

8th grade technology Education

1 credit

Technology is changing at a very rapid pace. While manufacturing materials and processes are changing rapidly today, the foundations of technology and how products are developed has changed very little over the course of history. 8th Grade Technology is a course that uses hands on activities to expand the students' knowledge in many technical areas. This class will develop skills and provide basic information which can be used and applied in technologic Education classes at the High School.

Curriculum

Course: 8th Grade Technology Education

Unit: FLUID POWER (Hydraulics)

Time - 1 Week

Technology Education

State Standards Addressed: A.8.2, A.8.3, B.8.1, B.8.2, B.8.3, B.8.4, D.8.2

CONTENT:

1. Definition of fluid power - Transmitting energy through the motion of a liquid or gas
2. Fluid power laws
 - 2.1 Fluids power includes liquid AND gas
 - 2.2 Have no shape of their own
 - 2.3 Fluids apply equal pressure in all directions
 - 2.4 Work in Always equals work out
3. Basic types of fluid systems
 - 3.1 Pneumatics - Systems that use gas (air)
 - 3.2 Hydraulics - Systems that use (liquids)
4. Advantages and Characteristics of Fluid power
 - 4.1 Increases ability to do work
 - 4.2 Flexibility and mobility
 - 4.3 Compactness
 - 4.4 Self-cooling/lubricating
5. Mechanical Advantage
 - 5.1 Ratio of two forces (effort and Load, Input and output)
 - 5.2 Tradeoff between force and distance (small force over a large distance)
 - 5.3 Distance to obtain a large force over a small distance
 - 5.4 Definitions of work, force and area
6. Elements in a fluid power system

- 6.1 Reservoir
 - 6.2 Pressure source (pump)
 - 6.3 Conductors, (hoses, pipes)
 - 6.4 Actuators (cylinders)
 - 6.5 Control devices (valves)
7. Application
- 7.1 Lifting and moving objects
 - 7.2 Transmitting force over a long distance

Course: 8th Grade Technology Education

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State Standards Addressed: A.4.9, A.8.1, A.8.2, A.8.3, A.8.5, C.4.2, C.8.4, D.4.1, D.4.5, D.8.1, D.8.2, D.8.3, D.8.4, D.8.5

Unit: Controlling Technology

Time – 1 Week

CONTENT

1. Foresight - Looking into the future
 - 1.1 Project centered
 - 1.2 Problem centered
 - 1.3 New technology-centered
2. Areas of impact
 - 2.1 Environment
 - 2.2 Social
 - 2.3 Global
 - 2.4 Local
3. Forecasting the future
 - 3.1 Trend analysis
 - 3.2 Trend extrapolation
4. Outcomes of technology
 - 4.1 Anticipated
 - 4.2 Unanticipated
5. Controlling Technology
 - 5.1 Ignore/destroy/create but don't use
 - 5.2 Monopolies
 - 5.3 Destroy it
 - 5.4 Legislate
 - 5.5 Litigate

- 5.6 Educate
- 5.7 Other (Individual choice, regulate, industry/Gov. relationships ...)
- 6. Diffusion of technology
 - 6.1 Invention stage
 - 6.2 Innovation stage
 - 6.3 Dispersion stage

Course: 8th Grade Technology Education

Technology Education

State Standards Addressed: A.4.1, A.4.4, A.8.1, B.8.1, B.8.4, C.8.2, C.8.5, D.8.4, D.8.5

Unit: Impacts of Technology

Time – 1 Week

CONTENT:

1. Nature of Technology
 - 1.1 Different from Science
 - 1.2 Objects (cars, boats, computers)
 - 1.3 Processes (Inputs, processes, outputs)
 - 1.4 Knowledge
 - 1.5 Activity
 - 1.6 Information
 - 1.7 Areas of Technology
 - 1.7.A Transportation
 - 1.7.B Communication
 - 1.7.C Construction
 - 1.7.D Manufacturing
2. Framework
 - 2.1 Conceptual framework (see Pg. 5 Exploring Technology)
3. Problem solving process
 - 3.1 Define problem
 - 3.2 Set goals and consider limitations
 - 3.3 Gather information
 - 3.4 Brainstorm ideas
 - 3.5 Chooses the best solution
 - 3.6 Carry out
 - 3.7 Evaluate and modify

4. Outcomes of technology
 - 4.1 Constantly changing
 - 4.2 Advances in other fields
 - 4.3 Creation/Elimination of industries (i.e. buggy whips)
 - 4.4 Forecasting (methods)

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Technology Education

State Standards Addressed: A.4.8, A.8.2, A.8.3, B.8.5, B.8.6, C.8.2, C.8.5, C.8.6

Unit: Building systems

Time – 6 Weeks

CONTENT:

1. Definitions: Easement, variance, setback, covenant
2. Developer
 - 2.1 Advantage
 - 2.2 Disadvantages
3. Permits (reasons for permits)
 - 3.1 Building
 - 3.2 sanitation
4. Planning and plans of a structure
 - 4.1 Views (Interior, Exterior, Section, Plan)
 - 4.2 Measurements and scale (3/4" scale, 1/4" scale,)
 - 4.3 Design/layout
 - 4.3.A Three area of a home
 - 4.3.B Size relationships
 - 4.3.C Closet/door openings
5. Elements of structure
 - 5.1 Foundations
 - 5.1.A Box, Slab, Column,
 - 5.1.B Concrete (consistency, rebar, forms, anchor bolts)
 - 5.1.C Wood
 - 5.1.D Reinforced Styrofome
 - 5.2 Flooring systems
 - 5.2.A Joists, Plates, Plywood
 - 5.3 Wall systems

5.3.A Studs, Jack studs, Headers, Plates

6. Building materials

6.1 Synthetic (Composite material and recycled material)

6.2 Natural (Wood, steel, other)

Course: 8th Grade Technology Education

Technology Education

State Standards Addressed: A.4.2, A.4.4, A.8.1, A.8.2, A.8.3, A.8.7, B.4.6, B.4.7, B.8.1, B.8.6, B.8.7, C.4.3, C.8.6

Unit: Materials Processing

Time – 3 Weeks

Content:

1. Source and use of plastic, metal, wood
 - 1.1 Each material has its own non tangible characteristics
 2. Characteristics of material
 - 2.1 Stiffness
 - 2.2 Ductility
 - 2.3 Brittleness
 - 2.4 Hardness
 - 2.5 Elasticity
 - 2.6 Stability
 - 2.7 Electrical conductivity
 - 2.8 Thermal conductivity
 - 2.9 Magnetism .
 3. Material selection
 - 3.1 By the intended use
 - 3.2 Economics
 - 3.3 Esthetic value
 4. Cutting material
 - 4.1 Shearing
 - 4.2 Sawing
 - 4.3 Induced fracture
- 5. Processing Plastics**
- 5.1 Types of plastics
 - 5.2 Plastic selection
 - 5.3 Thermal forming

5.4 Injection molding

6. Processing Metals

6.1 Types of metal working

- 6.1.A Casting
- 6.1.B Wrought metal
- 6.1.C Shaping
- 6.1.D Stamping
- 6.1.E Welding

7 Advantages/disadvantages of each

- 7.1 Intricate shapes
- 7.2 Mass production
- 7.3 Large objects

8 Properties of metal

- 8.1 Ferrous
 - Steel
 - Cast iron
- 8.2 Non ferrous metals
- 8.3 Carbon content
- 8.4 Alloys
- 8.5 Melting point
- 8.6 Elasticity
- 8.7 Electrical conductivity

Welding/Casting

9 History See Practical welding Chapter 20

10 Principal of the process

- 10.1 Electricity jumps a gap (1/16 – 1/8 “)
- 10.2 Heat produced (10,000 – 12,000

11 Types of welding

- 11.1 Oxy-Acetylene
- 11.2 Arc, Mig Tig welding

12. Principal Items effecting welding

- 12.1 Strength of the current
- 12.2 Length of the arc
- 12.3 Angle of the electrode
- 12.4 Speed of travel
- 12.5 Thickness of the metal

- 13. Principal parts
 - 13.1 Electrode
 - 13.2 Chemical coating (Insulates, stabilize the arc, core melts faster)
 - 13.3 Power source (scale for power)
 - 13.4 Ground cable,
 - 13.5 Electrode cable
 - 13.6 Work piece

- 14 Welding process
 - 14.1 Scratch/tapping
 - 14.2 Angle of electrode
 - 14.3 Weave pattern
 - 14.4 Setting the power level

- 15 Casting
 - 15.1 Methods of casting
 - 15.2 Melting points
 - 15.3 Procedure

Safety

- 16 Personal protection
 - 16.1 Clothing – leather, helmet with shade, safety glasses
 - 16.2 Screens – for others
 - 16.3 Ventilation
 - 16.4 No combustible material nearby
 - 16.5 Check cables, - good condition, grounded, electrode cable NOT touching metal

Course: 8th Grade Technology Education

Unit: Engineering

Time – 4 Weeks

Technology Education

State Standards Addressed: A.8.2, A.8.3, B.8.3, B.8.4, B.8.6, C.8.2, C.8.5, C.8.6

CONTENT:

- 1. Why take time to properly engineer/plan project
 - 1.1 Stronger, lighter, cheaper

- 2. Tension vs. Compression
 - 2.1 Pulling force
 - 2.2 Pushing force

3. Shapes
 - 3.1 Squares
 - 3.2 Triangles

4. Cross supports
 - 4.1 Ridged
 - 4.2 Non-ridged

5. Beams & columns
 - 5.1 Transfer of weight
 - 5.2 Factors effecting beam strength
 - 5.2.A Shape
 - 5.2.B Size
 - 5.2.C Span
 - 5.2.D Material
 - 5.2.E Types of joints
 - 5.2.F Type of load (Live, Dead)
 - 5.2.G Quality of material

6. Joining beams
 - 6.1 Types of joints (Butt, dado, rabbitt, cross lap, end lap, miter,)

Course: 8th Grade Technology Education

Unit: Manufacturing / Engineering
Transportation

Time – 4 Weeks

Technology Education

State Standards Addressed: A.8.2, A.8.3, B.8.1, B.8.3, B.8.6, B.8.7

CONTENT:

1. Technological Design
 - 1.1 Output – process- output
 - 1.2 Problem solving process

2. Research (what to consider)
 - 2.1 Aerodynamics
 - 2.2 Friction (contact area)
 - 2.3 Force
 - 2.4 Mass
 - 2.5 Drag
 - 2.6 Surface effects
 - 2.7 Momentum

3. Design
 - 3.1 Form and function
 - 3.2 Working drawing
 - 3.2.A Views (front, side, top)
 - 3.2.B Lines & Dimensions (extension, dimension, visible, hidden, center)
4. Manufacturing process
 - 4.1 Prototype
 - 4.2 Production
 - 4.3 Evaluation
5. Safety
 - 5.1 Machine safety (band saw, disk sander, drill press)
 - 5.2 Hand tool safety
 - 5.3 Personal (safety glasses)