

## Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

## Know:

**3.4.12.A1. – Important**  
CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.

**3.4.12.A3. – Essential**  
TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).

**13.1.A – Important**  
Relate careers to individual interests, abilities, and aptitudes.

**13.1.D – Compact**  
Explain the relationship of career training programs to employment opportunities.

Hazardous Occupations Order in Agriculture

Industry Safety Standards

Mechanical Hazards

Tractor Mechanical Controls

Tractor Instruments

Tractor Safety Signs, Symbols, and Colors

Safe Tractor Driving Skills and Attitudes

## Understand:

Students should understand the knowledge and skills necessary to safely operate agricultural machinery

## Do:

**3.4.12.A1. – Important**  
CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.

**3.4.12.A3. – Essential**  
TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).

**13.1.A – Important**  
Relate careers to individual interests, abilities, and aptitudes.

Define the Hazardous Occupations Order in Agriculture

Discuss tractor safety standards

Identify possible mechanical hazards when working with agricultural equipment

Explain and utilize tractor safety controls and instruments

Identify tractor safety signs, symbols, and colors

Drive a tractor

Topic: Unit A-1-Tractor/Agricultural Equipment Safety  
Subject(s): Vocations

Days: 45  
Grade(s): 10th

Know:	Understand:	Do:

Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Common Assessments on what students should know and do in this unit:

- Unit Worksheets
- Unit Review
- Tractor Safety Certification Exam
- Tractor Safety Driving Test
- Tractor Safety Skills Test

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

2. Assessments 1

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Short Description:

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Unit Worksheets

Long Description:

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Students will complete unit worksheets

Differentiation:

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Modifications will be made based on student's abilities

Time (in days):

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1

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

2. Assessments 2

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Short Description:

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Unit Review

Long Description:

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Students will complete a unit review in practice for their certification exam

Differentiation:

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Modifications will be made based on student's abilities

Time (in days):

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1

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

2. Assessments 3

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Short Description:

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Tractor Safety Certification Exam

Long Description:

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Students will complete a National Safe Tractor and Machinery Operation Certification Exam

Differentiation:

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Modifications will be made based on student's abilities

Time (in days):

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1

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

2. Assessments 4

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Short Description:

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Tractor Safety Driving Test

Long Description:

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Students will maneuver and complete a certified driving course utilizing a tractor and two wheeled trailer

Differentiation:

---

Modifications will be made based on student's abilities

Time (in days):

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1

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

2. Assessments 5

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Short Description:

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Tractor Safety Skills Test

Long Description:

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Students will properly complete a tractor safety check and hitch a tractor to an implement

Differentiation:

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Modifications will be made based on student's abilities

Time (in days):

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1



Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

**Key Learning:** Students should understand the knowledge and skills necessary to safely operate agricultural machinery.



Unit Essential Question(s):

**Why is knowledge and skill required to safely operate a tractor and other agricultural equipment?**



Concept:

**Agricultural and Hazardous Occupations**

3.4.12.A1., 13.1.A, 13.1.D

Concept:

**Mechanical Hazards**

Concept:

**Tractor Controls and Instruments**

3.4.12.A3.



Lesson Essential Question(s):

Why are agricultural occupations hazardous? **Answer:** A variety of machinery is used by many different people and age groups. (A)

Lesson Essential Question(s):

What are the major classes of mechanical hazards? **Answer:** Pinch Point, Wrap Point, Shear Point, Cruch Point, Pull In Point, Burn Point, Freewheeling Parts, Stored Energy, Thrown Objects (A)

Lesson Essential Question(s):

Why are different types of controls and instruments found on a tractor? **Answer:** Ammeter, Lights, Gauges, Buzzers, Red Controls, Orange Controls, Yellow Controls, Black Controls, Foot Control, Hand Control, Combination Control (A)



Vocabulary:

Hazardous Occupations Order in Agriculture, P.T.O., Highway, Implement of Husbandry, Reaction Time, P.P.E.

Vocabulary:

Pinch Point, Wrap Point, Shear Point, Cruch Point, Pull In Point, Burn Point, Freewheeling Parts, Stored Energy, Thrown Objects

Vocabulary:

Ammeter, Lights, Gauges, Buzzers, Red Controls, Orange Controls, Yellow Controls, Black Controls, Foot Control, Hand Control, Combination Control



Concept:

**Safety Signs, Symbols, and Colors**

13.1.D

Concept:

**Tractor Driving**

3.4.12.A3., 13.1.A

Concept:

**Implement Connection**

3.4.12.A3.

Lesson Essential Question(s):

How are some signs, symbols, and colors incorporated onto a tractor/implement? **Answer:** Modern day tractors incorporate ROPS, SMV signs, color coded controls, symbols, and warning statements into their design. (A)

Lesson Essential Question(s):

Why should proper skills be demonstrated when operating a tractor? **Answer:** Refer to teacher led driving demonstration--review all safety symbols, parts of the tractor, and controls with the students. (ET)

Lesson Essential Question(s):

How are implements correctly connected to tractors? **Answer:** Refer to teacher led skills demonstration--review the safety of 3 point hitches, PTO's, drawbars, and hydraulics. (ET)



Vocabulary:

R.O.P.S., Operation Symbols, Operator's Manual, S.M.V. Sign

Vocabulary:

Drawbar, Pre-Operational Check, Riding the Clutch, Center of Gravity, Stability Baseline

Vocabulary:

3 Point Hitch, Spotting, Hydraulics, Reservoir, Pump, Valve, Hose, Cylinder

Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Additional Information:
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Attached Document(s):
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Vocab Report for Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

**Concept: Agricultural and Hazardous Occupations**

Hazardous Occupations Order in Agriculture - Youths younger than age 14 may not be employed to operate tractors greater than 20 PTO Horsepower or connect/disconnect implements to a tractor; Youth between 14 and 15 years of age may be employed if they have successfully passed a tractor safety course; Youth greater than 16 years of age are exempt from this law; Any youth working on a family farm or other direct family business are exempt from this law

P.T.O. - Power Take Off

Highway - A road open to public including the shoulders and berms

Implement of Husbandry - A machine used exclusively for agricultural operations and only infrequently operated or moved on highways; May be self propelled or hitched to a tractor

Reaction Time - The time it takes an individual to react to an event or emergency

P.P.E. - Personal Protective Equipment; Items that a person would wear to help prevent an accident from occurring

**Concept: Mechanical Hazards**

Pinch Point - When two machine parts move together (belts, chains, gears)

Wrap Point - A rotating machine part (PTO)

Shear Point - When two machine parts move close to one another (knives and blades)

Crush Point - When two machine parts move together as the gap between them decreases (hitching an implement to a drawbar)

Pull In Point - Rotating parts that come within extremely close contact (feed rolls and gears)

Burn Point - Parts that may reach hot temperatures (muffler, engine, fluids)

Freewheeling Parts - Machine parts that continue to run even after being turned off (mowers, balers, saws, grinders)

Stored Energy - Confined energy that may be released unexpectedly (springs and hydraulics)

Thrown Objects - Machines that discharge materials while operating (mower, mixer, combine, choppers)

**Concept: Tractor Controls and Instruments**

Ammeter - Indicates the electrical charging capacity on a tractor/implement

Lights - Instruments that light up during operation

Gauges - Instruments that indicate the amount or level of something during operation; May be analog or digital

Buzzers - Instruments that make a sound during operation; May be a beep, chime, ring, or other noise

Red Controls - Stops the engine on some diesel engine tractors; Must be located within 6 inches of the key switch

Orange Controls - Indicates some form of ground motion; May be the gear shift, brake, throttle, shuttle shift, or differential lock control

Yellow Controls - Indicate a remote power engagement on a tractor/implement; Mainly the PTO

Black Controls - Indicates the positioning or adjusting of something on a tractor/implement; May be the seat lever, 3 point hitch lever, and any comfort adjustments

Foot Control - Any device such as a pedal that is operated with the feet; May be the clutch or brake

Hand Control - Any device that is operated by the hands; May be a lever, knob, switch, or button

Combination Control - Any device that may be operated by the hands or the feet; May be the throttle

**Concept: Safety Signs, Symbols, and Colors**

**Vocab Report for Topic: Unit A-1-Tractor/Agricultural Equipment Safety**

Days: 45

Subject(s): Vocations

Grade(s): 10th

R.O.P.S. - Roll Over Protective Structure; A device consisting of a roll bar that keeps a tractor from rolling over more than 90 degrees; Protects the operator when used in conjunction with a seat belt

Operation Symbols - Developed to show pictorials and words on tractors and other equipment pertaining to safety and operating functions

Operator's Manual - A book developed explicitly for tractors and implements that contains all necessary safety, maintenance, and operating information needed to run the machine

S.M.V. Sign - Slow Moving Vehicle; A triangular reflective sign that must be on a vehicle or implement that travels less than 25 miles per hour; Must be visible to on coming traffic from 600 feet away

**Concept: Tractor Driving**

Drawbar - The part of a tractor that most implements are hitched to; A piece of steel that extends from the back of a tractor that contains multiple holes for hitching

Pre-Operational Check - A list of items on a tractor/implement that should be checked daily prior to operation; These items should be checked for safety, wear, efficiency, and service life

Riding the Clutch - When an operator allows a foot to remain on or pushing downward on the clutch pedal during operation

Center of Gravity - The point where all parts of a tractor/implement are in balance with one another; Also known as CG

Stability Baseline - Point at which a tractor/implement is at a constant CG; Should never be altered

**Concept: Implement Connection**

3 Point Hitch - Point of attachment for some implements; May be used in conjunction with or without the drawbar; May be located on the rear or front of a tractor

Spotting - When someone helps an operator line up to and hook to an implement; Should never be located behind a tractor until the operator indicates that it is safe

Hydraulics - The use of fluid pressure to lift or move something

Reservoir - Storage place for hydraulic oil on a tractor/implement

Pump - Device that pushes hydraulic fluid throughout a hydraulic system on a tractor/implement

Valve - Device that allows or not allows hydraulic fluid to flow throughout a system

Hose - Transports hydraulic fluid throughout a hydraulic system; May be used in conjunction with steel lines

Cylinder - The part of a hydraulic system that physically does the work; Pushes, pulls, or lifts weight by use of hydraulic pressure

Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

5. Launch Activity 1

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**How are you going to get students engaged?**

Develop student interest and link their prior knowledge.  
Start the Student Learning Map of the unit with students.  
Preview key vocabulary with students.:

**Short Description:**

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**Age Appropriate Tasks**

**Long Description:**

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Brainstorm various types of jobs that youth may be employed for and discuss tasks involved with each one.

**Differentiation:**

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Modifications will be made based on student's abilities.

**Resources and Materials:**

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National Safe Tractor and Machinery Operation Program Curriculum

**Time (in days):**

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1

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Agricultural and Hazardous Occupations

## 5. Acquisition Lesson

Plan for the Concept, Topic, or Skill -- Not for the Day

### Lesson Essential Question:

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Why are agricultural occupations hazardous?

Answer: A variety of machinery is used by many different people and age groups.

What do students need to learn to be able to answer the Essential Question?

Assessment Prompt 1: Describe some aspects of agricultural settings and jobs that could be hazardous.

### Activating Strategy:

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Brainstorm Web

Key vocabulary to preview:

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Hazardous Occupations Order in Agriculture, P.T.O., Highway, Implement of Husbandry, Reaction Time, P.P.E.

### Teaching Strategies:

Graphic Organizer:

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Cause and Effect

Instruction:

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**AP:** Describe some aspects of agricultural settings and jobs that could be hazardous.

Assignment and/or Assessment:

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Unit Worksheets, Unit Review, Tractor Safety Certification Exam

### Summarizing Strategy:

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The Important Thing

Differentiation:

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Modifications will be made based on student's abilities.

Resources and Materials:

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National Safe Tractor and Machinery Operation Program Curriculum

Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Agricultural and Hazardous Occupations

## 5. Acquisition Lesson

Time (in days):

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2

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Mechanical Hazards

## 5. Acquisition Lesson

Plan for the Concept, Topic, or Skill -- Not for the Day

### Lesson Essential Question:

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What are the major classes of mechanical hazards?

Answer: Pinch Point, Wrap Point, Shear Point, Cruch Point, Pull In Point, Burn Point, Freewheeling Parts, Stored Energy, Thrown Objects

What do students need to learn to be able to answer the Essential Question?

Assessment Prompt 1: Brainstorm and explain common injuries that occur when working around machines

### Activating Strategy:

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Brainstorm Web

Key vocabulary to preview:

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Pinch Point, Wrap Point, Shear Point, Cruch Point, Pull In Point, Burn Point, Freewheeling Parts, Stored Energy, Thrown Objects

### Teaching Strategies:

Graphic Organizer:

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Compare and Contrast

Instruction:

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**AP:** Brainstorm and explain common injuries that occur when working around machines

Assignment and/or Assessment:

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Unit Worksheets, Unit Review, Tractor Safety Certification Exam

### Summarizing Strategy:

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Ticket Out the Door

Differentiation:

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Modifications will be made based on student's abilities.

Resources and Materials:

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Mechanical Hazards

## 5. Acquisition Lesson

National Safe Tractor and Machinery Operation Program Curriculum

Time (in days):

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1

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Tractor Controls and Instruments

## 5. Acquisition Lesson

Plan for the Concept, Topic, or Skill -- Not for the Day

### Lesson Essential Question:

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Why are different types of controls and instruments found on a tractor?

Answer: Ammeter, Lights, Gauges, Buzzers, Red Controls, Orange Controls, Yellow Controls, Black Controls, Foot Control, Hand Control, Combination Control

What do students need to learn to be able to answer the Essential Question?

Assessment Prompt 1: Describe the differences of controls and instruments between old and modern day tractors.

### Activating Strategy:

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Fayer Model

Key vocabulary to preview:

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Ammeter, Lights, Gauges, Buzzers, Red Controls, Orange Controls, Yellow Controls, Black Controls, Foot Control, Hand Control, Combination Control

### Teaching Strategies:

Graphic Organizer:

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Classifying / Categorizing

Instruction:

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**AP:** Describe the differences of controls and instruments between old and modern day tractors.

Assignment and/or Assessment:

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Unit Worksheets, Unit Review, Tractor Safety Certification Exam, Tractor Safety Driving Test

### Summarizing Strategy:

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3-2-1

Differentiation:

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Modifications will be made based on student's abilities.

Resources and Materials:

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Tractor Controls and Instruments

## 5. Acquisition Lesson

National Safe Tractor and Machinery Operation Program Curriculum

Time (in days):

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7

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Safety Signs, Symbols, and Colors

## 5. Acquisition Lesson

Plan for the Concept, Topic, or Skill -- Not for the Day

### Lesson Essential Question:

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How are some signs, symbols, and colors incorporated onto a tractor/implement?

Answer: Modern day tractors incorporate ROPS, SMV signs, color coded controls, symbols, and warning statements into their design.

What do students need to learn to be able to answer the Essential Question?

Assessment Prompt 1: Draw and explain various signs and symbols found on the school's tractor.

### Activating Strategy:

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Draw a Picture / Diagram

Key vocabulary to preview:

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R.O.P.S., Operation Symbols, Operator's Manual, S.M.V. Sign

### Teaching Strategies:

Graphic Organizer:

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Classifying / Categorizing

Instruction:

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**AP:** Draw and explain various signs and symbols found on the school's tractor.

Assignment and/or Assessment:

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Unit Worksheets, Unit Review, Tractor Safety Certification Exam, Tractor Safety Driving Test

### Summarizing Strategy:

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Ticket Out the Door

Differentiation:

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Modifications will be made based on student's abilities.

Resources and Materials:

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Safety Signs, Symbols, and Colors

## 5. Acquisition Lesson

National Safe Tractor and Machinery Operation Program Curriculum

Time (in days):

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3

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Tractor Driving

## 6. Extending Thinking Lesson

Lesson Essential Question:

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Why should proper skills be demonstrated when operating a tractor?

Answer: Refer to teacher led driving demonstration--review all safety symbols, parts of the tractor, and controls with the students.

Task:

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Students will apply their knowledge of tractor safety to successfully drive the school tractor and hitch it to an implement.

Summarize / Share:

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Observe and encourage other class members as the driving activities are completed.

Assignment:

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Tractor Safety Driving Test, Tractor Safety Skills Test (drive tractor forward, back tractor into stall, drive tractor and trailer through figure 8 course, drive tractor and wagon through serpentine course, complete the tractor driving certification course, hitch an implement to the tractor)

Differentiation:

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Modifications will be made based on student's abilities.

Resources and Materials:

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National Safe Tractor and Machinery Operation Program Curriculum

Time (in days):

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20

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

Concept: Implement Connection

## 6. Extending Thinking Lesson

Lesson Essential Question:

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How are implements correctly connected to tractors?

Answer: Refer to teacher led skills demonstration--review the safety of 3 point hitches, PTO's, drawbars, and hydraulics.

Task:

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Students will apply their knowledge of tractor safety to successfully drive the school tractor and hitch it to an implement.

Summarize / Share:

---

Observe and encourage other class members as the driving activities are completed.

Assignment:

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Unit Worksheets, Unit Review, Tractor Safety Certification Exam, Tractor Safety Driving Test, Tractor Safety Skills Test

Differentiation:

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Modifications will be made based on student's abilities.

Resources and Materials:

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National Safe Tractor and Machinery Operation Program Curriculum

Time (in days):

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7

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**Topic: Unit A-1-Tractor/Agricultural Equipment Safety**

Days: 45

**Subject(s):** Vocations

Grade(s): 10th

**8. Differentiating the Unit**

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What accommodations will you make in order to meet the varied interest, learning styles, and ability levels of all students?

**Differentiation Associated with the Unit:**

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Modifications will be made based on student's abilities.

**Differentiation Associated with Lessons and Activities:**

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**Student Assessment 1: Unit Worksheets :**

Modifications will be made based on student's abilities

**Student Assessment 2: Unit Review :**

Modifications will be made based on student's abilities

**Student Assessment 3: Tractor Safety Certification Exam :**

Modifications will be made based on student's abilities

**Student Assessment 4: Tractor Safety Driving Test :**

Modifications will be made based on student's abilities

**Student Assessment 5: Tractor Safety Skills Test :**

Modifications will be made based on student's abilities

**Launch Activity 1: Age Appropriate Tasks :**

Modifications will be made based on student's abilities.

**Acquisition Lesson 1::**

**Why are agricultural occupations hazardous?**

**Answer:** A variety of machinery is used by many different people and age groups.

Modifications will be made based on student's abilities.

**Acquisition Lesson 2::**

**What are the major classes of mechanical hazards?**

**Answer:** Pinch Point, Wrap Point, Shear Point, Cruch Point, Pull In Point, Burn Point, Freewheeling Parts, Stored Energy, Thrown Objects

Modifications will be made based on student's abilities.

**Acquisition Lesson 3::**



Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

Subject(s): Vocations

Grade(s): 10th

**Why are different types of controls and instruments found on a tractor?**

**Answer:** Ammeter, Lights, Gauges, Buzzers, Red Controls, Orange Controls, Yellow Controls, Black Controls, Foot Control, Hand Control, Combination Control

Modifications will be made based on student's abilities.

**Acquisition Lesson 4::**

**How are some signs, symbols, and colors incorporated onto a tractor/implement?**

**Answer:** Modern day tractors incorporate ROPS, SMV signs, color coded controls, symbols, and warning statements into their design.

Modifications will be made based on student's abilities.

**Extending Thinking Lesson 1:**

**Why should proper skills be demonstrated when operating a tractor?**

**Answer:** Refer to teacher led driving demonstration—review all safety symbols, parts of the tractor, and controls with the students.

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Modifications will be made based on student's abilities.

**Extending Thinking Lesson 2:**

**How are implements correctly connected to tractors?**

**Answer:** Refer to teacher led skills demonstration—review the safety of 3 point hitches, PTO's, drawbars, and hydraulics.

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Modifications will be made based on student's abilities.

Curriculum: CCSD CURRICULUM

Course: Agricultural Science II-(4/14/14)

Teacher / Team Name: Brown/Turner

PENNSYLVANIA

Date: April 13, 2014 ET

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Topic: Unit A-1-Tractor/Agricultural Equipment Safety

Subject(s): Vocations

Days: 45

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**Topic:** Unit A-1-Tractor/Agricultural Equipment Safety

Days: 45

**Subject(s):** Vocations

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What resources and materials do you need for this unit, the lessons, and the activities?

**Resources Associated with the Unit:**

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**Resources Associated with Lessons and Activities:**

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**Resources and Materials from Launch Activity 1:**

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National Safe Tractor and Machinery Operation Program Curriculum