

Cluster 6.4: Proportionality

6.4G: Rates and Ratios: Chore Money Distribution

Focusing TEKS

6.4G Proportionality. The student applies mathematical process standards to develop an understanding of proportional relationships in problem situations. The student is expected to generate equivalent forms of fractions, decimals, and percents using real-world problems, including problems that involve money. **Readiness Standard**

Additional TEKS:

6.2E Extend representations for division to include fraction notation such as a/b represents the same number as $a \div b$ where $b \neq 0$. **Supporting Standard**

6.3E Multiply and divide positive rational numbers fluently. **Readiness Standard**

6.4E Represent ratios and percents with concrete models, fractions, and decimals. **Supporting Standard**

6.5C Use equivalent fractions, decimals, and percents to show equal parts of the same whole. **Supporting Standard**

Focusing Mathematical Process

6.1A Apply mathematics to problems arising in everyday life, society, and the workplace.

6.1B Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

6.1C Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.

▲ Performance Task

Cole receives \$20 each week from his parents for performing chores around the house. This week he plans to spend $\frac{1}{4}$ of his money to see a movie with friends, 0.4 of his money on music downloads, save $\frac{3}{10}$ of his money, and put the remaining amount of his money in the jar for giving.

Janel, Coles' older sister, receives \$30 a week for her chores. This week she spends the same amount of money that Cole spends on a movie to get a new art notebook. She also will spend $\frac{5}{8}$ of her money on a hardcover book at the school book fair and 40% of what remains she will add to the jar for giving. She will save the rest of her money. What percent of each person's allowance was used on each item purchased, for savings, and for the giving jar? Who put more money in the giving jar? What percent of their combined chore money for the week is used for giving?

Justify your reasoning.

Answer: Cole spent 25% on the movie, 40% on music, 30% for savings, and 5% for giving. Janel spent $16\frac{2}{3}\%$ on an art notebook, 62.5% on a book, 12.5% for savings, and $8\frac{1}{3}\%$ for giving. Janel adds more to the giving jar. Combined the siblings contribute 7% of the money their parents paid them to the giving jar.

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Mathematically Speaking...

In this task, students use ratios given in fraction and decimal forms to determine the amount of two siblings' chore allowances that they use for different purposes and which sibling contributed more to a giving jar. Students will determine the percent of the allowances spent on each purchase, savings, and giving contribution, and will also determine the percent of the combined allowances allocated to the giving jar.

In solving, students will use an appropriate form of the ratios for each allocation to determine the amount of the total each allocation represents and the actual amount of the money. Students can represent the ratios using fractions and decimals, but are asked to convert either form to a percent. Students can solve using models, numeric procedures, or other strategies.



This task builds upon students' understanding of ratio as a proportion of a whole and connects to multiplication and division.

Possible Solution

Represent each person's allowance and spending choices.

Cole's whole allowance is \$20. He uses $\frac{1}{4}$ for a movie, 0.4 for music, $\frac{3}{10}$ for savings, and the rest for the giving jar. First find $\frac{1}{4}$ of his allowance. Multiplying a number by a fraction is the same as dividing by the reciprocal.

$$20 \times \frac{1}{4} = 20 \div 4 = 5$$

Cole spends \$5 of his \$20 chore allowance on the movie.

Next find the amount he spends on music. He spends 0.4 of his allowance. Multiply 0.4 times \$20 to find the portion spent on music.

$$20 \times 0.4 = 8$$

Cole spends \$8 on music downloads.

Cole puts $\frac{3}{10}$ of his money away in savings. As a decimal this amount is 0.3. Multiply 0.3 times \$20 to find the amount for savings.

$$0.3 \times 20 = 6$$

Cole will save \$6 of his allowance.

Add the three items together to determine how much of the \$20 Cole has used so far.

$$\$5 + \$8 + \$6 = \$19$$

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Subtract that sum from \$20.00 to find the amount going to the giving jar. Cole puts \$1.00 into the giving jar for the week.

To find the portion of Cole's allowance used for each item, convert each item's portion of the \$20 to a percent.

For the movie Cole spent $\frac{1}{4}$ of his chore allowance. A percent is a ratio out of 100. To convert $\frac{1}{4}$ to a percent, first find the fraction equivalent to $\frac{1}{4}$ with a denominator of 100.

$$\frac{1}{4} = \frac{n}{100}$$

Because it takes 25 fours to equal 100, multiply 1 times 25 to find n , the number out of 100. The percent equivalent to $\frac{1}{4}$ is 25%. Cole spent 25% on the movie.

For the music, Cole spent 0.4 of his \$20. To convert a decimal, 0.4, to a percent, multiply times 100 since a percent is a value out of 100. $0.4 \times 100 = 40\%$. Cole spent 40% on the music downloads.

Cole saved $\frac{3}{10}$ of his \$20. To convert $\frac{3}{10}$ to a percent, either write the number in decimal form and multiply times 100, or find a fraction equivalent with a denominator of 100.

$$0.3 \times 100 = 30\%$$

Cole put 30% of his money away for savings.

To find the percent put in the giving jar, add the percent amounts used for the other items, and then subtract from 100%.

$$\begin{aligned} 100\% - (25\% + 40\% + 30\%) \\ 100\% - 95\% = 5\% \end{aligned}$$

Reasonableness



To check that 5% is correct, divide $\frac{1}{20}$ representing the ratio of giving money to the total amount of money and multiply times 100 to convert the decimal value to a percent.

$$\begin{aligned} 1 \div 20 &= 0.05 \\ 0.05 \times 100 &= 5\% \end{aligned}$$

As a percent of his allowance, Cole spends 25% on a movie, 40% on music, 30% for savings, and puts 5% (\$1.00) in the giving jar.

Janel's whole is \$30. She spends the same amount of money that Cole spends on the movie for the art notebook. She also will spend $\frac{5}{8}$ on a book and $\frac{4}{10}$ of what remains goes to the giving jar. She will save the remaining amount of money.

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Cole spent \$5 of his allowance on the movie so Janel spends \$5 on the art notebook. To find the portion of her allowance represented by the art notebook, make a ratio of the notebook's cost to the total amount of money, then convert to a percent using division and then multiply by 100.

$$\frac{5}{30} = \frac{1}{6} = 0.1\overline{66}$$

$$0.1\overline{66} \times 100 = 16.\overline{66}\%$$

$$16.\overline{66}\% = 16\frac{2}{3}\%$$

Because $0.\overline{66}$ is equivalent to $\frac{2}{3}$, Janel spends $16\frac{2}{3}\%$ of her chore allowance on the art notebook.

Janel spends $\frac{5}{8}$ of her \$30 on the book. To find the amount of the book, multiply $\frac{5}{8}$ or its equivalent times 30.

$$\frac{5}{8} = 0.625$$

$$0.625 \times 30 = 18.75$$

Janel spends \$18.75 on the hardcover book.

To find the percent of her allowance used for the book, convert the fraction $\frac{5}{8}$ to a decimal using division and then multiply times 100. $\frac{5}{8} = 0.625$ and $0.625 \times 100 = 62.5\%$. Janel uses 62.5% of her chore money for the book.

Janel will use $\frac{4}{10}$ of the remaining money for the giving jar. First find the remaining money by subtracting what Janel spent on the book and notebook from \$30.

$$\$30.00 - \$5.00 - \$18.75 = \$6.25$$

Janel will put $\frac{4}{10}$ of the remaining \$6.25 in the giving jar. To find the amount, multiply \$6.25 times the decimal equivalent of $\frac{4}{10}$ which is 0.4.

$$0.4 \times 6.25 = 2.5$$

Janel will add \$2.50 to the giving jar. To find the percent of her \$30 chore money used for giving, first make a ratio of the amount to the total amount of money. Then use division to convert the fraction to a decimal. Finally multiply times 100.

$$\frac{2.5}{30} = 0.08\overline{33}$$

$$0.08\overline{33} \times 100 = 8.\overline{33}\%$$

Because $0.\overline{33}$ is equivalent to the fraction $\frac{1}{3}$, $8.\overline{33}\% = 8\frac{1}{3}\%$. Janel puts $8\frac{1}{3}\%$ of her money into the giving jar.

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Next find the amount leftover for savings.

$$\$6.25 - \$2.50 = \$3.75$$

Janel saves \$3.75 of her money. The percent portion of her money used for savings is the difference of all the other portions combined and 100%.

$$100\% - (16\frac{2}{3}\% + 62.5\% + 8\frac{1}{3}\%)$$

$$100\% - 87.5\% = 12.5\%$$

Reasonableness



To check that 12.5% is correct, make a ratio of the amount for savings divided by the total: $\frac{3.75}{30}$

Use division to convert the number to a decimal and then multiply times 100 to convert the decimal value to a percent.

$$3.75 \div 30 = 0.125$$

$$0.125 \times 100 = 12.5\%$$

Janel puts \$2.50 into the giving jar. This is more than her brother's amount of \$1.00 so Janel puts more in the giving jar.

As a percent of her allowance, Janel spends $16\frac{2}{3}\%$ on an art notebook, 62.5% on a hardcover book, 12.5% for savings, and puts $8\frac{1}{3}\%$ into the giving jar.

Together Cole and Janel add \$1.00 + \$2.50 to the giving jar for the week for a total of \$3.50. Cole and Janel together earned \$50 performing chores (\$20 + \$30).

To find the percent of giving for their total allowance make a ratio of the amount for giving to the total. Simplify using division or find an equivalent decimal fraction.

$$\frac{3.50}{50.00} = \frac{3.50 \times 2}{50.00 \times 2} = \frac{7}{100}$$

The decimal quotient is 0.07. To convert a decimal to a percent, multiply by 100 since percent is a ratio out of 100. $0.07 \times 100 = 7\%$. As a percent of both their allowances, Cole and Janel add 7% of their money to the giving jar.

Look For...

- a solution strategy to determine the amount each person spent on purchases, savings, and giving
- a solution strategy to determine the percent of each person's allowance used for each purchase, for savings, and for giving
- a solution strategy to determine the percent of the combined allowance used for giving establishing flexibility with defining of "the whole" in a ratio
- correct percent values for each person's allocations and for the combined amount
- student justification of choices of solution strategy

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● Differentiation: Simplified Task

Cole receives \$20 each week from his parents for performing chores around the house. This week he plans to spend $\frac{1}{4}$ of his money to see a movie with friends, 0.4 of his money on music downloads, save $\frac{3}{10}$ of his money, and put the remaining amount of his money in the jar for giving.

Janel, Cole's older sister, receives \$30 a week for her chores. This week she spends the same amount of money that Cole spends on a movie to get a new art notebook. She also will spend $\frac{5}{8}$ of her money on a hardcover book at the school book fair and save 0.125 of her money. She will put the remaining amount of money in the jar for giving. What percent of each person's allowance was used on each item purchased, for savings, and for the giving jar? Who put more money in the giving jar?

Justify your reasoning.

Answer: Cole spent 25% on the movie, 40% on music, 30% for savings, and 5% for giving. Janel spent $16\frac{2}{3}\%$ on an art notebook, 62.5% on a book, 12.5% for savings, and $8\frac{1}{3}\%$ for the giving jar. Janel adds more money to the giving jar than Cole.

■ Differentiation: Enriching Task

Cole receives \$15 each week from his parents for performing chores around the house. This week he plans to spend $\frac{1}{3}$ of his money to see a movie with friends, 0.2 of the money on music downloads, save $\frac{7}{20}$ of his money, and put the remaining amount of his money in a jar for giving.

Janel, Cole's older sister, receives \$20 a week for her chores. This week she spends the same amount of money that Cole spends on the movie to get a new art notebook. She also will spend $\frac{3}{8}$ of her money on a book at the school book fair and save 0.6 of what remains of her money. She will put the remaining amount of money in the giving jar. What percent of his or her allowance was used on each item purchased and for savings and giving? Who puts more in the giving jar? What percent of each of the siblings' chore allowance was used for giving? What percent of their combined chore money for the week is used for giving?

Justify your reasoning.

Answer: Cole spends $33\frac{1}{3}\%$ on the movie, 20% on music, 35% for savings, and $11\frac{2}{3}\%$ for the giving jar. Janel spends 25% on an art notebook, 37.5% on a book, 22.5% for savings, and 15% for the giving jar. Janel puts more money in the giving jar than Cole. Combined the siblings contribute about 13.6% ($13\frac{4}{7}\%$ exactly) of the money their parents paid them to the giving jar.

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Scaffolded Task with Answers

Cole receives \$20 each week from his parents for performing chores around the house. This week he plans to spend $\frac{1}{4}$ of his money to see a movie with friends, 0.4 of his money on music downloads, save $\frac{3}{10}$ of his money, and put the remaining amount of his money in the jar for giving.

Janel, Coles' older sister, receives \$30 a week for her chores. This week she spends the same amount of money that Cole spends on a movie to get a new art notebook. She also will spend $\frac{5}{8}$ of her money on a hardcover book at the school book fair and 40% of what remains she will add to the jar for giving. She will save the rest of her money.

1. What amount of money does Cole spend on the movie with friends?
\$5
2. What percent of his total chore money does the movie cost represent?
25%
3. What amount of money does Cole spend on music downloads?
\$8
4. What percent of his total chore money do the music downloads represent?
40%
5. What amount of money does Cole put in savings?
\$6
6. What percent of his total chore money does his savings represent?
30%
7. What amount of money is left to put into the giving jar?
\$1
8. What percent of his total chore money does his giving jar amount represent?
5%
9. What amount of money does Janel spend on the art notebook?
\$5
10. What percent of Janel's total chore money does the art notebook represent?
 $16\frac{2}{3}\%$
11. What amount of money does Janel spend on the book?
\$18.75
12. What percent of Janel's total chore money does the book represent?
62.5%

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13. What amount of Janel's chore money remains after buying the notebook and the book?

What amount of this remaining money was put into the giving jar?

\$6.25 remains after buying the notebook and book; \$2.50 was put in the giving jar

14. What percent of Janel's total chore money does her giving jar amount represent?

$8\frac{1}{3}\%$

15. What amount of money does Janel put in savings?

\$3.75

16. What percent of Janel's total chore money does her savings amount represent?

12.5%

17. How much combined do the siblings put into the giving jar? How much total money did they earn in chores?

\$3.50 is the combined total in the giving jar; \$50 is the total amount earned for chores

18. What percent of the total chore money does their combined giving money represent?

7%

Performance Task: 6.4G
Rates and Ratios: Chore Money Distribution

Cole receives \$20 each week from his parents for performing chores around the house. This week he plans to spend $\frac{1}{4}$ of his money to see a movie with friends, 0.4 of his money on music downloads, save $\frac{3}{10}$ of his money, and put the remaining amount of his money in the jar for giving.

Janel, Coles' older sister, receives \$30 a week for her chores. This week she spends the same amount of money that Cole spends on a movie to get a new art notebook. She also will spend $\frac{5}{8}$ of her money on a hardcover book at the school book fair and 40% of what remains she will add to the jar for giving. She will save the rest of her money.

- What percent of each person's allowance was used on each item purchased, for savings, and for the giving jar?
- Who put more money in the giving jar?
- What percent of their combined chore money for the week is used for giving?

Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____



Performance Task: 6.4G
Rates and Ratios: Chore Money Distribution

Cole receives \$20 each week from his parents for performing chores around the house. This week he plans to spend $\frac{1}{4}$ of his money to see a movie with friends, 0.4 of the money on music downloads, save $\frac{3}{10}$ of his money, and put the remaining amount of his money in a jar for giving.

Janel, Coles' older sister, gets \$30 a week for her chores. This week she spends the same amount of money that Cole spends on the movie to get a new art notebook. She also will spend $\frac{5}{8}$ of her money on a hardcover book at the school book fair and save 0.125 of her money. The remaining amount of money will be put in the jar for giving.

- What percent of each person's allowance was used on each item purchased and for savings and giving?
- Who puts more in the giving jar?

Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____



Performance Task: 6.4G
Rates and Ratios: Chore Money Distribution

Cole receives \$15 each week from his parents for performing chores around the house. This week he plans to spend $\frac{1}{3}$ of his money to see a movie with friends, 0.2 of his money on music downloads, save $\frac{7}{20}$ of his money, and put the remaining amount of his money in the jar for giving..

Janel, Coles' older sister, gets \$20 a week for her chores. This week she spends the same amount of money that Cole spends on the movie to get a new art notebook. She also will spend $\frac{3}{8}$ of her money on a book at the school book fair and 0.6 of what remains she will add to her savings. The remaining amount of her money she puts in the giving jar.

- What percent of his or her allowance was used on each item purchased and for savings and giving?
- Who puts more in the giving jar?
- What percent of their combined chore money for the week is used for giving?

Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points:_____



Performance Task: 6.4G
Rates and Ratios: Chore Money Distribution

Cole receives \$20 each week from his parents for performing chores around the house. This week he plans to spend $\frac{1}{4}$ of his money to see a movie with friends, 0.4 of the money on music downloads, save $\frac{3}{10}$ of his money, and the remaining amount he will put in a jar for giving.

Janel, Coles' older sister, gets \$30 a week for her chores. This week she spends the same amount of money that Cole spends on the movie to get a new art notebook. She also will spend $\frac{5}{8}$ of her money on a hardcover book at the school book fair and 40% of what remains she will add to the giving jar. The remaining of money she puts in her savings.

1. What amount of money does Cole spend on the movie with friends?
2. What percent of his total chore money does the movie cost represent?
3. What amount of money does Cole spend on music downloads?
4. What percent of his total chore money do the music downloads represent?
5. What amount of money does Cole put in savings?



Name _____ Date _____

6. What percent of his total chore money does his savings represent?
7. What amount of money is left to put into the giving jar?
8. What percent of his total chore money does his giving jar amount represent?
9. What amount of money does Janel spend on the art notebook?
10. What percent of Janel's total chore money does the art notebook represent?
11. What amount of money does Janel spend on the book?
12. What percent of Janel's total chore money does the book represent?



Name _____ Date _____

13. What amount of Janel's chore money remains after buying the notebook and the book?
What amount of this remaining money was put into the giving jar?

14. What percent of Janel's total chore money does her giving jar amount represent?

15. What amount of money does Janel put in savings?

16. What percent of Janel's total chore money does her savings amount represent?

17. How much combined do the siblings put into the giving jar? How much total money did they earn in chores?

18. What percent of the total chore money does their combined giving money represent?

