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)
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.
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
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 testing 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 windpipe 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 backbone
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
OCAP: Agriculture Products Processing

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 sea::,na 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:*

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### Competency 21.1: Market products—Continued

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<thead>
<tr>
<th>Competency Builders:</th>
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</thead>
<tbody>
<tr>
<td>21.1.10</td>
<td>Identify factors in cross-cultural communications that could affect marketing of products</td>
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<tr>
<td>21.1.11</td>
<td>Follow check-off procedures in product marketing</td>
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<tr>
<td>21.1.12</td>
<td>Identify impact of international trade, quotas, and tariffs*</td>
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<td>21.1.13</td>
<td>Describe the concept of “value-added”</td>
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### Competency 21.2: Promote products

**Competency Builders:**

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<tr>
<th>Competency Builders:</th>
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<tbody>
<tr>
<td>21.2.1</td>
<td>Differentiate between advertising and promotion</td>
</tr>
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<td>21.2.2</td>
<td>Outline promotional program using different audiovisual techniques*</td>
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<tr>
<td>21.2.3</td>
<td>Employ promotional techniques*</td>
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### Competency 21.3: Advertise products and services*

**Competency Builders:**

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<tr>
<th>Competency Builders:</th>
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<tbody>
<tr>
<td>21.3.1</td>
<td>Identify products and services to be advertised*</td>
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<td>21.3.2</td>
<td>Identify opportunities for publicity*</td>
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<tr>
<td>21.3.3</td>
<td>Identify types of advertising media*</td>
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<td>21.3.4</td>
<td>Prepare advertising materials*</td>
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### Competency 21.4: Display products

**Competency Builders:**

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<thead>
<tr>
<th>Competency Builders:</th>
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<tbody>
<tr>
<td>21.4.1</td>
<td>Arrange displays</td>
</tr>
<tr>
<td>21.4.2</td>
<td>Label products in display cases</td>
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<td>21.4.3</td>
<td>Set up self-service displays</td>
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<td>21.4.4</td>
<td>Prepare tray packs for products</td>
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<td>21.4.5</td>
<td>Group products</td>
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<tr>
<td>21.4.6</td>
<td>Post sales announcements</td>
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<tr>
<td>21.4.7</td>
<td>Monitor lighting and temperature of display cases</td>
</tr>
<tr>
<td>21.4.8</td>
<td>Rotate products</td>
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<tr>
<td>21.4.9</td>
<td>Prepare product removal reports</td>
</tr>
</tbody>
</table>

### Competency 21.5: Compare industry products using price lists and catalogs

**Competency Builders:**

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<thead>
<tr>
<th>Competency Builders:</th>
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<tbody>
<tr>
<td>21.5.1</td>
<td>Compare prices of similar products and services</td>
</tr>
<tr>
<td>21.5.2</td>
<td>Determine material and service availability</td>
</tr>
<tr>
<td>21.5.3</td>
<td>Maintain a supply of current product and service catalogs</td>
</tr>
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### Competency 21.6: Price merchandise

**Competency Builders:**

<table>
<thead>
<tr>
<th>Competency Builders:</th>
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<tbody>
<tr>
<td>21.6.1</td>
<td>Estimate fixed and variable expenses</td>
</tr>
<tr>
<td>21.6.2</td>
<td>Calculate markups</td>
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<tr>
<td>21.6.3</td>
<td>Calculate break-even points</td>
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<tr>
<td>21.6.4</td>
<td>Compare pricing strategies</td>
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<tr>
<td>21.6.5</td>
<td>Identify the psychological effects of pricing</td>
</tr>
</tbody>
</table>
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 benchmarks (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
OCAP: Agriculture Products Processing

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 goal(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 nonexistent 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
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

<table>
<thead>
<tr>
<th>Skill Area</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Mathematics</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locating Information</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading for Information</td>
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<td></td>
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<tr>
<td>Applied Technology</td>
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<td>Teamwork</td>
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<td>Listening</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Writing</td>
<td>5</td>
<td>4</td>
<td></td>
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</tbody>
</table>

**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\textsuperscript{*} 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., \(\frac{1}{2}, .75, 25\%\)) 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-step 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.

\textsuperscript{*}Work Keys Score Interpretation Guide. \textsuperscript{1994} by American College Testing (ACT). Used with permission.
**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.

<table>
<thead>
<tr>
<th>Level</th>
<th>Skills</th>
</tr>
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</table>
| **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). Non-critical 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, coworkers, 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.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 0</strong></td>
<td>An attempt is made at the message, but the message is completely garbled with no recognizable sentence structure.</td>
</tr>
<tr>
<td><strong>Level 1</strong></td>
<td>Message conveyed inadequately; overall lack of proper sentence structure.</td>
</tr>
<tr>
<td><strong>Level 2</strong></td>
<td>Message conveyed inadequately; weak sentence structure; large number of mechanical errors.</td>
</tr>
<tr>
<td><strong>Level 3</strong></td>
<td>Message conveyed clearly; most sentences complete; some mechanical errors.</td>
</tr>
<tr>
<td><strong>Level 4</strong></td>
<td>Message conveyed clearly; all sentences are complete; may have a few minor mechanical errors; may have a choppy style.</td>
</tr>
<tr>
<td><strong>Level 5</strong></td>
<td>Message conveyed clearly; good sentence structure; no mechanical errors; highly appropriate for business setting and situation; smooth, logical style.</td>
</tr>
</tbody>
</table>
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.
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.

### 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 |
**Academic Competencies: Total List**

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**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

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**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

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**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
Academic Competencies: Total List

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:

WM11 Use writing process for learning across curriculum.
WM12 Use writing process to demonstrate knowledge of need for human rights and freedom.
WM13 Value and apply collaborative skills in the writing process.
WM14 Write in response to reading, speaking, viewing, and listening.
WM15 Use multidisciplinary resources in writing projects.
WM16 Use writing process to facilitate learning across curriculum.
WM17 Recognize value of and engage in collaboration in the writing process.
WM18 Use communication processes to develop a published writing piece in collaboration with others.
WM19 Record experiences and observations related to content learning.
WM20 Apply collaborative skills in the writing process.
WM21 Write collaboratively with peers.
WM22 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.
Academic Competencies: Total List

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 rhythm, 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
Academic Competencies: Total List

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, 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 measurements—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 problems, 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
Academic Competencies: Total List

GI9 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

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 nonliving 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)
Academic Competencies: Total List

K27 Formulate models and hypotheses about change over time (e.g., natural selection, speciation, punctuated equilibrium, phyletic gradualism, stellar evolution, plate tectonics, 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
Academic Competencies: Total List

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

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**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 investigation 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