TOPIC

Advanced Manufacturing – Supply Chain Management, Aerospace

LEARNING OBJECTIVES

- Learn how constraints on the supply chain impact production schedules.
- Learn the basic components of an aircraft.

CONTENTS OF THIS GUIDE

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2. Sample Outline
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In the Wing Fling activity, students learn about assembly lines, supply chains, and production. This is a great activity for those exploring advanced manufacturing and supply chain management. The game shows how workflow stoppages, production bottlenecks, erratic supplies, and poor communication can impact production schedules.

The activity is a simulation of an aircraft assembly line. Aircraft parts come off the conveyor belt out into a storage area, and they must be transferred to a production bay. For an aircraft to be considered fully assembled, the fuselage, engines, and wings must be combined in a production bay. Students will need to make smart decisions about the order in which they produce aircraft. Airliners, business jets, and fighter jets are all being produced at the plant and their parts are all coming off of the same conveyor belt. If the bays are stuck in partial production and the storage bins fill up, a work stoppage will occur! Students can work collaboratively to keep the assembly line flowing smoothly for as long as possible. They'll receive clams for their efforts.

MATERIALS

- Properly configured computers. See our Technical Guide for more information.
- Student handout for daily grade, included in this lesson plan.

WHAT TO DO BEFORE CLASS

1) Watch the associated WhyPak video *WingFling Walkthrough*.
2) Navigate through Whyville and find the WingFling activity within PlaneWorks.
3) Browse through the instructions for the game. Play through the game for a few rounds to understand the mechanics of the activity.
4) Skim through the attached worksheet. Decide if it is applicable for your class.

LESSON OUTLINE

1) Conduct a short class discussion on what the students know about factories, the relationship between suppliers and producers, assembly lines, and aircraft components. Hand out the student worksheet. [Recall]
2) Have your students log into Whyville, direct them to PlaneWorks and then to the WingFling.
3) They should read through the instructions for WingFling prior to playing the activity. Have them begin playing WingFling while working collaboratively in groups. [Explore]
4) Conduct a short class discussion on what the students learned about working on the assembly line. What problems did they encounter? Was it easier to play alone or working with a group? [Reflect]
5) After hearing the students' feedback, recommend some strategies to them that will increase their production throughput. Division of labor, planning, and improved communication and playing strategies should help. If desired, challenge the groups to reach a goal of earning a certain number of clams while playing. Set a stretch goal based on the clams they are earning already. [Accomplish]
6) Have students complete the attached worksheet for a daily grade. [Connect]

> **WhyPaks Lesson Guide Framework**
>
> *Recall* – Ask the students what they already know about the subject.
>
> *Explore* – The students self-direct themselves through the activity. Teacher facilitates.
>
> *Reflect* – Refine the students' understanding by using directed inquiries.
>
> *Accomplish* – The students are presented with a goal to achieve.
>
> *Connect* – Connect what was learned to standards-based content.

WHERE TO NEXT? RELATED CONTENT WITHIN WHYVILLE

SUBJECT MATTER	WHYVILLE DESTINATION
Advanced Manufacturing	Dell Plaza – Dell Laptop Game
Aerospace	WASA, PlaneWorks
Collaborative "Pick up" Games	Cafeteria - Recycle, Cafeteria – Food Sort, Raven Island – Trash Pickup

Next Generation Science Standards (NGSS)

NGSS Subcategory	Standard ID	Standard Description
Developing and Using Models	MS-ETS1-4	Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.
Engineering Design	MS-ETS1-4	Models of all kinds are important for testing solutions.
Engaging in Argument from Evidence	MS-PS3-5	Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon.

Common Core – ELA: Science and Technical Subjects (CC-ELA)

CC Subcategory	Standard ID	Standard Description
Writing for History/Social Studies, Science and Technical Subjects	WHST.6-8.1	Write arguments focused on discipline content.
Writing for History/Social Studies, Science and Technical Subjects	WHST.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
Reading for Science and Technical Subjects	RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
Speaking & Listening	SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CC Subcategory	Standard ID	Standard Description
Speaking & Listening	SL.8.1.c	Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.

Texas Essential Knowledge & Skills (TEKS)

TEKS Category	Chapter	Standard ID	Standard Description
CTE – Career Portals	127.4	1.A	The student explores one or more career clusters of interest. The student is expected to: (A) identify the various career opportunities within one or more career clusters.
CTE – Career Portals	127.4	2.A	The student explores pathways of interest within one or more career clusters. The student is expected to: (A) investigate career opportunities within the pathways.
CTE – Exploring Careers	127.3	4.A	The student evaluates skills for personal success. The student is expected to: (A) implement effective study skills for academic success.
CTE – Exploring Careers	127.3	4.C	Use a problem-solving model and critical-thinking skills to make informed decisions.
CTE – Exploring Careers	127.3	4.D	Use effective time-management and goal-setting strategies.
CTE – Exploring Careers	127.3	4.E	Effectively use information and communication technology tools.
CTE – Exploring Careers	127.3	7.E	The student develops skills for professional success. The student is expected to: (E) explore and model characteristics necessary for professional success such as work ethics, integrity, dedication, perseverance, and the ability to interact with a diverse population.
CTE – Exploring Careers	127.3	7.F	Complete activities using project- and time-management techniques.

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TEKS Category	Chapter	Standard ID	Standard Description
CTE – Exploring Careers	127.3	8.A	The student identifies and explores technical skills essential to careers in multiple occupations, including those that are high skill, high wage, or high demand. The student is expected to: (A) complete actual or virtual labs to simulate the technical skills required in various occupations.