ft	.62 cu yd	1.24 cu yd	1.86 cu yd	2.47 cu yd
150 sq ft	.93 cu yd	1.86 cu yd	2.78 cu yd	3.71 cu yd
200 sq ft	1.24 cu yd	2.47 cu yd	3.71 cu yd	4.94 cu yd

Figure G

Forms

Forms are printed documents used to elicit or supply information appropriate to an individual case (e.g., a specific customer, employee, or a business or other institution). They can be used, for example, to describe the attributes of a particular individual for a specific job, to verify important information, to request the purchase of certain items, to give directions (e.g., a service order), or to describe items sold. Although people commonly think of forms as documents having blank spaces to be filled with requested information, forms can also include the large number of electronically generated documents used in the workplace, such as cash register receipts.

The individual filling in a form may be asked for information he or she already knows or for data that must be obtained from another source. A variety of response modes are used on forms. Some modes require only a mark by the appropriate response or the entry of a single number or word. Others may have a string of blanks asking for short (one- or two-word) entries. Still others may ask for fairly long open-ended responses. Even the format used for recording responses varies from blank lines or spaces to boxes used for structured text, such as the boxes for the Social Security number in Figure H.

Figure H

MAPS, DIAGRAMS, AND SCHEMATICS

Some types of graphic presentations mimic the shape, layout, order, and/or distinguishing characteristics of an object, structure, or event such as a process or procedure. These graphics present information in a format such that moving a piece of the graphic drastically alters the real-life meaning of what the graphic is describing. Such graphics include diagrams, engineering drawings, flowcharts, maps, layouts, and floor plans.

Diagrams

Diagrams are graphics that show the arrangement and relationships of parts for either concrete or abstract systems. Concrete arrangements include the configuration of an electrical wiring system, the construction of a piece of furniture, or the order of the controls on a panel. Figure I shows the concrete arrangement of the image adjustment controls on a computer monitor.

Computer Monitor Adjustment

Vertical
Horizontal
Contrast
Brightness
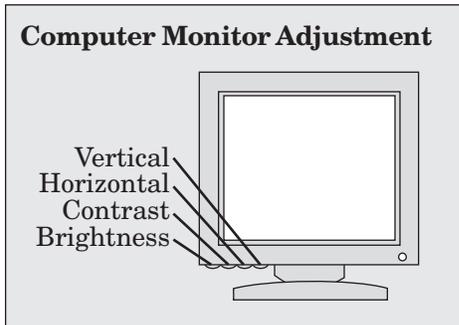
Figure I

Abstract arrangements of ideas can also be displayed in diagrams. For example, Figure J shows the management structure of a company.

PRESIDENT

Operations Vice President

Finance Vice President

Marketing Vice President

Processing Manager

Sales Manager

Registration Supervisor

Claims Supervisor

Northern District Manager

Southern District Manager

Executives

Middle Management

1st Level Managers
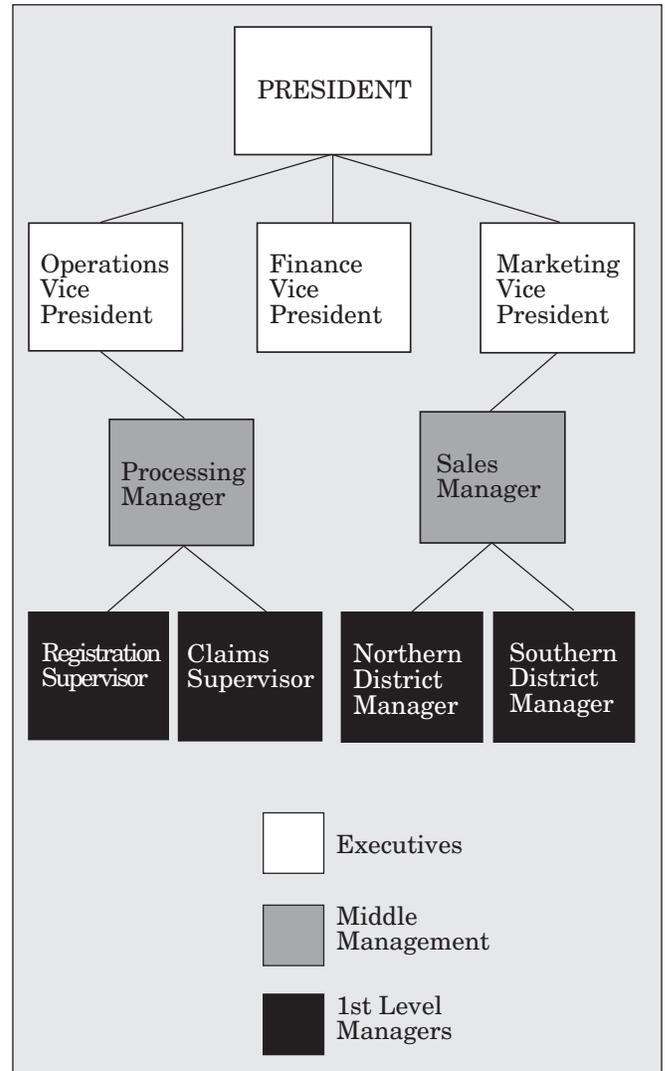
Figure J

Engineering Drawings, Maps, Layouts, and Floor Plans

Engineering drawings, maps, layouts, and floor plans are figurative drawings that show the design of an object or arrangement of the parts of a site such as a parcel of land, a building, or a room (see Figure K). A key is generally used to explain any symbols in the drawing.

Layout of Office Cubicle

Table

Desk

File Cabinet

File Cabinet

Bookcase

Overhead fluorescent fixture	
Duplex receptacle	
Telephone	
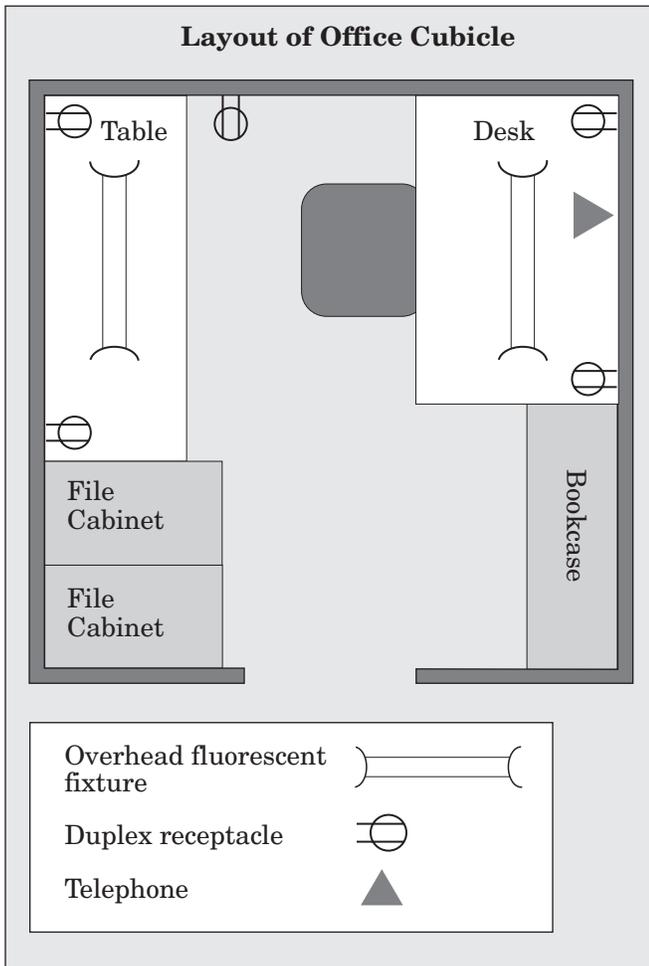
Figure K

Gauges

Instrument gauges can present information in an **analog** format that displays a measurement on a graduated scale in a linear or nonlinear form, usually a circle, a square, or an arc. A clock with hour, minute, and second hands that sweep around the dial is an analog representation of time. A speedometer with a needle that shows the vehicle's speed is an analog representation of speed. Data can also be displayed using numerals in a **digital** format. See Figure L for a comparison of analog and digital watches. Sometimes the same instrument displays both formats.

8:07

ANALOG   DIGITAL
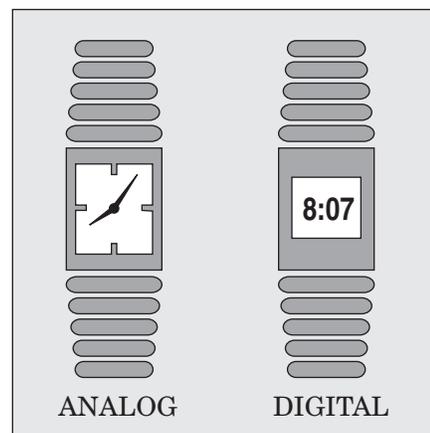
Figure L

Interpreting and Evaluating Graphs

We caution learners not to believe everything they read, but they often apply that caution only to text material. In the minds of many people, the graphic form lends an unwarranted credibility to information. Teaching any level of the Locating Information skill should include helping learners develop a critical eye.

The information presented in graphics can be intentionally or unintentionally misleading or give an inaccurate picture because it is incomplete. Distortion can be caused by too much attention to artistic presentation at the expense of quantitative merit. Some graphics are also distorted because they are oversimplified in an attempt to substitute for more difficult text. Graphics should be used to amplify or reveal data more clearly than text can do.

Edward R. Tufte, in his book *The Visual Display of Quantitative Information*, lists six principles for developing graphics with integrity.

— The representation of numbers, as physically measured on the surface of the graphic itself, should be directly proportional to the numerical quantities represented.

— Clear, detailed, and thorough labeling should be used to defeat graphic distortion and ambiguity. Write out explanations of the data on the graphic itself. Label important events in the data.

— Show data variation, not design variation.

— In time-series displays of money, deflated and standardized units of monetary measurement are nearly always better than nominal units.

— The number of information-carrying (variable) dimensions depicted should not exceed the number of dimensions in the data.

— Graphics must not quote data out of context.[1]

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[1]Edward R. Tufte, *The Visual Display of Quantitative Information.* (Cheshire, CT: Graphics Press, 1983), 77. Used with permission.

These principles can also be used to evaluate graphical presentations. For example, graphics users should learn to watch for scales that change in the middle of a graphic and for unclear or incomplete labeling. Picture graphs, which use symbols or objects instead of bars or columns, often employ a change in scale. If the object, such as a stack of newspapers, gets wider or narrower in proportion to a change in height, the actual area of the object changes more than the data.

Many graphics, especially those in popular publications, use three-dimensional figures to depict two variables or other disparate elements. For example, the volume of the three-dimensional columns in Figure M suggests that the September totals are more than twice the size of the January totals, but the scales tell a different story. It is also not clear at which line on the grid this graph should be read. Do we read the back edge (10,000) or the front edge (9,000) on the September column? Additionally, graphs may use objects such as barrels, boxes, or stacks of money in place of columns or bars—often introducing a meaningless third dimension that can trick the eye.

Student Enrollment in Area Community Colleges
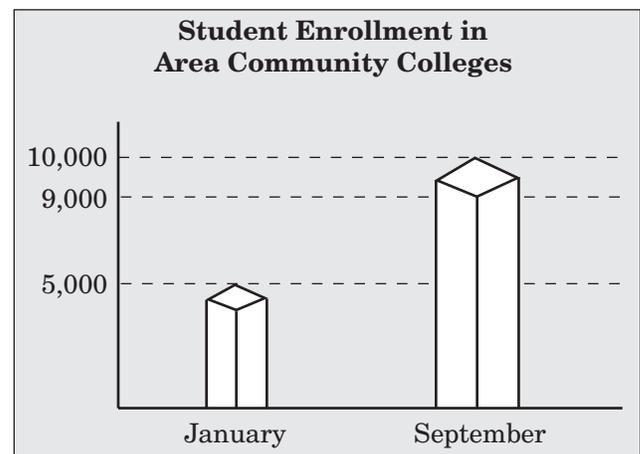
Figure M

A major strength of graphics is the ease of visual comparison. However, if the information is taken out of context, that comparison is not possible. When dealing with graphics, learners should often ask "Compared to what?"

The type and form of the graphic used may also convey certain characteristics of the data that may or may not be accurate. For example, data can be classified as either **discrete** or **continuous**. Generally, discrete data represents things that can be counted. We can count the number of babies born in a hospital on a given day, the number of people who attended a concert, and the number of products sold in a certain time period. For example, a dealership can say exactly 12 cars were sold last Thursday—not 11.75 or 12.3. Discrete data is best represented by bar-type graphs where each element is distinct and unconnected.

Continuous data includes anything that is measured (not counted) over time. Whereas discrete data is distinct and unconnected, continuous data is related to the data that comes immediately before and after it. Examples of continuous data are height, weight, length, elapsed time, and temperature. Line graphs best represent continuous data because the line indicates that there is an infinite number of points.

Sometimes the type of data is ignored and a line graph is used to display information to emphasize a trend rather than distinct numbers. The line graph in Figure N is used to show the number of jet skis manufactured each month in a small recreational vehicle plant. It is easy to see from the graph that peak production appears to be in the spring. But learners need to be cautioned that only the plotted points represent real data. Using a line graph for these discrete numbers gives the inaccurate impression that more jet skis were produced **between** each pair of points.
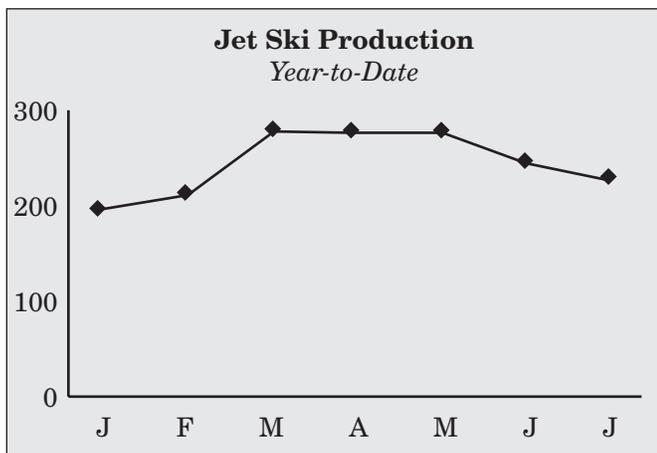
On the other hand, Figure O displays continuous data as if it were discrete. A column chart is used to record the temperature of a patient in a hospital as it was measured at one-hour intervals. Learners should come to notice that the information is not complete—the patient had a measurable temperature continuously, not just on the hour, but this was not recorded. We know that in order to rise from 37.6 °C at 10:00 A.M. to 37.8 °C at 11:00 A.M., the patient's temperature had to pass through all the points between these two readings. But we don't know the rate of change or the number of direction changes that occurred between the readings. Again learners need to recognize what is actually being said by a graphic and what is not.
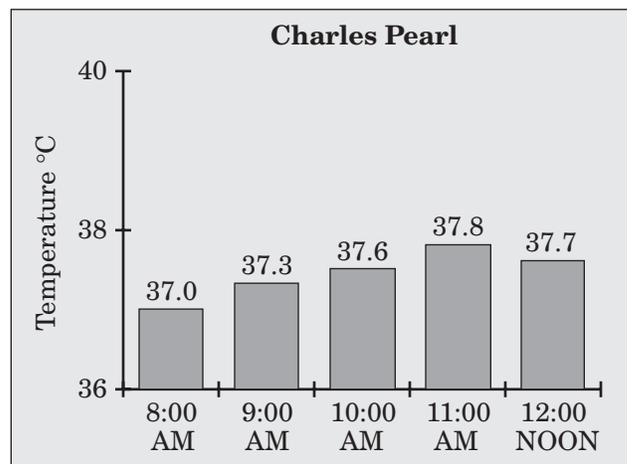
Figure O

Figure N

Finally, Figure P appears to present continuous data on a line graph. But, which points are supported by data? If the temperature was actually recorded only on the hour, the temperature at, for example, 10:30 A.M. would not necessarily have been 37.7 °C as indicated by the line. Actually, Charles Pearl's temperature may have dropped below 37.5 °C, risen above 37.8 °C, or risen at an irregular rate during that hour. Therefore the line graph could be misrepresenting the actual events.
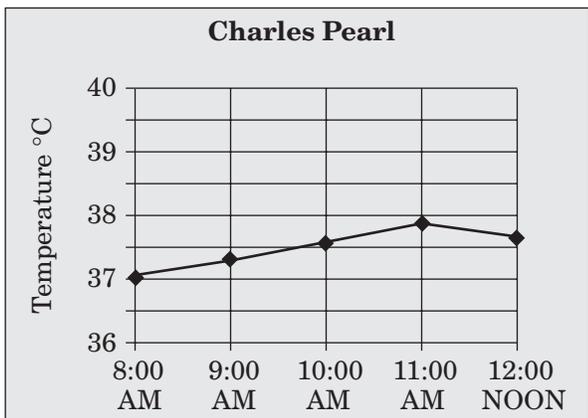
Generally, dots indicate points at which data were actually measured. In the absence of dots, a change in the slope of the line may be an indicator—the slope changes where the measurement was taken.

Learners working on their Locating Information skills need to understand the basic differences between these two types of data and how they are recorded and displayed. This information and a skeptical, questioning attitude will enable them to avoid interpreting implied information as accurate. For example, a nurse's aide who is tending Charles Pearl could not with certainty state that the patient's temperature never rose above 38 °C during this time period.

Figure P

Strategies for Teaching Locating Information Skills

General strategies used to teach map and graph reading are applicable in preparing learners for the workplace. This *Target* seeks to expand those strategies by identifying appropriate materials and suggesting activities that may be particularly useful. Cognitive strategies are like tools in a toolbox. The more learning tools your learners possess, the better equipped they will be to handle the challenges of each new situation in the workplace.

Materials

Unlike those materials produced for a traditional educational setting, workplace materials are not necessarily designed to facilitate reading and interpreting graphical information. Every adult has at one time struggled with trying to interpret a graphic that is complex and confusing. One hurdle you must help your learners overcome is that of mentally "shutting down" when faced with difficult or unfamiliar graphics. If your learners automatically give up when they see graphics that they perceive as too hard, they will probably struggle with reading graphical information in the workplace.

Therefore, when preparing instruction for Locating Information skills, find appropriate, real-life materials from which your learners can work. Newspapers and newsmagazines have graphics that are particularly adaptable to working with the lower level skills. Simple maps and floor plans can be designed by you or even by the learners themselves. Tax guides provide a wealth of tables, charts, and forms useful at the middle levels. Instructions for household electronic equipment often have diagrams. In addition, copies of charts, forms, tables, and diagrams can be obtained from businesses. Learners should practice breaking these documents down into simpler, more

understandable parts. Once learners have practiced dissecting difficult documents and have experienced some success in understanding them, they should be less likely to shut down when faced with unfamiliar graphics in the workplace.

When working with graphics in a secondary or postsecondary school, you may want to begin with material that is familiar to the learner before generalizing to and emphasizing workplace tasks. You should try, however, to relate exercises to the workplace as often as possible. An important consideration will be the comparative skill levels of the learners in the class or training program. In groups where all individuals are currently at the same level and working toward the same goal, group instruction will often be successful. However, if the learners bring a variety of skill levels to the program, instruction will need to be more individualized. In this case, you may want to prepare learning packets for each skill level containing self-guided activities, and you should work with small groups as much as possible. Computer-managed instruction offers another route to providing individualization.

Integration of Locating Information Skills into School Curricula

If the teaching of these skills is to be diffused throughout existing courses, dovetail them wherever appropriate with the rest of the course material. One advantage of this approach is that many of the skills are already being taught, or at least used, in various academic programs. Much of the material in texts and other classroom materials is presented in graphic form. Math classes are an obvious choice for enhancing graphic skills, but courses in physics, psychology, sociology, and economics also present opportunities for intensifying graphic presentation. Vocational classes usually have technical material that would be a good starting point. The addition of workplace materials and some of the strategies presented in this guide to the existing curriculum can strengthen the teaching of these skills.

Reinforcement of Locating Information skills in other classes should be strongly encouraged by the school or institution. These skills are not only appropriate to all academic disciplines, vocational classes, and the fine arts, but they are also important for success in those areas. An important factor in such an integrated program would be giving one individual or group responsibility for establishing, monitoring, and evaluating the program. A well-organized, integrated plan for teaching Locating Information skills throughout the system would clearly strengthen the entire educational program.

Working With Adult Learners

Since many WorkKeys learners are adults, there are some useful points concerning adult learning to keep in mind. Adults are motivated to learn something primarily because they believe it will be useful. You will therefore want to be sure that learners understand and appreciate the connections between Locating Information skills and the workplace. Adults especially need to relate new material to something they already know. Otherwise, they are less likely to retain or use the new material.

Adult learners may have less self-esteem in the classroom than younger learners. You can respect this by giving adult learners ample opportunities to practice a skill on their own successfully before demonstrating it in front of others, or by having them work in small groups or teams to learn collaboratively.

Finally, take advantage of the wealth of work and life experiences that adults bring to the classroom. These experiences are not only great sources of material, but they also connect the instructional materials to the learners' knowledge and experiences. This, as mentioned previously, provides important reinforcement.

Whatever the level of the learner or the length of the program, it is important to remember the following guidelines:

- Allow enough time to effect a permanent increase in all skill levels by incorporating adequate practice to establish solid competence.

- Be sure each learner is clearly aware of his or her own goals and of the relationship between those goals and job qualifications.

- A pretest can be useful for motivational purposes and to avoid time-consuming reteaching of skills that have already been mastered. A posttest can be administered at the end of the program to evaluate whether the learners have mastered the skills.

- Present the instruction sequentially; each step should be mastered before going on to the next.

- Be sure that the prerequisite skills for each level are either demonstrated by each learner or are remediated.

The Skill Scale and Assessments

WorkKeys assessments simulate the requirements of the workplace to the maximum degree possible given the requirements of a large-scale standardized assessment. As a result, WorkKeys is not geared toward any particular age group but, instead, targets the requirements of the workplace. The WorkKeys System provides information to instructors and trainers so they can help individuals improve their workplace skills.

WorkKeys assessments are based on common skill scales that are divided into hierarchical levels. The scale used to assess each skill is identical to the one used in the WorkKeys profiling of that skill. Profiling determines the skills and the level of those skills needed to perform successfully in particular jobs or occupations. A WorkKeys profile indicates the level of each WorkKeys skill required to adequately perform the job or occupation in question. The same scale is also used to describe that skill in the corresponding *Targets for Instruction*. This common scale enables the instructor to use the assessments, the profiling component, and the *Targets for Instruction* to help the learner prepare for the job or occupation of his or her choice.
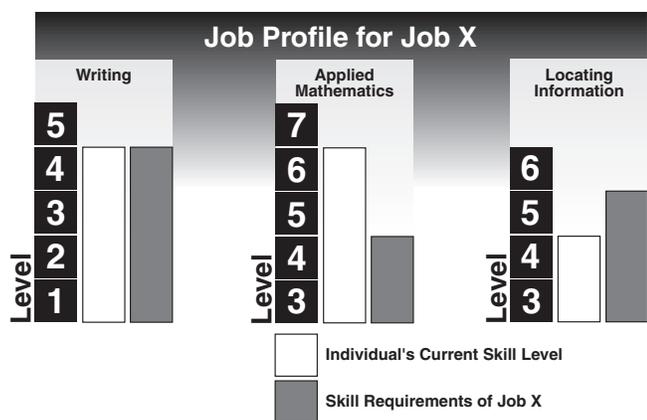
Figure Q

The number of levels and the range of the levels vary among the skills. For example, the skill scale for the Writing skill has levels ranging from 1 to 5, while the scale for the Locating Information skill has levels ranging from 3 to 6. This variation reflects the levels of each skill that employers want tested. Level 3 in one skill is not necessarily equal to Level 3 in another skill.

For example, Figure Q shows how the WorkKeys system matches the skills of a particular individual with the skill requirements of a particular job. The individual whose skill profile is shown may be currently employed in or interested in a particular job that requires Level 4 Writing skills, Level 4 Applied Mathematics skills, and Level 5 Locating Information skills. The individual's WorkKeys assessment scores show that he or she has achieved Level 4 Writing skills, Level 6 Applied Mathematics skills, and Level 4 Locating Information skills. The assessment results show that this individual needs to improve his or her Locating Information skills in order to match the skill requirements of the job.

The WorkKeys *Targets for Instruction* assist the instructor in helping learners improve by focusing on the skills needed at each level of the WorkKeys skill scale. For Figure Q, this *Target* identifies the Locating Information skills that are added at Level 5. It then suggests how to help the learner improve his or her skills from Level 4 to Level 5. Remember that it is not the purpose of the *Targets for Instruction* to teach the exact material that is on the tests but, rather, to help your learners build the skills that characterize each level of the skill scale.

The occupational profiles can be used to inform individuals about the generalizable workplace skills that they are likely to need in selected occupations. The occupational profiles may also serve as a starting point for a discussion about standards and/or requirements for entering or exiting a training program.

A comprehensive list of the occupational profiles that have been completed by WorkKeys job profilers is available at: http://www.act.org/workkeys/profiles/occuprof/index.html

Format and General Strategies of the Assessment

The WorkKeys *Locating Information* assessment measures the examinee's skill in using information taken from workplace graphics such as charts, graphs, tables, forms, flowcharts, diagrams, floor plans, maps, and instrument gauges. Examinees are asked to find, insert, compare, and summarize information using one graphic or a group of related graphics. At the highest level, examinees are asked to compare and apply specific information to make decisions or predictions.

There are four measured levels of proficiency on the Locating Information skill scale. At each successive level, the graphics are more complex and the processing tasks are more involved. The complexity of the graphic is determined by various factors: the amount of information, the types of information, and the presentation of information. These factors have varying impacts on the complexity of the document.

To answer the questions on the *Locating Information* assessment correctly, the examinee does not need to use any math processes beyond counting and simple comparisons. The total emphasis is on using the graphics to arrive at an answer. However, while teaching graphics skills, you may also want to reinforce other skill areas such as math, reading, writing, and science.

Although Level 3 is the lowest level measured by the *Locating Information* assessment, the individual does need some basic skills in working with graphic documents (see page 16). To be successful at Level 3, individuals must be able to look for information in simple graphics and fill in information that is missing from simple graphics. To demonstrate Level 4 Locating Information skills, for example, a person must be able to perform Level 3 skills and also summarize or compare information from one or two

types of graphics. As the levels progress, the graphics become more complex and it is often necessary to find, synthesize, and manipulate more pieces of data. At Level 6, it is necessary to analyze and use information in one or more complex graphics to draw conclusions and make decisions.

There are several equivalent forms of the *Locating Information* assessment. Each form of the *Locating Information* assessment contains multiple-choice questions at 4 levels of difficulty. The levels range from Level 3, which is the least complex, to Level 6, which is the most complex. The levels build on each other, each incorporating the skills assessed at the preceding levels. For example, Level 5 includes the skills used at Levels 3, 4, and 5. As the examinee advances to higher levels, the tasks become more difficult. The complexity can also increase as the quantity and/or density of the information increases. Each question or pair of questions is followed by one or more graphics.

The accuracy and appropriateness of the graphics and items have been reviewed by content and fairness experts. The assessment forms are constructed so that the occupations described are varied. Care has been taken to ensure that the assessment items are as realistic as possible and that the content of the tasks is accurate. The items focus on situations that may actually be encountered in the workplace. The tasks contain enough detail to create a realistic workplace context, but not so much detail that the assessment is job specific. The items depict approximately equal distribution of power between men and women. The items also represent a variety of racial and ethnic groups.

3 Description of Level 3 Skills

Level 3 workplace graphics are elementary. They may be simple order forms, bar graphs, tables, flowcharts, maps, instrument gauges, or floor plans. At Level 3, individuals use one graphic at a time. Individuals with Level 3 skills can:

■ Find one or two pieces of information in a graphic. For example, an individual must find one or two pieces of information (such as a name and phone number) in order to call a sales client.

■ Fill in one or two pieces of information that are missing from a graphic. The individual must also be able to place one or two new pieces of information (e.g., a bill number on a form) in the correct place on a clearly labeled existing form or other type of document.

Level 3 Prerequisite Skills

A learner needs some basic skills and must understand some basic concepts in order to handle Level 3 materials and tasks. First, while the focus is not specifically on reading, some **basic reading and organizational skills** are necessary to interpret the documents. Second, familiarity with **basic symbols and structures** normally used in graphics is assumed at this level. Finally, the nature of graphic information makes at least a fundamental grasp of **spatial relationships** imperative. You could use these guidelines to develop a pretest or a checklist for determining which skills each learner is lacking.

Basic reading and organizational skills:

♦ **Recognizing the use of alphabetical order and other methods of organizing material.** Alphabetical and numerical order are so common that it is assumed that the person using the document can detect the organizational method by examining it.

♦ **Using headings.** Frequently, learners who have trouble with this level may be attracted to the visual images first and may not notice the written headings and labels. These learners need practice noting written cues to the topic of the graphic and to the location of specific information. Such cues include column headings and pie chart section labels.

♦ **Using basic workplace vocabulary.** An understanding of such terms as *management, sales associate, sick leave, holiday, benefit,* and others may be necessary to deal with workplace graphics, especially those dealing with company policies and procedures.

♦ **Reading and listening to instructions for significant details and words that limit the task like *only, both, first,* and *after*.** The learner also needs to discriminate between similar categories and terms.

Familiarity with basic symbols and structures:

♦ **Using keys.** Many graphics use symbols, colors, patterns, and other visual means to designate categories of data or to represent written information. Learners must be able to recognize and use the key in order to interpret the material.

♦ **Understanding the meaning and uses of the vertical and horizontal axes on any type of graph.** The learner should be able to identify the meaning of a point on a graph in terms of the two axes and, also, when given the polar or Cartesian coordinates, be able to place such a point on the graph. For example, the learner should be able to use a graph to find out how many cans of blue paint were sold last August or to plot the number of cans sold this August. The same skill in using coordinates is necessary for reading some maps.

♦ **Following a simple flowchart.** The learner should recognize not only the significance of the connecting lines but should also know when multiple decisions are presented.

♦ **Recognizing the standard form of common data such as addresses, phone numbers, and Social Security numbers.** For example, when the learner sees a number given in the form (000) 000-0000, he or she should recognize that it is probably a telephone number. Or, when looking at an address, the individual should know that a capitalized, two-letter abbreviation after the city or town represents the state, and that the ZIP code generally follows that abbreviation.

♦ **Using the standard compass points on a map whether or not these are given on the map.** Some learners may not recognize that the top of a map represents north unless otherwise stated. Learners also need to notice if a directional key is given and if there is a deviation from the standard.

Recognizing spatial relationships:

♦ **Being able to compare on sight the relative sizes or areas of the components of circle or pie charts and bar or column graphs.** In other words, the learner should recognize general concepts such as *about half, smallest, largest,* and *about double* and be able to apply those terms to the parts of a graphic.

Moving to Level 3 Skills

In developing WorkKeys, educators, employers, and ACT staff identified Level 3 skills as comprising the lowest level of skill in using graphic information for which employers would most likely want assessment results. An individual who does not achieve at this level poses special instructional problems. You will want to ensure that the test score is representative of the individual's skill level (e.g., that the individual was motivated to do well on the assessment). If the score is representative, it is important to determine if the individual uses English as a second language, has a learning disability, has difficulty reading, or has some other impediment to standard achievement. Additional training may be necessary. At any rate, the individual needs introductory training in the functions and uses of graphics.

At this level, it is probably best to begin with documents that are used to show the arrangement of physical objects such as simple maps, layouts, and floor plans. Start with maps of territories that are familiar to the learner. Telephone books often contain simplified maps of college campuses, small towns, business districts, and transit systems. The maps given to customers at tourist attractions such as zoos and amusement parks can also be useful. Figure 3.1 gives an idea of the type of simple map that is appropriate to this level.
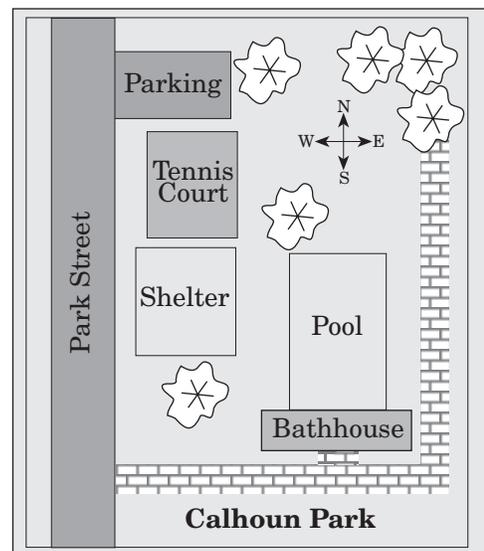
Figure 3.1

Remember, the two skills that should be focused on at this level are inserting and extracting one or two pieces of information. Have learners find details in this type of graphic ("On which side of the park does Park Street run?") or insert details ("Mark an x on the map near the northeast corner of the swimming pool to show an employee where a new tree should be planted.").

After reviewing the basic structure and characteristics of simple maps and layouts, you may want the learners to develop their own similar graphics. Learner-generated maps of classrooms, work areas, neighborhoods, and other familiar areas can be analyzed and modified by the rest of the group. These graphics can also be used as a basis for questions devised either by the learner or by you. Each graphic should have a specific purpose and be labeled with an appropriate heading or title. If needed, there should also be a key. This provides a basis for discussing what has been included on the map or layout, what has been left out, and why.

Learners may have had less experience with flowcharts than with maps and layouts. Flowcharts usually demonstrate arrangement of responsibilities or procedures to follow. There are many examples of flowcharts in tax guides, although some of these are fairly complex.

This type of diagram, however, can be easily devised by you and/or your learners to illustrate a familiar chain of command (e.g., the decision-making or appeal process in a particular business, school, or similar institution). Flowcharts can also be designed by the learners to demonstrate a simple procedure, such as changing a tire, programming a VCR, or, as in Figure 3.2, frying an egg. Familiarize your learners with the standard shapes that are often used in flowcharts (e.g., rectangles for actions or processes, diamonds for decision points).
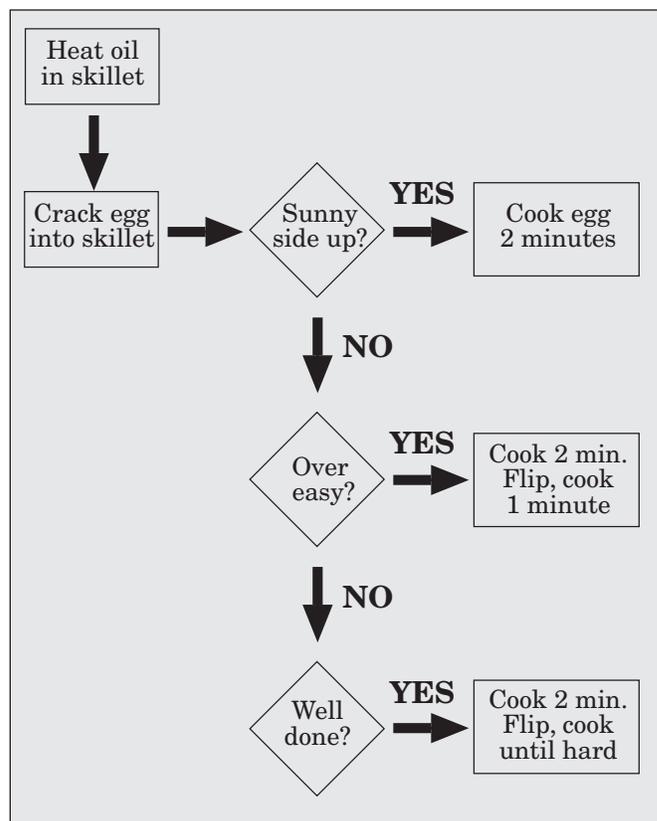
Figure 3.2

Having learners describe the process shown in a flowchart orally or in writing can be an effective aid to understanding. Emphasize the terms used to designate order, choice, and limits on the process. For example, a learner could describe the flowchart in Figure 3.2 as follows:

> *First* you should heat oil in a skillet. *Then* crack an egg into the skillet. *If* you want the egg sunny side up, *then* cook the egg for two minutes. *If not,* and you want the egg over easy . . .

Finally, tie this exercise to the function of flowcharts by having learners label the appropriate places on the chart with the italicized words.

Analog instrument gauges and dials can be unfamiliar to many learners, and digital gauges can present their own problems. Clocks, appliance dials, and bathroom scales are common in both digital and analog form. Home electric and water meters provide examples of basic gauges. In addition, drawings of various dials can be found in math texts, car manuals, and technical manuals. Be sure to introduce dials and gauges that use different shapes, spacing, and configurations to present information. The gauge in Figure 3.3 has a horizontal layout and the scale begins at –20.
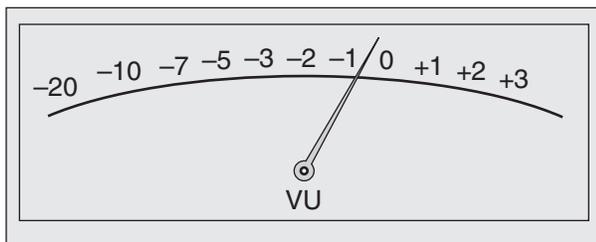
Figure 3.3

Circle graphs (pie charts) have been used by most learners since elementary school, so the form should be familiar. You may need to emphasize that these graphs have the unique characteristic of always representing a whole, or 100%. Simple pie charts may be made by the instructor or by learners to illustrate the composition of the class or workplace in terms of gender, age, nationality, or other criteria. Learners should practice labeling these graphs with a key and visual patterns, as well as written categories and percentages.

Bar and column graphs are also familiar to most learners and are easily found in newspapers and other periodicals. For practice, bar graphs can first be made to display simple data about the group, such as favorite sports, kinds of music, or other interests, and then learners can move on to work-related subjects. You should emphasize the importance of scales with

regular intervals and accurate labeling. You may want to identify published materials that violate these rules or that distort data in other ways and discuss the possible results or harm. Although the column graph in Figure 3.5 is constructed with exactly the same data as the one in Figure 3.4, the change appears more dramatic in Figure 3.5 because the scale on the vertical axis begins with 20,000 instead of 0.
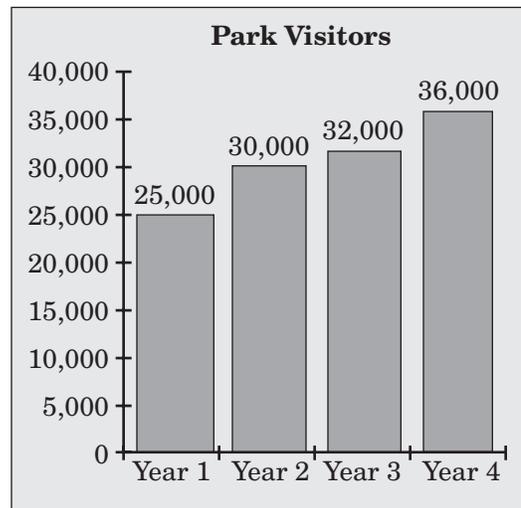
Figure 3.4
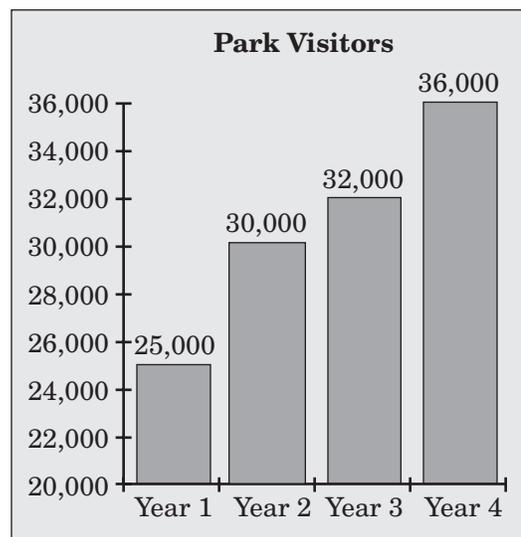
Figure 3.5

Line graphs should be used to display continuous information. Since both vertical and horizontal axes are present, labeling is crucial to reading and understanding the graphic. Learners can practice with these graphs when working with cumulative earnings or monitoring temperature or weight for an individual over a period of time. Be sure they are aware of any gaps in the data between points on the graph.

Because tables and charts rely less on visual images and more on written and numerical symbols to convey data, they are especially useful for teaching the importance of attention to headings and categories. To increase efficient use of tables, learners should practice using the title and headings to gain an overview of the subject and scope of the table. They should also watch for organizational clues and ask questions such as, "Is the material listed alphabetically, numerically, or in some other definite order?" Examples of simple tables can be constructed or they can be obtained. How-to literature (e.g., cookbooks, home repair guides, and gardening books) serves as one good source of such materials.

The display of information on a computer screen is often in a table or chart form, and an individual needs the same skills to extract data from the screen. The database menu shown in Figure 3.6 is a very simple table. Learners can use printouts of sample screens or the computers themselves to hone the skimming and scanning skills required for this kind of task.
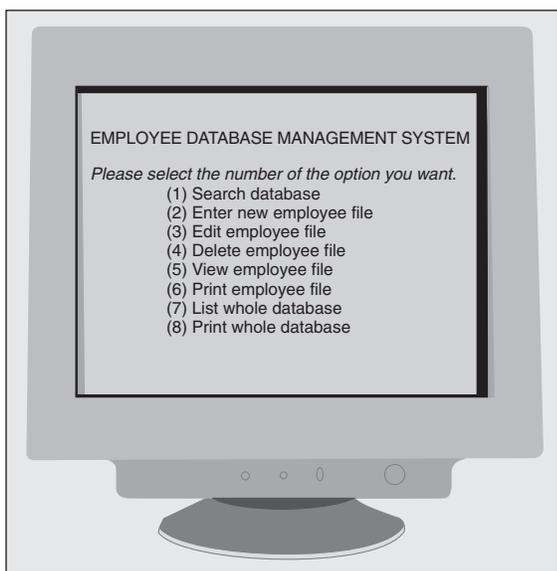
Although most learners have filled out forms at some time, they are less likely to have had experience extracting information from completed forms. As with tables, attention to headings is especially important.

Job applications and order forms from restaurants, flower shops, photography studios, and other businesses can be filled out and then used as sources for details. Catalog order forms, license applications, and school and voter registration forms also provide potential practice materials. The message form in Figure 3.7 is a typical workplace document that could be used in this way.

Figure 3.6

Figure 3.7

With all types of graphics, you may need to spend some time helping learners develop skimming and scanning skills. Using the title and other written clues has been mentioned before, but ignoring these aids is a common problem of Level 3 learners. To help develop habits of generalizing and looking for details, ask learners questions about the topic, labels, and structure of the graphic before presenting them with a task involving the graphic. Then, the task itself should be examined: What exactly are we being asked to do or find? In regular academic materials, questions or tasks are often worded to help the learner find the answer. For example, the order of the wording in the question will probably reflect the order of information presented in the graphic. Workplace materials are not designed so conveniently; an individual's attention to detail and order becomes much more important.

Constructing graphs, tables, maps, and charts to illustrate specific, familiar information not only aids learners in understanding the crucial components of the different types of graphics, but also allows experimentation with presenting the same data in different forms. Learners can exchange the graphics they have created and critique or answer questions about them. You can use these experiments as a basis for comparing the merits and drawbacks of each format in different instances. Computer software programs for constructing graphics and databases offer a faster means to structure, record, sort, and investigate data. After learners have practiced developing their own samples, these programs will allow them to change scale and format easily so that they can compare different presentations of the same information.

OTHER STRATEGIES FOR IMPROVING SKILLS TO LEVEL 3

■ If learners have problems recognizing the approximate proportions in a pie chart, compare it to a clock face and point out comparable time segments.

■ Use a television viewing guide that is arranged in table form to practice extracting data.

■ To gain practice in working with different graphic forms, convert information from graphics in newspapers and textbooks to other forms, then compare results.

■ Get copies of simple (one page) job applications. Discuss why each piece of information is probably being required. Have learners consider the possible consequences of incomplete or erroneous entries. Suppose, for example, that the applicant does not completely or correctly fill in his or her telephone number. Practice filling out a model application and have learners critique the results in small groups.

■ Follow the same procedure using other basic, everyday forms. Deposit slips, checks, magazine subscription forms, vehicle registrations, and phone messages are examples of the shorter, simpler forms that adapt well to this level.

■ Teach learners how to read local utility meters. If forms used by meter readers to record customer usage can be obtained from the utility company, learners can practice both extracting and inserting information.

Level 3 *Locating Information Sample Item*

You regularly check the pressure gauge on a large tank. According to the gauge shown, what is the current pressure (in PSI)?

A.   30
B.   35
C.   40
D.   45
E.   100

40   60
PSI
20   80
0 °   100
✓|
Varsity Instrutech
USA
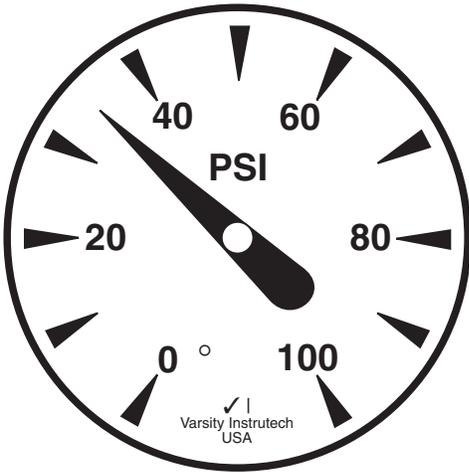
Indications that this is a Level 3 item:

♦   The gauge is an elementary workplace graphic with only a single scale.

♦   The examinee is required to find only one piece of information.

The task is to read the gauge realizing that it is scaled such that each mark represents 10 PSI. Therefore, the needle is pointing between 30 and 40 PSI, at 35 PSI.

4 Description of Level 4 Skills

Level 4 workplace graphics are straightforward and slightly more complex than those at Level 3. They may be basic order forms, diagrams, line graphs, tables, flowcharts, instrument gauges, or maps. Details become more important, and the individual must watch for small variations. At Level 4, individuals may work with one or two graphics at a time. In addition to demonstrating the skills at Level 3, individuals with Level 4 skills can:

■ Find several pieces of information in one or two graphics. For example, an individual may need to find a name, address, and phone number or a size, color, and price in order to complete a task.

■ Understand how graphics are related to each other. For example, an individual might use a parts table and shipping ticket together. This requires recognizing the relationship between the graphics to clarify, confirm, or narrow down data.

■ Summarize information from one or two straightforward graphics. The task may involve finding pieces of information and making a general statement about that information. For example, they might find how many oak trees in an inventory table are taller than four feet.

■ Identify trends shown in one or two straightforward graphics. For example, an individual might use a line graph to find how sales of a product change from one month to another.

■ Compare information and trends shown in one or two straightforward graphics. To compare trends an individual must consider the time frame of the document, find pertinent details, and recognize the direction of change in those details.

Moving to Level 4 Skills

An individual who succeeds at Level 3 but not at Level 4 is probably familiar with common graphic forms and can extract or insert single pieces of information. However, this person could have problems working with several pieces of data and with summarizing and comparing information. The individual may also have difficulty working with more than one graphic at a time.

As the material becomes more complex, learners need to develop and sharpen sorting skills. Most workplace tasks using graphics require the individual to focus on specific information. When a consumer wants to order something from a catalog, it is not necessary to read, memorize, or even understand the entire catalog. The important tasks for the consumer are finding the correct section, locating the specific item, and selecting the pertinent information. For practical purposes, most of the information in the catalog is extraneous to those particular tasks.

When using visual displays of information in the workplace, the same thing is true. Most of the information given does not apply to one specific task. The learner must use headings and labels to zero in on task-specific information and to eliminate information that is not pertinent. Key words in the task implying quantities and comparison of quantities must be used to determine significant details. Such words include *all, only, most, least, greater, smaller, increase, decrease, half, third,* and *fourth.* You will want to determine first whether learners have an adequate understanding of this kind of vocabulary, perhaps with a pretest, and incorporate review work if necessary.

Headings and labels are particularly important when using tables. An individual who works for a tree nursery may use a table such as the one in Figure 4.1 to recommend a maple tree that could grow to be very tall, that will have very bright foliage in the fall, and that will cost less than $120. All of the trees on this table meet the cost requirement, but after checking the height column, the individual can see that only the red maple and sugar maple are tall, and of those two, only the sugar maple has bright foliage. Using the headings in this way is more efficient than reading the data for each tree and checking it against the requirements.

MAPLE TREES				
TYPE	HEIGHT	FOLIAGE	COST OF 6–8 ft TREE	COST OF 10 ft TREE
Norway	Medium	Yellow	69.99	99.99
Red	Tall	Dull Red	69.99	99.99
Sugar	Tall	Brilliant Yellow	69.99	99.99
Globe	Short	Yellow	79.99	109.99
Sunset	Medium	Scarlet	79.99	109.99
Harlequin	Short	Brown	79.99	109.99

Figure 4.1

Figure 4.2 shows another type of form that could be used by your learners to consider the purposes and importance of various pieces of information. What would an employee using the form want to know first? Most likely, this would be the pick-up time so the work can be scheduled. When it is time to actually make the sandwich, the information about the ingredients and wrapping would be important. Is there any information that may not be used? Since the phone number is probably included only for contacting the customer in case of a problem, it is backup information. It is worth noting, however, that error or omission in the phone number would make such contact difficult, if not impossible, and could result in an irate customer. The information may not always be used, but it is still important.

SANDWICH ORDER

Customer's Name _____Ernie Harrison_____

Phone _333–1130_ Pick-up time _11:45_

Sandwich Wrapping

[ ] In House (plastic)   [X] To Go (paper)

MEAT & CHEESE

1. ___Swiss___   2. ___cheddar___
3. ___roast beef___   4. _____

EXTRAS

1. ___tomato___   2. ___mustard___
3. _____   4. _____

Figure 4.2

This approach to a document—considering its purpose and structure—has at least two advantages. First, the learner is more likely to see the exercise as practical and worthwhile, rather than simply academic. In addition, the learner will find these kinds of documents less daunting if he or she develops a methodical approach, especially as the graphics become more complex.

Catalog order forms, sales slips, and credit card receipts are also good examples of forms with multiple details. By using a variety of any one type of graphic, such as several different examples of credit card receipts, the learner will discover that although the documents contain basically the same categories of information, the location and format of the data varies a great deal. For example, the date on a sales slip or credit card receipt seems to have as many locations as the number of businesses using them.

The two examples in Figure 4.3 illustrate the absence of a standard format for electronic credit card receipts. Using these or similar examples, have learners locate information such as the name of the business, the date, the account number, the customer's signature, and the expiration date. Discuss what clues are used to determine the meaning of each piece of data.

00003746549655634
00003746549655634   BATCH 425

TYGER PIT
416 N BROOK STREET
LINCOLN, IA 52776

DATE 02/18   0001

ACCT # 938662212253729   EXP 0806
ACT 0@2 REF 7345   APPROVAL 0062

PURCHASE
AMOUNT $29.37

I AGREE TO PAY ABOVE TOTAL AMOUNT
ACCORDING TO CARD ISSUER AGREEMENT
(MERCHANT AGREEMENT IF CREDIT VOUCHER)

SIGN X _____
RETAIN THIS COPY FOR YOUR RECORDS
TOP COPY-MERCHANT
BOTTOM COPY-CUSTOMER

I Agree to Pay Below Total Amount
According To Card Issuer Agreement

X _____
CHO/HAE REE

ANDY'S HANDYMART   09356
200 NORTH MANN STREET
KANSAS CITY KS 66214

ACCT # 937462093749274   EXP 0906
03/24   16:24   38740293 839023   #085

Items Purchased =
GALLONS   PRICE   TYPE   FUEL TOT
14.584   1.459   UNL   21.28

APPROVED   08475

Figure 4.3

It is important to also present varying formats of dials and gauges. Stress the importance of labels, especially if more than one needle and scale are on the dial. An example is a furnace thermostat with one scale to set the temperature desired and another to indicate the actual temperature. The gauge in Figure 4.4 is for a gas-fired hot-water furnace and has three scales and needles.
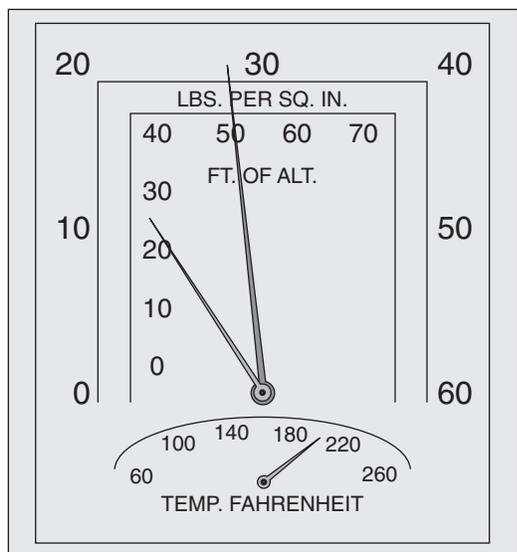
Figure 4.4

Cooperative learning can be used here, too. Have learners design forms for others to fill out. Discussion should center around how the form's design and wording affects the ability of an individual to complete it correctly. Through this exercise, the learner gains practice in using verbal and other clues to find the data.

Using class schedules from postsecondary programs, including adult education and vocational/technical programs, requires attention to details. Assign learners to work out schedules and fill out registration forms that meet certain criteria such as time slots, cost, and basic requirements. Then, have learners work with work-related materials.

Making the necessary connections between pieces of data will enable the learner to make a decision or take a certain action. Suppose a boat mechanic receives a call to repair a boat located in the water just out from the lighthouse. Using a map such as the one in Figure 4.5, the boat mechanic must determine the direction to travel by boat to get from the Nesting Place Marina to the boat needing repair. First, the pertinent information is the location of the Nesting Place, the location of the lighthouse, and the compass points. The connection that must be made is the relationship of the lighthouse to the marina.
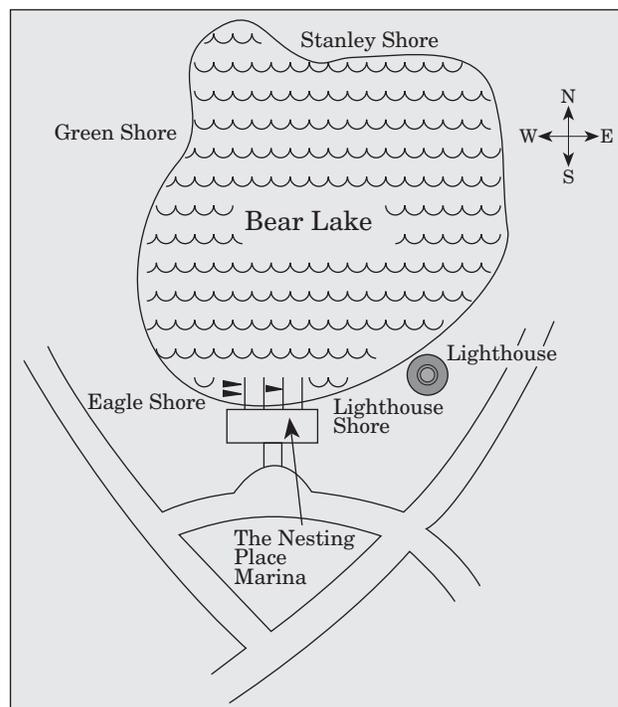
Figure 4.5

Summarizing information requires higher thinking skills than simply finding pieces of data. Summarizing a particular graphic might lead to a conclusion such as, "More men than women hold management positions in Company X"; "Wages are the single biggest expense in Company Y"; or "Roses account for the highest profit on Valentine's Day for flower shops." Other summarization tasks may involve being able to see the significance of one or more pieces of information in the whole picture. For example, Mr. Garcia calls Ms. Jones's office for an appointment on Wednesday. A receptionist who has Level 3 skills might, after looking at Ms. Jones's appointment book, have a conversation like the one shown in Figure 4.6:

Mr. Garcia:	*"Is Ms. Jones free at 8:30 A.M.?"*
Receptionist:	*"No."*
Mr. Garcia:	*"Is she free at 9:00 A.M.?"*
Receptionist:	*"No."*
Mr. Garcia:	*"Is she free at 9:30 A.M.?"*
Receptionist:	*"Yes."*

Figure 4.6

However, a receptionist with Level 4 skills would look at Ms. Jones's appointment book and say, "Ms. Jones can see you at 9:30 A.M. or 11:00 A.M., but the only time she has in the afternoon is 2:00 P.M. Which time would you prefer?" or, "Ms. Jones has more time available in the morning than in the afternoon. Would that be all right?" This is a very basic generalizing skill, but it is one that makes the employee in this situation more efficient. Learners can also practice summarizing skills by making single statements that emphasize what they feel is an important point about a graphic.

Comparing trends requires information about the time element, but it must be based on more than one point in time. Is production up or down this month compared to last? Has the demand for small cars increased in the past five years? Did the company use more paper this year than last? Learners need first to notice the time frame of the graphic. If the graphic gives data for only one year, a trend can be determined for that time period only.

A task requiring comparison can be illustrated using Figure 4.7. A Department of Energy employee may use pie charts like those shown in Figure 4.7 when preparing a report on the changes in oil sources. In describing general trends, the employee might highlight the source that had the greatest increase between Year 1 and Year 2. The task involves two comparisons: one year to another, and one oil source to another.
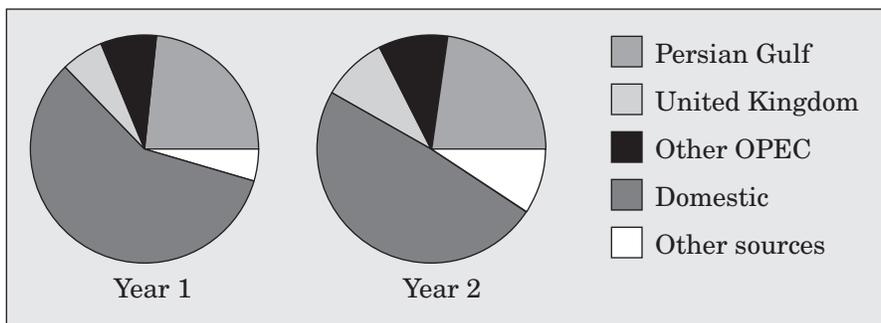
Figure 4.7

When working with more than one graphic, an individual must examine the task for clues to the crucial data from each document. For example, an employee is asked to find the shipping charges for the parts to be ordered. To complete this task, the employee would need to extract data from the "Part Number" and "Total Weight" columns of Figure 4.8 and from the shipping charges table in Figure 4.9. Also, it is important to notice that "Weight" is the common link between the two tables.

Part Number	Quantity	Weight (kg)	Total Weight (kg)
694HD	4	0.5	2.0
84M2H	1	1.0	1.0
9367G	3	1.5	4.5
3298D	2	3.0	6.0

Figure 4.8

Shipping Charges	
Weight (kg)	Charge ($)
0.5–1.0	3.50
1.1–2.5	6.00
2.6–4.0	7.50
4.1–6.0	10.00

Figure 4.9

The employee finds that the total weights have already been figured, so for this task, the quantities and individual weights have no bearing. The important information is in the total weight column. You could also have learners find the shipping charges per part if one item is shipped separately. In dealing with such tasks, the learner must ask, "What are the criteria for the information I am looking for?"

The same skill is used with tax tables available in income tax guides. The criteria are the individual's taxable income and his or her filing status. In this case, you may want to point out the way to determine which criteria to use first. Individuals who first look for their filing status face a column with hundreds of figures. By finding the correct taxable income first, the options are narrowed down to only a few numbers.

OTHER STRATEGIES FOR IMPROVING SKILLS TO LEVEL 4

■ Practice making comparisons by using different criteria to sort the data in a graphic: How many parts weigh more than three pounds? Which days of the week have the highest sales? Where are most of the customers located?

■ Mileage charts found on road maps and in atlases are good for honing skills like sorting and generalizing: Which cities are within 500 miles of the home office in Chicago?

■ Most telephone books now have community information sections that contain charts, simple maps, and schedules that make good sources for finding several details.

■ Work on interpreting trends by having learners chart temperatures or rainfall for your local area. What trends appear?

■ Develop summarizing skills by having learners write short paragraphs describing the trends shown in bar or line graphs.

■ Use tables and charts from consumer magazines to compare features of consumer products.

■ Using a bank statement and canceled check, find what values or numbers link the statement (a table) to the check (a form).

Level 4 *Locating Information* Sample Item

You must sort clothes in a dry-cleaning establishment according to the customer's instructions. According to the form shown, how should this customer's shirt be treated?

A. Dry-clean it, add light starch, and fold it.
B. Dry-clean it, add light starch, and place it on a hanger.
C. Launder it with no starch and place it on a hanger.
D. Launder it with light starch and place it on a hanger.
E. Launder it with medium starch and fold it.

Indications that this is a Level 4 item:

♦ The graphic is a straightforward order form.

♦ The examinee is required to find and summarize several pieces of information.

The task is to find how the customer's shirt is to be treated. This requires finding that the shirt is to be laundered and starched. It is important to notice that the starch amount is "light" and that the shirt is to be placed on a hanger.

FRESH 'N' CLEAN   555-6301   4:16 PM 8/26
1200 14TH ST
MAPLETON, OH 45768

75053
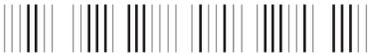
PHONE	555-2261	DATE	8-29	CLERK'S INITIALS SW
PRINT NAME	EDNA THOMPSON			
ADDRESS				

Fold	On Hangers	Starch	NO	LT	MED	HVY
	X	X		X		
Due	MON	TUE	WED	THUR	FRI	
	X					

LAUNDRY

X	TROUSER		TROUSER
	SHIRT		SUIT
	DRESS		SHIRT
	BLOUSE		OVERCOAT
	SKIRT		SWEATER
	JACKET		DRESS
			BLOUSE
			SKIRT
			JACKET
			TIE

DRYCLEANING

5 Description of Level 5 Skills

Level 5 workplace graphics are complicated. Typically, they are longer and contain more detail than those at Level 4. The graphics are sometimes in a less common format (such as a three-dimensional bar graph). Therefore, these graphics require careful study because some of the detail may be confusing. They may be detailed forms, tables, graphs, diagrams, maps, or instrument gauges. Both the language and the symbols may be technical, and the use of fractions, decimals, and integers is common at this level. At Level 5, individuals may work with one or more graphics at a time. In addition to demonstrating the skills at the previous levels, individuals with Level 5 skills can:

■ Sort through distracting information. That is, using one or more graphics, the individual can sort through information that may not be useful for the current task.

■ Summarize information from one or more detailed graphics. Summarizing material at Level 5 requires individuals to find pertinent details in a graphic that may be highly detailed and may also be presented in an obscure format. For example, they might find which maple trees in an inventory table are taller than four feet, are less than $50, and are in a particular sales region.

■ Identify trends shown in one or more detailed or complicated graphics. Recognizing trends can be challenging because Level 5 documents contain a great deal of distracting information that is not related to the task at hand.

■ Compare information and trends from one or more complicated graphics. For example, individuals might use a detailed line graph to compare sales of five separate products from March to July.

Moving to Level 5 Skills

Multiple-column and multiple-bar graphs, line graphs plotting several categories of data, and circle graphs with numerous segments will provide more challenges for this level. Diagrams with less familiar forms, more details, and unusual perspectives should be used. Charts and tables should have considerable detail and technical information. It is also important that the learner use multiple graphics dealing with related information to complete one task.

Business and government publications are good sources for these kinds of documents. The Census Bureau, as well as the Departments of Labor, Education, Health and Human Services, and other cabinet departments all publish documents containing the types of graphics described here. City zoning maps and other government-generated maps are detailed and unfamiliar to most learners. Insurance and investment businesses publish materials full of detailed tables as well as circle (pie) charts, line graphs, and multiple-bar graphs. Stock market pages in the newspaper also provide detailed tables. Auto and appliance repair manuals contain technical tables, diagrams, and graphs appropriate to this level.

There are additional challenges in the tasks at this level. Because very detailed data are presented in the documents, it is crucial that the learner be able to sort through extraneous information to find the pertinent material. Tasks may involve understanding conditional statements (if–then), using multiple criteria to arrive at a conclusion, and carefully checking the data in one graphic against the data in another.

Learners will need to recognize and understand terminology in a task that denotes upper and lower limits (e.g., at least–but less than). With many tasks at this level, the learner must first identify essential data and then analyze and synthesize that data. Learners should also understand such directions as *estimate, evaluate, recommend, suggest,* and *decide* when undertaking a task. When presented with several positive or negative fractions or decimals, learners should be able to select the smallest or largest.

Item Number	Description	Cost	Sales	Change from Nov. to Dec.
w4923h	roses—"Sophia"	$0.80	124	-126
d5378x	roses—"Cardinal"	$0.75	240	+60
r38746	Gerber dark red	$0.60	65	-10
d5621g	carnation—"Red Fluff"	$0.25	528	+120
p8923h	poinsettia—"Jingle Bells"	$11.50	225	+25

Figure 5.1

When **summarizing information** in these documents, the sorting process described at Level 4 becomes more important. The chart in Figure 5.1 can be used to illustrate this kind of sorting. The employee is asked to determine which kind of flower or plant had the highest sales in December. The "Item Number" and "Cost" columns are not pertinent for this particular task and should not be considered by the learner. By locating the highest number under the "Sales" column (528), the employee can quickly see that Red Fluff carnations were the most popular item in terms of sales. Learners need practice in using the headings and other labels on larger tables to make this kind of summarizing statement.

One technique that is useful in locating specific data is to use a yellow highlighter to mark the appropriate column and a blue highlighter to mark the row. The information sought will be in the green intersecting square.

Comparing trends shown in one document is the next step at this level. If asked to figure which type of flower and plant showed the greatest increase in sales, the employee must eliminate any entries in the "Change" column that represent decreases and then choose the largest number.

If the learner is expected to **summarize information or compare trends using more than one document,** the task is complicated further. The two pie charts (see Figures 5.2 and 5.3) show the breakdown of rose and carnation sales into several categories. The learner could be asked to determine whether more roses or carnations were used in wedding arrangements during the last month.
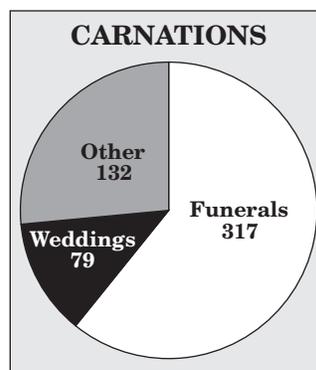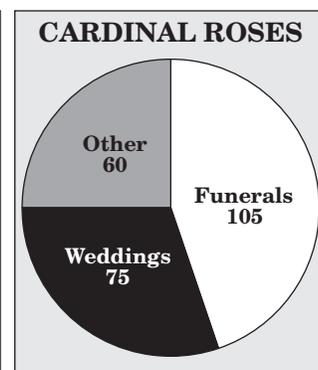
Figure 5.2   **Figure 5.3**

There are several confusing details here. The two flowers are given in one order in the question and are presented in a different order in the charts. The words "carnations" and "cardinal" could be confused. In addition, roses sold for weddings represent a larger percentage of total roses sold than that of carnations sold for weddings of total carnations sold. That fact could be very confusing: if the learner focuses on the segments of the graphs rather than the actual numbers of carnations and roses sold, he or she will arrive at the wrong conclusion. Practice with using the key words in the task and the labels on the graphics will help avoid this kind of confusion.

In many instances in the workplace, an individual is confronted with several related documents that are not all actually pertinent to a particular task. For example, a travel agent may need to tell a client what meals will be served on the client's flight. Using the airline tickets in Figure 5.4 and the schedule shown in Figure 5.5, the agent should realize that only the schedule is needed to give the client this summary information.

```
                                                USD210.00
                                                NONREFUNDABLE. SALE FINAL.
WORLD TVL                      CLIENT: TYLER/PAUL
DOWNTOWN PLAZA                                            PAGE:01
SOUTH BEND          IN         217-855-0200     INVOICE: 20806100

25 AUG         EXPRESS         FLIGHT: 2886     CLASS: V       SEAT: 12A
   TU          SOUTH BEND      DEPART: 930A        VIA: AIR EXPRESS
               CHICAGO/OHARE   ARRIVE: 1025A

25 AUG         EXPRESS         FLIGHT: 684      CLASS: V       SEAT: 6F
   TU          CHICAGO/OHARE   DEPART: 1120A
               HARTFORD/LOGAN  ARRIVE: 223P

30 AUG         EXPRESS         FLIGHT: 1629     CLASS: V
   SU          HARTFORD/LOGAN  DEPART: 655P
               CHICAGO/OHARE   ARRIVE: 815P

TICKET: 016 1487958207
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                                                USD210.00
                                                NONREFUNDABLE. SALE FINAL.
WORLD TVL                      CLIENT: TYLER/PAUL
DOWNTOWN PLAZA                                            PAGE:02
SOUTH BEND          IN         217-855-0200     INVOICE: 20806100

30 AUG         EXPRESS         FLIGHT: 341      CLASS: V
   SU          CHICAGO/OHARE   DEPART: 1007P       VIA: AIR EXPRESS
               SOUTH BEND      ARRIVE: 1107P



TICKET: 016 1487958207
```

Figure 5.4

World Travel, Inc.

Tyler, Paul

Paul Tyler
7 Terrace Street
South Bend, IN 62443

August 10   20806100

25 AUG - TUESDAY
2886 COACH CLASS   OPERATED BY AIR EXPRESS
LV: SOUTH BEND   930A   NONSTOP   CONFIRMED
AR: CHICAGO/OHARE   1025A

                                             SEAT-12A

684 COACH CLASS
LV: CHICAGO/OHARE   1120A   NONSTOP   CONFIRMED
AR: HARTFORD/LOGAN   223P
SNACK-AUDIO   SEAT-6F

30 AUG - SUNDAY
1629 COACH CLASS
LV: HARTFORD/LOGAN   655P   NONSTOP   CONFIRMED
AR: CHICAGO/OHARE   815P
DINNER-AUDIO

341 COACH CLASS
LV: CHICAGO/OHARE   1007P   NONSTOP   CONFIRMED
AR: SOUTH BEND   1107P
YOUR SEATS ON YOUR RETURN WILL BE ASSIGNED AT THE AIRPORT

THANK YOU FOR YOUR BUSINESS-PATTY
PLEASE RECONFIRM YOUR TICKETS 2 DAYS PRIOR TO YOUR DEPARTURE
CHANGES AND CANCELLATIONS ARE SUBJECT TO A $10 SVC FEE
EXCEPT ON NONREFUNDABLE TICKETS

TICKET NUMBER/S:
TYLER/PAUL   1487958207   DC CARD   210.00

AIR TRANSPORTATION   190.92   TAX   19.08   TTL   210.00
                                             SUBTOTAL   210.00
                                             CREDIT CARD PAYMENT 210.00-
                                             AMOUNT DUE   0.00

Figure 5.5

CONNECTIONS BETWEEN MULTIPLE GRAPHICS

When working with more than one graphic, learners need to examine the connections between the graphics before determining where to begin on the task and how one document can be used to understand the material in another. There are many ways that graphics can be related.

- ♦ Sometimes **one graphic may amplify one aspect of another.** The pie chart in Figure 5.2 breaks down the total sales of carnations into more detailed information than the single entry "528" in the table in Figure 5.1. Learners should notice that the table is more general; the pie chart, on the other hand, gives information about a narrower topic—carnations—and no information about any of the other categories.

- ♦ Two separate graphics may be used to **compare aspects of two similar components,** as those in Figures 5.2 and 5.3 do. Learners should see that there is no overlapping information that appears on both graphics.

- ♦ One graphic may **excerpt information from another and present it in a different form,** such as an order form filled out from a catalog list. The learner must find the appropriate information and transfer it to another document. The task may even involve summarizing certain data from one graphic and transferring it to another or checking data from one graphic against information from another. When using a school transcript to complete a job application, an individual may have to summarize the number of credits in math classes or some other specific area and enter that information on the application.

- ♦ Two or more graphics may **present information about the same subject at different points in time,** like the pie charts on oil sources in Figure 4.7. Again, there is no overlapping information.

- ♦ One or more graphics may **contain general information that can be used to take action on the more specific information in another graphic.** For example, suppose an individual is a hospital dietitian. Using the tables in Figures 5.6, 5.7, and 5.8, the dietitian must change the basic menu for 10/7 in order to serve it to Rachel Pierce. For the sake of illustration, these tables are arranged from the most general to the most specific. The table in Figure 5.6 gives the daily food requirements for all groups of patients. Figure 5.7 shows the general menus for two particular days. A list of patients in Figure 5.8 gives specific dietary needs for seven individual patients. The dietitian needs to know first what special needs and characteristics Rachel Pierce has. This is the specific data that requires action.

  To determine this action, the dietitian must note that Rachel's pregnancy and her sensitivity to chocolate are the limiting factors; her age is not. Using the general table in Figure 5.6, the dietitian finds the requirements for pregnant women. Then, the dietitian checks the menus in Figure 5.7 to see if it is necessary to make any changes to ensure that Rachel's needs are met and that her meals do not include chocolate.

Learners should be given ample opportunities to work with multiple graphics and to identify the connections between them. Developing these skills will help to clarify how each graphic should be used in relation to the others.

			October	
		Food Groups and Available Foods		
Daily Servings for:	Dairy	Protein	Fruits & Vegetables	Grains
Adults	2	2	4	4
Children	3	2	4	4
Pregnant Women	4	3	4	4
	cheese (4 oz) cottage cheese (4 oz) ice cream (4 oz) milk (8 oz) yogurt (6 oz) pudding (4 oz)	chicken (4 oz) fish (4 oz) hamburger (4 oz) peanut butter (2 oz) pork chops (4 oz) sardines (4 oz) tuna (4 oz) turkey (4 oz) eggs (1) kidney beans (4 oz) lima beans (4 oz)	apples (1 med) bananas (1 small) broccoli ($\frac{1}{2}$ cup) cabbage ($\frac{1}{2}$ cup) carrots ($\frac{1}{2}$ cup) cucumbers ($\frac{1}{2}$ cup) green beans ($\frac{1}{2}$ cup) lettuce ($\frac{1}{2}$ cup) oranges (med) peas ($\frac{1}{2}$ cup) potatoes ($\frac{1}{2}$ cup) strawberries ($\frac{1}{2}$ cup) tomatoes ($\frac{1}{2}$ cup) tomato sauce ($\frac{1}{4}$ cup)	bread (slice) cereal ($\frac{1}{2}$ cup) corn muffin (1) crackers (4) pancakes (2) pasta ($\frac{1}{2}$ cup) rice ($\frac{1}{2}$ cup)

Figure 5.6

Basic Menu 10/7

Breakfast
   1 toast and peanut butter
  milk
  orange
Lunch
  cheese and tomato sandwich
Dinner
  pork chops
  rice
  carrots
  broccoli

Basic Menu 10/8

Breakfast
     cornflakes and milk
     banana

Lunch
     tuna sandwich
Dinner
     spaghetti and tomato-meat
     sauce
     cucumber and lettuce salad
     chocolate pudding

Figure 5.7

Patient Name	Age	Dietary Restrictions or Preferences	Food Sensitivities
Joe Shield	10	none	tomatoes
Henry Raiz	5	no fish	none
Lonnie Johnson	40	none	none
Sylvia Osborne	32	pregnant	peanuts
Betty Daniel	57	none	none
Lester Cole	38	no red meat	none
Rachel Pierce	28	pregnant	chocolate

Figure 5.8

OTHER STRATEGIES FOR IMPROVING SKILLS TO LEVEL 5

■ Use the newspaper box scores for sports to find details and summarize them.

■ Using a mechanical diagram of a building, have learners locate and tally how many outlets, switches, and fixtures of different types are on each floor. Then, have them convert the information into table form.

■ Use mazes to find the most direct route through a diagram or office floor plan.

■ Compare different types of maps for the same area. For example, learners could use a topographical map, a road map, and a population map to summarize or compare information about specific locations.

■ Develop a job description for a position that needs to be filled and create several resumes and applications for potential employees. Have learners determine which applicants meet the job requirements.

■ Use charts from several mutual funds to compare the trends in prices of these funds.

■ Use information from the Census Bureau on population, schools, industries, and retail businesses for a specific area to have learners prepare summaries that could be used to attract businesses to the area.

Level 5 *Locating Information* Sample Item

You are a line supervisor at a plant that packages dishwashing soap in bottles. Each week you review the production rates for the three teams that work on your line. According to the following bar chart, which team had the highest overall production for Week 38?

A. Team A
B. Team B
C. Team C
D. Team A and Team B had the same high production rate.
E. Team B and Team C had the same high production rate.

Bottle Packaging Production
Week 38

Team A   Team B   Team C
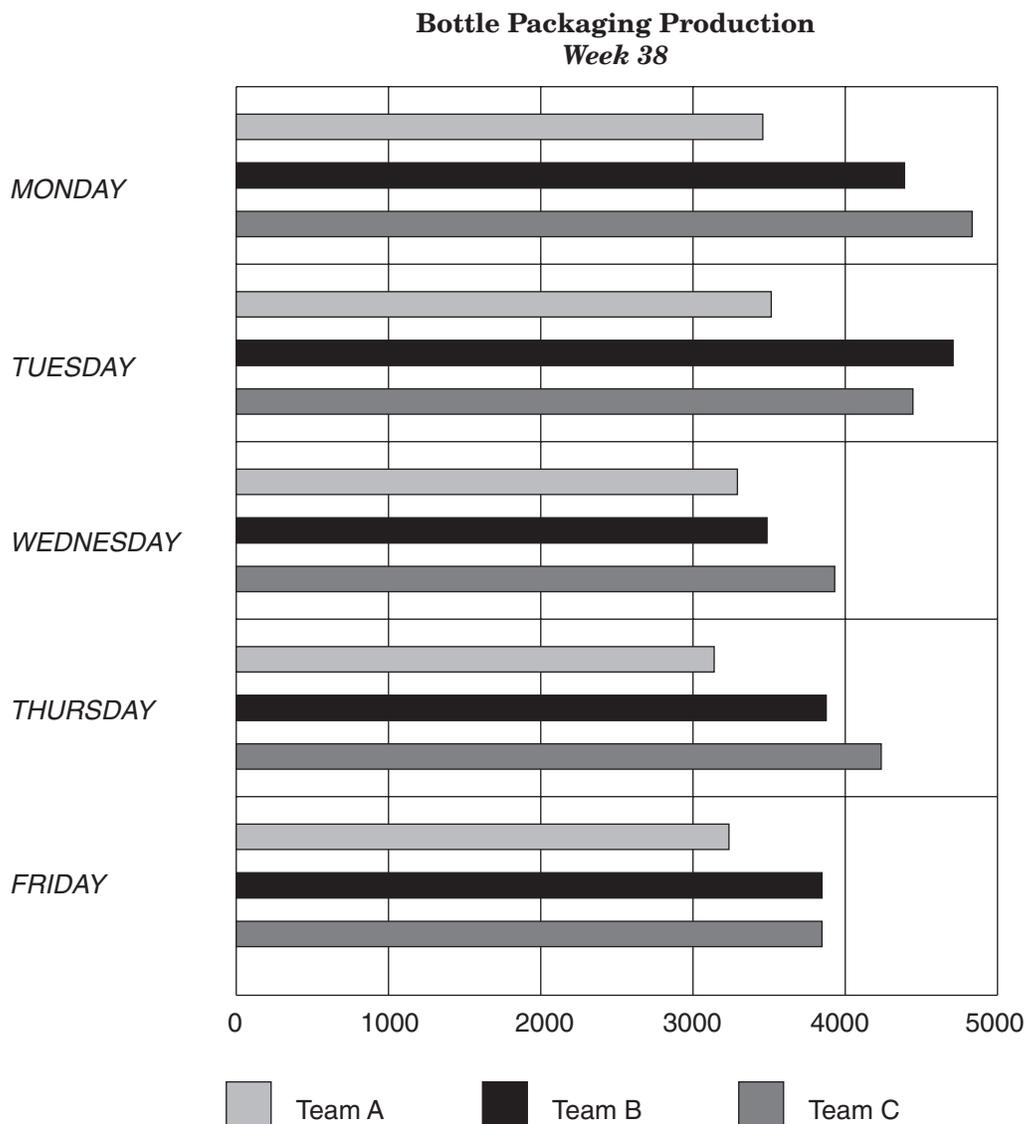
6 Description of Level 6 Skills

Level 6 workplace graphics are very complicated. They contain large amounts of information and may have challenging formats (such as a wiring diagram, airplane control chart, or contour map). They may be very detailed graphs, charts, tables, forms, maps, engineering drawings, and diagrams. Such graphics may contain technical terms and symbols and may have less familiar formats. At Level 6, individuals may work with one or more graphics at a time, and the connections between the graphics may be subtle. In addition to demonstrating the skills at the previous levels, individuals with Level 6 skills can:

■ Draw conclusions based on one complicated graphic or multiple related graphics. The individual must use higher-order thinking to unravel complicated data and summarize it to form a specific conclusion. For example, when analyzing process control charts, it might be necessary to find a point when machine failure occurred.

■ Apply information from one or more complicated graphics to specific situations. Given certain, specific criteria, the individual must locate and then determine how to use the appropriate data. For example, using multiple schedule forms and clinic maps, individuals might schedule appointments for several people to visit doctors, clinicians, and labs in various parts of a large hospital. This may involve using skills described at the previous levels in new ways.

■ Use the information to make decisions. Many workplace responsibilities include using graphics and sorting out unnecessary information to make a decision to solve a problem or complete a task. For example, individuals might use handling forms, facility maps, and storage guidelines to decide where to store a product that is highly flammable and/or corrosive.

Moving to Level 6 Skills

As with Level 5, you can find appropriate graphics in many types of business and government publications. Company annual reports often have detailed tables and graphics. Many industries, such as insurance and investment, publish reports with statistical tables and graphs. Automobile, computer, and appliance retailers, among others, have technical materials, often in chart form, comparing various models. Samples of federal government applications for everything from patents to Secret Service jobs are available free from the government.

Drawing conclusions from graphics with confusing presentations can be especially challenging. The graph in Figure 6.1 illustrates this type of graphic. An employee who works at a stockbrokerage may need to use such a graph to compare the performance of a client's stocks over the past year and to decide which two companies' stock values changed most from the beginning to the end of the year. The graph is somewhat difficult to read because of the number of stocks displayed and the confusing pattern of lines. The task itself includes instructions that could be easily overlooked or misinterpreted: the individual is to find the **two** stocks that have had the **greatest change.**
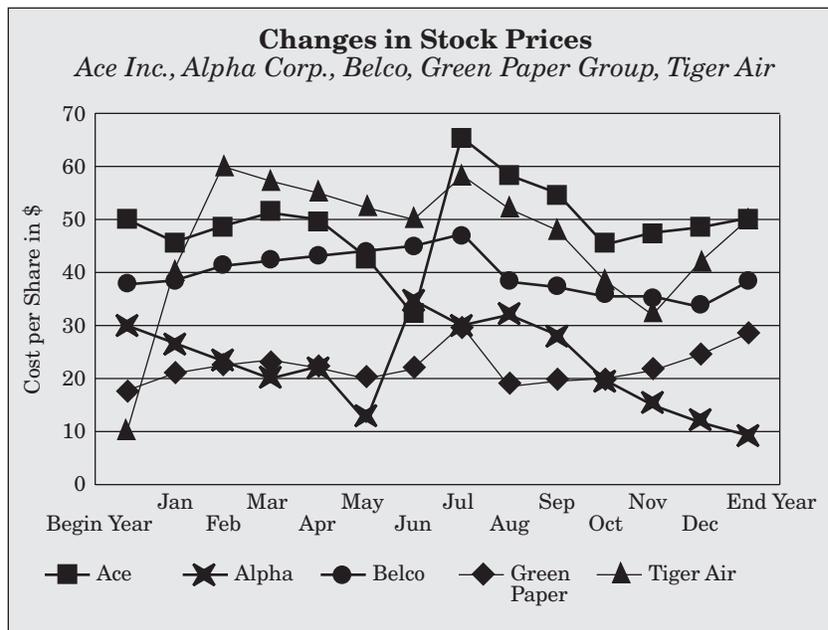
Figure 6.1

Multiple documents relating to the same subject are an important part of Level 6. In some cases, the learner needs to be able to use the data from one document as a point of entry into others. An example of this process is using an automobile crash rating chart to find the rating for a particular model of car and, then, using that rating to find the insurance rate on another chart.

Another example that involves comparing information from several documents, assimilating the data from several sources, and making decisions based on that data is the task of planning a business trip. The employee with this responsibility needs to know the criteria for selecting a hotel. Is location important? What are the cost limits? Are any special facilities required? This employee may need to use road maps, city maps, brochures, and hotel listings to see which choices best meet those criteria. For example, the traveler may wish to be within walking distance of a conference he or she plans to attend. By referring to the conference information, a city map, and a hotel listing, the employee finds a hotel that meets the location criteria. When checking the hotel's rate list, however, the employee discovers that this hotel does not meet the cost limits. The employee must then return to the hotel listing and the map to identify other options.

Often the task may prioritize the criteria. If the person described above is not able to find a hotel that is both close and within the price range, he or she must decide whether price or location is more important in this case. In the workplace, employees are usually given those priorities, but they must understand what those priorities are in order to effectively complete the task.

The tasks at this level stress the more advanced skills of applying information and drawing conclusions. For example, a research specialist for a manufacturing company needs these skills when presented with the following task. The company wants to build a small

plant in a midsized city (population of 375,000–440,000 people) where the prices of necessities are as low as possible and do not change much from year to year. After examining the table in Figure 6.2 and the Consumer Price Index table in Figure 6.3 (using the information in the first subheadings only), the specialist must be able to suggest the region(s) that would suit the company's needs.

There are multiple criteria: city size, low prices, and little price change. The presentation is confusing; some regions do not contain all the area size categories. The researcher must apply the criteria to the chart, compare information that meets the criteria, and reach a conclusion concerning the best site(s).

Region and Area Size

Northeast Urban
     Size A – More than 1,500,000
     Size B/C – 50,000 to 1,500,000
Midwest Urban
     Size A – More than 1,500,000
     Size B/C – 50,000 to 1,500,000
     Size D – Nonmetropolitan (less than 50,000)

South Urban
     Size A – More than 1,500,000
     Size B/C – 50,000 to 1,500,000
     Size D – Nonmetropolitan (less than 50,000)

West Urban
     Size A – More than 1,500,000
     Size B/C – 50,000 to 1,500,000

Figure 6.2

Consumer Price Index for All Urban Consumers (CPI-U)									
	Size Class A			Size Class B/C			Size Class D		
	Index[1]	Percent change from		Index[1]	Percent change from		Index[1]	Percent change from	
Group	Apr. 2003	Apr. 2002	Mar. 2003	Apr. 2003	Apr. 2002	Mar. 2003	Apr. 2003	Apr. 2002	Mar. 2003
Expenditure Category									
Food and beverages	162.2	1.3	−0.2	175.1	2.1	0.1	111.7	1.1	−0.1
Food...	161.7	1.3	−0.2	174.6	2.0	0.1	111.6	1.1	−0.1
Food at home	164.8	0.7	−0.3	170.5	1.6	0.1	110.4	0.3	−0.1
Food away from home	156.8	2.0	0.0	182.7	2.6	0.2	113.7	2.3	0.2
Alcoholic beverages	168.0	1.9	−0.1	182.9	3.0	0.1	113.4	1.8	−0.1
Housing	169.4	2.7	−0.1	167.0	2.4	−0.1	112.6	2.1	−0.3
Shelter	183.7	2.4	−0.1	191.1	2.5	0.2	114.2	1.6	0.0
Rent of primary residence............................	175.6	3.1	0.2	179.7	2.2	0.2	114.7	2.5	0.2
Gas (piped) and electricity	149.3	9.3	−0.1	138.2	4.9	−1.0	115.1	8.3	−0.8
Electricity	136.2	2.6	1.2	134.2	1.9	0.7	106.2	2.9	0.9
Utility natural gas service	179.6	21.4	−2.3	168.2	13.1	−5.8	146.1	22.9	−5.1
Fuels and utilities	154.7	9.0	−0.8	152.5	4.8	−1.0	116.7	8.0	−1.2
Fuels	153.0	10.3	−1.0	128.6	5.2	−1.2	117.2	9.1	−1.5
Household furnishings and operations	121.4	−1.6	0.1	120.5	−1.5	−1.1	100.3	−0.9	0.1
Medical care	232.6	3.5	0.3	285.2	3.7	0.3	124.7	4.3	−0.1
Medical care commodities............................	210.0	2.2	0.1	255.4	1.4	0.0	121.1	3.2	0.0
Medical care services	238.1	3.9	0.4	294.7	4.5	0.4	125.8	4.7	−0.2
Nondurables	159.7	1.8	−0.9	164.0	2.0	−1.0	113.5	2.0	−0.6
Nondurables less food	157.7	2.3	−1.5	154.1	2.0	−2.1	115.2	2.9	−1.1
Nondurables less food and beverages	156.6	2.4	−1.6	152.8	2.0	−2.2	115.3	2.9	−1.2
Nondurables less food and apparel	184.8	5.2	−1.9	170.1	4.2	−2.6	123.9	4.9	−2.0
Recreation	108.7	1.2	−0.1	108.4	0.9	−0.1	105.3	0.3	0.2
Services	185.4	3.2	0.1	205.4	3.2	0.2	116.2	2.9	−0.1
Transportation	157.8	3.7	−0.8	155.6	3.6	−1.4	110.8	3.2	−1.3
Transportation services	175.9	3.2	0.6	218.4	3.4	0.7	116.7	3.9	0.3
Private transportation	156.9	4.1	−1.0	151.7	3.7	−1.5	110.4	3.4	−1.4
New and used motor vehicles	98.1	−1.2	−0.3	97.2	−1.5	−0.2	97.4	−2.2	−0.3
New vehicles...	121.4	−1.0	−0.5	141.8	0.6	−0.1	96.5	−1.9	−0.4
Used cars and trucks....................................	142.5	−2.2	0.0	136.9	−2.3	−0.1	99.5	−2.3	−0.1
Motor fuel	209.3	14.5	−5.0	131.6	11.9	−6.8	135.9	12.7	−5.7
Gasoline (all types)	208.4	14.5	−5.0	130.7	12.0	−6.7	136.1	12.8	−5.6
Gasoline, unleaded regular..................	211.7	14.6	−5.5	124.8	11.7	−7.2	137.9	13.1	−5.9
Gasoline, unleaded midgrade	143.4	14.2	−4.4	146.1	12.0	−5.4	133.8	12.3	−5.5
Gasoline, unleaded premium...............	190.0	13.6	−3.9	135.4	11.0	−5.5	131.9	12.1	−5.1

[1]Index is in US dollars and is a monthly average.

Data from US Department of Labor, Bureau of Labor Statistics: www.bis.gov

Figure 6.3

The abilities to use written and visual clues, sort information, and eliminate unnecessary information have been discussed at the earlier levels. These skills are even more crucial at Level 6. Have learners examine the task carefully, looking for key words and writing them down. These key words include interrogatory words such as *who, what, which,* and *how many;* limiting words such as *only, all, worst,* and *least;* and descriptive words that describe the topic the learner will focus on.

Suppose an employee of Baxter Crackers is responsible for purchasing boxes as needed. The employee must place any orders to be shipped on a particular day by noon. A supervisor asks the employee how many (total) Animal Crackers boxes will be expected for production during the week of 10/20 and when the last day to order boxes for the week of 10/20 would be. The employee has the documents in Figures 6.4, 6.5, and 6.6 for reference. Most of the information provided is unnecessary. The question asks only about total expected production and the last chance to order the boxes, if they are needed. Therefore the number of boxes on hand (see Figure 6.4) does not matter. Nor does it matter what the production is for any product other than Animal Crackers (see Figure 6.5). As shown in Figure 6.5, the total number expected is 7,700. If the boxes are needed for the week of 10/20, they must be ordered by noon on Thursday of the preceding week. That information is available from Figure 6.6.

Boxes on Hand 10/13	
Animal Crackers	10,000
Crispies	6,200
Grahams	6,340
Salties	20,200
Thins	12,400
Wheat Ones	4,900

Figure 6.4

It is especially important that the learner be exposed to documents containing unfamiliar formats, perspectives, symbols, and terms. However, the learner's goal is always to use the graphic as a tool to accomplish a specific task. A driver quickly learns to watch the car's gauges for certain indications of problems but may understand very little about automobile mechanics. In the same way, an employee often deals with documents, no matter how complicated, for very task-specific reasons without having to understand the entire document. The task defines the use of the document. Therefore, it is useful to find or devise tasks that include specific guidelines and requirements, especially with the more difficult graphics.

Production Week of 10/20								
	Mon 10/20	Tues 10/21	Wed 10/22	Thurs 10/23	Fri 10/24	Sat 10/25	Sun 10/26	Total Expected to Produce
Animal Crackers	1,100	1,100	1,100	1,100	1,100	1,100	1,100	7,700
Crispies	1,000	1,050	1,200	1,200	900	–	–	5,350
Grahams	1,100	1,100	1,100	1,100	800	–	–	5,200
Salties	2,200	2,200	2,200	2,200	2,200	2,200	2,200	15,400
Thins	2,200	2,200	2,200	2,200	1,900	–	–	10,700
Wheat Ones	1,000	1,000	1,000	1,000	800	–	–	4,800

Figure 6.5

Ordering Schedule for Boxes				
Product	Point of Origin for Boxes	Shipment Days	Transit Time (Days)	Arrival Time
Animal Crackers	Omaha, NE	Every Thursday	1	5:50 PM
Crispies	Cincinnati, OH	Every Monday	3	4:20 PM
Grahams	Michigan City, IN	Every Wednesday	2	12:30 PM
Salties	Kalamazoo, MI	Every Monday & Wednesday	2	1:00 PM
Thins	St. Louis, MO	Every Wednesday & Friday	1	3:00 PM
Wheat Ones	Chicago, IL	Every Monday	1	2:15 PM

Figure 6.6

OTHER STRATEGIES FOR IMPROVING SKILLS TO LEVEL 6

■ Use industrial diagrams to provide practice with unfamiliar terminology and format.

■ Tax guides also provide plenty of complicated material; working with a depreciation and amortization schedule and the accompanying depreciation tables would be a good Level 6 exercise using more than one document.

■ Devise a list of requirements for the purchase of stoves (or other appliance or fixture) for an apartment complex. Include size, price, safety features, color, and convenience features. Obtain charts describing model features and prices from at least two dealers. Price schedules should include variations for purchases of different quantities. Find or devise city or other government code regulations that apply to apartments. Have learners recommend the best choice for purchase.

■ Have learners use a wide selection of graphic documents to make travel and hotel arrangements that meet a variety of criteria. Include airline schedules, car rental rate lists, and hotel listings, among others.

■ Use the graphics in a company's annual report to have learners make summarizing statements and draw conclusions concerning the company's sales over a year's time.

You are a road contractor and you have analyzed a soil that you want to use for road fill. Your analysis shows that the soil contains 15% sand, 65% silt, and 20% clay. You need to know what the shrink–swell potential is for the soil because it will affect the durability of the road. Based on the diagram and table shown, what is the shrink–swell potential at a 30-inch depth for this soil?

A. Low
B. Low to moderate
C. Moderate
D. Moderate to high
E. High
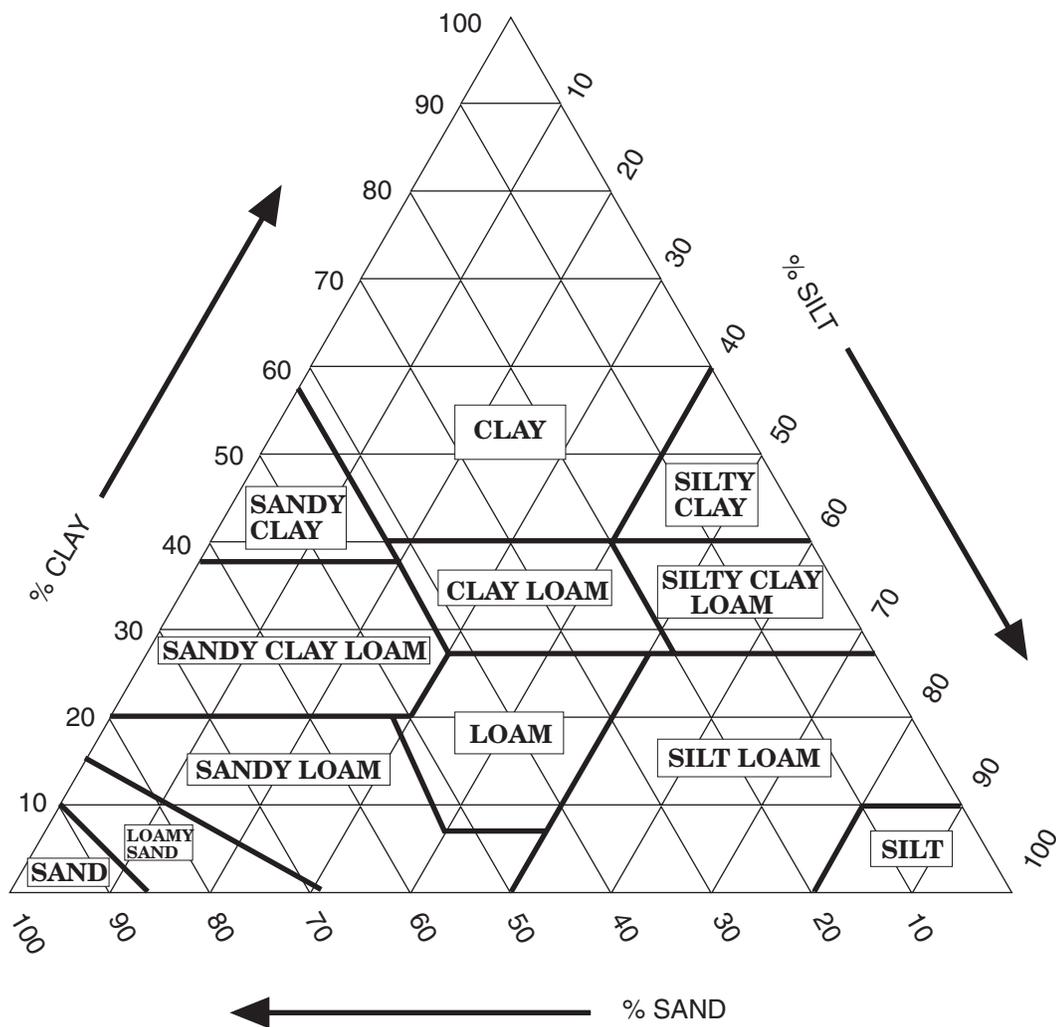
Soil name	Texture class	Depth (inches)	Shrink-swell potential
Sarpy	sandy loam	0-7 7-60	low low to moderate
Kennebec	silt loam	0-38 38-60	moderate low to moderate
Colo	silty clay loam	0-31 31-60	high high
Blend	silty clay	0-17 17-29 29-60	high moderate to high high
Nevin	clay loam	0-28 28-48 48-60	moderate to high moderate moderate
Kenmoor	loamy sand	0-24 24-60	low high

Indications that this is a Level 6 item:

♦ The item uses two graphics, one of which (the soil triangle) has a challenging format.

♦ The examinee is required to apply the information to a specific situation—the given soil analysis.

Using the soil triangle, the task is to find the intersection of 15% sand, 65% silt, and 20% clay. The values intersect in the "silt loam" soil texture class. From the soil table, Kennebec is the soil that is a silt loam texture class. Kennebec, at a depth of 30 inches, has moderate shrink–swell potential.

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