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ABSTRACT

This Occupational Competency Analysis Profile (OCAP) contains a competency list verified by expert workers and developed through a modified DACUM (Developing a Curriculum) involving business, industry, labor, and community agency representatives from Ohio. This OCAP identifies the occupational, academic, and employability skills (competencies) needed to enter agriculture products processing occupations. These 23 units are included: general safety precautions; sanitation; meat processing industry; livestock purchasing; slaughtering; carcass grading; wholesale cutting; retail beef cutting; retail pork cutting; retail veal and beef-calf cutting; retail lamb, mutton, and goat cutting; miscellaneous meat merchandising; dairy and other pasteurized products; eggs; processed foods; fish and fish products; fruits and vegetables; grains; preservation of agricultural products; customer service; marketing; product handling; and business management . The units detail the knowledge, skills, and attitudes (competency builders) needed to perform each competency. Within the competency list are two levels of items, core items essential for entry-level employment, and items needed to advance in agriculture products processing occupations. The OCAP guide also contains an academic job profile based on the Work Keys system that identifies the level of applied academic skills that students must master to qualify for and be successful in their occupations; a total list of academic competencies in communication, mathematics, and science that all students should master; and a specific list of academic competencies for agriculture products processing occupations. (YLB)

OCAP

OCCUPATIONAL COMPETENCY ANALYSIS PROFILE

AGRICULTURE PRODUCTS PROCESSING

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Introduction

What is an OCAP?

According to the *Action Plan for Accelerating the Modernization of Vocational Education: Ohio's Future at Work*—

> A comprehensive and verified employer competency list will be developed and kept current for each program
>
> —Imperative 3, Objective 2—

The Occupational Competency Analysis Profiles (OCAPs) are the Ohio Division of Vocational and Adult Education's response to that objective.

OCAPs are competency lists—verified by expert workers—that evolve from a modified DACUM job analysis process involving business, industry, labor, and community agency representatives from throughout Ohio. The OCAP process is directed by the Vocational Instructional Materials Laboratory located at The Ohio State University's Center on Education and Training for Employment.

How is the OCAP used?

Each OCAP identifies the occupational, academic, and employability skills (or competencies) needed to enter a given occupation or occupational area. The OCAP not only lists the *competencies* but also clusters those competencies into broader *units* and details the knowledge, skills, and attitudes (*competency builders*) needed to perform each competency.

Within the competency list are two levels of items: core and advancing. *Core items*, which are essential for entry-level employment, are required to be taught and are the basis for questions on the Ohio Vocational Competency Assessment (OVCA). *Advancing items* (marked with an asterisk) are those needed to advance in a given occupation.

School districts may add as many units, competencies, and/or competency builders as desired to reflect local employment needs, trends, and specialties. Local advisory committees should be actively involved in the identification and verification of additional items. Vocational and applied academic instructors will be able to formulate their courses of study using the varied contents of the OCAP and will be able to monitor competency gains via the new criterion-referenced competency testing program, which is tied to the competencies identified on the OCAP.

Notes

Occupational Competency Analysis Profile:

Agriculture Products Processing

Unit 1: General Safety Precautions

Competency 1.1: Maintain safe work environment

Competency Builders:

1.1.1 Follow printed workplace safety information (e.g., employee handbook)
1.1.2 Identify hazardous materials
1.1.3 Identify the location of material safety data sheets (MSDSs)
1.1.4 Locate emergency exits
1.1.5 Comply with shop and equipment safety rules
1.1.6 Organize work area in accordance with safety standards
1.1.7 Maintain work area in accordance with standards for cleanliness and safety
1.1.8 Identify importance of using safety devices
1.1.9 Use safety devices pertaining to the work area in accordance with OSHA standards
1.1.10 Identify the most common causes of agricultural and food processing accidents
1.1.11 Identify safety hazards
1.1.12 Report safety hazards to appropriate person(s)
1.1.13 Identify appropriate action to be taken in given emergency situations
1.1.14 Follow basic first aid and cardiopulmonary resuscitation (CPR) procedures
1.1.15 Complete accident reports for any injury (minor or major) sustained on the job
1.1.16 Identify classes of fires (e.g., A, B, C)
1.1.17 Explain the operation of given fire extinguishers
1.1.18 Select appropriate extinguisher to extinguish given class of fire
1.1.19 Participate in safety training programs
1.1.20 Recognize consumer issues pertaining to the industry (e.g., environment, health)

Competency 1.2: Demonstrate safe work habits

Competency Builders:

1.2.1 Follow label information
1.2.2 Wear protective clothing and equipment
1.2.3 Locate chemical wash stations
1.2.4 Comply with personal hygiene requirements (e.g., wear hair net and head covering)
1.2.5 Follow safety procedures established for lifting and carrying
1.2.6 Observe safety precautions when using and storing chemicals
1.2.7 Follow procedures established for personal cleanup after handling chemicals
1.2.8 Dispose of chemicals and chemical containers according to manual specifications and/or government regulations*
1.2.9 Remove debris from work area
1.2.10 Handle live animals in safe manner

Competency 1.3: Demonstrate established procedures for the operation and maintenance of tools and equipment

Competency Builders:

1.3.1 Identify tools and equipment used in agriculture products processing
1.3.2 Select tools and equipment appropriate for given job
1.3.3 Set up/adjust tools and equipment in accordance with operating instructions

Continued

Competency 1.3: ***Demonstrate established procedures for the operation and maintenance of tools and equipment***—*Continued*

1.3.4 Operate tools and equipment in accordance with general safety precautions and operating instructions
1.3.5 Comply with safety zones around tools and equipment
1.3.6 Interpret safety symbols
1.3.7 Maintain safety shields on tools and equipment
1.3.8 Identify potential tool and equipment safety hazards
1.3.9 Report potential tool and equipment safety hazards to appropriate person(s)
1.3.10 Disable power equipment before servicing (i.e., shut down and lock-out/tag-out)
1.3.11 Service equipment (e.g., perform daily maintenance)
1.3.12 Repair tools and equipment in accordance with operating manuals*
1.3.13 Store equipment
1.3.14 Demonstrate knowledge of the principles of selected mechanical applications (e.g., levers, pulleys, hydraulics, internal combustion)*

Unit 2: Sanitation

Competency 2.1: Clean/sanitize facility

Competency Builders:

2.1.1 Follow general safety precautions
2.1.2 Identify equipment/areas to be cleaned
2.1.3 Remove edible products
2.1.4 Remove debris
2.1.5 Disassemble equipment
2.1.6 Select cleaning and sanitizing agent(s) appropriate for given job
2.1.7 Soak equipment
2.1.8 Apply soap (degreaser)
2.1.9 Brush or scrub equipment/area (e.g., floors, ceilings, walls)
2.1.10 Rinse equipment/area
2.1.11 Sanitize equipment/area
2.1.12 Oil equipment
2.1.13 Follow pre-cleanup and post-cleanup inspection procedures
2.1.14 Monitor sanitation program*
2.1.15 Conduct sanitation inspections inside and outside the plant*

Competency 2.2: Test for bacteria*

Competency Builders:

2.2.1 Follow general safety and sanitation precautions*
2.2.2 Identify equipment/area to be tested*
2.2.3 Select appropriate testing equipment*
2.2.4 Follow established te ting procedures*
2.2.5 Interpret test results*
2.2.6 Identify appropriate corrective action*
2.2.7 Identify procedures for product testing*

Competency 2.3: Conduct pest-control programs

Competency Builders:

2.3.1 Identify major types of pests
2.3.2 Select appropriate control for each major type of pest
2.3.3 Extract pertinent information from label on selected control
2.3.4 Select nonrestricted control*
2.3.5 Solve time, distance, area, volume, ratio, proportion, and percentage problems*
2.3.6 Mix nonrestricted control according to label*
2.3.7 Calibrate spray equipment*
2.3.8 Apply nonrestricted control according to label and local, state, federal, and EPA regulations*
2.3.9 Clean pesticide application equipment, safety clothing, and safety equipment*
2.3.10 Store pesticide application equipment, safety clothing, and safety equipment*
2.3.11 Dispose of containers and residual pesticides*
2.3.12 Monitor pest-control program

Competency 2.4: Comply with legal regulations for the agriculture products processing industry*

Competency Builders:

2.4.1 Identify agencies regulating the industry*
2.4.2 Identify sanitation requirements for licensing*
2.4.3 Identify marketing regulations*
2.4.4 Identify local, state, and federal inspection requirements*
2.4.5 Display appropriate inspection certificates*

Unit 3: Meat Processing Industry

Competency 3.1: Evaluate economic aspects of the meat processing industry

Competency Builders:

3.1.1 Describe regulatory groups governing the meat processing industry (e.g., United States Department of Agriculture [USDA], Ohio Department of Agriculture [ODA], Environmental Protection Agency [EPA], Occupational Safety and Health Administration [OSHA])
3.1.2 Identify state licensing requirements for meat processing
3.1.3 Describe consumer and industry trends
3.1.4 Identify factors affecting meat consumption
3.1.5 Identify supportive industry and trade organizations (e.g., Farm Bureau, Beef Council, Ohio Association of Meat Processors)

Competency 3.2: Assess employment and professional development opportunities in the meat processing industry

Competency Builders:

3.2.1 Identify employment opportunities within the meat processing industry
3.2.2 Identify entrepreneurial opportunities within the meat processing industry
3.2.3 Identify continuing education/training opportunities related to meat processing
3.2.4 Identify industry and trade journals related to meat processing

Unit 4: Livestock Purchasing

Competency 4.1: Inspect animals

Competency Builders:

4.1.1 Follow general safety precautions
4.1.2 Identify state and federal inspection requirements
4.1.3 Examine animals for disease symptoms
4.1.4 Examine animals for injuries
4.1.5 Identify parasites that affect meat animals
4.1.6 Examine animals for parasites

Competency 4.2: Select market animals (e.g., cattle, hogs, lambs, and goats) for slaughter

Competency Builders:

4.2.1 Follow general safety precautions
4.2.2 Identify alternative methods of evaluation (e.g., Sonaray)
4.2.3 Evaluate muscling
4.2.4 Evaluate size
4.2.5 Evaluate finish
4.2.6 Estimate expected carcass desirability
4.2.7 Determine market class
4.2.8 Determine market weight
4.2.9 Determine market grade

Competency 4.3: Select live poultry (e.g., turkeys, ducks, and chickens) for slaughter

Competency Builders:

4.3.1 Follow general safety precautions
4.3.2 Evaluate physical characteristics
4.3.3 Evaluate birds' health
4.3.4 Evaluate general conformation
4.3.5 Check fleshing
4.3.6 Check fat covering
4.3.7 Examine birds for injuries
4.3.8 Determine market grades and standards

Unit 5: Slaughtering

Competency 5.1: Handle livestock

Competency Builders:

5.1.1 Follow strict safety precautions in the handling of livestock
5.1.2 Follow established procedures for the humane handling of livestock
5.1.3 Clean watering equipment
5.1.4 Water animals

Continued

Competency 5.1: ***Handle livestock—Continued***

5.1.5 Feed animals as appropriate
5.1.6 Weigh animals
5.1.7 Clean holding pens
5.1.8 Dispose of dead animals

Competency 5.2: Kill livestock

Competency Builders:

5.2.1 Follow strict safety precautions in the killing of livestock
5.2.2 Identify animal welfare issues
5.2.3 Stun animal
5.2.4 Shackle animal
5.2.5 Bleed animal

Competency 5.3: Prepare beef/veal, mutton/lamb, and goat carcasses

Competency Builders:

5.3.1 Follow general safety precautions
5.3.2 Remove head
5.3.3 Tie off weasand and esophagus
5.3.4 Remove feet
5.3.5 Skin animal
5.3.6 Eviscerate animal
5.3.7 Empty paunch
5.3.8 Split carcass into halves
5.3.9 Wash carcass
5.3.10 Salvage offals (e.g., heart, liver)
5.3.11 Trim carcass
5.3.12 Weigh carcass
5.3.13 Shroud carcass

Competency 5.4: Prepare pork carcasses

Competency Builders:

5.4.1 Follow general safety precautions
5.4.2 Scald animal
5.4.3 Dehair or skin animal
5.4.4 Singe/polish animal
5.4.5 Remove head
5.4.6 Eviscerate animal
5.4.7 Split carcass into halves
5.4.8 Wash carcass
5.4.9 Salvage offals (e.g., heart, liver)
5.4.10 Trim carcass

Unit 6: Carcass Grading

Competency 6.1: Grade beef and veal carcasses

Competency Builders:

6.1.1 Follow general safety precautions
6.1.2 Classify carcasses according to age
6.1.3 Classify carcasses according to sex
6.1.4 Observe conformation
6.1.5 Determine quality and yield grade in accordance with federal grading standards
6.1.6 Determine maturity

Competency 6.2: Grade lamb, mutton, and goat carcasses

Competency Builders:

6.2.1 Follow general safety precautions
6.2.2 Determine cutability
6.2.3 Determine finish
6.2.4 Evaluate muscle development
6.2.5 Determine quality and yield grade in accordance with federal grading standards
6.2.6 Determine maturity

Competency 6.3: Grade pork carcasses

Competency Builders:

6.3.1 Follow general safety precautions
6.3.2 Classify carcasses according to age
6.3.3 Classify carcasses according to sex
6.3.4 Determine finish
6.3.5 Evaluate muscle development
6.3.6 Determine quality
6.3.7 Identify alternative methods of determining expected lean cut yield (e.g., Fat-o-meter)
6.3.8 Determine expected yield of a given number of lean cuts

Competency 6.4: Grade dressed poultry

Competency Builders:

6.4.1 Follow general safety precautions
6.4.2 Classify poultry according to species
6.4.3 Classify poultry according to age
6.4.4 Check fleshing
6.4.5 Check fat covering
6.4.6 Check for bodily damage
6.4.7 Evaluate carcass quality
6.4.8 Apply federal grading standards and regulations
6.4.9 Perform uniformity tests on turkey breast skin

Unit 7: Wholesale Cutting

Competency 7.1: Identify wholesale cuts

Competency Builders:

7.1.1 Follow general safety and sanitation precautions
7.1.2 Determine species
7.1.3 Identify bone structure of carcasses
7.1.4 Identify muscle structure of carcasses

Competency 7.2: Cut beef carcasses (hanging)

Competency Builders:

7.2.1 Follow general safety and sanitation precautions
7.2.2 Separate forequarter from hindquarter
7.2.3 Break forequarter
7.2.4 Separate chuck
7.2.5 Separate rib
7.2.6 Separate brisket
7.2.7 Separate short plate
7.2.8 Break hindquarter
7.2.9 Separate flank
7.2.10 Separate round
7.2.11 Separate loin
7.2.12 Separate shank

Competency 7.3: Prepare boxed beef

Competency Builders:

7.3.1 Follow general safety and sanitation precautions
7.3.2 Identify forequarter cuts (e.g., chuck, rib, plate, brisket)
7.3.3 Identify hindquarter cuts (e.g., round, loin, flank)
7.3.4 Describe color characteristics of boxed beef while in packaging material

Competency 7.4: Cut pork carcasses

Competency Builders:

7.4.1 Follow general safety and sanitation precautions
7.4.2 Identify primal pork cuts (i.e., leg, loin, rib)
7.4.3 Remove shoulder
7.4.4 Remove neckbone
7.4.5 Remove jowl
7.4.6 Remove forefeet
7.4.7 Separate Boston butt and picnic
7.4.8 Trim Boston butt and picnic
7.4.9 Separate ham and hind feet
7.4.10 Remove hind feet
7.4.11 Trim ham

Continued

Competency 7.4: ***Cut pork carcasses—Continued***

7.4.12 Remove loin
7.4.13 Trim loin
7.4.14 Remove rib
7.4.15 Separate fat back and belly
7.4.16 Trim belly

Competency 7.5: Cut veal carcasses*

Competency Builders:

7.5.1 Follow general safety and sanitation precautions*
7.5.2 Cut fore saddle*
7.5.3 Cut hind saddle*
7.5.4 Cut long saddle*
7.5.5 Remove shoulder*
7.5.6 Remove foreshank*
7.5.7 Remove breast*
7.5.8 Remove rack*
7.5.9 Remove flank*
7.5.10 Remove loin*
7.5.11 Remove leg*

Competency 7.6: Cut lamb, mutton, and goat carcasses

Competency Builders:

7.6.1 Follow general safety and sanitation precautions
7.6.2 Cut fore saddle
7.6.3 Cut hind saddle
7.6.4 Cut long saddle
7.6.5 Remove lower hind shank
7.6.6 Remove upper foreshank
7.6.7 Remove shoulder
7.6.8 Remove lower foreshank
7.6.9 Remove breast
7.6.10 Remove rack
7.6.11 Remove loin
7.6.12 Remove leg

Unit 8: Retail Beef Cutting

Competency 8.1: Identify beef cuts

Competency Builders:

8.1.1 Follow general safety and sanitation precautions
8.1.2 Recognize bone structure of wholesale cuts
8.1.3 Recognize muscle structure of wholesale cuts
8.1.4 Identify box cuts at the retail level

Competency 8.2: Merchandise beef chuck cuts

Competency Builders:

8.2.1 Follow general safety and sanitation precautions
8.2.2 Cut bone-in chuck roasts
8.2.3 Cut boneless chuck roasts
8.2.4 Cut blade steaks/roasts
8.2.5 Cut arm steaks/roasts

Competency 8.3: Merchandise beef shank cuts

Competency Builders:

8.3.1 Follow general safety and sanitation precautions
8.3.2 Cut foreshanks
8.3.3 Cut hind shanks
8.3.4 Prepare shank cross cuts

Competency 8.4: Merchandise beef brisket cuts

Competency Builders:

8.4.1 Follow general safety and sanitation precautions
8.4.2 Cut whole bone-in beef briskets
8.4.3 Prepare boneless fresh briskets
8.4.4 Prepare briskets for curing

Competency 8.5: Merchandise beef rib cuts

Competency Builders:

8.5.1 Follow general safety and sanitation precautions
8.5.2 Cut standing rib roasts
8.5.3 Cut bone-in rib steaks
8.5.4 Cut boneless rib steaks
8.5.5 Cut rib eye steaks/roasts

Competency 8.6: Merchandise beef plate cuts

Competency Builders:

8.6.1 Follow general safety and sanitation precautions
8.6.2 Cut short ribs
8.6.3 Cut skirt steaks
8.6.4 Cut skirt steak rolls

Competency 8.7: Merchandise beef short loin cuts

Competency Builders:

8.7.1 Follow general safety and sanitation precautions
8.7.2 Cut top loin steaks
8.7.3 Cut T-bone steaks
8.7.4 Cut porterhouse steaks
8.7.5 Cut strip steaks
8.7.6 Cut tenderloin steaks

Competency 8.8: Merchandise beef flank cuts

Competency Builders:

8.8.1 Follow general safety and sanitation precautions
8.8.2 Cut flank steaks
8.8.3 Prepare rolled flanks
8.8.4 Prepare flank meat for curing

Competency 8.9: Merchandise beef sirloin cuts

Competency Builders:

8.9.1 Follow general safety and sanitation precautions
8.9.2 Cut pin bone sirloin steaks
8.9.3 Cut flat bone sirloin steaks
8.9.4 Cut wedge bone sirloin steaks
8.9.5 Cut round bone sirloin steaks
8.9.6 Cut boneless sirloin steaks
8.9.7 Cut cube steaks
8.9.8 Cut shell sirloin steaks
8.9.9 Cut top sirloin steaks

Competency 8.10: Merchandise beef round cuts

Competency Builders:

8.10.1 Follow general safety and sanitation precautions
8.10.2 Separate rump cuts
8.10.3 Cut heel of round roasts
8.10.4 Cut top round steaks/roasts
8.10.5 Cut bottom round steaks/roasts
8.10.6 Cut round steaks
8.10.7 Cut eye of round steaks/roasts
8.10.8 Cut full beef round steaks/roasts
8.10.9 Cut cube steaks
8.10.10 Prepare rolled rump roasts
8.10.11 Cut standing rump roasts
8.10.12 Cut sirloin tip steaks/roasts

Competency 8.11: Merchandise beef variety meats

Competency Builders:

8.11.1 Follow general safety and sanitation precautions
8.11.2 Prepare beef heart
8.11.3 Prepare beef liver
8.11.4 Prepare beef tongue
8.11.5 Prepare beef kidneys
8.11.6 Prepare beef sweetbreads
8.11.7 Prepare oxtails

Unit 9: Retail Pork Cutting

Competency 9.1: Merchandise Boston butt cuts

Competency Builders:

9.1.1 Follow general safety and sanitation precautions
9.1.2 Cut blade steaks/roasts
9.1.3 Cut Boston butt roasts
9.1.4 Prepare rolled Boston butt roasts

Competency 9.2: Merchandise pork picnic shoulder cuts

Competency Builders:

9.2.1 Follow general safety and sanitation precautions
9.2.2 Cut fresh picnic shoulder roasts
9.2.3 Prepare rolled fresh picnic shoulder roasts
9.2.4 Cut arm steaks/roasts
9.2.5 Cut fresh hocks
9.2.6 Prepare hocks and jowls for curing

Competency 9.3: Merchandise pork belly cuts

Competency Builders:

9.3.1 Follow general safety and sanitation precautions
9.3.2 Cut fresh side pork
9.3.3 Prepare fresh side pork for curing
9.3.4 Slice slab bacon
9.3.5 Cut spareribs

Competency 9.4: Merchandise pork loin cuts

Competency Builders:

9.4.1 Follow general safety and sanitation precautions
9.4.2 Cut blade steaks/roasts
9.4.3 Prepare country-style ribs
9.4.4 Cut back ribs
9.4.5 Cut center loin roasts/chops
9.4.6 Cut rib roasts/chops
9.4.7 Cut butterfly chops
9.4.8 Prepare rolled loin roasts
9.4.9 Cut sirloin roasts/chops
9.4.10 Cut tenderloins
9.4.11 Cut boneless center-cut roasts/chops
9.4.12 Prepare boneless loin for Canadian bacon

Competency 9.5: Merchandise ham cuts

Competency Builders:

9.5.1 Follow general safety and sanitation precautions
9.5.2 Cut smoked (or fresh) ham shanks
9.5.3 Cut smoked (or fresh) ham butt roasts
9.5.4 Cut smoked (or fresh) ham center slices
9.5.5 Prepare rolled fresh hams
9.5.6 Prepare boneless smoked ham rolls
9.5.7 Prepare semiboneless smoked ham rolls
9.5.8 Slice cooked boiled hams

Competency 9.6: Merchandise pork variety meats

Competency Builders:

9.6.1 Follow general safety and sanitation precautions
9.6.2 Prepare pork tongue
9.6.3 Prepare pork heart
9.6.4 Prepare pork liver
9.6.5 Prepare pork kidneys

Unit 10: Retail Veal and Beef-Calf Cutting

Competency 10.1: Merchandise veal and beef-calf shoulder cuts

Competency Builders:

10.1.1 Follow general safety and sanitation precautions
10.1.2 Cut arm steaks/roasts
10.1.3 Prepare rolled shoulder roasts
10.1.4 Cut neck
10.1.5 Cut blade steaks/roasts

Competency 10.2: Merchandise veal and beef-calf breast cuts

Competency Builders:

10.2.1 Follow general safety and sanitation precautions
10.2.2 Debone whole veal breasts
10.2.3 Cut riblets
10.2.4 Cut breast roasts
10.2.5 Prepare stuffed breast roasts
10.2.6 Prepare brisket rolls

Competency 10.3: Merchandise veal and beef-calf rib or rack cuts

Competency Builders:

10.3.1 Follow general safety and sanitation precautions
10.3.2 Cut rib roasts
10.3.3 Cut crown roasts
10.3.4 Cut rib chops
10.3.5 Cut French rib chops
10.3.6 Prepare stuffed chops

Competency 10.4: Merchandise veal and beef-calf loin cuts

Competency Builders:

10.4.1 Follow general safety and sanitation precautions
10.4.2 Cut loin roasts
10.4.3 Cut loin chops
10.4.4 Cut kidney chops

Competency 10.5: Merchandise veal and beef-calf leg cuts

Competency Builders:

10.5.1 Follow general safety and sanitation precautions
10.5.2 Cut standing rump roasts
10.5.3 Prepare rolled leg roasts
10.5.4 Prepare boneless cutlets
10.5.5 Prepare rolled cutlets
10.5.6 Cut center-cut leg roasts
10.5.7 Cut round steaks
10.5.8 Cut heel of round roasts
10.5.9 Cut veal shanks
10.5.10 Cut sirloin chops

Competency 10.6: Merchandise veal and beef-calf variety meats

Competency Builders:

10.6.1 Follow general safety and sanitation precautions
10.6.2 Prepare veal and beef-calf heart
10.6.3 Prepare veal and beef-calf liver
10.6.4 Prepare veal and beef-calf tongue
10.6.5 Prepare veal and beef-calf kidneys
10.6.6 Prepare veal and beef-calf sweetbreads

Unit 11: Retail Lamb, Mutton, and Goat Cutting

Competency 11.1: Merchandise lamb, mutton, and goat shoulder cuts

Competency Builders:

11.1.1 Follow general safety and sanitation precautions
11.1.2 Cut neck slices
11.1.3 Cut cushion shoulder roasts
11.1.4 Prepare rolled shoulder roasts
11.1.5 Cut blade chops
11.1.6 Cut square cut shoulder roasts
11.1.7 Cut arm chops

Competency 11.2: Merchandise lamb, mutton, and goat breast cuts

Competency Builders:

11.2.1 Follow general safety and sanitation precautions
11.2.2 Cut breast roasts
11.2.3 Prepare rolled breast roasts
11.2.4 Cut riblets
11.2.5 Cut spareribs
11.2.6 Cut brisket pieces

Competency 11.3: Merchandise lamb, mutton, and goat rib or rack cuts

Competency Builders:

11.3.1 Follow general safety and sanitation precautions
11.3.2 Prepare rib roasts/chops
11.3.3 Cut crown roasts
11.3.4 Cut French rib chops

Competency 11.4: Merchandise lamb, mutton, and goat loin cuts

Competency Builders:

11.4.1 Follow general safety and sanitation precautions
11.4.2 Cut loin roasts/chops
11.4.3 Prepare rolled loin roasts

Competency 11.5: Merchandise lamb, mutton, and goat sirloin cuts

Competency Builders:

11.5.1 Follow general safety and sanitation precautions
11.5.2 Cut sirloin chops
11.5.3 Cut sirloin roasts

Competency 11.6: Merchandise lamb, mutton, and goat leg cuts

Competency Builders:

11.6.1 Follow general safety and sanitation precautions
11.6.2 Prepare rolled leg roasts
11.6.3 Cut sirloin half of leg
11.6.4 Cut shank half of leg
11.6.5 Cut leg roasts with sirloin on
11.6.6 Cut leg roasts with sirloin off
11.6.7 Cut American leg roasts
11.6.8 Cut Frenched leg roasts
11.6.9 Cut center leg roasts
11.6.10 Cut hind shanks
11.6.11 Cut foreshanks

Competency 11.7: Merchandise lamb, mutton, and goat variety meats

Competency Builders:

11.7.1 Follow general safety and sanitation precautions
11.7.2 Prepare lamb, mutton, and goat heart
11.7.3 Prepare lamb, mutton, and goat kidneys
11.7.4 Prepare lamb, mutton, and goat liver
11.7.5 Prepare lamb, mutton, and goat tongue

Unit 12: Miscellaneous Meat Merchandising

Competency 12.1: Process meat cuts

Competency Builders:

12.1.1 Follow general safety and sanitation precautions
12.1.2 Select pork meats to be used for ground ham loaf
12.1.3 Select beef meats to be used for ground beef
12.1.4 Select pork meats to be used for sausage
12.1.5 Debone cuts
12.1.6 Grind meat
12.1.7 Cut stew meat
12.1.8 Cube meat
12.1.9 Shape roasts with string
12.1.10 Tenderize cuts
12.1.11 Slice meat cuts

Continued

Competency 12.1: ***Process meat cuts—Continued***

12.1.12 Prepare meat loaves
12.1.13 Prepare meat patties
12.1.14 Prepare cube steaks

Competency 12.2: Cure primal meat cuts

Competency Builders:

12.2.1 Follow general safety and sanitation precautions
12.2.2 Identify curable meat cuts
12.2.3 Identify curing ingredients and their properties
12.2.4 Cure meat cuts using appropriate curing methods (e.g., sweet pickle, stitch pumping, artery, dry rub)
12.2.5 Tumble and/or massage meat cuts to cure
12.2.6 Prepare meats for smoking (e.g., net, shape)
12.2.7 Smoke poultry meats
12.2.8 Smoke red meats

Competency 12.3: Prepare sausages

Competency Builders:

12.3.1 Follow general safety and sanitation precautions
12.3.2 Describe types of sausages
12.3.3 Select sausage casings
12.3.4 Cut pieces of meat for sausages
12.3.5 Perform fat percentage tests
12.3.6 Select spices and additives
12.3.7 Mix ingredients
12.3.8 Grind or emulsify sausage meat
12.3.9 Fill casings
12.3.10 Smoke or cook sausage as applicable

Competency 12.4: Prepare turkey hams*

Competency Builders

12.4.1 Prepare turkey ham ingredients*
12.4.2 Ensure that finished turkey hams meet quality specifications/standards*

Competency 12.5: Determine quality of raw turkey

Competency Builders:

12.5.1 Perform uniformity tests on turkey breast skin
12.5.2 Perform range tests on raw turkey breasts
12.5.3 Inspect raw turkeys for compliance with governmental regulations
12.5.4 Ensure that raw whole turkeys meet quality specifications and standards
12.5.5 Review sampling techniques and process-control procedures to ensure that finished product meets quality specifications and standards

Continued

Competency 12.5: Determine quality of raw turkey—Continued

12.5.6 Inspect incoming raw turkey thighs for compliance with governmental and plant standards
12.5.7 Grade fresh turkey products
12.5.8 Grade raw turkey products to be processed
12.5.9 Grade raw whole turkeys to determine compensation to producers
12.5.10 Grade packaged raw turkey products
12.5.11 Conduct daily product scoring on prepared turkey products
12.5.12 Comply with governmental and plant standards related to turkey basting pick-up
12.5.13 Grade whole turkeys for Grade-A consistency, size, and appearance

Unit 13: Dairy and Other Pasteurized Products

Competency 13.1: Demonstrate general knowledge of dairy products

Competency Builders:

13.1.1 Interpret terminology related to the dairy field
13.1.2 Identify the chemical components of milk
13.1.3 Calculate the gross components of commercially sold whole milk
13.1.4 Identify the nutritional value of milk
13.1.5 Identify the characteristics of dairy products
13.1.6 Identify the grades of milk and their corresponding characteristics
13.1.7 Identify the steps in processing milk
13.1.8 Identify the steps in making ice cream
13.1.9 Identify the steps in making butter
13.1.10 Identify the steps in making yogurt
13.1.11 Identify the steps in making cheese
13.1.12 Differentiate between processing plant sanitation regulations and plant safety rules
13.1.13 Determine the cost per 100 calories of selected dairy products
13.1.14 Differentiate between traditional and new dairy products
13.1.15 Differentiate between real and artificial dairy products
13.1.16 Compare labels of real and artificial dairy products
13.1.17 Determine off-flavors in processed dairy products
13.1.18 Evaluate selected cheeses
13.1.19 Evaluate selected ice creams and ice milks

Competency 13.2: Start up high-temperature, short-time pasteurization process

Competency Builders:

13.2.1 Inspect equipment prior to start-up
13.2.2 Adjust equipment for start-up
13.2.3 Prepare data recording equipment
13.2.4 Start up equipment

Competency 13.3: Process high-temperature, short-time pasteurization

Competency Builders:

13.3.1 Monitor pasteurization process
13.3.2 Adjust equipment for high-temperature, short-time processing
13.3.3 Record high-temperature, short-time processing data
13.3.4 Place product into storage tank

Competency 13.4: Perform product-to-product changeover

Competency Builders:

13.4.1 Prepare lines and valves to bring new product to balance tank
13.4.2 Adjust equipment for product changeover
13.4.3 Complete product changeover process

Competency 13.5: Perform product changeover requiring flush-out

Competency Builders:

13.5.1 Operate lines following established sequence
13.5.2 Set recording data equipment for changeover/flush-out
13.5.3 Perform flush-out procedures
13.5.4 Inspect equipment for proper operation
13.5.5 Complete product changeover process

Competency 13.6: Shut down high-temperature, short-time pasteurization

Competency Builders:

13.6.1 Prepare equipment for shut-down
13.6.2 Shut down equipment
13.6.3 Inspect recording data equipment

Competency 13.7: Clean high-temperature, short-time pasteurizer

Competency Builders:

13.7.1 Inspect equipment and lines for cleaning
13.7.2 Adjust equipment and lines for cleaning
13.7.3 Perform cleaning procedures

Competency 13.8: Determine nonfluid product quality

Competency Builders:

13.8.1 Apply federal grading standards and regulations
13.8.2 Evaluate products
13.8.3 Classify products

Competency 13.9 Determine quality of milk

Competency Builders:

13.9.1 Prepare finished milk product samples for pretesting of bacterial and chemical quality
13.9.2 Accept or reject incoming raw milk
13.9.3 Conduct testing procedures for coliforms
13.9.4 Test raw milk product samples for antibiotics
13.9.5 Test raw milk product samples for acids/bases
13.9.6 Test raw milk product samples for yeast/mold
13.9.7 Separate milk according to fat content

Unit 14: Eggs*

Competency 14.1: Pack eggs*

Competency Builders:

14.1.1 Check packer operation*
14.1.2 Check supply of egg oil*
14.1.3 Load empty flats in packer*
14.1.4 Turn packer on*
14.1.5 Start delivery belts*
14.1.6 Observe feeding of eggs to ensure even distribution*
14.1.7 Remove cracked/broken and extremely dirty eggs*
14.1.8 Observe oil sprayer component periodically to ensure that eggs are being oiled*
14.1.9 Clean oiling mechanism periodically*
14.1.10 Correct problems causing automatic shutdown of equipment*
14.1.11 Stack filled flats on cart/rack*
14.1.12 Turn packer off*
14.1.13 Place racks of eggs in egg-holding room*
14.1.14 Record daily egg count*
14.1.15 Maintain egg-holding room inventory*

Competency 14.2: Clean eggs*

Competency Builders:

14.2.1 Fill egg washer with water*
14.2.2 Heat water to 110°F*
14.2.3 Mix in detergent*
14.2.4 Place eggs in washer*
14.2.5 Turn on egg washer*
14.2.6 Remove eggs at end of cleaning cycle*
14.2.7 Turn off egg washer*
14.2.8 Separate eggs that are impossible to clean from clean eggs*
14.2.9 Oil eggs when specified by market requirements*

Competency 14.3: Grade eggs*

Competency Builders:

14.3.1 Determine interior and exterior quality of eggs using an egg candle*
14.3.2 Remove eggs with cracks, blood spots, dirt or excess stain, and other imperfections (e.g., odd-shaped or rough shells)*
14.3.3 Weigh eggs on hand scales to determine weight classification*
14.3.4 Carton eggs according to weight classification and quality grades*

Competency 14.4: Refrigerate eggs*

Competency Builders:

14.4.1 Place eggs in cooler as soon as gathered*
14.4.2 Adjust temperature and humidity to specified levels*
14.4.3 Check temperature and humidity of cooler periodically*

Unit 15: Processed Foods

Competency 15.1: Maintain standard quality of processed foods

Competency Builders:

15.1.1 Assist in establishing quality specifications and standards for processed foods
15.1.2 Assist in establishing quality specifications and standards for raw materials
15.1.3 Compare company's products to competitors' products

Competency 15.2: Process food and food by-products

Competency Builders:

15.2.1 Visually inspect/grade products to be processed
15.2.2 Review testing procedures for raw materials in products
15.2.3 Follow product flow through line (start to finish)
15.2.4 Identify by-products

Competency 15.3: Demonstrate knowledge of specialized agricultural food products*

Competency Builders:

15.3.1 Identify the steps in honey production*
15.3.2 Identify the steps in maple syrup production*
15.3.3 Identify the steps in wine production*

Unit 16: Fish and Fish Products

Competency 16.1: Demonstrate knowledge of fish and fish products

Competency Builders:

16.1.1 Interpret terms associated with fish and fish products
16.1.2 Identify conditions/factors that affect the quality of fish and fish products
16.1.3 Classify important food fish as freshwater or saltwater fish
16.1.4 Identify the characteristics of common food fish (color, texture, etc.)
16.1.5 Identify the characteristics of common fish product forms (e.g., steaks, patties)
16.1.6 Identify fish processing techniques
16.1.7 Identify major ports and fish-processing areas and the types of fish found there*
16.1.8 Identify the regulations and inspection guidelines for fish and fish products*
16.1.9 Identify the uses for fish by-products*

Competency 16.2: Market fish and fish products

Competency Builders:

16.2.1 Calculate cost of fish per serving
16.2.2 Evaluate fish freshness and quality
16.2.3 Process fish into steaks and fillets*

Unit 17: Fruits and Vegetables

Competency 17.1: Demonstrate knowledge of fruits and vegetables

Competency Builders:

17.1.1 Interpret terms associated with fresh and processed fruits and vegetables
17.1.2 Locate, on a chart or table, the nutritional values of specified fruits and vegetables
17.1.3 State how and why fruits and/or vegetables are sorted
17.1.4 Identify the factors that affect the marketability of fruits and vegetables
17.1.5 Determine the shelf life of fruits and vegetables subjected to different processing methods
17.1.6 Identify vegetables suitable for food-grade oil production

Competency 17.2: Determine the quality of fruit and vegetable products

Competency Builders:

17.2.1 Evaluate fruit and vegetable quality
17.2.2 Classify fruit and vegetable products (e.g., size, type, grade)
17.2.3 Apply federal grading standards and regulations for fruits and vegetables*

Unit 18: Grains

Competency 18.1: Demonstrate knowledge of grains

Competency Builders:

18.1.1 Interpret terminology associated with grain products
18.1.2 Identify types of grains and their characteristics
18.1.3 Label parts of grain
18.1.4 Identify functions of different parts of grain
18.1.5 Identify the essential nutrients found in grains
18.1.6 Differentiate between the characteristics of common grains used for human consumption
18.1.7 Identify common grains by appearance
18.1.8 Identify types of wheat flour based on their descriptions
18.1.9 Identify types of flour according to their uses
18.1.10 Describe different types of milling processes
18.1.11 Identify the requirements for grain storage
18.1.12 Identify various pests and the most appropriate means of control for each
18.1.13 Demonstrate knowledge of the U.S. grain markets
18.1.14 Identify nonfood uses for grain products
18.1.15 Identify grains suitable for food-grade oil production
18.1.16 Identify corn sweeteners used in snack foods

Competency 18.2: Determine quality of grain products

Competency Builders:

18.2.1 Identify federal grading standards and regulations for grain products
18.2.2 Clean grain samples
18.2.3 Evaluate grain products
18.2.4 Classify grain products
18.2.5 Grade wheat samples

Unit 19: Preservation of Agricultural Products

Competency 19.1: Demonstrate knowledge of food preservation

Competency Builders:

19.1.1 Interpret terms associated with the preservation of agricultural products
19.1.2 Identify major events in the history of food preservation
19.1.3 Identify the major factors in bacteria and microorganism control
19.1.4 Identify the processes used to preserve meats, fish, and poultry
19.1.5 Identify the major methods for preserving dairy products and the characteristics of each
19.1.6 Identify the major methods of preserving fruits and vegetables and the characteristics of each
19.1.7 Identify the major steps in canning fruits and vegetables
19.1.8 Identify the steps involved in freezing fruits, vegetables, and meats
19.1.9 Identify the characteristics of various types of freezing and refrigeration
19.1.10 Explain the effect of light on cured meat

Continued

Competency 19.1: Demonstrate knowledge of food preservation—Continued

19.1.11 Evaluate the effect of packaging on preserving frozen food
19.1.12 Describe the procedure for disposing of contaminated products
19.1.13 Describe how and why concentrates are made

Competency 19.2: Preserve foods

Competency Builders:

19.2.1 Select preservation methods appropriate for different foods*
19.2.2 Make jerky
19.2.3 Dry fruits and vegetables
19.2.4 Can fruits and vegetables
19.2.5 Can jams and jellies
19.2.6 Visually determine the presence of bacteria and other microorganisms (bulging lids, rust on seal, etc.)

Unit 20: Customer Service

Competency 20.1: Employ presale skills

Competency Builders:

20.1.1 Analyze types of selling techniques
20.1.2 Identify types of customers
20.1.3 Identify customer buying motives
20.1.4 Identify customer buying signals

Competency 20.2: Perform initial customer relations activities

Competency Builders:

20.2.1 Greet customers
20.2.2 Use effective communication skills (phone, person-to-person)
20.2.3 Use questioning techniques
20.2.4 Wear appropriate attire

Competency 20.3: Determine customer needs

Competency Builders:

20.3.1 Interpret customers' item descriptions
20.3.2 Determine whether customers' needs can be met (availability of time, product, etc.)
20.3.3 Identify products available
20.3.4 Estimate quantity of products needed
20.3.5 Estimate total cost of products needed
20.3.6 Recommend products to meet customers' needs
20.3.7 Recommend alternate products

Competency 20.4: Provide customers with technical assistance

Competency Builders:

20.4.1 Provide product information
20.4.2 Interpret product labels
20.4.3 Describe extent of product guarantees
20.4.4 Provide user guidelines for products

Competency 20.5: Conduct sales

Competency Builders:

20.5.1 Use selling techniques
20.5.2 Document telephone orders
20.5.3 Use product demonstrations, exhibits, and displays
20.5.4 Calculate prices using computerized pricing systems
20.5.5 Calculate prices using current pricing list(s)
20.5.6 Record sales information
20.5.7 Complete sales tickets
20.5.8 Complete sales slips
20.5.9 Compute taxes
20.5.10 Operate cash register
20.5.11 Process tax-exempt sales transactions
20.5.12 Process charge card sales transactions
20.5.13 Make change
20.5.14 Process customer refunds

Competency 20.6: Perform follow-up customer relations activities

Competency Builders:

20.6.1 Resolve customer complaints according to company policies
20.6.2 Answer customer objections
20.6.3 Follow up on purchases and sales

Unit 21: Marketing

Competency 21.1: Market products

Competency Builders:

21.1.1 Interpret marketing regulations
21.1.2 Locate market information sources
21.1.3 Determine seasonal markets
21.1.4 Identify target markets
21.1.5 Identify potential buyers
21.1.6 Identify distribution channels
21.1.7 Analyze competition
21.1.8 Develop marketing goals
21.1.9 Identify key factors in marketing agricultural products

Continue

Competency 21.1: Market products—Continued

21.1.10 Identify factors in cross-cultural communications that could affect marketing of products
21.1.11 Follow check-off procedures in product marketing
21.1.12 Identify impact of international trade, quotas, and tariffs*
21.1.13 Describe the concept of "value-added"

Competency 21.2 Promote products

Competency Builders:

21.2.1 Differentiate between advertising and promotion
21.2.2 Outline promotional program using different audiovisual techniques*
21.2.3 Employ promotional techniques*

Competency 21.3: Advertise products and services*

Competency Builders:

21.3.1 Identify products and services to be advertised*
21.3.2 Identify opportunities for publicity*
21.3.3 Identify types of advertising media*
21.3.4 Prepare advertising materials*

Competency 21.4: Display products

Competency Builders:

21.4.1 Arrange displays
21.4.2 Label products in display cases
21.4.3 Set up self-service displays
21.4.4 Prepare tray packs for products
21.4.5 Group products
21.4.6 Post sales announcements
21.4.7 Monitor lighting and temperature of display cases
21.4.8 Rotate products
21.4.9 Prepare product removal reports

Competency 21.5: Compare industry products using price lists and catalogs

Competency Builders:

21.5.1 Compare prices of similar products and services
21.5.2 Determine material and service availability
21.5.3 Maintain a supply of current product and service catalogs

Competency 21.6: Price merchandise

Competency Builders:

21.6.1 Estimate fixed and variable expenses
21.6.2 Calculate markups
21.6.3 Calculate break-even points
21.6.4 Compare pricing strategies
21.6.5 Identify the psychological effects of pricing

Unit 22: Product Handling

Competency 22.1: Package products

Competency Builders:

22.1.1 Follow general safety and sanitation precautions
22.1.2 Program scales
22.1.3 Weigh products
22.1.4 Identify packaging materials
22.1.5 Identify packaging methods
22.1.6 Identify general requirements for food packaging
22.1.7 Differentiate between biodegradable, degradable, and recyclable materials
22.1.8 Identify sealing methods used in packaging
22.1.9 Identify factors affecting shelf life
22.1.10 Select packaging
22.1.11 Calculate cost of packaging*
22.1.12 Design packages for agricultural products*
22.1.13 Fill containers
22.1.14 Pack precut parts
22.1.15 Pack/stage products for visual appeal
22.1.16 Wrap packages for customers' home freezers or self-service
22.1.17 Identify packages for rewrapping
22.1.18 Label packages
22.1.19 Record weights on packages/boxes
22.1.20 Interpret labels
22.1.21 Organize and rotate products

Competency 22.2: Store refrigerated/frozen products

Competency Builders:

22.2.1 Follow general safety and sanitation precautions
22.2.2 Explain shrink and its impact on profits
22.2.3 Monitor conditions (i.e., air circulation, temperature, humidity, lighting)
22.2.4 Explain the impact of air circulation on refrigerated/frozen products
22.2.5 Explain the impact of temperature on refrigerated/frozen products
22.2.6 Explain the impact of humidity on refrigerated/frozen products
22.2.7 Explain the impact of lighting on refrigerated/frozen products
22.2.8 Rotate products
22.2.9 Quick-freeze products
22.2.10 Identify storage life of various fresh and frozen products
22.2.11 Recognize signs of product spoilage
22.2.12 Recognize damaged products
22.2.13 Recognize freezer burn

Competency 22.3: Control dry goods inventory

Competency Builders:

22.3.1 Organize storage area
22.3.2 Maintain storage area in a dry and pest-free condition
22.3.3 Conduct physical inventories
22.3.4 Identify high- and low-activity items
22.3.5 Maintain inventory records
22.3.6 Identify items that need to be ordered/reordered

Competency 22.4: Order dry good supplies*

Competency Builders:

22.4.1 Determine what to order*
22.4.2 Determine when to order*
22.4.3 Determine quantity to order*
22.4.4 Determine amount of storage needed*
22.4.5 Assess product seasonality*
22.4.6 Evaluate quality of available products*
22.4.7 Select vendors*
22.4.8 Secure vendor discounts*

Competency 22.5: Receive shipments

Competency Builders:

22.5.1 Follow general safety and sanitation precautions
22.5.2 Verify orders
22.5.3 Unload items
22.5.4 Interpret packing slips and invoices
22.5.5 Inspect items for damage
22.5.6 Check item quality
22.5.7 Check item weight
22.5.8 Check item code dates
22.5.9 Distribute items to designated locations

Competency 22.6: Ship products

Competency Builders:

22.6.1 Follow general safety and sanitation precautions
22.6.2 Assemble orders
22.6.3 Obtain labels and shipping boxes for products
22.6.4 Verify orders
22.6.5 Load products
22.6.6 Secure loads
22.6.7 Prepare shipping documents
22.6.8 Record shipments
22.6.9 Determine delivery routes
22.6.10 Arrange deliveries
22.6.11 Calculate shipping charges
22.6.12 Comply with government regulations concerning the shipping of agriculture products

Unit 23: Business Management

Competency 23.1: Demonstrate basic knowledge of economics and business management

Competency Builders:

23.1.1 Identify basic economic principles applicable to business
23.1.2 Identify ways in which local, state, and federal regulations and required documentation affect agriculture (e.g., labor laws, commerce)*
23.1.3 Identify ways in which agriculture affects the American economy
23.1.4 Compare/contrast business management structures
23.1.5 Identify business management and operation activities
23.1.6 Develop a business plan for starting a business

Competency 23.2: Comply with required regulations and standards

Competency Builders:

23.2.1 Adhere to EPA regulations
23.2.2 Follow OSHA regulations (all levels)
23.2.3 Adhere to FDA, state department, agriculture, and USDA regulations
23.2.4 Adhere to company quality and operational requirements
23.2.5 Follow state and federal transportation regulations
23.2.6 Comply with the industry's good management principles
23.2.7 Adhere to international standards*

Competency 23.3: Plan work activities

Competency Builders:

23.3.1 Review production schedule
23.3.2 Identify supply requirements and availability
23.3.3 Order shortfalls (materials)
23.3.4 Assess basic equipment, manpower, and utility needs
23.3.5 Prioritize daily activities (initial/ongoing)
23.3.6 Delegate work assignments
23.3.7 Plan line changeovers
23.3.8 Schedule routine maintenance
23.3.9 Schedule cleanups
23.3.10 Plan product disposition

Competency 23.4: Optimize use of resources

Competency Builders:

23.4.1 Compare/contrast concepts of LIFO and FIFO in reference to optimizing resources
23.4.2 Minimize line losses
23.4.3 Control waste of raw materials and supplies
23.4.4 Maximize recycling of resources
23.4.5 Streamline processing activities
23.4.6 Conserve utilities (electricity, gas, oil)
23.4.7 Provide supplier feedback

Continued

Competency 23.4: Optimize use of resources—Continued

23.4.8 Implement principles of good design
23.4.9 Identify improvement opportunities in the manufacturing process
23.4.10 Establish well-defined process for worker input concerning improvements*
23.4.11 Provide employee training

Competency 23.5: Manage the manufacturing process*

Competency Builders:

23.5.1 Conduct pre-orientation inspections*
23.5.2 Perform minor maintenance*
23.5.3 Stage raw materials*
23.5.4 Initiate manufacturing process*
23.5.5 Monitor press indicators*
23.5.6 Troubleshoot deviations*
23.5.7 Adjust press as required*
23.5.8 Shut down manufacturing process*
23.5.9 Implement product changeovers*

Competency 23.6: Maintain product quality

Competency Builders:

23.6.1 Conduct sanitation inspections
23.6.2 Review raw materials specifications
23.6.3 Evaluate raw materials
23.6.4 Calibrate quality-control equipment
23.6.5 Conduct objective testing
23.6.6 Conduct subjective testing
23.6.7 Compare test results against bench marks (standards)
23.6.8 Audit quality-control processes
23.6.9 Isolate defective products
23.6.10 Monitor customer feedback
23.6.11 Report deviations

Competency 23.7 Demonstrate basic knowledge of commodity marketing

Competency Builders:

23.7.1 Outline the economic functions and channels used in business marketing
23.7.2 Identify methods used to transport agricultural commodities
23.7.3 Develop plans for livestock and grain commodity marketing
23.7.4 Identify business marketing agencies

Competency 23.8: Manage business finances

Competency Builders:

23.8.1 Prepare budgets
23.8.2 Calculate insurance needs
23.8.3 Identify sources of business capital
23.8.4 Interpret financial statements
23.8.5 Record accounts payable

Continued

Competency 23.8: ***Manage business finances****—Continued*

23.8.6 Prepare cash flow statements
23.8.7 Calculate overhead costs
23.8.8 Calculate processing costs
23.8.9 Calculate tax costs
23.8.10 Interpret tables, graphs, and pictures
23.8.11 Identify laws applicable to business
23.8.12 Identify need for credit

Competency 23.9: Maintain customer accounts

Competency Builders:

23.9.1 Check customer credit references
23.9.2 Set up customer files
23.9.3 Prepare customer statements
23.9.4 Prepare customer invoices
23.9.5 Post customer receipts
23.9.6 Balance customer accounts

Competency 23.10: Conduct general banking procedures

Competency Builders:

23.10.1 Prepare funds for bank deposit
23.10.2 Make bank deposits
23.10.3 Write checks
23.10.4 Endorse checks
23.10.5 Balance bank statements
23.10.6 Process banking transactions via automated teller machines (ATMs)

Competency 23.11: Minimize theft

Competency Builders:

23.11.1 Examine effect of theft on profit
23.11.2 Identify potential loss situations
23.11.3 Maintain organized work area
23.11.4 Interpret laws regarding theft

Competency 23.12: Manage data

Competency Builders:

23.12.1 Maintain production logs
23.12.2 Complete required forms
23.12.3 Enter data into computer
23.12.4 Locate relevant data
23.12.5 Organize record systems
23.12.6 Apply data
23.12.7 Select/design data output*
23.12.8 Forecast trends based on data*
23.12.9 Store required records
23.12.10 Revise data collection activities in accordance with needs

Competency 23.13: Perform general office duties

Competency Builders:

23.13.1 Open/close business facility
23.13.2 Schedule appointments and meetings.
23.13.3 Duplicate materials
23.13.4 File materials
23.13.5 Prepare reports
23.13.6 Process mail
23.13.7 Prepare correspondence
23.13.8 Send/receive documents via a fax machine
23.13.9 Select computer applications appropriate to business*
23.13.10 Perform office functions using a computer
23.13.11 Interpret computer printouts*
23.13.12 Maintain service records
23.13.13 Maintain invoice records
23.13.14 Maintain sanitation and inspection records
23.13.15 Maintain personnel records*
23.13.16 Secure business documents
23.13.17 Inventory stock and supplies
23.13.18 Order supplies
23.13.19 Interpret market information
23.13.20 Process transactions using a cash register

Competency 23.14: Communicate in the workplace

Competency Builders:

23.14.1 Maintain mixture-component records
23.14.2 Disseminate test results to management
23.14.3 Prepare documents for USDA label approvals*
23.14.4 Obtain required USDA-level approvals*
23.14.5 Maintain file of complaint mail
23.14.6 Evaluate customer complaints to determine need for remediation and/or modification
23.14.7 Supervise assistant(s) during processing seasons*
23.14.8 Rotate schedules to provide for coverage of all shifts
23.14.9 Indoctrinate new employees concerning the sanitation program
23.14.10 Provide technical assistance to management in connection with purchasing of raw materials
23.14.11 Work with USDA inspectors and inspection services to correct quality-control/assurance problems
23.14.12 Confer with customers and suppliers concerning specific quality problems*

Occupational Competency Analysis Profile:

Employability

Unit 1: Career Development

Competency 1.1: Investigate career options

Competency Builders:

1.1.1 Determine interests and aptitudes
1.1.2 Identify career options
1.1.3 Research interests, knowledge, abilities, and skills needed in an occupation
1.1.4 Select careers that best match interests and aptitudes
1.1.5 Identify advantages and disadvantages of career options, including self-employment and nontraditional careers

Competency 1.2: Utilize career information

Competency Builders:

1.2.1 Identify a range of career information resources
1.2.2 Use a range of resources to obtain career information (e.g., handbooks, career materials, labor market information, and computerized career-information delivery systems)
1.2.3 Demonstrate knowledge of various classification systems that categorize occupations and industries (e.g., *Dictionary of Occupational Titles*)
1.2.4 Describe the educational requirements of various occupations
1.2.5 Identify individuals in selected occupations as possible information resources, role models, or mentors
1.2.6 Describe the impact of factors such as population, climate, employment trends, and geographic location on occupational opportunities
1.2.7 Assess differences in the wages, benefits, annual incomes, cost of living, and job opportunities associated with selected career options
1.2.8 Determine labor market projections for selected career options

Competency 1.3: Participate in a career exploration activity

Competency Builders:

1.3.1 Identify career exploration activities (e.g., job shadowing, mentoring, volunteer experiences, part-time employment, and cooperative education)
1.3.2 Compare traits, skills, and characteristics required for specific career choices with individual's traits, skills, and characteristics
1.3.3 Recognize potential conflicts between personal characteristics and career choice areas
1.3.4 Describe the impact of exploration activities on current career choices

Competency 1.4: Assess the relationship between educational achievement and career planning

Competency Builders:

1.4.1 Describe how skills developed in academic and vocational programs relate to career goals
1.4.2 Describe how education relates to the selection of a college major, further training, and/or entry into the job market
1.4.3 Identify skills that can apply to a variety of occupational requirements
1.4.4 Explain the importance of possessing learning skills in the workplace

Competency 1.5: Develop an individual career plan

Competency Builders:

1.5.1 Identify career goal(s)
1.5.2 Identify worker conditions, education, training, and employment opportunities related to selected career goal(s)
1.5.3 Describe school and community resources available to help achieve career goal(s)
1.5.4 Identify career ladders possible within selected career goal(s)*
1.5.5 Identify additional experiences needed to move up identified career ladders*
1.5.6 Recognize that changes may require retraining and upgrading of employees' skills

Competency 1.6: Annually review/revise the individual career plan

Competency Builders:

1.6.1 Identify experiences that have reinforced selection of the specific career goal(s) listed on the individual career plan
1.6.2 Identify experiences that have changed the specific career goal(s) listed on the individual career plan
1.6.3 Modify the career goals(s) and educational plans on the individual career plan
1.6.4 Ensure that parents or guardians provide input into the individual career plan process
1.6.5 Identify the correlation between the individual career plan and the actual courses to be taken in high school
1.6.6 Identify the correlation between the individual career plan and postsecondary training, adult education, or employment

Unit 2: Decision Making and Problem Solving

Competency 2.1: Apply decision-making techniques in the workplace

Competency Builders:

2.1.1 Identify the decision to be made
2.1.2 Compare alternatives
2.1.3 Determine the consequences of each alternative
2.1.4 Make decisions based on values and goals
2.1.5 Evaluate the decision made

Competency 2.2: Apply problem-solving techniques in the workplace

Competency Builders:

2.2.1 Diagnose the problem, its urgency, and its causes
2.2.2 Identify alternatives and their consequences in relation to the problem
2.2.3 Recognize multicultural and nonsexist dimensions of problem solving
2.2.4 Explore possible solutions to the problem using a variety of resources
2.2.5 Compare/contrast the advantages and disadvantages of each solution
2.2.6 Determine appropriate action
2.2.7 Implement action
2.2.8 Evaluate results of action implemented

Unit 3: Work Ethic

Competency 3.1: Evaluate the relationship of self-esteem to work ethic

Competency Builders:

3.1.1 Identify special characteristics and abilities in self and others
3.1.2 Identify internal and external factors that affect self-esteem
3.1.3 Identify how individual characteristics relate to achieving personal, social, educational, and career goals
3.1.4 Identify the relationship between personal behavior and self-concept

Competency 3.2: Analyze the relationship of personal values and goals to work ethic both in and out of the workplace

Competency Builders:

3.2.1 Distinguish between values and goals
3.2.2 Determine the importance of values and goals
3.2.3 Evaluate how one's values affect one's goals
3.2.4 Identify own short- and long-term goals
3.2.5 Prioritize own short- and long-term goals
3.2.6 Identify how one's values are reflected in one's work ethic
3.2.7 Identify how interactions in the workplace affect one's work ethic
3.2.8 Identify how life changes affect one's work ethic

Competency 3.3: Demonstrate work ethic

Competency Builders:

3.3.1 Examine factors that influence work ethic
3.3.2 Display initiative
3.3.3 Demonstrate dependable attendance and punctuality
3.3.4 Demonstrate organizational skills
3.3.5 Adhere to schedules and deadlines
3.3.6 Demonstrate a willingness to learn
3.3.7 Demonstrate a willingness to accept feedback and evaluation
3.3.8 Demonstrate interpersonal skills required for working with and for others
3.3.9 Describe appropriate employer-employee interactions for various situations
3.3.10 Express feelings and ideas in an appropriate manner for the workplace

Competency 3.4: Demonstrate safety skills

Competency Builders:

3.4.1 Practice safe work habits
3.4.2 Identify safety hazards
3.4.3 Employ preventative safety measures
3.4.4 Demonstrate appropriate care and use of equipment and facilities to ensure safety
3.4.5 Comply with safety and emergency procedures

Unit 4: Job-Seeking Skills

Competency 4.1: Prepare for employment

Competency Builders:

4.1.1 Identify traditional and nontraditional employment sources
4.1.2 Utilize employment sources
4.1.3 Research job opportunities, including nontraditional careers
4.1.4 Interpret equal employment opportunity laws
4.1.5 Explain the critical importance of personal appearance, hygiene, and demeanor throughout the employment process
4.1.6 Prepare for generic employment tests and those specific to an occupation/organization

Competency 4.2: Develop a résumé

Competency Builders:

4.2.1 Identify personal strengths and weaknesses
4.2.2 List skills and/or abilities, career objective(s), accomplishments/achievements, educational background, work experience, volunteer/community contributions, and organizational memberships
4.2.3 Select an acceptable résumé format
4.2.4 Use correct grammar and spelling and concise wording
4.2.5 Secure references
4.2.6 Complete the résumé

Competency 4.3: Complete the job application process

Competency Builders:

4.3.1 Explain the importance of an application form
4.3.2 Obtain job application forms
4.3.3 Demonstrate appropriate behaviors (e.g., personal appearance, hygiene, and demeanor) for obtaining job application forms in person
4.3.4 Describe methods for handling illegal questions on job application forms
4.3.5 Demonstrate legible written communication skills using correct grammar and spelling and concise wording
4.3.6 Return application to appropriate person
4.3.7 Request interview
4.3.8 Follow up on application status

Competency 4.4: Demonstrate interviewing skills

Competency Builders:

4.4.1 Investigate interview procedures
4.4.2 Demonstrate appropriate behaviors (e.g. appearance, hygiene, and demeanor) for the interview
4.4.3 Demonstrate question-and-answer techniques
4.4.4 Demonstrate methods for handling difficult and/or illegal interview questions
4.4.5 Use correct grammar and concise wording

Competency 4.5: Secure employment

Competency Builders:

4.5.1 Identify present and future employment opportunities within an occupation/organization
4.5.2 Research the organization/company
4.5.3 Use follow-up techniques to enhance employment potential
4.5.4 Evaluate job offer(s)
4.5.5 Respond to job offer(s)

Unit 5: Job Retention and Career Advancement Skills

Competency 5.1: Analyze the organizational structure of the workplace

Competency Builders:

5.1.1 Identify employer expectations regarding job performance, work habits, attitudes, personal appearance, and hygiene
5.1.2 Comply with company policies and procedures
5.1.3 Examine the role/relationship between employee and employer
5.1.4 Recognize opportunities for advancement and reasons for termination
5.1.5 Recognize the organization's ethics.

Competency 5.2: Maintain positive relations with others

Competency Builders:

5.2.1 Exhibit appropriate work habits and attitudes
5.2.2 Identify behaviors for establishing successful working relationships
5.2.3 Cooperate through teamwork and group participation
5.2.4 Demonstrate a willingness to compromise
5.2.5 Identify methods for dealing with harassment, bias, and discrimination based on race, color, national origin, gender, religion, disability, or age
5.2.6 Cooperate with authority
5.2.7 Accept supervision

Competency 5.3: Demonstrate accepted social and work behaviors

Competency Builders

5.3.1 Demonstrate a positive attitude
5.3.2 Demonstrate accepted conversation skills
5.3.3 Use good manners
5.3.4 Accept responsibility for assigned tasks
5.3.5 Demonstrate personal hygiene
5.3.6 Demonstrate knowledge of a position
5.3.7 Perform quality work

Competency 5.4: Analyze opportunities for personal and career growth*

Competency Builders:

5.4.1 Determine opportunities within chosen occupation/organization*
5.4.2 Determine other career opportunities outside chosen occupation/ organization*
5.4.3 Evaluate the factors involved in considering a new position within or outside an occupation/ organization*
5.4.4 Exhibit characteristics needed for advancement*

Unit 6: Technology in the Workplace

Competency 6.1: Demonstrate knowledge of technology issues

Competency Builders:

6.1.1 Demonstrate knowledge of the characteristics of technology
6.1.2 Demonstrate knowledge of how technology systems are applied
6.1.3 Assess the impact of technology on the individual, society, and environment
6.1.4 Demonstrate knowledge of the evolution of technology
6.1.5 Identify how people, information, tools and machines, energy, capital, physical space, and time influence the selection and use of technology
6.1.6 Identify legal and ethical issues related to technology (e.g., confidentiality, information sharing, copyright protection)

Competency 6.2: Demonstrate skills related to technology issues

Competency Builders:

6.2.1 Exhibit willingness to adapt to technological change
6.2.2 Utilize technological systems
6.2.3 Utilize a variety of resources and processes to solve technological problems
6.2.4 Employ higher-order thinking skills for solving technological problems
6.2.5 Work as a team member in solving technological problems
6.2.6 Use technology in a safe and responsible manner
6.2.7 Apply science, mathematics, communication, and social studies concepts to solve technological problems
6.2.8 Demonstrate ingenuity and creativity in the use of technology*
6.2.9 Utilize a formal method (systems approach) in solving technological problems*

Unit 7: Lifelong Learning

Competency 7.1: Apply lifelong learning practices to individual situations

Competency Builders:

7.1.1 Define lifelong learning
7.1.2 Identify factors that cause the need for lifelong learning
7.1.3 Identify changes that may require the retraining and upgrading of employee's skills
7.1.4 Identify avenues for lifelong learning
7.1.5 Participate in lifelong learning activities

Competency 7.2: Adapt to change

Competency Builders:

7.2.1 Analyze the causes and effects of change
7.2.2 Identify the effect of change on goals
7.2.3 Identify the importance of flexibility when reevaluating goals
7.2.4 Evaluate the need for lifelong learning experiences in adapting to change

Unit 8: Economic Education

Competency 8.1: Analyze how an economy functions as a whole

Competency Builders:

8.1.1 Describe how individuals and societies make choices to satisfy needs and wants with limited resources
8.1.2 Identify how production factors (land, labor, capital, and entrepreneurship) are used to produce goods and services
8.1.3 Illustrate how individuals and households exchange their resources for the income they use to buy goods and services
8.1.4 Explain how individuals and business firms use resources to produce goods and services to generate income
8.1.5 Identify characteristics of command, market, and traditional economies*
8.1.6 Describe how all levels of government assess taxes in order to provide services

Competency 8.2: Analyze how an economic system is a framework within which decisions are made by individuals and groups

Competency Builders:

8.2.1 List several individuals and groups that make economic decisions at the local, state, and national levels
8.2.2 Identify the important roles that local, state, and national governments play in a market economy

Continued

Competency 8.2: ***Analyze how an economic system is a framework within which decisions are made by individuals and groups—Continued***

8.2.3 List examples of how government decisions affect individuals
8.2.4 Identify how geographic locations affect the political and economic systems of the world
8.2.5 Evaluate how markets allocate goods and services
8.2.6 Explain how resources, goods, and services are exchanged in markets
8.2.7 Explain competition and its effect on the market

Competency 8.3: Analyze the importance of making informed personal financial decisions

Competency Builders:

8.3.1 Describe the need for personal management records
8.3.2 Create a personal budget
8.3.3 Create a budget for a family of four for one month
8.3.4 Explain how credit affects personal/family finances
8.3.5 Identify steps to avoid credit problems
8.3.6 Make informed consumer choices in response to personal needs and wants
8.3.7 Identify factors that influence consumer decisions (e.g., advertisements, peer groups, price, and location)
8.3.8 Explain the costs and benefits for individuals of various types of taxation at the local, state, and federal levels

Unit 9: Balancing Work and Family

Competency 9.1: Analyze the effects of family on work

Competency Builders:

9.1.1 Recognize how family values, goals, and priorities are reflected in the workplace
9.1.2 Identify present and future family structures and responsibilities
9.1.3 Describe personal and family roles
9.1.4 Analyze concerns of working parent(s)
9.1.5 Examine how family responsibilities can conflict with work
9.1.6 Identify ways to resolve family-related conflicts
9.1.7 Explain how to use support systems/community resources to help resolve family-related conflicts

Competency 9.2: Analyze the effects of work on family

Competency Builders:

9.2.1 Identify responsibilities associated with paid and nonpaid work
9.2.2 Compare the advantages and disadvantages of multiple incomes
9.2.3 Explain how work can conflict with family responsibilities
9.2.4 Explain how work-related stress can affect families
9.2.5 Identify family support systems and resources

Unit 10: Citizenship in the Workplace

Competency 10.1: Exercise the rights and responsibilities of citizenship in the workplace

Competency Builders:

10.1.1 Identify the basic rights and responsibilities of citizenship in the workplace
10.1.2 Identify situations in which compromise is necessary
10.1.3 Examine how individuals from various backgrounds contribute to the workplace
10.1.4 Demonstrate initiative to facilitate cooperation
10.1.5 Give/receive constructive criticism to enhance cooperation

Competency 10.2: Prepare to work in a multicultural society

Competency Builders:

10.2.1 Identify ways to live in a multicultural society with mutual respect and appreciation for others
10.2.2 Examine how culture and experience create differences in people
10.2.3 Demonstrate respect for the contributions made by all people
10.2.4 Investigate personal cultural background as a means of developing self-respect
10.2.5 Make personal choices that reduce discrimination, isolation, and prejudice
10.2.6 Work effectively with people irrespective of their race, gender, religion, ethnicity, disability, age, or cultural background

Unit 11: Leadership

Competency 11.1: Evaluate leadership styles appropriate for the workplace

Competency Builders:

11.1.1 Identify characteristics of effective leaders
11.1.2 Compare leadership styles
11.1.3 Demonstrate effective delegation skills
11.1.4 Investigate empowerment concepts
11.1.5 Identify opportunities to lead in the workplace

Competency 11.2: Demonstrate effective teamwork skills

Competency Builders:

11.2.1 Identify the characteristics of a valuable team member
11.2.2 Identify methods of involving each team member
11.2.3 Contribute to team efficiency and success
11.2.4 Determine ways to motivate team members

Competency 11.3: Utilize effective communication skills

Competency Builders:

11.3.1 Identify the importance of listening
11.3.2 Demonstrate effective listening skills
11.3.3 Demonstrate assertive communication techniques
11.3.4 Recognize the importance of verbal and nonverbal cues and messages
11.3.5 Prepare written material
11.3.6 Analyze written material
11.3.7 Give/receive feedback
11.3.8 Communicate thoughts
11.3.9 Use appropriate language
11.3.10 Follow oral and written instructions
11.3.11 Demonstrate effective telephone techniques
11.3.12 Identify technology in communications

Unit 12: Entrepreneurship

Competency 12.1: Evaluate the role of small business

Competency Builders:

12.1.1 Identify the impact of small business on the local economy
12.1.2 Examine the relationship of small business to a national (USA) and global economy
12.1.3 Identify factors that contribute to the success of small business
12.1.4 Identify factors that contribute to the failure of small business
12.1.5 Identify the components of a business plan

Competency 12.2: Examine entrepreneurship as a personal career option

Competency Builders:

12.2.1 Evaluate personal interests and skills
12.2.2 Compare personal interests and skills with those necessary for entrepreneurship
12.2.3 Determine motives for becoming an entrepreneur
12.2.4 Identify the advantages and disadvantages of owning a small business
12.2.5 Compare business ownership to working for others

Notes

Academic Job Profile

The Purpose of Job Profiling

Developed by American College Testing (ACT), the purpose of the Job Profiling process is to identify the **level** of applied academic skills that, according to business and industry, students must master to qualify for and be successful in their occupation of choice. The results of Job Profile "leveling" can help teachers to better target instruction toward their students' needs.

As part of the Ohio Vocational Competency Assessment (OVCA) program, the Vocational Instructional Materials Laboratory (VIML) at The Ohio State University has conducted Job Profiling workshops in which representatives of business, industry, labor, and community organizations identified the academic skill levels needed by entry-level workers in the occupational areas covered by the OCAPs. The Job Profiling, which was carried out in fall 1994 and spring 1995, was sponsored by the Ohio Department of Education, Division of Vocational and Adult Education.

OVCA—What Is It?

The Ohio Vocational Competency Assessment (or OVCA) package consists of two assessment components: OCAP and Work Keys. Together they measure entry-level occupational, academic, and employability skills. All OVCA items are criterion-referenced, use a multiple-choice format, and are administered using a traditional paper-and-pencil method. The OVCA is designed to do the following:

- Provide one dimension of a multi-assessment strategy for career passport credentialing
- Evaluate learner readiness for jobs requiring specific occupational, academic, and employability skills
- Assist educators in curriculum development
- Provide state-aggregated learning gain scores to comply with regulations in the Carl D. Perkins Vocational and Applied Technology Act of 1992

OCAP. The OCAP component of OVCA assesses students in occupational skills—employment requirements—in a particular occupational area. Assessment is based on the core competencies identified through the OCAP process, and each multiple-choice assessment item is correlated to those essential competencies.

Work Keys. The Work Keys component, developed by ACT, measures students' applied academic skills. All OVCA packages contain two Work Keys assessments:

- *Applied Mathematics* measures students' ability to analyze, set up, and solve math problems typically found in the workplace.
- *Locating Information* measures students' ability to use graphic documents to insert, extract, and apply information.

In addition, certain taxonomies will use the following Work Keys assessments:

- *Reading for Information* will be used by Business, Marketing, Home Economics, Health Education, and Cosmetology taxonomies.
- *Applied Technology* will be used by Trade and Industrial and Agricultural Education taxonomies.

Other optional Work Keys assessments, not included in the basic OVCA package, are *Teamwork*, *Listening*, and *Writing*.

Each Work Keys assessment is further broken down into four to five levels of achievement, with higher numbers indicating higher achievement in the assessed skill (descriptions of the levels for each Work Keys assessment are provided on pp. 51-57). For each academic skill, the Job Profiling process identifies the level required for successful entry into an occupational area.

Job Profiling—How It Works

VIML's Job Profiling process was initiated by mailing surveys to current workers in OCAP occupations all across Ohio. The survey's purpose: to have actual workers in specific occupations rate job tasks according to each task's frequency and criticality—that is, the amount of time spent performing each task relative to other tasks and the importance of each task to overall job performance.

To complete the survey, participants examined OCAP competencies for their occupation. Based on the survey's results, VIML staff produced a list of the most critical competencies in each occupation.

The next stage of Job Profiling was to convene committees of subject-matter experts to perform "leveling," which involved the following tasks:

- Examining the frequency and criticality competency lists for an occupation
- Reviewing the levels associated with each of the seven Work Keys academic skills: *Locating Information, Reading for Information, Applied Mathematics, Applied Technology, Listening, Writing,* and *Teamwork*
- Identifying the level of skill students must master relative to each Work Keys academic skill in order to successfully perform the occupational competencies

Finally, in 1995, the initial leveling of Work Keys academic skills for the occupational area covered by this OCAP was revalidated by the new employer panel convened to update the OCAP (see inside back cover).

Example of Job Profiling

For every occupational area, there are shaded graphs to represent each of the seven Work Keys academic skills. Each graph shows the range of levels for that particular skill; the shading represents the academic skill level required by an entry-level worker in that occupation, as determined by the Job Profiling committee. For example:

Applied Mathematics

In the example shown, Applied Mathematics has a skill range of 3–7. The required skill level, determined by Job Profiling and shown by the highlighting, is 6.

Academic Job Profile: Agriculture Products Processing

Applied Mathematics

Locating Information

Reading for Information

Applied Technology

Teamwork

Listening

Writing

NOTE: Definitions of each level in each of the seven academic skill areas are provided on the pages that follow.

Levels of Work Keys Defined

The skills needed to achieve each level for each of the seven Work Keys* academic skills are as follows.

Applied Mathematics

Applied Mathematics measures skill in applying mathematical reasoning to work-related problems. There are five levels of complexity, 3 through 7, with Level 3 being the least complex and Level 7 the most complex. The levels build on each other, each incorporating the skills at the preceding levels.

Level 3

- Perform basic mathematical operations (addition, subtraction, multiplication, and division) and conversions from one form to another, using whole numbers, fractions, decimals, or percentages.
- Translate simple verbal problems into mathematical equations.
- Directly apply logical information provided to solve problems, including those with measurements and dollars and cents.

Level 4

- Perform one or two mathematical operations (such as addition, subtraction, or multiplication) on several positive or negative numbers. (Division of negative numbers is not covered until Level 5.)
- Add commonly known fractions, decimals, or percentages (e.g., ½, .75, 25%) or add three fractions that share a common denominator.
- Calculate averages, simple ratios, proportions, and rates, using whole numbers and decimals.
- Reorder verbal information before performing calculations.
- Read simple charts or graphs to obtain information needed to solve a problem.

Level 5

- Look up and calculate single-s ep conversions within English or non-English measurement systems (e.g., converting ounces to pounds or centimeters to meters) or between measurement systems (e.g., converting centimeters to inches).
- Make calculations using mixed units (e.g., hours and minutes).
- Determine what information, calculations, and unit conversions are needed to find a solution.

Level 6

- Calculate using negative numbers, fractions, ratios, percentages, mixed numbers, and formulas.
- Identify and correct errors in calculations.
- Translate complex verbal problems into mathematical expressions, using considerable setup and multiple-step calculations or conversions.

Level 7

- Solve problems requiring multiple steps of logic and calculation.
- Solve problems involving more than one unknown, nonlinear functions (e.g., rate of change), and applications of basic statistical concepts (e.g., error of measurement).
- Locate errors in multiple-step calculations.
- Solve problems with unusual content or format, or with incomplete or implicit information.

*

Locating Information

Locating Information measures skill in using information taken from workplace graphics such as diagrams, blueprints, floor plans, tables, forms, graphs, charts, and instrument gauges. There are four levels of complexity, 3 through 6, with Level 3 being the least complex and Level 6 the most complex. The levels build on each other, each incorporating the skills at the preceding levels.

Level 3

- Find one or two pieces of information in elementary workplace graphics, such as simple order forms, bar graphs, tables, flowcharts, and floor plans.
- Fill in one or two pieces of information that are missing from elementary workplace graphics.

Level 4

- Find several pieces of information in straightforward workplace graphics, such as basic order forms, line graphs, tables, instrument gauges, maps, flowcharts, and diagrams.
- Summarize and/or compare information and trends in a single straightforward graphic.
- Summarize and/or compare information and trends among more than one straightforward workplace graphic, such as a bar chart and a data table showing related information.

Level 5

- Summarize and/or compare information and trends in single complicated workplace graphics, such as detailed forms, tables, graphs, maps, instrument gauges, and diagrams.
- Summarize and/or compare information and trends among more than one complicated workplace graphic, such as a bar chart and a data table showing related information.

Level 6

- Make decisions, draw conclusions, and/or apply information to new situations using several related and complex workplace graphics that contain a great amount of information or have challenging presentations (e.g., very detailed graphs, charts, tables, forms, maps, blueprints, diagrams).

Reading for Information

Reading for Information measures skill in reading and understanding work-related reading materials. There are five levels of complexity, 3 through 7, with Level 3 being the least complex and Level 7 the most complex. Although Level 3 is the least complex, it still represents a level of reading skill well above "no skill at all." The levels build on each other, each incorporating the skills at the preceding levels.

Level 3

- Identify uncomplicated key concepts and simple details.
- Recognize the proper placement of a step in a sequence of events, or the proper time to perform a task.
- Identify the meaning of words that are defined within a passage.
- Identify the meaning of simple words that are not defined within a passage.
- Recognize the application of instructions from a passage to situations that are described in the passage.

Level 4

- Identify details that are more subtle than those in Level 3.
- Recognize the application of more complex instructions, some of which involve several steps, to described situations.
- Recognize cause-effect relationships.

Level 5

- Identify the paraphrased definition of jargon or technical terms that are defined in a passage and recognize the application of jargon or technical terms to stated situations.
- Recognize the definition of acronyms that are defined in a passage.
- Identify the appropriate definition of words with multiple meanings.
- Recognize the application of instructions from a passage to new situations that are similar to the situations described in the reading materials.
- Recognize the applications of more complex instructions to described situations, including conditionals and procedures with multiple steps.

Level 6

- Recognize the application of jargon or technical terms to new situations.
- Recognize the application of complex instructions to new situations.
- Recognize the less-common meaning of a word with multiple meanings from context.
- Generalize from a passage to situations not described in the passage.
- Identify implied details.
- Explain the rationale behind a procedure, policy, or communication.
- Generalize from a passage to a somewhat similar situation.

Level 7

- Recognize the definitions of difficult, uncommon jargon or technical terms from context.
- Generalize from a passage to situations neither described in nor completely similar to those in a passage.

Applied Technology

Applied Technology measures skill in solving problems of a technological nature, involving the basic principles of mechanics, electricity, fluid dynamics, and thermodynamics as they apply to machines and equipment found in the workplace. There are four levels of complexity, 3 through 6, with Level 3 being the least complex and Level 6 the most complex. Although Level 3 is the least complex, it still represents a level of applied technology skill well above "no skill at all." The levels build on each other, each incorporating the skills at the preceding levels.

Level 3

- Apply the elementary physical principles underlying the operation of uncomplicated systems or tools.
- Recognize and identify relevant aspects of simple problems that involve one uncomplicated system or tool.
- Select appropriate methods or materials needed to solve problems.

Level 4

- Recognize, identify, and order relevant aspects of one moderately complex system or more than one uncomplicated system.
- Evaluate alternative solutions to determine the most appropriate one for the situation presented.

Level 5

- Solve problems based on one complex system, or one or more uncomplicated tools or systems.
- Understand and apply moderately difficult principles of mechanics, electricity, thermodynamics, and fluid dynamics, in addition to understanding complex machines and systems.
- Recognize, identify, and order relevant aspects of a problem before reaching an appropriate solution.

Level 6

- Solve problems that do not contain all the information needed to solve them, and/or in which the information provided may be out of logical order.
- Solve problems that contain extraneous information.
- Solve problems involving one or more tools or systems having a wide range of complexity.
- Apply difficult physical principles.
- Understand and correctly interpret the interaction of several complex systems.

Listening

Listening measures skill in listening to and understanding work-related messages; receiving information from customers, coworkers, or suppliers; and then writing down the information to communicate it to someone else. Students demonstrate their ability to distinguish and communicate critical information and noncritical information. **Critical information** consists of those details that the recipient of the message must have in order to understand the message and act upon it (e.g., names, phone numbers, addresses, times). **Noncritical information** can improve a message by providing details that further explain the message or its tone, but the absence of this noncritical information does not interfere with the recipient's ability to understand and accurately act upon the message. Each *Listening* level describes the **content and quality** of messages students write to describe an audio message.

Level 0

- No meaningful information, or totally inaccurate information.

Level 1

- Minimal pertinent information; enough context to provide clues as to gist of situation or source of further information.

Level 2

- Some pertinent information; may have incorrect critical information, but sketch of the situation is correct.

Level 3

- All the critical information that is present is correct; may be missing a few pieces of critical information.

Level 4

- All critical information is given and is correct; may be missing subtle details or tone; may have incorrect noncritical information that does not interfere with central meaning.

Level 5

- All critical information is present and correct; response conveys insight into situation through tone and/or subtle details.

Writing

Writing measures skill at writing work-related messages; receiving information from customers, co-workers, or suppliers; and then writing down the information to communicate it to someone else. Each *Writing* level rates the **writing mechanics** (such as sentence structure and grammar) **and writing style** of messages students write to describe an audio message.

Level 0

- An attempt is made at the message, but the message is completely garbled with no recognizable sentence structure.

Level 1

- Message conveyed inadequately; overall lack of proper sentence structure.

Level 2

- Message conveyed inadequately; weak sentence structure; large number of mechanical errors.

Level 3

- Message conveyed clearly; most sentences complete; some mechanical errors.

Level 4

- Message conveyed clearly; all sentences are complete; may have a few minor mechanical errors; may have a choppy style.

Level 5

- Message conveyed clearly; good sentence structure; no mechanical errors; highly appropriate for business setting and situation; smooth, logical style.

Teamwork

Teamwork measures skill in choosing behaviors and/or actions that simultaneously support team interrelationships and lead toward the accomplishment of work tasks. There are four levels of complexity, 3 through 6, with Level 3 being the least complex and Level 6 the most complex. Although Level 3 is the least complex, it still represents a level of teamwork skill well above "no skill at all." The levels build on each other, each incorporating the skills at the preceding levels.

Level 3

- Identify team goals and ways to work with other team members to accomplish those goals.
- Choose actions that support the ideas of other team members to accomplish team goals.
- Recognize that a team is having problems finishing a task and identify the cause of those problems.

Level 4

- Identify the organization of tasks and the time schedule that would help accomplish team goals efficiently and effectively.
- Select approaches that accept direction from other team members in order to accomplish tasks and to build and keep up good team relations.
- Identify behaviors that show appreciation for the personal and professional qualities of other team members and respect for their diversity.

Level 5

- Identify courses of action that give direction to other team members effectively.
- Choose approaches that encourage and support the efforts of other team members to further team relationships and/or task accomplishment.
- Consider the possible effects of alternative behaviors on both team relationships and team accomplishments and select the one that would best help the team meet its goals.

Level 6

- Identify the focus of team activity and select a new focus if that would help the team meet its goals more effectively.
- Select approaches that show the willingness to give and take direction as needed to further team goals (e.g., recognize the organization of team members' tasks that would best serve the larger goals of the team).
- Choose approaches that encourage a team to act as a unit and reach agreement when discussing specific issues.
- Identify actions that would help manage differences of opinion among team members, moving the team toward its goals while valuing and supporting individual diversity.

Notes

Academic Competencies

Total List of Academic Competencies

Three products of the Ohio Department of Education, Division of Curriculum, Instruction, and Professional Development, describe the academic skills that should be possessed by each student at the end of each grade level:

- *Model Competency-Based Language Arts Program*
- *Model Competency-Based Mathematics Program*
- *Model Competency-Based Science Program*

The following lists were derived from the academic competencies delineated for Grades 9-12 in these documents. Although the competencies are listed separately by grade level in the original documents, the levels were combined—and in some cases refined—for OCAP purposes, any overlap was eliminated, and a numbering system was imposed for ease of reference.

During the course of the OCAP workshops, each of the representatives from business, industry, labor, and community-based organizations was given a copy of these lists of academic competencies and instructed to circle the competencies that an entry-level employee should possess. The results from each panel were tallied to identify those required academic competencies most crucial to entry level in each specific occupational area. The results for this OCAP are presented on pp.75-80.

Unit: Communications Skills

Subunit: Reading—Structure

Competencies:

RS1 Exhibit knowledge of language structure
RS2 Recognize that there may be more than one interpretation of reading selections
RS3 Recognize various literary devices (e.g., metaphor, simile, personification, hyperbole, pun, alliteration)
RS4 Recognize and discuss literary elements (e.g., plot, dialogue, theme, setting, characterization)
RS5 Develop and use an increasingly sophisticated vocabulary gained through context
RS6 Apply knowledge of language structure to reading
RS7 Explain why there may be more than one interpretation of reading selections
RS8 Recognize effect of literary devices on meaning
RS9 Analyze author's use of literary elements
RS10 Recognize relationship of structure to meaning
RS11 Describe various interpretations and levels of meaning in reading selections (e.g., symbolism, nuance)
RS12 Characterize author's use of literary devices
RS13 Characterize use of literary techniques (e.g., irony, satire, allegory, onomatopoeia)
RS14 Critique a variety of literature with regard to plot, dialogue, theme, setting, and characterization
RS15 Apply an expanding vocabulary gained through reading
RS16 Explain various interpretations and levels of meaning in reading selections (e.g., symbolism, nuance)
RS17 Analyze use of literary devices (e.g., extended metaphor, simile, personification, hyperbole, pun, alliteration)
RS18 Understand use of literary techniques (e.g., irony, satire, allegory, onomatopoeia)
RS19 Analyze and synthesize pieces of literature with regard to plot, dialogue, theme, setting, and characterization

Subunit: Reading—Meaning Construction

Competencies:

- RM1 Demonstrate ability to recognize appropriate pre-reading strategies
- RM2 Describe effectiveness of a reading selection
- RM3 Read to clarify personal thinking and knowledge
- RM4 Support interpretation of text by locating and citing specific information
- RM5 Develop personal response to a variety of literary works
- RM6 Recognize diverse literary interpretations
- RM7 Engage in self-selected reading activities
- RM8 Confirm and extend meaning in reading by researching new concepts and facts
- RM9 Self-monitor and apply corrective strategies when communication has been interrupted or lost
- RM10 Use features of literary genres to extend meaning
- RM11 Assess effectiveness of a selection read
- RM12 Use reading as a possible problem-solving strategy to clarify personal thinking and knowledge
- RM13 Use knowledge of semantic elements (e.g., figurative language, denotation, connotation, dialect) to clarify meaning when reading
- RM14 Predict, recognize, interpret, and analyze themes based on familiarity with author's work
- RM15 Compare and contrast literary genres
- RM16 Assess validity and quality of selection read (e.g., predict, summarize, analyze, infer)
- RM17 Clarify meaning when reading, using knowledge of literary devices, stylistic diction, and other semantic elements
- RM18 Compare personal reaction to critical assessment of a literary selection
- RM19 Assess validity of diverse literary interpretations
- RM20 Use reference books to find, evaluate, and synthesize information
- RM21 Identify tone of a literary work (e.g., ironic, serious, conversational, humorous)
- RM22 Critique validity of diverse literary interpretations
- RM23 Integrate personal reaction to and critical assessment of a literary selection

Subunit: Reading—Application

Competencies:

- RA1 Select and read material for personal enjoyment and information
- RA2 Read a variety of complete, unabridged works (e.g., self-selected or assigned stories, essays, nonfiction, plays, novels, poetry)
- RA3 Employ various reading strategies (e.g., scanning, skimming, reviewing, questioning, testing, retaining) according to purpose
- RA4 Participate in selection of books, materials, and topics for literature study groups
- RA5 Develop and apply knowledge of the interrelationship of concepts (e.g., construction of webs, graphs, timelines)
- RA6 Read selections from a variety of styles and formats, recognizing that style and format influence meaning
- RA7 Extend value of reading, writing, speaking, viewing, and listening by pursuing, through reading, new concepts and interests developed as a result of these activities
- RA8 Read extensively from the works of a particular author, and explain elements of author's style

Subunit: Reading—Multidisciplinary

Competencies:

- RM1 Connect themes and ideas across disciplines through literature
- RM2 Read to facilitate learning across curriculum
- RM3 Read to develop awareness of human rights and freedom
- RM4 Participate actively in a community of learners

RM5 Recognize and explain interaction between literature and various cultural domains (e.g., social, technological, political, economic)
RM6 Explore and analyze a variety of cultural elements, attitudes, beliefs, and value structures by reading and experiencing our diverse literary tradition, including works by men and women of many racial, ethnic, and cultural groups
RM7 Value thinking and language of others
RM8 Relate literature to historical period about which or in which it was written
RM9 Read to facilitate content learning

Subunit: Writing—Structure

Competencies:

WS1 Develop and expand a repertoire of organizational strategies (e.g., narration, comparison/contrast, and description) through practice and discussion
WS2 Clarify word choice according to audience, topic, and purpose
WS3 Locate and correct errors in usage, spelling, and mechanics (e.g., subject-verb agreement, parallel construction, pronoun reference, punctuation, capitalization, sentence structure) using a variety of resources
WS4 Recognize information gained from primary and secondary sources
WS5 Develop writing that contains ordered, related, well-developed paragraphs with sentences of varied lengths and patterns
WS6 Use information from a variety of sources to develop an integrated piece of writing
WS7 Evaluate and revise writing to focus on such things as audience, tone, and purpose
WS8 Recognize differences between documentation and reference list styles
WS9 Develop extended pieces of writing that contain ordered, related, well-developed paragraphs with sentences of varied lengths and patterns
WS10 Select from a repertoire of organization strategies a pattern appropriate to a topic (e.g., narration, example, detail, comparison/contrast, classification)
WS11 Synthesize information from a variety of sources to construct meaning
WS12 Refine word choice and tone according to audience, situation, and purpose
WS13 Appropriately cite information gained from primary and secondary sources
WS14 Use style manuals or software to prepare documentation and reference lists
WS15 Develop effectively organized pieces of expository writing containing strong voice, clear thesis, and well-developed ideas
WS16 Identify organization patterns appropriate to writing topic
WS17 Respond to others' suggested revisions to a writing piece

Subunit: Writing—Meaning Construction

Competencies:

WM1 Demonstrate knowledge of the recursive nature of the writing process by applying it appropriately to various topics, situations, and audiences (e.g., making connections between prior knowledge and new information, consulting other sources)
WM2 Develop criteria for writing evaluation using scoring guides (e.g., rubric/holistic scale, primary trait scoring) and peer/teacher assistance to clarify meaning
WM3 Respond to others' suggested revisions to a piece of writing (e.g., self-question, re-read, revise)
WM4 Use word processing, graphics, and publishing as aids for constructing meaning in writing
WM5 Engage in self-initiated writing activities
WM6 Incorporate personal criteria with generally accepted standards for writing evaluation
WM7 Evaluate, analyze, and synthesize information for writing
WM8 Evaluate own writing using personal and established scoring criteria
WM9 Assess personal/peer revisions to a writing piece
WM10 Recognize and refine personal writing styles

Subunit: Writing—Application

Competencies:

- WA1 Apply appropriate writing techniques (e.g., prewriting, drafting, revising, editing, presenting) suitable for varied writing tasks
- WA2 Use sentence-combining techniques to improve syntactic fluency and maturity
- WA3 Write in response to prompted and self-selected topics in practical, persuasive, descriptive, narrative, and expository domains
- WA4 Develop personal voice in writing
- WA5 Consider audience and purpose for writing
- WA6 Develop criteria for selection and potential development of topic
- WA7 Write in a journal or learning log to clarify personal thinking and knowledge
- WA8 Apply an expanding vocabulary gained through writing
- WA9 Make judicious use of reference sources (e.g., dictionary, thesaurus, online database, encyclopedia)
- WA10 Demonstrate an appreciation for aesthetically pleasing language through word choice and style
- WA11 Apply revising and editing strategies needed for writing task
- WA12 Vary sentence lengths and patterns
- WA13 Refine personal voice in writing
- WA14 Vary styles and formats for intended purpose and audience
- WA15 Apply criteria for selection and development of topic
- WA16 Participate in peer review of writing in progress
- WA17 Use transitions between sentences, ideas, and paragraphs in writing
- WA18 Revise and edit papers extensively in preparation for presentation/publication
- WA19 Develop a variety of genres (e.g. fantasy, science fiction, short stories, poetry)
- WA20 Focus writing and tone on such elements as audience, situation, and purpose
- WA21 Develop topic fully and appropriately
- WA22 Use writing process to clarify personal thinking and knowledge
- WA23 Apply appropriate recursive writing process as suggested by writing task and writer's process
- WA24 Develop an extended piece of writing (e.g., story, narrative poem, autobiography, novel, research paper)
- WA25 Revise writing and tone to assure focus on such elements as audience, situation, and purpose
- WA26 Use writing process to write reflectively

Subunit: Writing—Multidisciplinary

Competencies:

- WM1 Use writing process for learning across curriculum
- WM2 Use writing process to demonstrate knowledge of need for human rights and freedom
- WM3 Value and apply collaborative skills in the writing process
- WM4 Write in response to reading, speaking, viewing, and listening
- WM5 Use multidisciplinary resources in writing projects
- WM6 Use writing process to facilitate learning across curriculum
- WM7 Recognize value of and engage in collaboration in the writing process
- WM8 Use communication processes to develop a published writing piece in collaboration with others
- WM9 Record experiences and observations related to content learning
- WM10 Apply collaborative skills in the writing process
- WM11 Write collaboratively with peers
- WM12 Use cross-disciplinary resources in writing projects

Subunit: Listening/Visual Literacy—Structure

Competencies:

- LS1 Listen to and view a wide variety of genres (e.g. mystery, drama, poetry)
- LS2 Become aware of an author's style through listening to and viewing a variety of works

LS3 Recognize correct and appropriate grammar, diction, and syntax
LS4 Expand vocabulary through listening to and viewing varied media (e.g., recordings, films, music, news broadcasts)
LS5 Recognize beauty of language
LS6 Enhance recognition of an author's style through listening to and viewing a variety of works
LS7 Recognize use and misuse of language in media
LS8 Refine knowledge of style through listening to and viewing multiple works by the same author
LS9 Expand and refine grammar, diction, and syntax through listening
LS10 Compare authors' styles through viewing and listening to their works
LS11 Expand knowledge of complex grammar, diction, and syntax issues

Subunit: Listening/Visual Literacy—Meaning Construction

Competencies:

LM1 Develop critical thinking skills necessary to evaluate media and assess oral presentations
LM2 Compare new oral texts to past experiences and knowledge in order to enhance comprehension
LM3 Recognize how rhythmic patterns, silence, and cadences enhance quality of speech and literature
LM4 Focus listening and viewing on themes and/or plots
LM5 Gather information from listening and viewing experiences to enhance research
LM6 Use critical thinking skills to evaluate media and oral presentations
LM7 Use prior knowledge and experiences to facilitate comprehension of new oral texts
LM8 Identify rhythmic and time patterns in speech and literature
LM9 Identify and analyze themes and/or plots when listening and viewing
LM10 Use information gathered from listening and viewing experiences to expand research
LM11 Enhance use of critical thinking skills to evaluate media and oral presentations
LM12 Consider prior knowledge and experiences when attempting to understand the meaning of new texts
LM13 Appreciate rhythmic and time patterns of speech and literature
LM14 Select viewing and listening materials to support written text
LM15 Evaluate media and oral presentations analytically and critically
LM16 Organize prior knowledge and experiences to comprehend new texts
LM17 Organize and use viewing and listening materials to support written text

Subunit: Listening/Visual Literacy—Application

Competencies:

LA1 Listen attentively during oral reading
LA2 Use media as stimuli for learning and thinking
LA3 Develop knowledge of structure through art, music, and literature
LA4 Use electronic media to enhance and highlight language learning
LA5 Listen and view for entertainment and enjoyment
LA6 Use technology and other media (e.g., videos, posters, maps, graphs, t-shirts) as means of expressing ideas

Subunit: Listening/Visual Literacy—Multidisciplinary

Competencies:

LM1 Facilitate learning across curriculum through critical listening and viewing
LM2 Engage in individual, small-group, and whole-group listening and viewing activities
LM3 Develop language arts (e.g., viewing, listening) projects collaboratively
LM4 Investigate language and cultural differences through listening and viewing activities
LM5 Participate in a community of learners through productive listening

Subunit: Oral Communication—Structure

Competencies:

- OS1 Refine oral communication skills (e.g., voice modulation, eye contact, body language)
- OS2 Demonstrate knowledge of grammar, usage, and syntax when presenting
- OS3 Select topics and vocabulary suitable to audience
- OS4 Organize notes and ideas for speaking (e.g., cause-effect, chronological, exemplification)
- OS5 Use language imaginatively (e.g., word games, puns, limericks)
- OS6 Modulate voice to enhance meaning when interpreting literature orally
- OS7 Organize notes and ideas for formal, semiformal, and informal presentations of information
- OS8 Refine speaking techniques for formal, semiformal, and informal settings
- OS9 Develop repertoire of organizational strategies for presenting information orally
- OS10 Expand vocabulary to fit topic
- OS11 Select topics suitable to audience, situation, and purpose
- OS12 Select appropriate strategies when organizing notes and ideas for speaking

Subunit: Oral Communications—Meaning Construction

Competencies:

- OM1 Make connections between prior knowledge and new information for oral presentations
- OM2 Participate in informal speaking activities (e.g., offering opinions, supporting statements, questions, clarification, entertainment)
- OM3 Use interviewing techniques to gather information
- OM4 Communicate orally to entertain and to inform
- OM5 Participate in group communication activities (e.g., debates, panel discussions, negotiations, book-sharing, roundtables, cooperative/collaborative groups)
- OM6 Take and organize notes when preparing speech/presentation
- OM7 Interpret texts orally to illustrate meaning
- OM8 Respond to needs of various audiences
- OM9 Gather and assess information for speaking
- OM10 Communicate orally to inform and persuade
- OM11 Prepare and deliver formal speech/presentation
- OM12 Participate in a variety of oral interpretations
- OM13 Assess needs of audience, and adjust language and presentation according to their knowledge
- OM14 Analyze and synthesize information for speaking
- OM15 Describe effectiveness of a literary selection
- OM16 Describe topic or idea in order to clarify personal/audience thinking
- OM17 Analyze and synthesize information gathered from a variety of sources (e.g., interviews, hypermedia, reference works) for speaking
- OM18 Describe validity and/or quality of a literary selection and justify selection
- OM19 Interpret orally a variety of literature
- OM20 Describe topic or idea to clarify meaning for others

Subunit: Oral Communication—Application

Competencies:

- OA1 Become proficient at using interviewing techniques
- OA2 Give an oral interpretation for a specific audience
- OA3 Develop and apply oral communication skills for cooperative/collaborative learning
- OA4 Use oral communication for a variety of purposes and audiences (e.g., negotiations, book reviews, rationales)
- OA5 Develop and apply decision-making strategies
- OA6 Practice interviewing techniques
- OA7 Apply interviewing techniques to purposeful interviews
- OA8 Focus oral interpretation on a specific audience

Subunit: Oral Communications—Multidisciplinary

Competencies:

- OM1 Value thinking and language of others
- OM2 Develop oral projects collaboratively
- OM3 Be involved in individual, small-group, and whole-group language activities
- OM4 Participate actively in a community of learners
- OM5 Investigate language and cultural differences through oral language activities

Unit: Mathematics Skills

Subunit: Numbers and Number Relations

Competencies:

- NR1 Compare, order, and determine equivalence of real numbers
- NR2 Estimate answers, compute, and solve problems involving real numbers
- NR3 Compare and contrast real number system, rational number system, and whole number system
- NR4 Extend knowledge to complex number system, and develop facility with its operation

Subunit: Measurement

Competencies:

- M1 Estimate and use measurements
- M2 Understand the need for measurement and the probability that any measurement is accurate to some designated specification
- M3 Understand and apply measurements related to power and work
- M4 Understand and apply measurement concepts of distance-rate-time problems and acceleration problems with real-world experiments
- M5 Use real experiments to investigate elasticity, heat, sound, electricity, magnetism, light, acceleration, velocity, energy, and gravity
- M6 Use real-world problem situations involving mass and weight
- M7 Use real-world problem situations involving simple harmonic motion
- M8 Establish ratios with and without common units
- M9 Construct and interpret maps, tables, charts, and graphs as they relate to real-world mathematics
- M10 Understand and solve rate-change problems
- M11 Understand and solve right triangle relationships as they relate to measurement—specifically those that deal with the Pythagorean theorem
- M12 Graph and interpret ordered pairs
- M13 Compute total sales from a variety of items
- M14 Comprehend and compute rates of growth or decay
- M15 Comprehend, compute, and interpret real problems involving annuities
- M16 Develop an ability to identify real problems and provide possible solutions
- M17 Express and apply different types of measurement scales
- M18 Determine area and volume

NOTE: The math subunit on problem solving was not included on this list since it should be a continuing thread throughout all instruction rather than a separate set of competencies.

Subunit: Estimation and Mental Computation

Competencies:

- E1 Use estimation to eliminate choices in multiple-choice tests
- E2 Use estimation to determine reasonableness of problem situations in a wide variety of applications
- E3 Estimate shape of graphs of various functions and algebraic expressions
- E4 Use mental computation when computer and calculator are inappropriate

Subunit: Data Analysis and Probability

Competencies:

- D1 Organize data into tables, charts, and graphs
- D2 Understand and apply measures of central tendency, variability, and correlation
- D3 Use curve fitting to predict from data
- D4 Use experimental or theoretical probability, as appropriate, to represent and solve problems involving uncertainty
- D5 Use computer simulations and random number generators to estimate probabilities
- D6 Test hypotheses using appropriate statistics
- D7 Read, interpret, and use tables, charts, and graphs to identify patterns, note trends, draw conclusions, and make predictions
- D8 Identify probabilities of events involving unbiased objects
- D9 Use sampling and recognize its role in statistical claims
- D10 Design a statistical experiment to study problem, conduct experiment, and interpret and communicate outcomes
- D11 Describe normal curve in general terms, and use its properties
- D12 Create and interpret discrete probability distributions
- D13 Understand concept of random variable
- D14 Apply concept of random variable to generate and interpret probability distributions, including binomial, uniform, normal, and chi square

Subunit: Algebra

Competencies:

- A1 Describe problem situations by using and relating numerical, symbolic, and graphical representations
- A2 Use language and notation of functions in symbolic and graphing settings
- A3 Recognize, relate, and use the equivalent ideas of zeros of a function, roots of an equation, and solution of an equation in terms of graphical and symbolic representations
- A4 Describe and use logic of equivalence in working with equations, inequalities, and functions
- A5 Develop graphical techniques of solution for problem situations involving functions
- A6 Explore and describe characterizing features of functions
- A7 Make arguments and proofs in algebraic settings
- A8 Factor difference of two squares
- A9 Determine slope, midpoint, and distance
- A10 Explore and combine rational functions
- A11 Explore factoring techniques
- A12 Solve quadratic equations by factoring and formula
- A13 Set up and solve linear equations
- A14 Solve systems of linear equations with two variables
- A15 Describe geometric situations and phenomena using variables, equations, and functions
- A16 Describe measures of central tendency, mean, median, mode, and variance algebraically and graphically
- A17 Represent inequalities on the number line and in the coordinate plane
- A18 Use coordinate arguments in making geometric proofs

A19 Symbolize transformations of figures and graphs
A20 Explore geometric basis for functions of trigonometry
A21 Graph linear functions
A22 Develop and use vectors to represent direction and magnitude, including operations
A23 Use polar and parametric equations to describe, graph, and solve problem situations
A24 Represent sequences and series as functions both algebraically and graphically
A25 Explore recursive functions and procedures using spreadsheets, other computer utilities, and notions appropriate to these problem situations
A26 Describe and solve algebraic situations with matrices
A27 Describe and use inverse relationship between functions, including exponential and logarithmic
A28 Analyze and describe errors (and their sources) that can be made when using computers and calculators to solve problems
A29 Decide whether problem situation is best solved using computer, calculator, paper and pencil, or mental arithmetic/estimation techniques
A30 Explore relationships between complex numbers and vectors
A31 Make arguments concerning limits, convergence and divergence in contexts involving sequences, series, and other types of functions
A32 Represent transformations in the plane with matrices
A33 Contrast and compare algebras of rational, real, and complex numbers with characteristics of a matrix algebra system
A34 Construct polynomial approximations of a function over specified intervals of convergence
A35 Examine complex numbers as zeros of functions
A36 Translate verbal statements into symbolic language
A37 Simplify algebraic expressions
A38 Use laws and exponents (including scientific notation)
A39 Expand and extend idea of vectors and linear algebra to higher dimensional situations
A40 Use the idea of independent basis elements for a vector space and associated fundamental concepts of finite dimensional linear algebra
A41 Develop and communicate arguments about limit situations
A42 Use matrices to describe and apply transformations
A43 Develop and use polar and parametric equations to represent problem situations
A44 Explore proofs by mathematical induction

Subunit: Geometry

Competencies:

G1 Create and interpret drawings of three-dimensional objects
G2 Represent problem situations with geometric models and apply properties of figures
G3 Apply Pythagorean theorem
G4 Demonstrate knowledge of angles and parallel and perpendicular lines
G5 Explore inductive and deductive reasoning through applications to various subject areas
G6 Translate between synthetic and coordinate representations
G7 Identify congruent and similar figures using transformation with computer programs
G8 Deduce properties of figures using transformations and coordinates
G9 Use deductive reasoning
G10 Explore compass and straightedge constructions in context of geometric theorems
G11 Demonstrate knowledge of and ability to use proof
G12 Use variety of proof techniques (e.g., synthetic, transformational, and coordinate)
G13 Use variety of proof formats, including T-proof (i.e., two-column) and paragraph proof
G14 Explore different proof strategies
G15 Investigate different proofs of theorems
G16 Develop knowledge of an axiomatic system
G17 Apply transformations and coordinates in problem solving
G18 Represent problem situations with geometric models, and apply properties of figures

G19 Deduce properties of figures using vectors
G20 Analyze properties of Euclidean transformations, and relate translations to vectors
G21 Apply vectors in problem solving
G22 Develop further knowledge of axiomatic systems by investigating and comparing various geometries

Subunit: Patterns, Relations, and Functions

Competencies:

P1 Model real-world phenomena with polynomial and exponential functions
P2 Explore relationship between zeros and intercepts of functions
P3 Translate among tables, algebraic expressions, and graphs of functions
P4 Use graphing calculator or computer to generate graph of a function
P5 Explore relationship between a linear function and its inverse
P6 Describe and use characteristics of polynomial functions in problem-solving situations
P7 Explore conic sections, and graph using graphing calculator or computer
P8 Apply trigonometric functions to problem situations involving triangles
P9 Discover general relationships between algebraic description of conic, kind of conic, and special properties of that conic
P10 Explore periodic real-world phenomena using sine and cosine functions
P11 Analyze effects of parameter changes on graphs
P12 Use graphing calculator or computer to graph functions
P13 Develop a knowledge of rational and transcendental functions
P14 Understand connections between trigonometric and circular functions
P15 Use circular functions to model periodic real-world functions
P16 Solve trigonometric equations, and verify trigonometric identities
P17 Understand connections between trigonometric functions and polar coordinates, exponential functions, logarithmic functions, complex numbers, and series
P18 Model real-world phenomena with a variety of functions
P19 Graph using polar coordinates
P20 Explore graphs in three dimensions
P21 Explore functions of several variables
P22 Explore recursive functions using spreadsheets and/or programming languages

Unit: Science Skills

Subunit: Scientific Inquiry

Competencies:

Q1 Check the appropriateness and accuracy of measures and computations using various strategies (e.g., estimations, unit analysis, determination of significant figures)
Q2 Use ratios, proportions, and probabilities in appropriate problem situations
Q3 Translate information from and represent information in various forms with equal ease (e.g., tables, charts, graphs, diagrams, geometric figures)
Q4 Use existing algebraic formulas and create new ones in appropriate problem-solving situations
Q5 Estimate and justify probabilities of outcomes of familiar situations based on experimentation and other strategies
Q6 Invent apparatus and mechanical tools needed to perform unique tasks in various situations
Q7 Identify, compare, and contrast different modes of inquiry, habits of mind, and attitudes and dispositions
Q8 Design investigations that are safe and ethical (i.e., obtain consent and inform others of potential outcomes, risks, and benefits; and show evidence of concern for the health and safety of humans and non-human species)

Q9 Make and read scale drawings, maps, models, and other representations to aid planning and understanding

Q10 Seek elaboration and justification of data and ideas, and reflect on alternative interpretations of the information

Q11 Use appropriate units for counts and measures

Q12 Create and use databases (electronic and other) to collect, organize, and verify data and observations

Q13 Design and conduct investigations with multiple variables

Q14 Communicate the results of investigations clearly in a variety of situations

Q15 Examine relationships in nature, offer alternative explanations for the observations, and collect evidence that can be used to help judge among explanations

Q16 Trace the development (e.g., history, controversy, and ramifications) of various theories, focusing on supporting evidence and modification with new evidence

Q17 Select, invent, and use tools, including analog and digital instruments, to make and record direct measurements

Q18 Observe and document events and characteristics of complex systems

Q19 Explain the influence of perspective (e.g., spatial, temporal, and social) on observation and subsequent interpretations

Q20 Create multiple representations of the same data using a variety of symbols, descriptive languages, mathematical concepts, and graphic techniques

Q21 Generate testable hypotheses for observations of complex systems and interactions

Q22 Document potentially hazardous conditions and associated risks in selected homes and public areas

Q23 Participate in public debates, relying on documented and verified data to construct and represent a position on scientific issues

Q24 Construct and test models of physical, biological, social, and geological systems

Q25 Read, verify, debate, and, where necessary, refute research published in popular or technical journals of science (e.g., *Discover, Omni, Popular Mechanics*)

Q26 Explore discrepant events and develop and test explanations of what was observed

Q27 Conduct theory-based research using surveys, observational instruments, and other methods

Q28 Modify personal opinions, interpretations, explanations, and conclusions based on new information

Q29 Analyze error and develop explanations in various domains

Q30 Formulate taxonomic schemes based upon multivariate models that help to explain similarities and differences in form, distribution, behavior, survival, and origin of objects and organisms

Q31 Demonstrate various logical connections between related concepts (e.g., entropy, conservation of energy)

Q32 Account for discrepancies between theories and observations

Q33 Analyze the changes within a system when inputs, outputs, and interactions are altered

Q34 Create, standardize, and document procedures

Q35 Determine the sources of significant disparities between the predicted and recorded results, and change research procedures to minimize disparities

Q36 Research, locate, and propose applications for abstract patterns (e.g., fractals, Fibonacci sequences, string theory, orbitals)

Q37 Recognize and utilize classification systems for particles, elements, compounds, phenomena, organisms, and others for exploring and predicting properties and behaviors

Q38 Suggest and defend alternative experimental designs and data explanations (e.g., sampling, controls, safeguards)

Q39 Recognize and communicate differences between questions that can be investigated in a scientific way and those that rely on other ways of knowing

Q40 Draw conclusions based on the relationships among data analysis, experimental design, and possible models and theories

Q41 Suggest new questions as a result of reflection on and discussions about own scientific investigations

Q42 Investigate, assess, and comment on strengths and weakness of the descriptive and predictive powers of science

Q43 Create new information from representations of data in a variety of forms (e.g., symbols, descriptive languages, graphic formats) utilizing a variety of techniques (e.g., interpolations, extrapolations, linear regressions, central tendencies, correlations)

Subunit: Scientific Knowledge

Competencies:

- K1 Investigate various types of dynamic equilibrium (e.g., biological, geological, mechanical, chemical)
- K2 Investigate the relationship between the rates of energy exchange and the relative energy level of components within systems (e.g., trophic levels of ecosystems, osmosis, rate of heating and cooling, storms)
- K3 Investigate patterns in the natural world (e.g., heredity, crystalline structures, population and resource distributions, diffraction, dispersion, polarization)
- K4 Investigate models and theories that help to explain the interactions of components in systems (e.g., conservation of mass, energy, and momentum; foodwebs; natural selection; entropy; plate tectonics; chaos; relativity; social-psychology)
- K5 Investigate degrees of kinship among organisms and groups of organisms
- K6 Investigate the limits of the definition of life, and investigate organisms and physical systems that exist at or near these limits (e.g. viruses, quarks, black holes)
- K7 Investigate estimates and measurements of a wide range of distances and rates of change
- K8 Investigate the historical development of theories of change over time (e.g., natural selection, continental drift, the big bang, geologic change)
- K9 Investigate physical and chemical changes in living and nonliving systems (e.g., photosynthesis, weathering processes, glaciation, thermal effects of materials, energy cells)
- K10 Investigate simulations of nuclear change (e.g., radioactivity, half life, carbon dating)
- K11 Investigate conservation principles associated with physical, chemical, and nuclear changes
- K12 Formulate descriptions of the impacts of various forms of mechanical and electromagnetic waves on various organisms and objects
- K13 Formulate models and hypotheses for patterns in the natural world (e.g., earth structures, transportation systems, migrations, communications, constellations)
- K14 Formulate explanations for the influences of objects and organisms on each other over time
- K15 Formulate and interpret explanations for change phenomena (e.g., mass extinctions, stellar evolution, punctuated equilibrium, molecular synthesis)
- K16 Formulate and interpret explanations for the magnitudes of diversity at different periods of geologic time (e.g., mutation, global cataclysms, continental drift, competition, mass extinctions)
- K17 Formulate interpretations of the structure, function, and diversity in a variety of organisms and physical systems (e.g., DNA and RNA variants, nucleons, interaction particles)
- K18 Formulate understandings of geologic time (e.g., millennia, periods, epochs)
- K19 Formulate an understanding of the historical development of the model of the universe (e.g., Aristotle, Ptolemy, Copernicus, Brahe, Kepler, Galileo, Newton, Einstein)
- K20 Formulate explanations and representations of the production, transmission, and conservation of energy in biological and physical systems (e.g., weather, volcanism, earthquakes, electricity, magnetism, cellular respiration)
- K21 Formulate models and hypotheses about patterns in the natural world (e.g., social behavior, molecular structure, energy transformation, entropy, randomness, aging, chaos, hormonal cycles)
- K22 Formulate interpretations of the relationship between energy exchange and the interfaces between components within systems
- K23a Formulate estimations for the range of energies within and between various phenomena (e.g., thermal, electromagnetic, thermonuclear, chemical, electrical)
- K23b Formulate explanations for the historical development of descriptions of motions interactions and transformations of matter and energy (e.g., classical Newtonian mechanics, special and general relativity, chaos)
- K24 Formulate models that can be used to describe fundamental molecular interactions in living and non-living systems (e.g., cell membranes, semiconductors).
- K25 Formulate an understanding of the degree of relationship among organisms and objects based on molecular structure (e.g., proteins, nucleic acids)
- K26 Formulate hypotheses and models that may account for observable events (e.g., electricity and magnetism, gravitation, atoms, bonding, chemical reactions, quantum effects, energy flow on biological systems, predator-prey relationships)

K27 Formulate models and hypotheses about change over time (e.g., natural selection, speciation, punctuated equilibrium, phyleytic gradualism, stellar evolution, plate tectonies, radioactive decay, quantum mechanical theory)

K28 Formulate lists of limitations, and propose refinements of standard classification systems (e.g., periodic table, IUPAC, Linnean, standard model)

K29 Formulate specific cases of limitations and possible exceptions of theories and principles regarding the interactions of moving objects and organisms (e.g., fluid flow in vessels, motion near the speed of light, Heisenberg uncertainty principle, meteorological prediction, local variation and diversity, earthquake prediction, energy transport in cellular respiration)

K30 Formulate plans and contingencies that can be used to accommodate for changes to and stresses on systems (e.g., wildlife and habitat management, corrosion prevention, noise abatement, structure design)

K31 Formulate models of molecular, atomic, ionic, and subatomic structures and the physical and biological implications of these structures (e.g., genes, nucleons, quarks)

K32 Formulate estimates for a wide range of measurements and scales (e.g., angstroms to light years)

K33 Formulate and interpret representations of time from origin to present accounting for phenomena of scale (e.g., smoothness, punctuations, chaos)

K34 Formulate interpretations of the historical development of various theories of possible causes of diversity among physical and biological phenomena (e.g., the works of Aristotle, Mendel, Darwin, McClintock)

K35 Formulate models and hypotheses that can be used to explain the interactions of components within technological and ecological systems

Subunit: Conditions for Learning Science

Competencies:

C1 Participate actively in dialogue about and resolution of community issues

C2 Assess information from various countries in the original language or translated form to ascertain the perspectives of many cultures

C3 Analyze the scientific ideas presented in science fiction stories and films

C4 Perform and repeat investigations to verify data, determine regularity, and reduce the impact of experimental error

C5 Present the results of investigations in a variety of forums

C6 Contribute to the decisions regarding topics for investigation

C7 Use various creative means to communicate interpretations of scientific ideas, concepts, phenomena, and events

C8 Consider the scientific thinking and language of others

C9 Individually and collaboratively produce clearly written representations of investigative results

C10 Fulfill responsibilities as part of a research group

C11 Select and utilize resources by various criteria (e.g., efficiency, effectiveness, health, safety) that are appropriate to the investigations being conducted by groups

C12 Present persuasive argument based on the scientific aspects of controversial issues

C13 Collect, store, retrieve, and manipulate information with available technologies that may range from hand processes up through computer applications

C14 Investigate social issues with a scientific perspective (e.g., human rights, wellness, economics, futurism, environmental ethics)

C15 Keep journals of observations and inferences made over an extended period of time, and reflect upon the impact of these recorded ideas on own thinking and actions

C16 Examine the intellect, perspectives, and ethics of notable scientists

C17 Collect and analyze observations made over extended periods of time and compare these to scientific theories

C18 Create presentations of scientific understandings using diverse modes of expressions

C19 Conduct formal scientific debates in the classroom

C20 Wonder about the likelihood of events that may occur by chance or coincidence
C21 Plan and conduct field trips and experiences for small and large groups
C22 Analyze the historical context that leads to and has led to scientific theories
C23 Seek information on topics of personal scientific interest from a variety of sources
C24 Conduct learner-developed investigations independently and collaboratively over periods of weeks and months
C25 Listen attentively and critically to presentations of scientific information made by others
C26 Conduct analyses of propaganda related to scientific issues
C27 Perform investigations that require observations over varying periods of time
C28 Experience scientific concepts as interpreted by other cultures through multimedia and local and global specialists
C29 Access appropriate technology to perform complicated, time-consuming tasks
C30 Relate historical accounts of science to the cultural context in which they were written
C31 Work as a contributing member of a collaborative research group
C32 Examine the influences of social and political structures and realities that contribute to inquiry about scientific issues
C33 Use technology (e.g., desktop publishing, teleconferencing, networking) to communicate scientific ideas
C34 Explore and analyze a variety of perspectives on science (e.g., works by men and women of many racial, ethnic, and cultural groups)
C35 Lead groups of learners of various ages in designing, planning, and conducting science activities
C36 Respect the scientific thinking of others and self
C37 Recognize and contrast different epistemologies
C38 Develop possible courses of action in response to scientific issues of local and global concern
C39 Determine the validity of research conclusions in relation to the design, performance, and results
C40 Develop multimedia presentations of group and individual research projects and investigations appropriate for a variety of audiences and forums
C41 Produce interesting and scientifically correct stories and present them using various modes of expression
C42 Reflect on the ideas and content found in own journal records
C43 Examine ambiguous results and formulate explanations
C44 Recognize and synthesize the contributions to scientific thought of individuals from many cultures
C45 Construct models and simulations of the component structures and functions of living and nonliving entities
C46 Lead multi-age groups in the examination of and planned resolution for scientific issues
C47 Recognize and choose members of research teams based upon the merit of their ideas and skills
C48 Construct a portfolio of products, documentation, and self-evaluations of own abilities, skills, and experiences
C49 Synthesize scientific information from a variety of sources
C50 Evaluate and prioritize scientific issues based upon risk-benefit analyses
C51 Refine scientific skills from a variety of experiences

Subunit: Applications for Science Learning

Competencies:

A1 Answer student-determined questions by designing databases and drawing inferences from the analyses of the information in these databases
A2 Make personal behavior decisions by interpreting information that has a scientific basis
A3 Propose courses of action that will validate and demonstrate personal understandings of scientific principles
A4 Guide other learners in their understanding of the interactions of technologies and society at various periods in time
A5 Promote and carry out practices that contribute to a sustainable environment

A6 Study and propose improvements in public services and systems in own community
A7 Choose consumer materials utilizing personal and environmental risk and benefit information
A8 Make inferences and draw conclusions using databases, spreadsheets, and other technologies
A9 Do simple troubleshooting on common electrical and mechanical systems, identifying and eliminating possible causes of malfunctions
A10 Construct devices that perform simple, repetitive actions
A11 Investigate the functionality of various geometric shapes in the natural world and the designed world (e.g., translations from spherical to plane representations cause distortions; triangular shapes contribute to rigidity and stability in structures; round shapes minimize boundary for a given capacity)
A12 Make decisions regarding personal and public health
A13 Evaluate the social and ecological risks and benefits resulting from the use of various consumer products
A14 Analyze the contributions of advances in technology through history to own everyday life
A15 Identify and reduce risks and threats to a sustainable environment
A16 Extend the limits of human capabilities using technological enhancements
A17 Use and recognize various propaganda techniques
A18 Solve unique problems using the results of systematic analyses
A19 Choose everyday consumer products that utilize recent innovation and pass appropriate performance criteria
A20 Refine personal career interests through investigations of the diversity of manufacturing, research, service, and invention processes
A21 Predict and investigate the working of toys and tools while controlling and manipulating variables (e.g., friction, gravity, forces)
A22 Write, follow, modify, and extend instructions (e.g., equations, algorithms, formulas, flow diagrams, illustrations)
A23 Create products, make inferences, and draw conclusions using databases, spreadsheets, and other technologies
A24 Predict various scenarios and propose solutions to community issues using scientific information (e.g., actuarial tables, census data, topographic maps, incidence data, climatic data)
A25 Use scientific evidence to consider options and formulate positions about the health and safety of others and self
A26 Search for, use, create, and store objects and information using various strategies and methods of organization and access
A27 Research and write environmental impact statements of own design
A28 Compare school-based science perspectives with those gained through cutting-edge technological applications
A29 Design management plans for natural and human-altered environments (e.g., woodlots, patios, lots, lawns, farmlands, forests)
A30 Refine personal career interests
A31 Promote public awareness of the interaction of technology with social issues
A32 Advocate and propose courses of action for local and global scientific issues using global networks
A33 Use appropriate technologies to prepare and present the findings of investigations incorporating tables, graphs, diagrams, and text
A34 Make informed consumer choices by evaluating and prioritizing information, evidence, and strategies
A35 Develop an informed point of view that allows for validation or refutation of the scientific statements and claims of advocates before pursuing courses of action (e.g., contributing support, signing petitions, casting votes)
A36 Differentiate between observations and inferences in the exploration of evidence related to personal, scientific, and community issues
A37 Develop and write environmental impact, and safety and hygiene management plans
A38 Use technology to collect, analyze, and communicate information (e.g., electronic networks, desktop publishing, remote sensing, graphing calculators, satellite telemetry, and others)
A39 Design, construct, and market inventions

Academic Competencies: Agriculture Products Processing

The Agriculture Products Processing OCAP panel of expert workers (see member list on the inside back cover) identified the following academic competencies (from the total list, pp. 60-74) as most crucial to the entry-level success of an employee in the area of agriculture products processing. It is recommended that these competencies be taught in an applied manner for students enrolled in agriculture products processing programs.

Unit: Communications Skills

Subunit: Reading—Structure

Competencies:

RS1	Exhibit knowledge of language structure
RS2	Recognize that there may be more than one interpretation of reading selections
RS3	Recognize various literary devices (e.g., metaphor, simile, personification, hyperbole, pun, alliteration)
RS6	Apply knowledge of language structure to reading
RS7	Explain why there may be more than one interpretation of reading selections
RS15	Apply an expanding vocabulary gained through reading

Subunit: Reading—Meaning Construction

Competencies:

RM2	Describe effectiveness of a reading selection
RM3	Read to clarify personal thinking and knowledge
RM4	Support interpretation of text by locating and citing specific information
RM7	Engage in self-selected reading activities
RM9	Self-monitor and apply corrective strategies when communication has been interrupted or lost
RM16	Assess validity and quality of selection read (e.g., predict, summarize, analyze, infer)

Subunit: Reading—Application

Competencies:

RA1	Select and read material for personal enjoyment and information
RA7	Extend value of reading, writing, speaking, viewing, and listening by pursuing, through reading, new concepts and interests developed as a result of these activities

Subunit: Reading—Multidisciplinary

Competencies:

RM2	Read to facilitate learning across curriculum
RM7	Value thinking and language of others
RM9	Read to facilitate content learning

Subunit: Writing—Structure

Competencies:

WS2	Clarify word choice according to audience, topic, and purpose
WS5	Develop writing that contains ordered, related, well-developed paragraphs with sentences of varied lengths and patterns
WS6	Use information from a variety of sources to develop an integrated piece of writing
WS8	Recognize differences between documentation and reference list styles
WS11	Synthesize information from a variety of sources to construct meaning
WS12	Refine word choice and tone according to audience, situation, and purpose
WS13	Appropriately cite information gained from primary and secondary sources
WS15	Develop effectively organized pieces of expository writing containing strong voice, clear thesis, and well-developed ideas

Subunit: Writing—Meaning Construction

Competencies:

WM8	Evaluate own writing using personal and established scoring criteria

Subunit: Writing—Application

Competencies:

WA1	Apply appropriate writing techniques (e.g., prewriting, drafting, revising, editing, presenting) suitable for varied writing tasks
WA4	Develop personal voice in writing
WA5	Consider audience and purpose for writing
WA7	Write in a journal or learning log to clarify personal thinking and knowledge
WA8	Apply an expanding vocabulary gained through writing
WA9	Make judicious use of reference sources (e.g., dictionary, thesaurus, online database, encyclopedia)
WA13	Refine personal voice in writing
WA20	Focus writing and tone on such elements as audience, situation, and purpose

Subunit: Writing—Multidisciplinary

Competencies:

WM1	Use writing process for learning across curriculum
WM3	Value and apply collaborative skills in the writing process
WM9	Record experiences and observations related to content learning
WM11	Write collaboratively with peers

Subunit: Listening/Visual Literacy—Structure

Competencies:

LS3	Recognize correct and appropriate grammar, diction, and syntax
LS9	Expand and refine grammar, diction, and syntax through listening
LS11	Expand knowledge of complex grammar, diction, and syntax issues

Subunit: Listening/Visual Literacy—Meaning Construction

Competencies:

LM1	Develop critical thinking skills necessary to evaluate media and assess oral presentations
LM2	Compare new oral texts to past experiences and knowledge in order to enhance comprehension
LM6	Use critical thinking skills to evaluate media and oral presentations
LM7	Use prior knowledge and experiences to facilitate comprehension of new oral texts
LM10	Use information gathered from listening and viewing experiences to expand research
LM11	Enhance use of critical thinking skills to evaluate media and oral presentations
LM16	Organize prior knowledge and experiences to comprehend new texts

Subunit: Listening/Visual Literacy—Application

Competencies:

LA1	Listen attentively during oral reading

Subunit: Oral Communication—Structure

Competencies:

OS1	Refine oral communication skills (e.g., voice modulation, eye contact, body language)
OS3	Select topics and vocabulary suitable to audience
OS8	Refine speaking techniques for formal, semiformal, and informal settings
OS9	Develop repertoire of organizational strategies for presenting information orally
OS10	Expand vocabulary to fit topic
OS11	Select topics suitable to audience, situation, and purpose

Subunit: Oral Communications—Meaning Construction

Competencies:

OM1	Make connections between prior knowledge and new information for oral presentations
OM10	Communicate orally to inform and persuade
OM13	Assess needs of audience, and adjust language and presentation according to their knowledge

Subunit: Oral Communication—Application

Competencies:

OA1	Become proficient at using interviewing techniques
OA4	Use oral communication for a variety of purposes and audiences (e.g., negotiations, book reviews, rationales)
OA6	Practice interviewing techniques
OA7	Apply interviewing techniques to purposeful interviews
OA8	Focus oral interpretation on a specific audience

Subunit: Oral Communications—Multidisciplinary

Competencies:

OM1	Value thinking and language of others
OM2	Develop oral projects collaboratively

Unit: Mathematics Skills

Subunit: Numbers and Number Relations

Competencies:

NR1	Compare, order, and determine equivalence of real numbers
NR2	Estimate answers, compute, and solve problems involving real numbers

Subunit: Measurement

Competencies:

M1	Estimate and use measurements
M2	Understand the need for measurement and the probability that any measurement is accurate to some designated specification
M3	Understand and apply measurements related to power and work
M8	Establish ratios with and without common units
M9	Construct and interpret maps, tables, charts, and graphs as they relate to real-world mathematics
M13	Compute total sales from a variety of items
M16	Develop an ability to identify real problems and provide possible solutions
M17	Express and apply different types of measurement scales
M18	Determine area and volume

Subunit: Estimation and Mental Computation

Competencies:

E1	Use estimation to eliminate choices in multiple-choice tests
E2	Use estimation to determine reasonableness of problem situations in a wide variety of applications
E4	Use mental computation when computer and calculator are inappropriate

Subunit: Data Analysis and Probability

Competencies:

D1	Organize data into tables, charts, and graphs

Subunit: Algebra

Competencies:

A1	Describe problem situations by using and relating numerical, symbolic, and graphical representations
A4	Describe and use logic of equivalence in working with equations, inequalities, and functions
A28	Analyze and describe errors (and their sources) that can be made when using computers and calculators to solve problems
A29	Decide whether problem situation is best solved using computer, calculator, paper and pencil, or mental arithmetic/estimation techniques

Subunit: Geometry

Competencies:

G9	Use deductive reasoning

Unit: Science Skills

Subunit: Scientific Inquiry

Competencies:

Q1	Check the appropriateness and accuracy of measures and computations using various strategies (e.g., estimations, unit analysis, determination of significant figures)
Q2	Use ratios, proportions, and probabilities in appropriate problem situations
Q3	Translate information from and represent information in various forms with equal ease (e.g., tables, charts, graphs, diagrams, geometric figures)
Q4	Use existing algebraic formulas and create new ones in appropriate problem-solving situations
Q5	Estimate and justify probabilities of outcomes of familiar situations based on experimentation and other strategies
Q9	Make and read scale drawings, maps, models, and other representations to aid planning and understanding
Q11	Use appropriate units for counts and measures
Q13	Design and conduct investigations with multiple variables
Q14	Communicate the results of investigations clearly in a variety of situations
Q17	Select, invent, and use tools, including analog and digital instruments, to make and record direct measurements
Q22	Document potentially hazardous conditions and associated risks in selected homes and public areas
Q28	Modify personal opinions, interpretations, explanations, and conclusions based on new information
Q29	Analyze error and develop explanations in various domains
Q34	Create, standardize, and document procedures

Subunit: Scientific Knowledge

Competencies:

K5	Investigate degrees of kinship among organisms and groups of organisms
K14	Formulate explanations for the influences of objects and organisms on each other over time

Subunit: Conditions for Learning Science

Competencies:

C4	Perform and repeat investigations to verify data, determine regularity, and reduce the impact of experimental error
C5	Present the results of investigations in a variety of forums
C8	Consider the scientific thinking and language of others
C10	Fulfill responsibilities as part of a research group
C11	Select and utilize resources by various criteria (e.g., efficiency, effectiveness, health, safety) that are appropriate to the investigations being conducted by groups
C36	Respect the scientific thinking of others and self
C39	Determine the validity of research conclusions in relation to the design, performance, and results
C51	Refine scientific skills from a variety of experiences

Subunit: Applications for Science Learning

Competencies:

A12	Make decisions regarding personal and public health
A13	Evaluate the social and ecological risks and benefits resulting from the use of various consumer products
A25	Use scientific evidence to consider options and formulate positions about the health and safety of others and self
A30	Refine personal career interests
A34	Make informed consumer choices by evaluating and prioritizing information, evidence, and strategies

Verification Panels

The Vocational Instructional Materials Laboratory wishes to extend thanks and appreciation to the many representatives of business, industry, labor, and community organizations who donated their time and expertise to the identification and revalidation of competencies.

The following panel was responsible for verifying the occupational competencies on the Agriculture Products Processing OCAP, identifying those academic competencies that an entry-level employee should possess, and determining the Work Keys academic skill levels required for successful entry into the occupation:

David E. Bishop, *Turk Bros. Custom Meats*, Ashland, Ohio
Janet Cassidy, *Ohio FFA Foundation, Inc.*, Columbus, Ohio
Chad Curtis, *J. M. Smucker Company*, Orrville, Ohio
Bartolome Flores, Jr., *Tip Top Canning*, Tipp City, Ohio
Maria A. Flores, *Tip Top Canning*, Tipp City, Ohio
Leo A. Speicher, *Nestle Research and Development of Ohio*, Marysville, Ohio

The following panel was responsible for verifying the competencies on the Employability OCAP:

Barbara J. Forster, *Nationwide Insurance*, Columbus, Ohio
Joan L. Hall, *Health Management Nursing*, Chesapeake, Ohio
Jane Highland, *Southern Ohio Staffing, Inc.*, Chillicothe, Ohio
Chuck Jackson, *Butech, Inc.*, Salem, Ohio
Garry Kessel, *Medina Auto Parts, Inc.*, Medina, Ohio
Joyce A. McMickens, *Ernst & Young*, Cleveland, Ohio
Julie C. Payeff, *The Andersons Management Corp.*, Maumee, Ohio
Patricia Piper, *Edison Industrial Systems Center*, Toledo, Ohio
Gary F. Rybak, *Red Roof Inns, Inc.*, Hilliard, Ohio