Algebra 2 Workbook

Ratios and proportions

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RATIOS AND PROPORTIONS

■ 1. The class has 12 girls and 18 boys. What is the ratio of boys to the total number of students in the class?

■ 2. The ratio of boys to girls in the class is $4 : 3$. The total number of students in the class is 28. How many girls are in the class?

■ 3. The ratio of boys to girls in the class is $5 : 3$. The total number of students in the class is 32. How many boys are in the class?

■ 4. Two numbers have a ratio of 1 to 4 and a sum of 40. What are the two numbers?

■ 5. There are 11 quarters, 9 dimes, and 13 nickels. What is the ratio of dimes to the total number of coins?

■ 6. The ratio of dimes to quarters is $3 : 2$. The total value of the coins is $\$2.40$. How many quarters are there?

CHEMICAL COMPOUNDS

■ 1. Find the molar mass for one molecule of table salt in grams per mole. Table salt has the molecular formula NaCl.

Sodium (Na) has a molar mass of 22.989770 g/mol

Chlorine (Cl) has a molar mass of 35.453 g/mol

■ 2. Find the molar mass for one molecule of isopropyl chloride in grams per mole. Isopropyl chloride has the molecular formula C_3H_7Cl.

Carbon (C) has a molar mass of 12.0107 g/mol

Hydrogen (H) has a molar mass of 1.00794 g/mol

Chlorine (Cl) has a molar mass of 35.453 g/mol

■ 3. Glucose, $C_6H_{12}O_6$, has a molar mass of 180.156 g/mol. What is the mass of oxygen in a 100 g glucose sample given that the molar mass of carbon is 12.01 g/mol and the molar mass of hydrogen is 1.00794 g/mol.

■ 4. Find the total mass of a sample of silver phosphate, Ag_3PO_4, in grams per mole given that it contains 25.55 g of silver with the molar mass 107.8682 g/mol. The molar mass of Ag_3PO_4 is 418.58 g/mol.

■ 5. If vitamin C has the molecular formula $C_6H_8O_6$ and the molar mass of vitamin C is 176.12 g/mol, find the mass of each element in a 325 g vitamin C sample.

Carbon (C) has a molar mass of 12.01 g/mol

Hydrogen (H) has a molar mass of 1.00794 g/mol

Oxygen (O) has a molar mass of 15.9994 g/mol

■ 6. Find the molar mass of calcium (Ca) in one mole of calcium carbonate. $CaCO_3$ has a molar mass of 100.0869 g/mol.

Carbon (C) has a mass of 12.0107 g/mol

Oxygen (O) has a mass of 15.9994 g/mol

FRACTIONS TO DECIMALS TO PERCENTS

- 1. Convert $60\,\%$ to a fraction in lowest terms.

- 2. Convert $33.5\,\%$ to a decimal.

- 3. Convert $2/3$ to a percent.

- 4. Find $15\,\%$ of 48.

- 5. Find a mixed fraction that represents $8\,\%$ of 120.

- 6. Convert $100/160$ to a percent.

PERCENT MARKUP

■ 1. A book store purchases a book for $\$6.00$ and sells it for $\$9.00$. What percentage of the original price is the markup amount?

■ 2. A bike shop buys a used bike for $\$130$ and marks up the price by $35\,\%$. What is the markup amount?

■ 3. It costs a car manufacturer $\$12{,}800$ to produce a car. The percent markup is $48\,\%$. What is the selling price of the car.

■ 4. A bakery purchases a dozen sugar cookies for $\$2.25$. The markup percent is $60\,\%$. What is the selling price of the dozen sugar cookies?

■ 5. A store purchases dresses from a manufacturer, marks them up by $75\,\%$, and sells each dress for $\$91$. How much did the store pay the manufacturer for each dress?

■ 6. If a furniture store purchases a chair from a manufacturer, marks it up by $24\,\%$, and sells the chair for $\$84.94$. How much did the furniture store pay the manufacturer for the chair?

PERCENT MARKDOWN

■ 1. A computer has an original price of $\$375$ and is now on sale for $\$255$. What is the percent markdown?

■ 2. A sweater has an original price of $\$34$ and is now on sale for $\$25.50$. What is the percent markdown?

■ 3. The regular price of an item is $\$75$, but the item is now on clearance for $40\,\%$ off the regular price. What is the sale price of the item?

■ 4. The regular price of the latest smartphone is $\$749$. After two years, the smartphone is on sale for $25\,\%$ off. What is the sale price of the item?

■ 5. The price of a house was marked down to $\$250{,}000$, and the sale price was $12\,\%$ off of the original price. What was the original price of the house?

■ 6. The sale price of a shirt is $\$68.00$, and the shirt is on sale for $25\,\%$ off the original price. What was the original price of the shirt?

CALCULATING COMMISSION

■ 1. A makeup company advertises that we can make 15% commission on sales of their product. If we sell $\$3{,}252$ worth of product, how much money do we earn?

■ 2. An employee at a clothing store earned $\$1{,}450$ in hourly pay for the month. She also sold $\$4{,}250$ worth of merchandise and will earn a commission of 6% on those sales. What is the employee's expected paycheck before tax deductions?

■ 3. A local bakery sells croissants for $\$5.00$ each. A sales clerk makes a 6% commission on the selling price of each croissant he sells. How many croissants does he need to sell to earn $\$60$ in commission?

■ 4. A car salesman earns $\$48{,}000$ per year plus a commission of 12% on all the cars he sells. If he wants a yearly salary of $\$72{,}500$, how much money in car sales does he need to make?

■ 5. Brittany earns $\$1{,}772.10$ in commission of makeup products. If she earns 18% commission, how much money in makeup sales did she make?

6. Anthony works at a clothing store and earned $\$1{,}644.75$ last month before tax deductions. If he earns $7.5\,\%$ in commission and his hourly pay was $\$975$ for the month, how much clothing did he sell?

CALCULATING SIMPLE INTEREST

■ 1. If we deposit $\$300$ into a savings account and it earns $2\,\%$ in simple interest, how much interest will we earn on the account in 7 years?

■ 2. If we invest $\$500$ that earns $13\,\%$ in simple interest, how much interest will we earn in 12 years?

■ 3. What is the simple interest rate if we invest $\$7{,}000$ and earn $\$3{,}250$ in interest in 15 years?

■ 4. If we deposit $\$275$ into a savings account that earns $4\,\%$ simple interest, how much is in the account after 2 years?

■ 5. If we invest $\$450$ that earns $15\,\%$ simple interest, how many years will it take to have $\$1{,}800$ in the account?

■ 6. If we invest $\$1{,}230$ that earns $14\,\%$ simple interest, how much is in the account after 10 years?

COMPLEX FRACTIONS

■ 1. Simplify the expression.

$$\frac{\frac{3}{5}}{\frac{2}{7}}$$

■ 2. Simplify the expression.

$$\frac{\frac{y}{x}}{z}$$

■ 3. Simplify the expression.

$$\frac{\frac{x}{b}}{n}$$

■ 4. Simplify the expression.

$$\frac{\frac{a}{m}}{n+\frac{1}{b}}$$

■ 5. Simplify the expression.

$$\frac{\frac{1}{y}-\frac{1}{x}}{1-\frac{1}{y}}$$

6. Simplify the expression.

$$\frac{\frac{1}{a-5}-\frac{1}{a+5}}{\frac{5}{a+5}}$$

RATIOS AND PROPORTIONS WITH COMPLEX FRACTIONS

■ 1. Solve for the variable.

$$\frac{x}{\frac{1}{2}} = \frac{\frac{3}{4}}{\frac{1}{4}}$$

■ 2. Solve for the variable.

$$\frac{\frac{4}{7}}{\frac{1}{6}} = \frac{y}{\frac{7}{2}}$$

■ 3. Solve for the variable.

$$\frac{\frac{x}{2}}{\frac{8}{3}} = \frac{\frac{3}{4}}{\frac{2}{5}}$$

■ 4. Solve for the variable.

$$\frac{\frac{3}{8}}{\frac{x}{2}} = \frac{\frac{1}{4}}{\frac{4}{5}}$$

5. Solve for the variable.

$$\frac{\frac{4}{5}-\frac{1}{2}}{\frac{3}{2}}=\frac{\frac{6}{7}+\frac{1}{7}}{\frac{b}{8}}$$

6. Solve for the variable.

$$\frac{\frac{2}{3}}{\frac{1}{c}}=\frac{\frac{4}{5}}{\frac{7}{6}}$$

IMAGINARY AND COMPLEX NUMBERS

1. Simplify the imaginary expression.

$$2 - 6i - 4 + 9i$$

2. Simplify the imaginary expression.

$$-3 - 7i + 8 + 3i$$

3. Simplify the imaginary expression.

$$\sqrt{-4} + ii + 5i - 2i^3$$

4. Simplify the imaginary expression.

$$\sqrt{27} - 3ii + 2i - 7i^3 + \sqrt{-36}$$

5. Simplify the imaginary expression.

$$\sqrt{-9} + 2i^3 + 6i - \sqrt{25}\sqrt{-25} - 2\sqrt{-16}$$

6. Simplify the imaginary expression.

$$\sqrt{-4} + 2i^4 + 6i^5 - \sqrt{-49} - 2i^6$$

RATIONALIZING COMPLEX DENOMINATORS

■ 1. Use the conjugate method to simplify the imaginary expression.

$$\frac{2+6i}{3-i}$$

■ 2. Use the conjugate method to simplify the imaginary expression.

$$\frac{2-2i}{4i-1}$$

■ 3. Use the conjugate method to simplify the imaginary expression.

$$\frac{3i+2i^2}{5i^3+4i^4}$$

■ 4. Use the conjugate method to simplify the imaginary expression.

$$\frac{2i+4i^2}{6-6i}$$

■ 5. Use the conjugate method to simplify the imaginary expression.

$$\frac{\sqrt{-5}\sqrt{-5}-7i^3}{3+i}$$

6. Use the conjugate method to simplify the imaginary expression.

$$\frac{\sqrt{-2}\sqrt{-2}+3i^3}{i-4}$$

FOR THE LOVE OF MATH

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