

Plotting the Path from Costs to Cash Flow

Business Management and Cost of Production

Louisa Onyekuru, Samaya Williams, Erin Finley, MacKenzie Corrigan
Published by *K20 Center*

This work is licensed under a Creative Commons CC BY-SA 4.0 License

Grade Level	11th – 12th Grade	**Time Frame**	90 min
Subject	Mathematics	**Duration**	1-2
Course	Math of Finance		

Essential Question

How do we interpret and compare graphs to show production costs?

Summary

In this lesson, students will learn how graphs are used to analyze cost of production in business. Students complete a card sort to engage with important terms and use the WIS-WIM strategy to analyze line graphs. Students then learn how double bar graphs are used to compare fixed and variable costs and discuss the meaning of the data in relation to product-based business. They will then view an ICAP video to learn how business owners use line graphs and double bar graphs to analyze cost of production.

Snapshot

Engage

Students complete a Card Sort to activate their prior knowledge.

Explore

Students engage in a WIS-WIM activity to explore a line graph comparing fixed cost, variable cost, and total cost in the cost of production of a business.

Explain

Students participate in a discussion about the cost of production.

Extend

Students create a double bar graph. They then watch an ICAP video featuring business owners who discuss the cost of production in their business.

Evaluate

Students demonstrate their knowledge by using the I Used to Think, But Now I Know strategy.

Attachments

- 3-2-1 ICAP Review—Plotting the Path from Costs to Cash Flow - Spanish.docx
- 3-2-1 ICAP Review—Plotting the Path from Costs to Cash Flow - Spanish.pdf
- 3-2-1 ICAP Review—Plotting the Path from Costs to Cash Flow.docx
- 3-2-1 ICAP Review—Plotting the Path from Costs to Cash Flow.pdf
- Cost of Production Card Sort (BW)—Plotting the Path from Costs to Cash Flow - Spanish.docx
- Cost of Production Card Sort (BW)—Plotting the Path from Costs to Cash Flow - Spanish.pdf
- Cost of Production Card Sort (BW)—Plotting the Path from Costs to Cash Flow.docx
- Cost of Production Card Sort (BW)—Plotting the Path from Costs to Cash Flow.pdf
- Cost of Production Card Sort—Plotting the Path from Costs to Cash Flow - Spanish.docx
- Cost of Production Card Sort—Plotting the Path from Costs to Cash Flow - Spanish.pdf
- Cost of Production Card Sort—Plotting the Path from Costs to Cash Flow.docx
- Cost of Production Card Sort—Plotting the Path from Costs to Cash Flow.pdf
- Cost of Production Line Graph (BW)—Plotting the Path from Costs to Cash Flow - Spanish.docx
- Cost of Production Line Graph (BW)—Plotting the Path from Costs to Cash Flow - Spanish.pdf
- Cost of Production Line Graph (BW)—Plotting the Path from Costs to Cash Flow.docx
- Cost of Production Line Graph (BW)—Plotting the Path from Costs to Cash Flow.pdf
- Cost of Production Line Graph—Plotting the Path from Costs to Cash Flow - Spanish.docx
- Cost of Production Line Graph—Plotting the Path from Costs to Cash Flow - Spanish.pdf
- Cost of Production Line Graph—Plotting the Path from Costs to Cash Flow.docx
- Cost of Production Line Graph—Plotting the Path from Costs to Cash Flow.pdf
- Creating Bar Graphs—Plotting the Path from Costs to Cash Flow - Spanish.docx
- Creating Bar Graphs—Plotting the Path from Costs to Cash Flow - Spanish.pdf
- Creating Bar Graphs—Plotting the Path from Costs to Cash Flow.docx
- Creating Bar Graphs—Plotting the Path from Costs to Cash Flow.pdf
- Guided Notes (BW)—Plotting the Path from Costs to Cash Flow - Spanish.docx
- Guided Notes (BW)—Plotting the Path from Costs to Cash Flow - Spanish.pdf
- Guided Notes (BW)—Plotting the Path from Costs to Cash Flow.docx
- Guided Notes (BW)—Plotting the Path from Costs to Cash Flow.pdf
- Guided Notes (Teacher's Guide) (BW)—Plotting the Path from Costs to Cash Flow.docx
- Guided Notes (Teacher's Guide) (BW)—Plotting the Path from Costs to Cash Flow.pdf
- Guided Notes (Teacher's Guide)—Plotting the Path from Costs to Cash Flow..pdf
- Guided Notes (Teacher's Guide)—Plotting the Path from Costs to Cash Flow.docx
- Guided Notes—Plotting the Path from Costs to Cash Flow - Spanish.docx
- Guided Notes—Plotting the Path from Costs to Cash Flow - Spanish.pdf
- Guided Notes—Plotting the Path from Costs to Cash Flow.docx
- Guided Notes—Plotting the Path from Costs to Cash Flow.pdf
- Lesson Slides—Plotting the Path from Costs to Cash Flow.pptx
- Note Catcher—Plotting the Path from Costs to Cash Flow - Spanish.docx
- Note Catcher—Plotting the Path from Costs to Cash Flow - Spanish.pdf
- Note Catcher—Plotting the Path from Costs to Cash Flow.docx
- Note Catcher—Plotting the Path from Costs to Cash Flow.pdf
- Station Posters (BW)—Plotting the Path from Costs to Cash Flow.docx
- Station Posters (BW)—Plotting the Path from Costs to Cash Flow.pdf
- Station Posters—Plotting the Path from Costs to Cash Flow.docx
- Station Posters—Plotting the Path from Costs to Cash Flow.pdf

Materials

- Lesson Slides (attached)
- Cost of Production Card Sort (attached; one per group)

- Station Posters (attached)
- Cost of Production Line Graph (attached; one per pair)
- Guided Notes (attached; one per student)
- Guided Notes (Teacher's Guide) (attached)
- Creating Bar Graphs (attached; one per pair)
- Note Catcher (attached; one per student)
- 3-2-1 ICAP Review (attached; one per student)
- Internet-capable devices (optional)

Black and White Copies

If you do not have access to a color printer, use the handouts with the (BW) in the title for black and white printing instead of the colored copy with the same title.

5 minutes

Engage

Activity Preparation

Before starting the lesson, print and cut out enough copies of the card sort activity to group your students by three or four.

Use the attached **Lesson Slides** to facilitate the lesson. Display **slides 3-4** to introduce the essential question and learning objectives.

Divide students into groups of three or four and distribute one set of the **Card Sort** handout to each group.

Display **slide 5** and introduce students to the Card Sort instructional strategy. Instruct students to match the vocabulary terms to the correct definition and picture. Allow five minutes for students to work. Use the K20 Timer.

When all groups have completed their card sort, facilitate a group discussion about the results. Unhide **slide 6** to allow students to check their work and clear up any misconceptions.

20 minutes

Explore

Activity Preparation

Before starting this portion of the lesson, print the **Station Posters** handouts and place them randomly around the room. Ask students to go from graph to graph analyzing and answering the questions.

Display **slide 7** and introduce students to the WIS-WIM instructional strategy.

This strategy will help students interpret the line graph to see the relationship between costs and number of units (output). As you walk them through the example, if needed, annotate on the graph what is seen by drawing arrows or circling the area on the graph that answers the question. Then, have the students state what that means.

Scaffolding

If students need further scaffolding, walk them through how to use the strategy to read the graph. For example, the question is, "How much more is the variable cost to produce 600 units than the variable cost to produce 200 units?" Have students say what they see on the graph. They may say "At 600 units I see the variable cost is $1200 and at 200 units the variable cost is $400." Then ask what that means. The students may say, "The variable cost to produce 600 units is $800 more than producing 200 units."

Display **slide 8** and read the following scenario:

Imagine that you are a small business owner who produces and sells a product. You want to take a closer look at your fixed and variable costs and calculate the total cost of production to assess profitability and ensure you are pricing your product correctly.

Display **slide 9** and explain to students that they are going to take a closer look at fixed and variable costs and calculate total costs. Place students into pairs. Give each pair one copy of the attached **Cost of Production Line Graph** handout. Instruct students to start at any station in the room. Have each pair complete the WIS-WIM on their handout to answer the question about their graph. Once they have the answer, the instructions below the problem will direct them where to go next (ex: If the answer is 800, go to problem C. If the answer is 1300, go to problem D.).

Direct students to show their work on the Cost of Production Line Graph handout, along with the sequence of letters in the order that they visited the stations. If they answer them all correctly, they will visit all six stations and have a sequence of letters to show the teacher for easy grading.

10 minutes

Explain

Unhide **slide 10** to display the correct sequence to the Cost of Production Line Graph activity. Use the information to debrief the activity and talk about the connection between the vocabulary, graphs, and what it means to a product-based business.

Display **slide 11** and distribute the attached **Guided Notes** handout. Instruct students to record their notes on the handout during the class discussion. Use the **Guided Notes (Teacher's Guide)** if you need further support as you lead the discussion.

When the discussion ends and students have no more clarifying questions, display **slide 12**. Instruct students to use their notes from the discussion and the graph displayed on the slide to answer the questions at the bottom of the handout, which are also displayed on the slide. Allow students 10 minutes to complete the questions. Use the K20 Center timer.

Facilitate a short discussion after students have finished to go over the answers and clear up any lingering misconceptions. If students need further clarification, try using the following guiding questions:

"How would they use the data to project fixed, variable and total costs for outputs over 1200 units?"

"Suppose the variable cost is $3 per unit and the fixed cost is $1,000. What is the total cost to produce 2400 units?"

Display **slide 13** and read the following scenario:

You have taken a closer look at your fixed and variable costs and have calculated the total cost of production to assess profitability. Now you want to compare fixed and variable costs for different times of the year.

45 minutes

Extend

Display **slide 14** and introduce students to the I Notice, I Wonder instructional strategy. Facilitate a class discussion about the use of double bar graphs. Ask students to explain why a business might use them. Ask students what they notice about the double bar graph. Once shared, then ask what they wonder. Once students are done sharing, ask them why a business owner would want to look at their costs this way. You could encourage them to use their internet capable device to research the question.

Optional Activity

If you would like to facilitate a hands-on activity about double bar graphs or if students require further scaffolding, use the attached **Creating Bar Graphs** handout. Have students work in pairs to make their own double bar graph.

Distribute the attached **3-2-1 ICAP Review** handout.

Display **slide 15** and introduce students to the 3-2-1 instructional strategy. Instruct students to review the questions on the handout briefly so they can think about them as they watch the video.

Display **slide 16** and play the ICAP video.

Embedded video
https://youtube.com/watch?v=RHCaf0eRK40

When the video ends, allow students 5-10 minutes to complete their handout. After they have completed their handout, display **slide 17** and facilitate a class discussion. Invite students to share their answers.

Community Connections

Consider bringing in a business owner from the community if you have the connections and time to do so. This could be a great alternative or supplement using the ICAP video provided. If you choose to bring in a community member, consider using the attached **Note Catcher** handout and instruct students to write down questions for the guest speaker in the class period before they are scheduled to speak. If you choose to bring in a speaker instead of using the ICAP video, use hidden **slide 18** in lieu of **slides 15-17.**

10 minutes

Evaluate

Display **slide 19**. Instruct students to take out a piece of paper and writing instrument and introduce them to the instructional strategy, I Used to Think, but Now I Know. Direct students to write about the following prompt:

What is one thing you used to think about business and cost of production and what do you know now based on what you have learned?

When students have finished, invite them to share their answers with the class before turning in their work.

Resources

- Harmeyer, K. M. (2002). Cost of production. In *AGS Math for the World of Work* (pp. 158–161). American Guidance Service, Inc.
- K20 Center. (n.d.). 3-2-1. Strategies. https://learn.k20center.ou.edu/strategy/117
- K20 Center. (n.d.). Card sort. Strategies.https://learn.k20center.ou.edu/strategy/147
- K20 Center. (n.d.). Cornell notes system. Strategies.
- https://learn.k20center.ou.edu/strategy/56
- K20 Center. (n.d.). I notice, I wonder. Strategies. https://learn.k20center.ou.edu/strategy/180
- K20 Center. (n.d.). I used to think . . . but now I know. Strategies. https://learn.k20center.ou.edu/strategy/137
- K20 Center. (2024, December 12). Plotting the path from costs to cash flow. [Video]. YouTube. https://www.youtube.com/watch?v=RHCaf0eRK40
- K20 Center (n.d.) WIS-WIM. Strategies. https://learn.k20center.ou.edu/strategy/1201