Overview for Families

Mathematics in Context unit: **More or Less**

Mathematical strand: **Number**

The following pages will help you to understand the mathematics that your child is currently studying as well as the type of problems (s)he will solve in this unit.

Each page is divided into three parts:

- *Section Focus*
  Identifies the mathematical content of each section.

- *Learning Lines*
  Describes the mathematical flow of each section.

- *Learning Outcomes*
  Outlines what students should know and be able to do at the end of each section.

"From the very beginning of his education, the child should experience the joy of discovery."
                                        Alfred North Whitehead

More or Less

Section A   Produce Pricing

Section Focus

This section uses students' prior knowledge and experiences to solve problems that involve finding the cost of produce that is sold by weight. Three estimation strategies are introduced to estimate the cost of produce: rounding, changing decimals to fractions and multiplying, and using a double number line. At the end of the section, students use these strategies to find the exact answers. They also use number sense to determine the correct placement of the decimal point in the product of two decimal numbers. The instructional focus of Section A is to

• multiply decimals and fractions using a double number line and
• identify the appropriate placement of the decimal point in decimal multiplication.

Learning Lines

Concepts Number Sense and Strategies

Three multiplication estimation strategies are introduced in this section. The first estimation strategy, rounding numbers to find quick estimates, builds on students' number sense. The second estimation strategy involves converting decimals to fractions. Many decimals are easily converted to fractions, which some students may find easier to use. For example, instead of multiplying 0.25 times $1.80, students may find it easier to multiply 1/4 times 1.80, or take 1/4 of 1.80. Students can use number sense; "take 1/4 of" is the same as "take half" (0.90) and then "take half again" (0.45). Or students can calculate 1/4 of 1 (0.25) and 1/4 of 0.80 (0.20) and add to get a total of 0.45.

The third estimation strategy involves using a double number line, which helps students to visualize the relationship between the price of the apples and the amount purchased. If, for example, 1 kg of apples cost $2.40, students can estimate a cost at or near 1.75 kg by first doubling $2.40 to determine what 2 kg will cost. Then, students repeatedly find the number halfway between two numbers

Models

In this section, the double number line from the unit *Models You Can Count On* is revisited in the context of a supermarket produce department. Students use the scale and the price per kilogram to estimate and calculate the cost of produce. Like the ratio table, the double number line generates equivalent ratios, but the order of the numbers is maintained, and in this way, gives the students visual support.

Learning Outcomes

Students are able to use estimation strategies to multiply fractions and decimals and also to find exact answers. They can use number sense to multiply two decimal numbers.

More or Less

Section B   Discounts

Section Focus

Students use a bar chart and a pie chart to display the results of a survey. They describe the survey data using fractions and percents. Students use the relationships between benchmark percents and fractions and their number sense to solve percent problems, such as 25% of $40. They find discounts using their informal and formal knowledge of percents, fractions, and decimals. The instructional focus of Section B is to

• calculate the percent of a number and
• relate percents to fractions and decimals.

Learning Lines

Concepts *Percents*
In this section, various strategies are introduced to help students develop their ability to solve percent problems mentally, or with paper and pencil. For these strategies they use

• benchmark fractions like 1/2, 1/4, and 1/10;
• percents related to benchmark fractions, like 50%, 25%, and 10%;
• the relationship between ratios, fractions, decimals, and percents;
• rounding numbers to estimate percents; and
• the 1% and 10% strategy.

For example, to find 16% of $220, students can separate the 16% into the sum of several percentages that are easier to calculate. 16% = 10% + 5% + 1%. The result is $22 + $11 + $2.20 and the answer is $35.20. A ratio table can be very helpful in organizing these calculations.

Models
In this section, the use of the fraction bar, double number line, and ratio table is further developed.

Learning Outcomes

Students are able to relate percents to fractions and to decimals. They can calculate a percent of a number and discount and sale price.

More or Less

Section C   Many Changes

Section Focus
Students draw percent bars to illustrate discounts and sale prices. They use fractions and percents to express the relationship among regular price, sale price, and discount. Students solve problems about increase and decrease; the changes are indicated by fractions and by percentages. They start to develop the multiplicative strategy to solve this type of problems. This strategy is further developed in Section D. The instructional focus of Section C is to

• use percent bars to solve problems involving percents;
• calculate total cost with tax; and
• determine original price given the sale price and percent discount.

Learning Lines
Models

The percent bar is a model that is developed in the *Mathematics in Context* curriculum to represent and make sense of calculations and problems involving percents. Because the percent bar is a visual model, students reason and justify calculations by relating the model to the context of the problem.

Concepts *Percents*

In this section, students use the percent bar to represent percent increase and decrease in the price of an item. For example, decrease: Suppose an item is discounted by 25%. Students can find the sale price using the relationship between percents and fractions: The discount is 25% or 1/4; calculate 1/4 of the price and subtract this to find the sale price. This strategy is named the *additive strategy*.

Here is an example of the *multiplicative strategy*: The discount is 25%, so the sale price is 75% of the original price. You can multiply 3/4 times the original price to get the sale price. This multiplication strategy will be developed further in Section D.

Learning Outcomes

Students will be able to calculate the sale price of an item with a discount given as a percent or fraction. Students solve problems involving decrease and increase, and they use the relationship between benchmark fractions and percents. They start to use advanced multiplication strategies to find a percent discount.

More or Less

Section D   More or Less

Section Focus

Students investigate how percents are used to indicate reductions and enlargements of pictures on a photocopy machine. They use arrow language to describe the enlargements and reductions and to calculate the dimensions of the enlarged or reduced copy. Students further explore percents as operators in the context of discount, sales tax, and interest. The instructional focus of Section D is to

• solve percent increase and decrease problems involving measurements and

• calculate the money earned on interest from a savings account.

Learning Lines

Concepts *Percents* and *Increase and Decrease*
Arrow strings as developed in the Algebra strand are used to find the dimensions of enlarged or reduced photocopies and to connect the percent decrease and increase to multiplication. For example, the arrow string below describes a reduction to 80%.

$$\text{original length} \xrightarrow{\times\ 0.80} \text{reduced length}$$

Concepts *Percents*
In this section, these arrow strings are used to develop the concept of a percentage as operator. (For students the expression *one-multiplication* is used.) For example, to calculate the final cost of an item with a 19% sales tax:

$$\text{price} \xrightarrow{\times\ 1.19} \text{total cost with tax}$$

The concept of percents as operator is further investigated in the unit *Ratios and Rates*.

Learning Outcomes

Students can solve percent increase and decrease problems. They can choose a strategy they feel comfortable with: a ratio table, a percent bar, a one-multiplication, and/or the relationships between percents, fractions, and decimals. Students will have developed some understanding of the use of a percent as an operator.