Unit 4 – Percentage

Part 1 – Part of a Whole as Percentage

(1) Fraction as Percentage (pp. 47-50)

➢ Express a part of a whole as a percentage.

In *Primary Mathematics 5B*, students learned to express a part of a whole as a percentage. This is reviewed in this section.

A percentage is simply a specific type of fraction, one where the denominator is 100. 1 percent, which is written as 1%, is one part out of a hundred, or $\frac{1}{100}$.

55% means 55 out of 100, or $\frac{55}{100}$, or 55%.

Other fractions are also parts of a whole. $\frac{11}{25}$ is 11 out of 25. To convert to a percentage, we can find the equivalent fraction with a denominator of 100. $\frac{11}{25} = \frac{44}{100} = 44\%$. Instead of dividing the whole into 25 parts, we divide it into 100 parts. Each of the original parts is subdivided into 4 parts, so there are 4 times as many 1% parts.

We can also convert a fraction to a percentage by thinking of it as a fraction of the whole, with the whole being 100%. 1 = 100%.

$$\frac{11}{25} \text{ of the whole} = \frac{11}{25} \text{ of } 100\% = \frac{11}{25} \times 100\% = \frac{11 \times 100}{25}\% = \frac{11 \times \cancel{100}^{4}}{\cancel{25}_{1}} = 44\%$$

➤ Ask your student to tell you what a percentage is. A percentage is a specific fraction where the denominator is 100. Instead of being written as a fraction, it can be written as the number in the numerator followed by the percent symbol, %. $\frac{10}{100} = 10\%$. Discuss ways percentages are used, e.g. percent score on a test, percent humidity, percent chance of rain...

(4) Percentage of a Percentage (p. 51)

> ➢ Solve word problems involving percentage of a percentage.

➤ Draw a bar and mark 60%. Tell your student this is 60% of the total.

Draw another bar underneath the same length as the 60% and tell your student this is now the total. Ask her to mark 25% of this new bar.
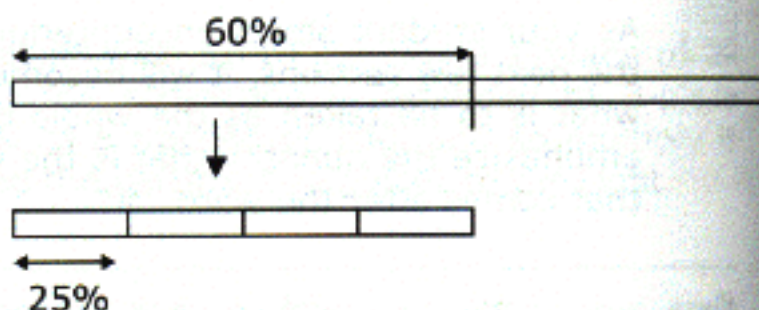
This is 25% of the 60%. Tell her we need to find out what percentage it is of the original bar. We can think of the 60% bar as consisting of 60 1% units.

25% of them would be $\frac{25}{100} = \frac{1}{4}$ of them, or $\frac{1}{4} \times 60 = 15$. 15 of the 60 units

is 25% of 60. $\frac{15}{60} = 25\%$. The original bar has 100 1% units of the same size.

So those 15 units are 15% of the original whole bar.

So to find a percentage of a percentage in terms of the original total, we can multiply the percentage *by* the percentage.

$$25\% \text{ of } 60\% = \frac{25}{100} \times 60\% = 15\%$$

$$25\% \text{ of } 60\% = 15\% \text{ of } 100\%$$

Have your student find some other percentages of a percentage:

$$50\% \text{ of } 50\% = \frac{50}{100} \times 50\% = \frac{50}{100_2} \times 50^1 = 25\%$$

$$20\% \text{ of } 80\% = 16\%$$

$$30\% \text{ of } 75\% = 22.5\%$$

Learning Task 13, p. 51

13. (a) $40\% + 15\% = $ **55%**   (b) $\frac{45}{100} \times \$120 = $ **$54**

Practice 4A, p. 53, problem 10
Use this problem as an additional learning task, if necessary. Answer is on p. 52.

Workbook Exercise 18

(5) Percentage Increase and Decrease (p. 52)

➤ Solve word problems involving tax, interest, increase, decrease, and discount.

Students learned how to solve problems involving tax, interest, increase, decrease, and discount in *Primary Mathematics 5B*. This is reviewed here.

Tax, interest, or increase is given as a percentage of the original amount. After we find the numerical amount for the tax, interest or increase, we can add it to the original amount to find the new amount. Decrease and discount is also given as a percentage of the original amount. After we find the numerical amount for the decrease or discount, we can subtract it from the original amount to find the new amount.

Learning Tasks 14-16, p. 52

Continue to ask your student for the quantity that is to be taken as the whole. You can also call it the *base*.

14. Whole or base is the normal cost, or $40 + $15.

Discount $= \dfrac{20}{100} \times \$55 = \$11$

$55 - $11 = **$44**

15. Whole or base is the number of members last year, or 140.

Increase $= \dfrac{15}{100} \times 140 = 21$

$140 + 21 = **161**$

16. Whole or base is the cost of the bicycle.

Tax $= \dfrac{3}{100} \times \$600 = \$18$

$600 + $18 = **$618**

➤ In these solutions, the actual value of the discount, increase, or tax is found first.

You may want to discuss an alternate approach.

14. Since there is a 20% discount, the new cost of the items is
    100% − 20% = of the old cost.

Final cost $= \dfrac{80}{100} \times \$55 = \$44$