

“Marvelous Machines: Making Work Easier”

Integration Notes

Lesson 1 (Aisha Makes Work Easier)

+ ELA

- Read book aloud and have the students summarize/paraphrase
- After reading, have students write about being in a factory
- Combination of reading aloud and independent reading
- Research a simple machine
- Write about ideas for making work easier (give some examples: wooden pencil vs. mechanical)
- Read the book as you work through the lesson
- Ask/answer questions that require making inferences
- Vocabulary – provide synonyms/antonyms, definitions
- Use the book in place of GHGR (Good Habits, Great Readers) suggested reader
- Discussion questions while reading
- Discuss cause and effect
- Make connections (text to self, text to text)
- Literacy Workshop/Readers Workshop
- Define what an engineer is
- Have students act out the story
- Discuss characters and plot
- Chunk (Break apart the chapters of the book)
- Read story in Readers Workshop and review in science

+ Math

- Create math story problems from the story.

+ Social Studies

- Discuss role of gender in STEM professions
- Civil War with Robert Shaw and the Boston area
- Concept of technology is addressed in history when learning about ancient cultures
- Industrial Revolution
- Where are industrial engineers used?
- Problem solving (global problems)
- US Geography (map)
- Tools developed over time
- Inventors
- Create a timeline
- Incorporate more geography and background from teacher manual.
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+ Science

- Have examples of simple machines as shown in book for kids to manipulate

+ Miscellaneous

- Use P. Board to move images into simple machine categories
- Field trip to a factory
- Show video of potato chip factory or share factory experiences
- Show video (via Youtube?) on making crayons – it shows many machines in use.
- Show Mr. Rogers videos of how things are made or how things work
- Bring chips to story time.

Lesson 2 (Assembly Lines)

+ ELA

- Reading about the process
- Writing—“How To...”
- Practice giving directions that contain sufficient details and specific information
- Write a persuasive essay for the best model
- Sequencing – draw picture and write a caption
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✚ Math

- Review/practice measuring
- Completed folders—comparison of numbers
- Data analysis
- Measuring with a ruler to $\frac{1}{4}$ inch intersecting lines
- Use extension activities: mean, median, mode, range – measuring
- How many folders could be made in various hours (based on time)
- Make a graph of folders made and time it took

✚ Social Studies

- Factory work, labor laws, work conditions
- Jobs
- Economy/production
- Henry Ford
- Read about the Industrial Revolution
- Show examples of assembly lines and include history of some companies that use assembly lines

✚ Miscellaneous

- Pattern game
- Teamwork!
- Integrate quiet on my “red/green light”
- Fits in with Junior Achievement economics lessons on productivity
- Draw an assembly line (focusing on lines/angles/shading)
- Community service – assembly line, make sandwiches for the homeless
- Field Trip – visit a factory
- Use this as a pre-teach for other needs later in the year – putting together essay folders for example
- Working in groups teaches students how to be collaborative. It will help students see why we need to collaborate our thinking/learning, then make it public.
- Morning Meeting
 - Games to reinforce teamwork
 - Prepare with team-building activities: ball toss, etc

Lesson 3 (Using Simple Machines)

✚ ELA

- Research levers and pulleys, reinvent one, and write about it
- Write the procedures used to test
- Make a comparison of different simple machines and write a paragraph for each machine
- Topic for “Words Their Way”
- Write about where these (simple machines) are used in the real world
- Have students make claims (“The further the load is from the fulcrum, the easier/harder it is to lift the load.”) and then provide evidence for the claim (“When the load was ____ cm from the fulcrum, it took ____ N to lift the load.”)
- Use sentence stems to aid/scaffold the learning for all students

✚ Math

- Use mean, median, and mode
- Calibrating, units of measurement
- Data landmarks
- Discuss “outliers”
- $F=M(A)$
- Averaging, fractions, decimals, ratios
- Create a bar graph
- Use all the data collected to make connections to the data unit in math

✚ Social Studies

- 3rd Grade curriculum: pyramids: wheel and axle, inclined plane
- Henry Ford—automobile
- Covered wagons
- Look for simple machines in the real world and write how you’d change it
- Simple machines used throughout history
- History of Newton

Science

- Discuss force and gravity
- Types of levers and pulleys in everyday use (real world use)
- Have students reflect on ergonomically friendly designs
- When talking about force, explain why a steady and slow pace is better than a fast and jerking motion.
- Possibly connect to “The Variables Kit” (life boats and pennies). Pennies placed in boat quickly make it sink, etc.

Lesson 4 (Improving a Factory Subsystem)

ELA

- Summaries: factual writing, rough drafts
- Write instructions/directions for your factory subsystem
- The final letter could be part of literacy when working on personal papers
- Write the report as a persuasive essay about findings including data and recommendations.
- Create a storybird.com about the process
- Make a video.
- Interview

Math

- Measuring data
- Review – reading scales
- Data analysis
- Problem solving or multi-step problems
- Time how long it takes to get the load where it needs to be (stopwatch)

Social Studies

- Historic systems
- Industrial revolution/factories
- Safety/labor unions
- Improvements of technology throughout history
- Share the history of potato chips
- Research the history of simple machines or architecture from around the world. View and discuss what simple machines were possibly used to create, speculate, and give evidence.
- River barge traffic – moving loads, lock and dam systems
- Handicap ramps – wheelchairs in schools, wheelchair lifts in busses, lift in pool areas

Miscellaneous

- Process—correlate with processes in other disciplines (such as scientific method)
- Health – discuss ergonomics
- Summative assessment with inventions
- Create a similar or problematic scenario or do this as a summative with all simple machines available