Lesson 2 of 4

Series: T-Shirt Business Math Project

Level Up Your T-Shirt Shop: Understanding Overhead and the Break-Even Point

Materials Needed

- Pencil and paper
- Calculator
- Completed "T-Shirt Business Plan" worksheet from the previous lesson
- New "Monthly Business Report" worksheet (details provided below)

Learning Objectives

Building on our knowledge of cost and profit, by the end of this lesson, you will be able to:

- Define and differentiate between variable costs and fixed costs (overhead).
- Calculate the total monthly costs for a business.
- Determine the "break-even point"—the number of items you must sell to cover all costs.
- Calculate the total monthly profit after selling multiple items.

Lesson Structure

I. Introduction (5-10 minutes)

Review of Previous Lesson

"Last time, you became a business owner and created an amazing plan for your t-shirt company. Let's quickly remember the three key ideas we learned. Can you tell me what **Unit Cost** is? What about **Profit**? And how did we use those to find the **Selling Price**?"

(Quickly review the answers: Unit Cost = cost to make one item; Profit = extra money made; Selling Price = Unit Cost + Profit.)

"Perfect. So, you have your price, and you're ready to sell!"

Hook & Engagement

"But wait! A new email just came in. It's a bill for your company's website, and it's $20 for the month. Uh oh! The profit we planned for each shirt didn't include paying for a website. Running a business has more costs than just making the product."

Setting the Stage

"Today, we're going to level up our business skills. We'll look at ALL the costs involved in running your

shop for a whole month. We'll learn how to separate them into two important types and use that information to find the most important number for any new business: the **break-even point**. That's the magic number of shirts you need to sell just to pay all your bills."

II. Body: Running the Business for a Month (25-30 minutes)

Part 1: The "I Do" - Variable vs. Fixed Costs (10 mins)

Educator explains and models the new concepts.

"In business, there are two types of costs. First, there's the cost you already know."

*(Educator writes down "**Variable Costs**.")*

"The **Unit Cost** of your t-shirt is a variable cost. It's 'variable' because the total amount you spend *varies* depending on how many shirts you make. If you make 10 shirts, you pay for 10 shirts' worth of materials. If you make 100 shirts, you pay for 100. It changes."

*(Educator writes down "**Fixed Costs (Overhead)**.")*

"The second type is new. That $20 website bill is a **fixed cost**. It's 'fixed' because the price stays the same no matter what. You pay $20 for the website whether you sell zero shirts or a thousand shirts. It doesn't change. These are also called 'overhead' costs."

"Now for the big question: How many shirts do I need to sell just to pay for my $20 website? Let's use my 'Math-Tastic Tees' from last lesson. Remember, my cost was $7.50 and my selling price was $12.50. This means I make a **$5.00 profit on each shirt**."

"To find my break-even point, I divide my total fixed costs by the profit I make per shirt."

(Educator writes it out clearly.)

$20.00 (Fixed Costs) ÷ $5.00 (Profit per shirt) = 4 shirts

"This means I need to sell 4 shirts just to pay my website bill. I don't make any *real* money for myself until I sell the 5th shirt. That's the break-even point!"

Formative Assessment (Quick Check): "If my website fee went up to $30, how many shirts would I need to sell to break even?" (Answer: $30 ÷ $5 = 6 shirts)

Part 2: The "We Do" - Calculating Total Monthly Profit (10 mins)

Learner and educator solve a problem together, using the learner's business plan from the previous lesson.

"Okay, let's look at the business you created. Pull out your worksheet from last time. What was your profit per shirt?"

(Wait for the learner to find the number, e.g., "$6.00 profit".)

"Great! Now, let's give your business some real-world fixed costs for the month:

- Design software subscription: $10
- Booth fee for the local market: $25

"First, what are your **total fixed costs** for the month? Let's add them up."

(Guide the learner: $10 + $25 = $35 total fixed costs.)

"Excellent. Now, let's find your break-even point together. We take the total fixed costs and divide by your profit per shirt."

(Guide the calculation: $35 ÷ $6 profit per shirt = 5.83 shirts)

"Uh oh, 5.83! Can you sell part of a shirt? Nope! So, to be safe and cover all your costs, you always have to round UP. How many shirts do you need to sell to break even?" (Answer: 6 shirts)

"Now, let's say you have a great month and sell **20 shirts**! Did you make a profit? Let's find out."

1. **Total Profit from Sales:** 20 shirts × $6 profit per shirt = $120
2. **Subtract Fixed Costs:** $120 - $35 (total fixed costs) = $85

"Wow! After paying for all your materials AND your monthly bills, you made a **total monthly profit of $85**! See how it all connects?"

Part 3: The "You Do" - Your Monthly Business Report (10 mins)

Learner applies all concepts independently using a new worksheet.

"You're a pro now. Here is your first 'Monthly Business Report'. Use the information from your original business plan and this new worksheet to see how well your company did this month."

Worksheet: Monthly Business Report

Company Name: _____

1. Review Your Product (From your first worksheet)

- My Unit Cost (Variable Cost per shirt): $_____
- My Selling Price: $_____
- My Profit per Shirt: (Selling Price - Unit Cost) = $_____

2. Calculate Your Monthly Fixed Costs (Overhead)
Every business is different! Choose two costs for your business this month.

- [ ] Website Hosting: $15
- [ ] Social Media Advertising: $20
- [ ] Design Software: $10
- [ ] A Cool Sticker to add to each order: $0.50 per shirt (Wait, is this a fixed cost or a variable cost? Hint: It depends on the number of shirts!)

My Total Fixed Costs This Month Are: $_____ + $_____ = $_____

3. Find Your Break-Even Point

My Total Fixed Costs: $_____ ÷ My Profit per Shirt: $_____ = _____ shirts to break even.
(Remember to round up if you get a decimal!)

Final Break-Even Point: _____ shirts.

4. Calculate Your Monthly Profit
*Congratulations, you had a successful month! You sold **40 shirts**.*

a. Total Profit from Sales (The money you made before paying bills):
40 shirts × $_____ (Profit per Shirt) = $_____

b. Your Final Take-Home Profit (After paying all bills):
$_____ (Total Profit from Sales) - $_____ (Total Fixed Costs) = $_____

III. Conclusion (5 minutes)

Share and Recap

The learner presents their "Monthly Business Report" and explains their calculations.

"Amazing work! Let's review what we learned today. We took your business from just an idea to running it for a whole month. We now know the difference between **variable costs** that change with each shirt, and **fixed costs** that stay the same every month. Most importantly, you figured out your **break-even point**—how many shirts you had to sell just to cover your bills."

Reinforce the Progression

"In our first lesson, we learned to price a single product correctly. Today, we learned how to manage the finances of the entire business for a month. You're seeing that making smart business decisions is just a series of math problems. You are building the skills to run any project you can dream of!"

Assessment & Success Criteria

- **Formative:** Answering the quick check question and participating in the "We Do" calculations correctly demonstrates understanding of the new concepts.
- **Summative:** The completed "Monthly Business Report" worksheet is the main assessment.
    - **Success looks like:** The learner correctly identifies fixed costs, calculates the total, computes the break-even point (rounding up correctly), and accurately determines the final monthly profit. The learner can explain why profit per shirt is not the same as the final take-home profit.

Differentiation & Adaptability

- **Scaffolding for Support:**
    - Use a calculator for all steps.
    - Pre-select the fixed costs for the learner to remove the choice component.
    - Break down the final profit calculation into more guided steps on the worksheet.
- **Extension for Challenge:**
    - **Hitting a Goal:** "You want to save up $200 for a new bike. How many shirts do you need to sell this month to cover your fixed costs AND have $200 left over?" (This requires them to add the goal to the fixed costs before calculating a new, higher target.)
    - **Dynamic Pricing:** "What if you sell your first 10 shirts at full price, but then put the rest on sale with a 20% discount? How would that change your total monthly profit on 40 shirts?"
- **Adaptability for Other Contexts:** This lesson is perfect for group work in a classroom. Each

group uses their business plan from the previous day and works together on their monthly report. In a workplace training context, replace "t-shirts" with "client projects" or "units produced" and replace fixed costs with salaries, office rent, and software licenses to teach departmental budgeting.