A favorite chocolate chip cookie recipe of our family is shown below.

<table>
<thead>
<tr>
<th>Oatmeal Chocolate Chip Cookies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2 cups sugar</td>
</tr>
<tr>
<td>2 cups brown sugar</td>
</tr>
<tr>
<td>4 cubes of butter</td>
</tr>
<tr>
<td>4 eggs beaten</td>
</tr>
<tr>
<td>2 Tablespoons vanilla</td>
</tr>
<tr>
<td>2 1/2 cups flour</td>
</tr>
<tr>
<td>2 cups wheat flour</td>
</tr>
<tr>
<td>2 cups oatmeal</td>
</tr>
<tr>
<td>1/2 cup oat bran</td>
</tr>
<tr>
<td>1 teaspoon salt</td>
</tr>
<tr>
<td>1 1/2 teaspoon soda</td>
</tr>
<tr>
<td>4 cups chocolate chips</td>
</tr>
</tbody>
</table>

Mix ingredients. Spoon onto cookie sheet.
Bake at 350 degrees for 9 minutes.

As shown in the recipe, various units of measure (teaspoons, tablespoons, cups) are used in making the cookies.

1. If we cut the recipe in half, how many cups of chocolate chips and how many cups of flour will be needed?
2. If a ½-cup measure is used to measure the sugar and brown sugar for the original recipe, how many times will the ½-cup measure need to be filled for each type of sugar?

Since two ½-cup measures make up a whole cup, three ½-cup measures are needed for the 1½ cups sugar and four ½-cup measures are needed for the 2 cups of brown sugar.

3. One way to compare two different quantities is to calculate their ratio. That is, divide one quantity by the other. Calculate the ratio of sugar to brown sugar in the original recipe. Then explain what the ratio means. (Hint: You may find it helpful to use the answer from (2).)

\[
\frac{\text{3 cups of sugar}}{\text{4 cups of brown sugar}} = \frac{3}{4}
\]

This means that for every 4 measures of brown sugar in the recipe, 3 measures of sugar should be added. This will be true whether cups, ½-cups, tablespoons, or other type of measure is used.

4. We want to make as many cookies as possible but only have 3 cups of oatmeal available. If we plan to use all of the oatmeal, how much sugar and how much oat bran will we need?

We must determine by what proportion we are increasing the recipe. To do this, we divide the amount of oatmeal available by the amount shown in the recipe.

\[
\frac{3 \text{ cups oatmeal}}{3 \text{ or 12 cups oatmeal}} = \frac{1}{4}
\]

We need 1½ times of each ingredient. The original recipe calls for 1½ cups sugar and ½ -cup of oat bran.

\[
\frac{1\frac{1}{2} \text{ cups sugar}}{3 \text{ cups sugar}} = \frac{3}{4}
\]

\[
\frac{1\frac{1}{2} \text{ cup oat bran}}{2 \text{ cups oat bran}} = \frac{3}{4}
\]

We need 2¼ cups of sugar and ¾ cup of oat bran.
A favorite chocolate chip cookie recipe of our family is shown below.

A oatmeal chocolate chip cookies

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1½ cups sugar</td>
<td>2 cups wheat flour</td>
</tr>
<tr>
<td>2 cups brown sugar</td>
<td>2 cups oatmeal</td>
</tr>
<tr>
<td>4 cubes of butter</td>
<td>⅛ cup oat bran</td>
</tr>
<tr>
<td>4 eggs beaten</td>
<td>1 teaspoon salt</td>
</tr>
<tr>
<td>2 Tablespoons vanilla</td>
<td>1½ teaspoon soda</td>
</tr>
<tr>
<td>2⅛ cups flour</td>
<td>4 cups chocolate chips</td>
</tr>
</tbody>
</table>

Mix ingredients. Spoon onto cookie sheet.
Bake at 350 degrees for 9 minutes.

As shown in the recipe, various units of measure (teaspoons, tablespoons, cups) are used in making the cookies.

1. If we cut the recipe in half, how many cups of chocolate chips and how many cups of flour will be needed?

To cut the recipe in half, we may divide the quantities by 2 or multiply them by ½. We will use both methods.

\[
\frac{\text{4 cups chocolate chips}}{2} = \frac{4}{2} \text{ cups chocolate chips} = 2 \text{ cups of chocolate chips}
\]

\[
\frac{1}{2} \times (2\frac{1}{2} \text{ cups flour}) = \frac{1}{2} \times \left(\frac{5}{2} \text{ cups flour}\right) = \frac{1 \times 5}{2 \times 2} \text{ cups flour} = \frac{5}{4} \text{ cups flour} = 1\frac{1}{4} \text{ cups flour}
\]

Two cups of chocolate chips and 1 ¼ cups flour will be needed.
2. If a \( \frac{1}{2} \)-cup measure is used to measure the sugar and brown sugar for the original recipe, how many times will the \( \frac{1}{2} \)-cup measure need to be filled for each type of sugar?

Since two \( \frac{1}{2} \)-cup measures make up a whole cup, three \( \frac{1}{2} \)-cup measures are needed for the 1 \( \frac{1}{2} \) cups sugar and four \( \frac{1}{2} \)-cup measures are needed for the 2 cups of brown sugar.

3. One way to compare two different quantities is to calculate their ratio. That is, divide one quantity by the other. Calculate the ratio of sugar to brown sugar in the original recipe. Then explain what the ratio means. (Hint: You may find it helpful to use the answer from (2).)

\[
\frac{3 \ \text{\( \frac{1}{2} \)}-\text{cups of sugar}}{4 \ \text{\( \frac{1}{2} \)}-\text{cups of brown sugar}} = \frac{3}{4} \times \frac{\text{\( \frac{1}{2} \)}-\text{cups of sugar}}{\text{\( \frac{1}{2} \)}-\text{cups of brown sugar}} = \frac{3 \ \text{sugar}}{4 \ \text{brown sugar}}
\]

This means that for every 4 measures of brown sugar in the recipe, 3 measures of sugar should be added. This will be true whether cups, \( \frac{1}{2} \)-cups, tablespoons, or other type of measure is used.

4. We want to make as many cookies as possible but only have 3 cups of oatmeal available. If we plan to use all of the oatmeal, how much sugar and how much oat bran will we need?

We must determine by what proportion we are increasing the recipe. To do this, we divide the amount of oatmeal available by the amount shown in the recipe.

\[
\frac{3 \ \text{cups oatmeal}}{2 \ \text{cups oatmeal}} = \frac{3}{2} \text{ or } 1 \frac{1}{2}
\]

We need 1 \( \frac{1}{2} \) times of each ingredient. The original recipe calls for 1 \( \frac{1}{2} \) cups sugar and \( \frac{1}{2} \) -cup of oat bran.

\[
1 \frac{1}{2} \times \left( 1 \frac{1}{2} \ \text{cups sugar} \right) = \frac{3}{2} \times \left( \frac{3}{2} \ \text{cups sugar} \right) = \frac{3 \times 3}{2 \times 2} = \frac{9}{4} \ \text{cups sugar}
\]

\[
1 \frac{1}{2} \times \left( \frac{1}{2} \ \text{cup oat bran} \right) = \frac{3}{2} \times \left( \frac{1}{2} \ \text{cup oat bran} \right) = \frac{3 \times 1}{2 \times 2} = \frac{3}{4} \ \text{cup oat bran}
\]

We need 2 \( \frac{3}{4} \) cups of sugar and \( \frac{3}{4} \) cup of oat bran.
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