4.2 Word Problems

Objective

• Solve word problems involving the product of fractions.

Notes

Students have previously encountered some multistep word problems involving the product of a fraction and a whole number, and some simple word problems involving the product of fractions. In this chapter, they will solve multistep problems involving the product of fractions. Some of these problems involve finding a fraction of a fraction. If the whole is 1, then to find a fraction of a fraction of the whole we find the product of the two fractions. $\frac{1}{4}$ of $\frac{2}{3}$ of 1 whole is $\frac{1}{4} \times \frac{2}{3} = \frac{1}{6}$ of the whole. If the whole is a set, we can either find the product of the fractions, or first find a fraction of a whole. $\frac{1}{4}$ of $\frac{2}{3}$ of 360 is $\frac{1}{4} \times \frac{2}{3}$ of 360 = $\frac{1}{6} \times 360 = 60$. Or $\frac{1}{4} \times \frac{2}{3}$ of 360 is $\frac{1}{4} \times (\frac{2}{3} \times 360) = \frac{1}{4} \times 240 = 60$.

Bar models (essentially fraction bars in these problems) can help students determine a method to solve the problems. Using the bar model emphasizes the relationship between the fractions: division to find the number in each part and multiplication to find the number in more than one part. Students can either write equations with fractions, or with units, a unit being a fractional part of the whole.

In these problems, we will either be given the value of the whole, or of a fractional part of the whole. Bar models are particularly effective with word problems where we are given the value of a fractional part of the whole. (Without a model, the concepts essentially involve division of a fraction, as will be seen in later chapters of this unit, since we are given the value of an equal part, rather than the value of a whole.)

4.2a Word problems

different methods to the model.

1 unit = 120, half of a unit = 60.

Method 1: $\frac{1}{6} \times 360 = 60$; 60

Method 2: $\frac{1}{4} \times 240 = 60$; 60

Method 3: $\frac{1}{4} \times 240 = 60$; 60

Method 4: 1 unit = 60

alternative solutions.

Assessment

Objective

• Solve word problems involving product of fractions.

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Discussion

Common Core State Standards

5.NF.4a 5.NF.4b

Mathematical Practices

MP1 MP2 MP3 MP4

Textbook, pp. 95-96 • Discuss the four methods shown on these two pages. 2 Word Problems Jim had 360 stamps. He sold $\frac{1}{3}$ of them on Monday and $\frac{1}{4}$ of the Point out that the first step used here is to draw a model mainder on Tuesday. How many stamps did he sell on Tuesday? using fraction bars. The whole is the total number of stamps Jim has, 360. Since he sold 1 third of them, the bar is divided into thirds. The second bar shows only the remainder and that we need to find 1 fourth Mothod 1 of the remainder. We can either find the amount in $1 - \frac{1}{3} = \frac{2}{3}$ First, find what fraction of the the remainder first, or we can find how many he sold He had $\frac{2}{3}$ of the stamps left on Monday on Tuesday as a fraction of the whole rather than as The remainder is $\frac{2}{3}$. a fraction of the remainder. Relate each step in the $\frac{1}{\cancel{4}} \times \frac{\cancel{2}}{3} = \frac{1}{2 \times 3}$ Next, find $\frac{1}{4}$ of the remainder. $=\frac{1}{4}$ The fourth method requires the least number of He sold $\frac{1}{6}$ of the stamps on Tuesday. computations, and so can be the easiest, if a model has $\frac{1}{6} \times 360 =$ been used. The remainder is two units, so to find 1 fourth Jim sold stamps on Tuesday. of the remainder, each of those units needs to be divided into two equal units to have fourths. If all the units are divided into two units, there are six in total, and from the model it is easy to see that we need to find the value Method 2: of one unit. Point out that we could also use the idea of $1 - \frac{1}{2} = \frac{2}{2}$ He had $\frac{2}{3}$ of the stamps left on Monda units to find the value of the remainder and then a half $\frac{2}{3} \times 360 = 2 \times 120 = 240$ unit, which is a fourth of the remainder. 3 units = 360, . He had 240 stamps left on Monday $\frac{1}{1} \times 240 =$ • Point out that it is not necessary to draw two separate Jim sold stamps on Tuesday bars; and we could have divided up the units on the Method 3: $\frac{1}{2} \times 360 = 120$ first bar to show fourths for the remainder without first He sold 120 stamps on Monday drawing a separate bar for the remainder. 360 - 120 = 240 He had 240 stamps left on Monday $\frac{1}{4} \times 240 =$ Jim sold stamps on Tuesday. Method 4: ____ Total number of stamps = 6 units = 360 Number of stamps sold on Tuesday = 1 unit = Textbook, p. 97 Have students solve these problems and discuss their solutions. Tell them they do not have to follow the method in the text only. Try to discuss at least two

Answers:





