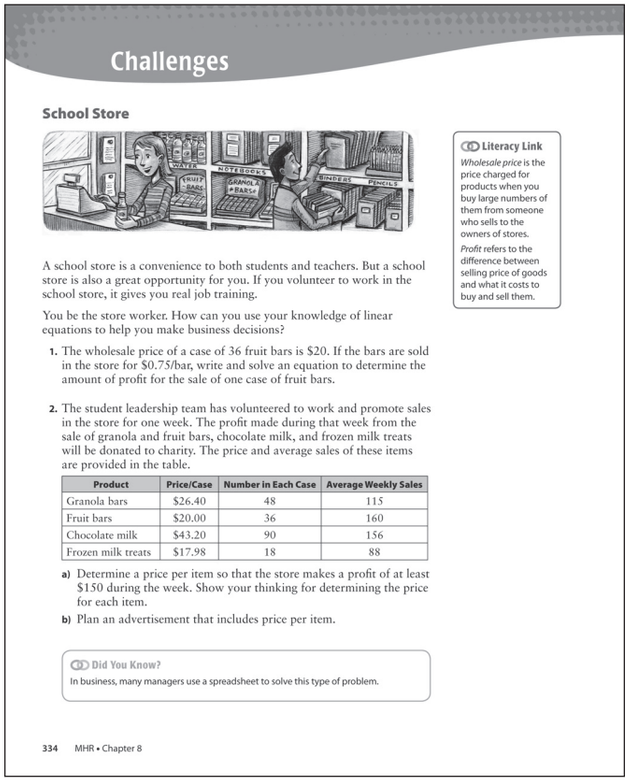

Challenges

School Store

Literacy Link

Wholesale price is the price charged for products when you buy large numbers of them from someone who sells to the owners of stores.

Profit refers to the difference between selling price of goods and what it costs to buy and sell them.

A school store is a convenience to both students and teachers. But a school store is also a great opportunity for you. If you volunteer to work in the school store, it gives you real job training.

You be the store worker. How can you use your knowledge of linear equations to help you make business decisions?

1. The wholesale price of a case of 36 fruit bars is $20. If the bars are sold in the store for $0.75/bar, write and solve an equation to determine the amount of profit for the sale of one case of fruit bars.

2. The student leadership team has volunteered to work and promote sales in the store for one week. The profit made during that week from the sale of granola and fruit bars, chocolate milk, and frozen milk treats will be donated to charity. The price and average sales of these items are provided in the table.

Product	Price/Case	Number in Each Case	Average Weekly Sales
Granola bars	$26.40	48	115
Fruit bars	$20.00	36	160
Chocolate milk	$43.20	90	156
Frozen milk treats	$17.98	18	88

a) Determine a price per item so that the store makes a profit of at least $150 during the week. Show your thinking for determining the price for each item.

b) Plan an advertisement that includes price per item.

Did You Know?

In business, many managers use a spreadsheet to solve this type of problem.

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Planning Notes: School Store

You may wish to use the following steps to introduce and complete this Challenge:

1. After reading the problem with students, discuss *wholesale price*, *selling price*, and *profit*.
   - *Wholesale price* and *profit* are defined in the Challenge.
   - *Selling price* is the price charged by the merchant.

   In this Challenge, the profits are going to charity. However, discuss with students how else a school might use the profits.
2. Ask students what strategies they might use to answer #1. (Examples: Working Backward, multiplying and subtracting, writing and solving an equation)
3. As students consider the second question, ask:
   - Do you think that every store manager would answer this question the same way? Explain.
   - What strategies/methods could you use to answer this question?
   - How might you develop a pricing structure that would encourage the sale of certain items? Is this necessary in this case?
   - How might you check that the pricing structure results in the needed profit?
   - How might you advertise your prices?
   - What information might you include in the ad?
4. Clarify that the task is to
   - find the profit for the sale of one box of fruit bars, if possible, by writing and solving an equation
   - set up a price for the four items in the Challenge. Show how the prices can be used to earn a profit of at least $150 in one week.
   - prepare an advertisement that includes the sales list and prices, and other information
5. Review the **Master 1 Project Rubric** with students so that they will know what is expected.

***MathLinks 9*, pages 334–335**

Suggested Timing

40–50 minutes

Materials

- calculator
- spreadsheet program (optional)

Blackline Masters

Master 1 Project Rubric

Mathematical Processes

- ☑ Communication (C)
- ☑ Connections (CN)
- ☑ Mental Mathematics and Estimation (ME)
- ☑ Problem Solving (PE)
- ☑ Reasoning (R)
- ☑ Technology (T)
- ☑ Visualization (V)

Specific Outcomes

PR3 Model and solve problems using linear equations of the form:

- $ax = b$
- $\frac{x}{a} = b, a \neq 0$
- $ax + b = c$
- $\frac{x}{a} + b = c, a \neq 0$
- $ax = b + cx$
- $a(x + b) = c$
- $ax + b = cx + d$
- $a(bx + c) = d(ex + f)$
- $\frac{a}{x} = b, x \neq 0$

where a, b, c, d, e and f are rational numbers.

Meeting Student Needs

- Students need to understand how to find the profit for #1 before they can start #2. Some students may need coaching in answering #1. For example, suggest they find the total income for the 36 bars and then subtract the wholesale cost of $20. If they try to find the wholesale cost per bar, they will get a repeating decimal ($0.\overline{5}$), which will need to be rounded to $0.56. The rounded value will not yield a profit of $7. You may wish to have students answer the question both ways and discuss which method is more efficient.
- It may be beneficial for students to set up a table as they answer #2. Discuss what column heads might be useful. (Example: The ones in the Challenge plus Wholesale Cost/Item, Selling Price/Item, Profit/Item, Profit for One Week.) Students can enter possible selling prices for each item, and compute the profit on their calculator or set up the columns on a spreadsheet.

Gifted and Enrichment

- Have students extend this Challenge by looking at various scenarios such as:
  - lowering the price on an item in the school store that is nearing its expiry date (lowering the price of an item has proven to increase the amount purchased) and determining the resulting profit or loss
  - taking monthly or weekly inventory so an order can be placed with the wholesaler
  - keeping a tally of items purchased in the school's store for a day or week and determining profit for that day or week
  - establishing a salary for a store worker and showing how this salary affects profit

Answers

School Store

1. Answers may vary. Example:
Let P represent the amount of profit.
$P + 20 = 36(0.75)$ or $P = 36(0.75) - 20$
$P = 7$
The amount of profit on the sale of one case of fruit bars is $7.00.

2. Encourage students to show how their choices allow a weekly profit of $150.

This Challenge can be used for either Assessment *for* Learning or Assessment *of* Learning.

Assessment	Supporting Learning
Assessment *for* Learning	
School Store Discuss the Challenge with students. Have students complete the activity in pairs.	• As a class, brainstorm strategies for approaching this Challenge. • Modelling a possible solution to #3 on the board may provide a springboard to assist students in attempting their own strategy. • For those who would like to provide students with additional practice, there is a second Challenge, Concert Promoter, on the Math Links website. Go to www.mathlinks9.ca, access the Teacher Centre on the Online Learning Centre, and then follow the links.
Assessment *of* Learning	
School Store Introduce the Challenge to students. Have students complete the activity in pairs.	• **Master 1 Project Rubric** provides a holistic descriptor that will assist you in assessing student work on this Challenge. Page 459 of this TR provides notes on how to use this rubric for the Challenge. • To view student exemplars, go to www.mathlinks9.ca, access the Teacher Centre on the Online Learning Centre, go to Assessment, and then follow the links.

The chart below shows the **Master 1 Project Rubric** for tasks such as this Challenge, School Store, and provides notes that specify how to identify the level of specific answers for this project.

Score/Level	Holistic Descriptor	Specific Question Notes
5 (Standard of Excellence)	❑ Applies/develops **thorough** strategies and mathematical processes making **significant** comparisons/connections that demonstrate a **comprehensive** understanding of how to develop a complete solution ❑ Procedures are **efficient and effective** and may contain a **minor mathematical error** that does not affect understanding ❑ Uses **significant** mathematical language to explain their understanding and provides **in-depth** support for their conclusion	• provides a complete and correct solution
4 (Above Acceptable)	❑ Applies/develops **thorough** strategies and mathematical processes for making **reasonable** comparisons/connections that demonstrate a **clear** understanding ❑ Procedures are **reasonable** and may contain a **minor mathematical error** that may hinder the understanding in one part of a complete solution ❑ Uses **appropriate** mathematical language to explain their understanding and provides **clear** support for their conclusion	Demonstrates one of the following: • provides a complete response to both parts of the question, with a weak justification or incomplete advertisement • provides a complete response to the question, which does not meet a minimum profit
3 (Meets Acceptable)	❑ Applies/develops **relevant** strategies and mathematical processes making **some** comparisons/connections that demonstrate a **basic** understanding ❑ Procedures are **basic** and may contain a **major error or omission** ❑ Uses **common** language to explain their understanding and provides **minimal** support for their conclusion	Demonstrates one of the following: • provides a complete and correct #2 • provides a correct response to #1 and finds the wholesale price of each item in #2; the response may have a complete advertisement
2 (Below Acceptable)	❑ Applies/develops **some relevant** mathematical processes making **minimal** comparisons/connections that lead to a **partial solution** ❑ Procedures are **basic** and may contain **several major mathematical errors** ❑ Communication is **weak**	• provides a correct response to #1 and a start to #2 using the new prices
1 (Beginning)	❑ Applies/develops an **initial start** that may be **partially correct** or could have led to a correct solution ❑ Communication is **weak or absent**	• provides a correct start to any part of the question and/or a start to the advertisement Note: A start to the advertisement is a start to the question; however, an initial start to #1, for example, and a start to the ad does not move the response to 2.

For student exemplars, go to www.mathlinks9.ca and follow the links.