

## **LAB: Graphic T-shirt Project**

Math Concept(s): 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Source / Text: Algebra 1 Learning in Context

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### **Attach the following documents:**

- Lab Instructions: Teams of 4
  1. Designate a team leader. (Team leader will be responsible for keeping the project on task and ensuring that all team members have a voice in the process)
  2. As a team, discuss the costs involved in creating a graphic t-shirt for sale. What is a T-shirt made of? What material are used to decorate the T-shirt? What equipment is used to apply the graphic design? What labor costs are involved?
  3. After you have a list of potential costs. Designate which costs are fixed or Variable.
  4. How do variable cost effect the retail sale (profit/loss) of a graphic t-shirt?
  5. Design a poster that demonstrates the variable and fixed cost that contribute to the cost of a t-shirt.
  6. As a team, create a linear formula that can project the cost of a t-shirt accounting for two variables and a fixed cost.
- Student Handout(s)
- Designate a team leader. (Team leader will be responsible for keeping the project on task and ensuring that all team members have a voice in the process)
- As a team, discuss the costs involved in creating a graphic t-shirt for sale. What is a T-shirt made of? What material are used to decorate the T-shirt? What equipment is used to apply the graphic design? What labor costs are involved?
- After you have a list of potential costs. Designate which costs are fixed or Variable.
- How do variable cost effect the retail sale (profit/loss) of a graphic t-shirt?
- Design a poster that demonstrates the variable and fixed cost that contribute to the cost of a t-shirt.
- As a team, create a linear formula that can project the cost of a t-shirt accounting for two variables and a fixed cost.
- Present your poster to the rest of the class. The entire team needs to participate.
- Rubric and/or Assessment Tool

### **Poster Design**

Names:

	<b>4. Distinguished</b>	<b>3. Proficient</b>	<b>2. Apprentice</b>	<b>1. Novice</b>
<b>Writing-Ideas:</b> Interesting, informative details	All details were unique, interesting, and related to and supported the main idea. Writing included information based	Writing had many interesting details which supported the main idea. Writing included information based on personal	Writing had three or more details that supported the main idea.	Writing had few details.

	on personal experience.	experience.		
<b>Writing-Sentence Fluency:</b> Length, variety and flow of writing	Most sentences varied in length and structure. Writing had a natural flow that made it easy to read.	Many sentences varied in length and structure. Some sentences did not flow smoothly.	A few sentences varied in length. Most sentences did not flow smoothly.	Sentences were short and did not flow well. Sentence structure did not change.
<b>Media-Graphics:</b> Backgrounds, illustrations, photographs, diagrams, and/or animation	Used colorful and consistent backgrounds that enhanced the mood of the project. Graphics and animations helped to clarify, explain, and support content.	Project used consistent background throughout. Used graphics to support project ideas and content.	Project used many different conflicting backgrounds. Graphics were used, but did not always support the content.	Project did not use backgrounds. Graphics were inappropriate and detracted from project.
<b>Design-Layout and Organization:</b> Organized and easy to read	Content was well organized with headings and subheadings. Text and graphics were neatly organized and made the project easy to read.	Project was organized with headings and subheadings. Text and graphics were placed to make the project easy to read.	Most of the project was organized. The placement of text and graphics sometimes made the project hard to read.	Project was hard to read. There is no clear structure. Text and graphics were randomly placed.

## Poster Design

Names:

\_\_\_\_\_ My writing includes interesting and informative details that support the main idea.

\_\_\_\_\_ My writing has sentences which are varied in length and flow well.

\_\_\_\_\_ My project has graphic elements that support the content.

\_\_\_\_\_ Project has information that is organized and easy to read.

## Presentation

Names:

	<b>4. Distinguished</b>	<b>3. Proficient</b>	<b>2. Apprentice</b>	<b>1. Novice</b>
<b>Oral Presentation-Content:</b> Relates to topic, detailed, and accurate	All content directly related to the topic. Content was thoroughly developed and demonstrated detailed knowledge of the topic. Opinions were supported by fact wherever possible.	Content directly related to the topic. Included many details that demonstrated knowledge of the topic. Most opinions were supported by facts.	Had difficulty explaining how the content and topic relate. Many opinions were not factually supported.	Presentation did not relate to topic. Included few details and relied heavily upon unsupported opinion.
<b>Oral Presentation-Knowledge:</b> Demonstrate knowledge of subject	Demonstrated a thorough knowledge of the subject matter. Able to use audience questions to further demonstrate understanding of the topic. Appeared to be an expert on the subject being presented.	Demonstrated a working knowledge of the subject matter. Able to satisfactorily answer audience questions and provided additional information upon request.	Demonstrated a basic knowledge of the subject matter. Able to address audience questions by repeating parts of the presentation -did not provide any additional information.	Demonstrated little or no knowledge of the subject. Unable to answer audience questions or comment further on any part of the presentation.
<b>Oral Presentation-Stays on Topic:</b> Relevant to the topic	Entire presentation focused on the topic. Able to answer audience questions without straying from subject.	Majority of presentation was on-topic. Made effort to return to topic when presentation or audience questions strayed.	Some material was unrelated to the topic, or presenter used unrelated material to pad the presentation.	More than half of the presentation did not directly address the topic.

<b>Oral Presentation- Posture/Eye Contact:</b> Appropriate posture and effective eye contact	Stood upright and appeared confident throughout. Avoided rocking, shifting, and other nervous behavior. Made eye contact throughout the audience.	Posture was good for most of the presentation. Made eye contact numerous times during presentation. Did not rely too heavily on notes or visual aids.	Sometimes rocked, shifted, or appeared uncomfortable. Made occasional eye contact with one or two audience members. Did not rely too heavily on notes or visual aids.	Posture was poor. Slouched, shifted from foot to foot, and appeared very uncomfortable. Made almost no eye contact with the audience. Looked down or at notes or visual aids.
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	4. Distinguished	3. Proficient	2. Apprentice	1. Novice
<b>Oral Presentation- Enthusiasm:</b> Energetic, not frenetic	Appeared enthusiastic about presentation at all times. Moderated level of excitement to hold audience's attention.	Appeared enthusiastic for most of the presentation. May have appeared overly enthusiastic at times. Held audience interest for most of presentation.	Showed some excitement about the topic. Attempted to modify behavior to engage audience on one or more occasions. Lost attention of some audience members.	Showed little or no enthusiasm about the topic. Did not moderate level of excitement in response to audience reaction. Lost audience interest.
<b>Oral Presentation- Audience:</b> Engage and interact with audience	Moderated speaking style based on audience feedback. Calmly and eloquently addressed audience questions and comments. Engaged audience for the duration of the presentation.	Adjusted volume, pace, and enthusiasm several times. Answered audience questions and addressed comments. Presenter adjusted enthusiasm or pace to hold audience attention.	Spoke more loudly when requested by audience members. Presenter was clearly uncomfortable. Presenter attempted to adjust enthusiasm or pace to hold audience attention.	Did not adjust speaking style based on audience reaction. Could not answer audience questions. Presenter made no visible effort to hold audience interest.
<b>Oral Presentation- Pace:</b> Speaks at an appropriate pace	Speaker adjusted pace to stay within allotted time. Speaker answered audience questions without running overtime or covered additional material if there were no questions.	Presentation was close to specified length. Speaker's pace was appropriate throughout.	Tended to speak too quickly or too slowly. Presentation ran a little long or was a bit too short.	Consistently spoke too fast or too slow. Presentation was much longer or shorter than specified length.

**Oral Presentation**

Names:

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\_\_\_\_\_ My presentation will be detailed and accurate.

\_\_\_\_\_ My presentation will demonstrate my knowledge of the subject matter.

\_\_\_\_\_ All of the material in my presentation relates to the topic.

\_\_\_\_\_ I will use good posture and eye contact during my presentation.

\_\_\_\_\_ I will demonstrate by my demeanor that I am excited about my topic.

\_\_\_\_\_ I will adjust my presentation style to engage the audience. I will interact with the audience when appropriate.

\_\_\_\_\_ I will speak at an understandable rate. My presentation will last the specified amount of time.

**Short Description (Be sure to include where in your instruction this lab takes place):**

Lab will take place in the classroom

**Lab Plan**

Lab Title: **Graphic T-shirt Project**

Prerequisite skills:

Students have learned how one variable can affect the cost of an item.

Students have learned that a variable represents an unknown quantity and how to isolate a variable.

Lab objective:

Students will learn how Algebra 1 is used in a business model.

Students will understand how variable costs are used in a linear equation price and quantity changes for a product.

**Standards: (Note SPECIFIC relationship to Science, Technology, and/or Engineering)**

Mathematics K–12 Learning Standards:

Mathematics K–12 Learning Standards: **CCLS - Math: A.CED.2**

**Category**

Creating Equations

**Sub-Category**

Create Equations That Describe Numbers or Relationships

**State Standard:**

- 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Standards for Mathematical Practice:

- Understand solving equations as a process of reasoning and explain the reasoning • Solve equations and inequalities in one variable

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

Comprehension and Collaboration:

CCSS.ELA-LITERACY.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

Leadership/21<sup>st</sup> Century Skills:

<p><u>21st Century Interdisciplinary themes</u> (Check those that apply to the above activity.)</p> <input type="checkbox"/> Global Awareness <input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy <input type="checkbox"/> Civic Literacy <input type="checkbox"/> Health/Safety Literacy <input type="checkbox"/> Environmental Literacy			
<p><u>21st Century Skills</u> (Check those that students will demonstrate in the above activity.)</p>			
<p><b>LEARNING AND INNOVATION</b></p> <p><u>Creativity and Innovation</u></p> <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations <p><u>Critical Thinking and Problem Solving</u></p> <input type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgments and Decisions <input checked="" type="checkbox"/> Solve Problems <p><u>Communication and Collaboration</u></p> <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	<p><b>INFORMATION, MEDIA &amp; TECHNOLOGY SKILLS</b></p> <p><u>Information Literacy</u></p> <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and manage Information <p><u>Media Literacy</u></p> <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products <p><u>Information, Communications and Technology (ICT Literacy)</u></p> <input type="checkbox"/> Apply Technology Effectively	<p><b>LIFE &amp; CAREER SKILLS</b></p> <p><u>Flexibility and Adaptability</u></p> <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible <p><u>Initiative and Self-Direction</u></p> <input type="checkbox"/> Manage Goals and Time <input type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners <p><u>Social and Cross-Cultural</u></p> <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams	<p><b>Productivity and Accountability</b></p> <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results <p><b>Leadership and Responsibility</b></p> <input type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others

Leadership:

Students be Self-Directed Learners (Once given directions, students will pick a group manager for the project. The project manager will ensure that the team stays on task.) The students will Think and Work Creatively with Others as they Create a product and cost formula for a graphic T-shirts. (Students will analyze the different variables that go into creating a graphic T-shirt. All team members will give input.) They will solve problems and understand how to be flexible and adapt to change (As the students discuss the variable costs, the Project Manager will ensure the team is open to better ideas.) While designing the poster, students will give examples of what variables could affect the overall cost of a graphics T-shirt. All students will collaborate on a potential linear formula to solve price increase or decrease by solving two or more variables. During their poster presentation, every student will have a part in the presentation. They will all Communicate Clearly and Collaborate with others, proving that they can Manage Projects and Produce Results.

<https://wa-appliedmath.org/>

## **Teacher Preparation: (What materials and set-up are required for this lab?)**

### Materials

- Large Poster Paper and Colored Pens or Pencils

### Set-Up Required:

- Have students get in groups of 4's and designate a team leader. Team leader will come up to the front table and get materials and directions for the project.

### **Lab Organization Strategies:**

Leadership (Connect to 21<sup>st</sup> Century Skills selected):

- Think Creatively
- Work Creatively with Others
- Solve Problems
- Communicate Clearly
- Collaborate with Others
- Adapt to Change
- Be Flexible
- Be Self-Directed Learners
- Manage Projects
- Produce Results

### Cooperative Learning:

- Students work in a team with a designated lead. All students' ideas are validated within the team and all contribute to project and presentation.

### Expectations:

Students will stay on task and share in the discovery and preparation and presentation.

### Timeline:

- 15 minutes

### **Post Lab Follow-Up/Conclusions:**

Discuss real world application of learning from lab

- Variable costs effect all service and products. Think of it as supply and demand.

### Career Applications

- Entrepreneur, Graphic Designer, Small Business Owner, Cost Analysis, Sales.

### Optional or Extension Activities

- Research Commodities and Stock Market. Discuss how variables impact Supply and Demand. Use Desmos.com to pricing models and compare the graphs to the markets.

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