

Grade Band: 3-5

Lesson Length: Approximately 2 days

NCTM Standard and Expectation

Algebra

1. Use mathematical model to represent and understand quantitative relationships.
2. Analyze change in various contexts

Learning Objectives

1. The student will understand profit and loss, components of a simple profit and loss statement, and the importance of a profit and loss statement.
2. The student will calculate profits using gross income, total expenses, and cost of goods sold.
3. The student will analyze monthly profit and loss statements for a school store and calculate profit margin percentages.

Connection to Bloom's Taxonomy

- ✓ Comprehension
- ✓ Application
- ✓ Analysis
- ✓ Synthesis

RG's Literary Connection



How the Second Grade Got \$8,205.50 to Visit the Statue of Liberty by Nathan Zimelman is a perfectly matched literary pick for this profit loss mathematics lesson. This adventures book is filled with humor as a group of second-grade students attempt to raise a bundle of money in order to fund a field trip to the Statue of Liberty. The students participate in a number of fund raisers, some being profitable and other for a loss. A great read aloud and laugh book for all elementary grades.

Word Origin by Hannie



Profit from the Latin word *profectus* meaning "to profit or make progress". The words use after 1912 has primarily been as a noun. For example; The school store has profited from its sales of pencils and eraser. Have students create additional sentences using the word as a noun.

Vocabulary Words



1. Profit – the net income that remains after deducting all expenses and costs of doing business
2. Net Loss – the loss that results when expenses and costs are greater than income
3. Profit and Loss Statement – a financial statement or record that helps to track a business; also called a P&L
4. Gross income – the income generated from sales; calculated by multiplying price by quantity; also referred to as gross sales
5. Inventory – a list of goods or materials in stock and available to be sold
6. Cost of Goods Sold – the cost of selling goods or items; calculated as the opening merchandise inventory plus purchases minus closing merchandise inventory
7. Expenses – cost associated with sales, administration, and advertising
8. Profit Margin – net income or loss divided by gross income/sales; written as a percentage

Learning Model Component

- ✓ Making Connections
- ✓ Exploring and Learning
- ✓ Extended Learning and Practice
- ✓ Assessment
- ✓ Closure

Teaching Strategies

- ✓ Brainstorming
- ✓ Guided Practice
- ✓ Paired Learning

Materials List

- ✓ Calculator
- ✓ Pencils
- ✓ Lemonade Stand Income and Expense Information
- ✓ Lemonade Stand P&L Statements
- ✓ Lemonade Stand P&L Statements – Key
- ✓ Lemonade Stand P&L Analysis
- ✓ Lemonade Stand P&L Analysis – Key
- ✓ School Store P&L Statements
- ✓ School Store P&L Statements – Key
- ✓ Assessment of Student Progress
- ✓ Index Cards
- ✓ Crayons or colored pencils

Profit & Loss

Making Connections

Ask students to explain the terms profit and loss. What is a profit and what is meant by a loss? As a class, brainstorm some possible definitions. Explain that a profit is when a business makes money after expenses. It is the revenue that remains after all expenses and costs have been paid. A loss is the opposite. It is when a business does not make money or a profit after deducting all expenses and costs. The business is losing money. The goal of a business is to increase profits and reduce losses.

Discuss with students that it is important for store owners and businesses to know whether they are profitable or not. As a class, brainstorm several reasons why understanding profits and losses are important. Some possible responses may include the following:

- To understand if the store is making money
- To understand what specific store products are making money and which may be losing money
- To reduce expenses if needed
- To change product pricing to increase revenue
- To plan for future purchases including inventory and other expenses associated with running the business
- To understand if the store can afford future investments (e.g. increasing store space, hiring more help, upgrading computer systems etc.)

Next, divide the class into pairs. Have them answer the following questions:

- Identify the income and expenses for a lemonade stand.
- How would you determine the income for lemonade sales? What expenses are associated with having a lemonade stand?

Use the following chart for guidelines and to review team responses:

Lemonade Stand Profit and Loss Components

Income Components	Possible Expenses
Price	Cartons of lemonade if using ready-made lemonade
# of cups of lemonade sold	Powdered lemonade if mixing own
	Bottled water if not using tap water
	Container for mixing and serving powdered lemonade
	Spoon or spatula to mix powdered lemonade
	Cups
	Poster board for sign
	Marker for sign
	Table
	Tape to attach sign to table

Exploring and Learning

1. Explain that an important accounting tool is the profit and loss statement. This is a financial statement that helps to keep track of a business. It includes gross income, cost of goods sold, expenses, and net income. Review the following definitions with the class:
 - Gross income is income generated from sales. It is the price of a product multiplied by the quantity sold. For example, if a store sold only beaded necklaces and each necklace cost \$5.00 each, the gross income would be the number of necklaces sold multiplied by the \$5.00 price per necklace.
 - Cost of goods sold is the cost of selling goods or items during a specified period of time. The cost of goods sold is the opening merchandise inventory plus purchases made during the period less the closing merchandise inventory.
 - Expenses include selling, administration, and operating expenses. Expenses specifically may include rent, salaries, and advertising.
 - Net income is gross income minus the cost of goods sale and expenses. This is the profit made on sales. If the cost of goods sold and expenses are greater than the gross income, the business had not made a profit. The business would record a net loss.
2. The profit and loss statement must be accurate because it helps a business make important decisions. The goal of a business is to increase profits. Ask students to work in pairs to prepare simple profit and loss statements for a lemonade stand.
3. Pair students together and provide each group with the Lemonade Stand Income and Expense Information, the Lemonade Stand P&L Statements, and Lemonade Stand P&L Analysis. Review the assumptions listed on the Lemonade Stand P&L Statements with the class before each team works independently to complete the P&L statements.
4. Explain and list on the board or as a transparency the following instructions:
 - Review the Lemonade Stand Income and Expense Information
 - Complete the Lemonade Stand P&L Statements by calculating gross income, total expenses, and net income.
 - Calculate the profit margin percentages for each P&L.
 - Answer the questions listed on the Lemonade Stand P&L Analysis.
5. Review the five lemonade profit and loss statements as a class. Use the Lemonade Stand P&L Statements - Key and the Lemonade Stand P&L Analysis - Key for answers.

6. Present students with the following scenario:



RG and Hannie are working at the Raymond Geddes Elementary School Store. Sniffer has asked them to complete and analyze the January, February, and March school store profit and loss statements. Can you help RG and Hannie prepare and analyze the statements for the three month period?

7. To help complete the scenario, pair students together and provide each group with the following:

- Calculator and pencils
- School Store P&L Statements. (These statements are based on Appendix G of the "School Store: An Operating Manual" located on the Raymond Geddes website at www.raymondgeddes.com.)
- Review the following assumptions:
 - The school store has a simple P&L. Income less cost of goods sold equals profit.
 - Income from sales is not affected by returns. All sales are final at the school store and returns are not allowed.
 - The school store is run by volunteers. There are no administrative costs or operating costs.
 - The school store is set up on a cart which is rolled into the cafeteria. The store uses little space and inventory is held in a closet. There are no rental space expenses.

8. Explain and list on the board or as a transparency the following instructions:

- Calculate the Total Merchandise Available, the Cost of Goods Sold, and the Gross Profit On Sale for each month.
- Calculate the Profit Margins (as a percentage) by dividing the Gross Profit on Sale by the Income from Sales.
- Answer the questions to complete an analysis of the school store P&Ls.

9. Review the School Store P&L Statements as a class. Use the School Store P&L Statements – Key for answers.

Extended Learning and Practice

1. Ask students to interview a parent or other adult about a business they work for or own. How does the company make a profit? Is it a service provider or a business that sells merchandise? What expenses are associated with the business? Ask students to share their findings with the class.
2. Invite a local business owner to your classroom to discuss his or her business. Ask the business owner to share information about what the business does, how it makes money, how prices are set, and what expenses they have.

Assessment

The lesson objectives can be assessed by evaluating the Lemonade Stand P&L Statements, Lemonade Stand P&L Analysis, and School Store P&L Statements with Lemonade Stand P&L Statements - Key, Lemonade Stand P&L Analysis - Key, and School Store P&L Statements - Key.

Use the Assessment of Student Progress to evaluate students' overall abilities to meet the lesson's learning objectives, which include understanding and explaining profit and loss; identifying components of a simple profit and loss statement; explaining the importance of a profit and loss statement as a financial tool; calculating profits using gross income, total expenses, cost of goods sold, and profit margin percentages; and analyzing monthly profit and loss statements for a school store.

Closure

Provide each student with an index card and have them answer the following questions on one side of the index card:

1. Describe two new things that you have learned.
2. What else would you like to learn about this topic?

On the back side of the index card, instruct the students to draw a picture of something they learned about during this lesson. The index cards can be hole punched and held together with a simple shower curtain ring

<p>Profit & Loss Lemonade Stand Income and Expense Information</p>

Income:

- | | |
|-------------------------------|--------|
| • total cups of lemonade sold | 20 |
| • selling price per cup | \$.50 |

Expenses:

- | | |
|--|-------------|
| • Ready made ½ gallon cartons of lemonade (10 cups per carton) | \$1.50 each |
| • Lemonade Powder (20 cups per can) | \$1.50 each |
| • Water (use tap water) | \$ 0 |
| • Cups (100 in a package) | \$.99 |
| • Spoon or spatula (use one from home) | \$ 0 |
| • Container (use from home) | \$ 0 |
| • Poster board | \$.79 |
| • Marker | \$.59 |
| • Tape | \$.59 |
| • Table (use from home) | \$ 0 |



Profit & Loss Lemonade Stand P&L Statements

Calculate gross income, total expenses, net income (profit), and profit margin %s for each P&L statement below.

	P&L #1	P&L #2	P&L #3	P&L #4	P&L #5
Cups sold	20	20	20	20	20
Selling Price	\$.50	\$.50	\$.50	\$.50	\$.60
Gross Income	\$	\$	\$	\$	\$
Ready-made lemonade	\$ 3.00	\$ 3.00	\$ 3.00	\$ 0	\$ 0
Powered lemonade	\$ 0	\$ 0	\$ 0	\$ 1.50	\$ 1.50
Cups	\$.99	\$.99	\$ 0	\$ 0	\$ 0
Poster board	\$.79	\$.79	\$ 0	\$ 0	\$ 0
Marker	\$.59	\$ 0	\$ 0	\$ 0	\$ 0
Tape	\$.59	\$ 0	\$ 0	\$ 0	\$ 0
Total Expenses	\$	\$	\$	\$	\$
Net Income (Profit)	\$	\$	\$	\$	\$
Profit Margin %	%	%	%	%	%
Assumptions:	High expenses	Reduce some expenses	Reduce more expenses	Switch from ready-made to powder	Increase selling price by \$.10/cup
Cartons of ready-made lemonade	2	2	2	0	0
Cans of powdered lemonade	0	0	0	1	1
Packages of cups	1	1	Use from home	Use from home	Use from home
Poster board	1	1	Use paper from home	Use paper from home	Use paper from home
Marker	Purchase	Use from home	Use from home	Use from home	Use from home
Tape	Purchase	Use from home	Use from home	Use from home	Use from home

Profit & Loss Lemonade Stand P&L Statements - Key

	P&L #1	P&L #2	P&L #3	P&L #4	P&L #5
Cups sold	20	20	20	20	20
Selling Price	\$.50	\$.50	\$.50	\$.50	\$.60
Gross Income	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$12.00
Ready-made lemonade	\$ 3.00	\$ 3.00	\$ 3.00	\$ 0	\$ 0
Powered lemonade	\$ 0	\$ 0	\$ 0	\$ 1.50	\$ 1.50
Cups	\$.99	\$.99	\$ 0	\$ 0	\$ 0
Poster board	\$.79	\$.79	\$ 0	\$ 0	\$ 0
Marker	\$.59	\$ 0	\$ 0	\$ 0	\$ 0
Tape	\$.59	\$ 0	\$ 0	\$ 0	\$ 0
Total Expenses	\$ 5.96	\$ 4.78	\$ 3.00	\$ 1.50	\$ 1.50
Net Income (Profit)	\$ 4.04	\$ 5.22	\$ 7.00	\$ 8.50	\$ 10.50
Profit Margin %	40.4%	52.2%	70%	85%	87.5%
Assumptions:	High expenses	Reduce some expenses	Reduce more expenses	Switch from ready-made to powder	Increase selling price by \$.10/cup
Cartons of ready-made lemonade	2	2	2	0	0
Cans of powdered lemonade	0	0	0	1	1
Packages of cups	1	1	Use from home	Use from home	Use from home
Poster board	1	1	Use paper from home	Use paper from home	Use paper from home
Marker	Purchase	Use from home	Use from home	Use from home	Use from home
Tape	Purchase	Use from home	Use from home	Use from home	Use from home



Profit & Loss Lemonade Stand P&L Analysis

Answer the following questions using the Lemonade Stand P&L Statements.

1. Which shows more profit, P&L#1 or P&L#2?
2. What is the difference in profit between P&L#1 and P&L#2?
3. Why is the profit higher in P&L#2 than in P&L#1?
4. Why does P&L#3 show even more profit?
5. Why is P&L#4 more profitable than P&L#3? What changed?
6. How did pricing in P&L#5 affect the profit?
7. Which scenario would you choose to make the most profit if you kept the price per cup of lemonade at \$.50?
8. Which P&L shows the highest profit margin %?

Profit & Loss Lemonade Stand P&L Analysis - Key

Answers are based on the
Lemonade Stand P&L Statements – Key.

1. **Which shows more profit, P&L#1 or P&L#2?** P&L#2

2. **What is the difference in profit between P&L#1 and P&L#2?**

$$\$5.22 - \$4.04 = \$1.18$$

3. **Why is the profit higher in P&L#2 than in P&L#1?**

Expenses are \$1.18 less in P&L#2 than in P&L#1. There are no marker or tape expenses.

4. **Why does P&L#3 show even more profit?**

P&L#3 shows more profit because expenses are reduced even further. Cup and poster board expenses have been eliminated too. We are going to use cups and poster board that we already have at home.

5. **Why is P&L#4 more profitable than P&L#3? What changed?**

P&L#4 is more profitable than P&L#3 because we have switched from ready-made lemonade to powdered lemonade. The ready-made lemonade is more expensive. To sell 20 cups of lemonade, we need to purchase two cartons of ready-made lemonade for a total of \$3.00. To sell the same 20 cups of lemonade using powdered lemonade, we need to purchase only one can of powdered lemonade at \$1.50.

6. **How did pricing in P&L#5 affect the profit?**

In P&L#5, the price per cup increased \$.10 from \$.50 to \$.60. This increased gross income by \$2.00 (20 cups selling for \$.10 more each). Since expenses did not increase from P&L#4, the \$2.00 in additional gross income turned into all profit.

7. **Which scenario would you choose to make the most profit if you kept the price per cup of lemonade at \$.50?**

P&L#4 shows the most profit with a price of \$.50 per cup. We would have to keep expenses low and use powdered lemonade to have the most profit at this selling price.

8. **Which P&L shows the highest profit margin %?**

P&L#5 has the highest profit margin at 87.5%



Profit & Loss School Store P&L Statements

Calculate total merchandise available, cost of good sold, gross profit on sale, and gross profit margin%.

	January	February	March
INCOME FROM SALES	\$500.00	\$450.00	\$650.00

COST OF GOODS SOLD	January	February	March
Opening Merchandise Inventory	\$250.00	\$200.00	\$300.00
Plus Purchases	+\$250.00	+\$350.00	+\$175.00
Total Merchandise Available	=\$	=\$	=\$
Less Closing Merchandise Inventory	-\$200.00	-\$350.00	-\$100.00
Cost of Goods Sold	=\$	=\$	=\$

GROSS PROFIT ON SALES	January	February	March
Income from Sales	\$500.00	\$450.00	\$650.00
Cost of Goods Sold	-\$300.00	-\$200.00	-\$375.00
Gross Profit on Sale	\$	\$	\$

	January	February	March
GROSS PROFIT MARGIN %	%	%	%

1. Which month had the most income from sales? _____
2. Which month had the highest gross profit on sale? _____
3. Which month had the lowest gross profit on sale? _____
4. Which month had the highest gross profit margin %? _____
5. Which month had the lowest gross margin %? _____

Profit & Loss School Store P&L Statements - Key

	January	February	March
INCOME FROM SALES	\$500.00	\$450.00	\$650.00

COST OF GOODS SOLD	January	February	March
Opening Merchandise Inventory	\$250.00	\$200.00	\$300.00
Plus Purchases	+\$250.00	+\$350.00	+\$175.00
Total Merchandise Available	=\$500.00	=\$550.00	=\$475.00
Less Closing Merchandise Inventory	-\$200.00	-\$350.00	-\$100.00
Cost of Goods Sold	=\$300.00	=\$200.00	=\$375.00

GROSS PROFIT ON SALES	January	February	March
Income from Sales	\$500.00	\$450.00	\$650.00
Cost of Goods Sold	-\$300.00	-\$200.00	-\$375.00
Gross Profit on Sale	\$200.00	\$250.00	\$275.00

	January	February	March
GROSS PROFIT MARGIN %	40%	55.6%	42.3%

- | | |
|---|----------|
| 1. Which month had the most income from sales? | March |
| 2. Which month had the highest gross profit on sale? | March |
| 3. Which month had the lowest gross profit on sale? | January |
| 4. Which month had the highest gross profit margin %? | February |
| 5. Which month had the lowest gross margin %? | January |

Use the following summary to assess a student's abilities and performance throughout the lesson. Share this assessment with students at the start of the lesson so that students will understand how they will be assessed prior to beginning the Exploring and Learning section. Use this tool as a basis for providing feedback to the student. Use the scale below to score each of the following items:

Making Connections:

- _____ Student participates in class discussion to define profit and loss.
- _____ Student participates in discussion by offering reasons why understanding profits and losses are important.
- _____ Student works with partner to identify income and expenses for a lemonade stand.

Exploring and Learning

- _____ Student works with partner to calculate gross income, total expenses, net income (profit), and profit margin percentages for five lemonade stand P&L statements.
- _____ Lemonade Stand P&L Statements contain accurate calculations.
- _____ Student works with partner to analyze lemonade stand P&Ls using questions from the Lemonade Stand P&L Analysis.
- _____ The Lemonade Stand P&L Analysis contains accurate responses to the eight questions.
- _____ Student works with partner to calculate total merchandise available, cost of goods sold, gross profit on sale, and gross profit margin %s for school store P&L statements.
- _____ The School Store P&L Statements contain accurate calculations.
- _____ Student works with partner to analyze monthly school store P&L statements using questions from School Store P&L Statements.
- _____ The School Store P&L Statements contain accurate responses to the five questions.

SCALE

4 – Excellent

Student completes the activity, task or assignment with no errors and demonstrates mastery of concepts and/or lesson objectives.

3 – Good

Student completes the activity, task, or assignment with few major errors and demonstrates an understanding of the concepts and/or lesson objectives.

2 – Fair

Student completes the activity, task, or assignment with some major errors and demonstrates difficulty with the concepts and lesson objectives.

1 – Poor

Student does not complete the activity, task, or assignment and demonstrates no understanding of the concepts and/or lesson objectives.