Algebra 2 Workbook Solutions

Ratio and proportion

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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?

Solution:

We know that there are 18 boys and we're looking for the ratio

$$\frac{\text{boys}}{\text{total}}$$

We need to find the total number of students in the class by adding the number of boys and girls together.

$$12 + 18 = 30$$

Then the ratio of boys to the total number of students is

$$\frac{\text{boys}}{\text{total}} = \frac{18}{30} = \frac{6(3)}{6(5)} = \frac{3}{5}$$

There are 3 boys for every 5 students.

■ 2. The class has 15 girls and 10 boys. What is the ratio of boys to girls in the class?

Solution:

We know that there are 10 boys and 15 girls in the class, so the ratio of boys to girls is

$$\frac{\text{boys}}{\text{girls}} = \frac{10}{15} = \frac{5(2)}{5(3)} = \frac{2}{3}$$

There are 2 boys for every 3 girls.

■ 3. 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?

Solution:

We know that the ratio of boys to girls in the class is $4 : 3$. This means that there are 3 girls in each group of 7 students.

$$\frac{\text{girls in group}}{\text{total in group}} = \frac{3}{7}$$

This needs to be proportional to the total number of girls in the class.

$$\frac{\text{girls in group}}{\text{total in group}} = \frac{\text{total girls in class}}{\text{total in class}}$$

Let g be the total number of girls in the class. Then the number of girls in the class is

$$\frac{3}{7} = \frac{g}{28}$$

$$7g = 84$$

$$\frac{7g}{7} = \frac{84}{7}$$

$$g = 12$$

There are 12 girls in the class.

■ 4. 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?

Solution:

We know that the ratio of boys to girls in the class is $5 : 3$. This means that there are 5 boys in each group of 8 students.

$$\frac{\text{boys in group}}{\text{total in group}} = \frac{5}{8}$$

This needs to be proportional to the total number of boys in the class.

$$\frac{\text{boys in group}}{\text{total in group}} = \frac{\text{total boys in class}}{\text{total in class}}$$

Let b be the total number of boys in the class. Then the number of boys in the class is

$$\frac{5}{8} = \frac{b}{32}$$

$$8b = 160$$

$$\frac{8b}{8} = \frac{160}{8}$$

$$b = 20$$

There are 20 boys in the class.

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

Solution:

Let's call the two numbers x and y and set up a ratio.

$$\frac{x}{y} = \frac{1}{4}$$

Solve for a variable by cross multiplying.

$$4x = 1y$$

$$y = 4x$$

Set up an equation for the sum of the two numbers.

$$x + y = 40$$

Use substitution and plug $4x$ in for y.

$$x + y = 40$$

$$x + 4x = 40$$

$$5x = 40$$

$$\frac{5x}{5} = \frac{40}{5}$$

$$x = 8$$

Now use $y = 4x$ to solve for y by plugging 8 in for x.

$$y = 4x$$

$$y = 4(8)$$

$$y = 32$$

The two numbers are 8 and 32.

■ 6. Two numbers have a ratio of 4 to 7 and a sum of 99. What are the two numbers?

Solution:

Let's call the two numbers x and y and set up a ratio.

$$\frac{x}{y}=\frac{4}{7}$$

Solve for a variable by cross multiplying.

$$7x=4y$$

$$x=\frac{4}{7}y$$

Set up an equation for the sum of the two numbers.

$$x+y=99$$

Use substitution and plug $(4/7)y$ in for x.

$$x+y=99$$

$$\frac{4}{7}y+y=99$$

$$\frac{4}{7}y+\frac{7}{7}y=99$$

$$\frac{11}{7}y=99$$

$$\frac{7}{11}\cdot\frac{11}{7}y=99\cdot\frac{7}{11}$$

$$y=9\cdot 7$$

$$y=63$$

Now use $x=(4/7)y$ to solve for x by plugging 63 in for y.

$$x = \frac{4}{7}y$$

$$x = \frac{4}{7}(63)$$

$$x = 4(9)$$

$$x = 36$$

The two numbers are 36 and 63.

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

Solution:

We know that there are 9 dimes and we're looking for the ratio

$$\frac{\text{dimes}}{\text{total}}$$

We need to find the total number of coins by adding all the groups together.

$$11 + 9 + 13 = 33$$

Then the ratio of dimes to total coins is

$$\frac{\text{dimes}}{\text{total}} = \frac{9}{33}$$

Now we need to reduce the ratio.

$$\frac{3(3)}{3(11)}$$

$$\frac{3}{11}$$

There are 3 dimes for every 11 coins.

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

Solution:

Let d be the number of dimes and q be the number of quarters. Set up the ratio of dimes to quarters.

$$\frac{d}{q} = \frac{3}{2}$$

Solve for a variable by cross multiplying.

$$3q = 2d$$

$$q = \frac{2}{3}d$$

Set up an equation for the total value of the coins.

$$0.1d + 0.25q = 2.40$$

Clear out the decimals by multiplying through by 100.

$$(100)0.1d + (100)0.25q = (100)2.40$$

$$10d + 25q = 240$$

Use substitution and plug $(2/3)d$ in for q.

$$10d + 25q = 240$$

$$10d + 25\left(\frac{2}{3}d\right) = 240$$

Solve for d by simplifying and combining like terms.

$$10d + \frac{50}{3}d = 240$$

$$\frac{30}{3}d + \frac{50}{3}d = 240$$

$$\frac{80}{3}d = 240$$

$$\frac{3}{80} \cdot \frac{80}{3}d = 240 \cdot \frac{3}{80}$$

$$d = 3 \cdot 3$$

$$d = 9$$

Now use $q = (2/3)d$ to solve for q by plugging 9 in for d.

$$q = \frac{2}{3}d$$

$$q = \frac{2}{3}(9)$$

$$q = 2(3)$$

$$q = 6$$

There are 6 quarters.

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 mass of 22.989770 g/mol

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

Solution:

A molecule of table salt has one sodium atom and one chlorine atom. To find the molar mass of table salt, add the mass of sodium and chlorine together.

$$22.989770 + 35.453 = 58.44277$$

The molecular mass of one molecule of table salt is 58.44277 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 mass of 12.0107 g/mol

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

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

Solution:

A molecule of isopropyl chloride has 3 carbon, 7 hydrogen, and 1 chlorine atom. To find the molar mass of isopropyl chloride, multiply each of the atoms by their molar mass.

Carbon: $12.0107(3) = 36.0321$

Hydrogen: $1.00794(7) = 7.05558$

Chlorine: $35.453(1) = 35.453$

Then add these together.

$$36.0321 + 7.05558 + 35.453 = 78.54068$$

The molecular mass of one molecule of isopropyl chloride is 78.54068 g/mol.

■ 3. Find the molar mass for one molecule of glucose in grams per mole. Glucose has the molecular formula $C_6H_{12}O_6$.

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

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

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

Solution:

A molecule of glucose has 6 carbon, 12 hydrogen, and 6 oxygen atoms. To find the molar mass of glucose, multiply each of the atoms by their molar mass.

Carbon: $12.0107(6) = 72.0642$

Hydrogen: $1.00794(12) = 12.09528$

Oxygen: $15.9994(6) = 95.9964$

Then add these together.

$$72.0642 + 12.09528 + 95.9964 = 180.15588$$

The molecular mass of one molecule of glucose is 180.15588 g/mol.

■ 4. Find the molar mass for one molecule of silver phosphate in grams per mole. Silver phosphate has the molecular formula Ag_3PO_4.

Silver (Ag) has a mass of 107.8682 g/mol

Phosphorus (P) has a mass of 30.973761 g/mol

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

Solution:

A molecule of silver phosphate has 3 silver, 1 phosphorus, and 4 oxygen atoms. To find the molar mass of silver phosphate, multiply each of the atoms by their molar mass.

Silver: $107.8682(3) = 323.6046$

Phosphorus: $30.973761(1) = 30.973761$

Oxygen: $15.9994(4) = 63.9976$

Then add these together.

$$323.6046 + 30.973761 + 63.9976 = 418.575961$$

The molecular mass of one molecule of silver phosphate is 418.575961 g/mol.

■ 5. Find the molar mass for one molecule of vitamin C (ascorbic acid) in grams per mole. Vitamin C has the molecular formula $C_6H_8O_6$.

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

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

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

Solution:

A molecule of vitamin C has 6 carbon, 8 hydrogen, and 6 oxygen atoms. To find the molar mass of vitamin C, multiply each of the atoms by their molar mass.

Carbon: $12.0107(6) = 72.0642$

Hydrogen: $1.00794(8) = 8.06352$

Oxygen: $15.9994(6) = 95.9964$

Then add these together.

$$72.0642 + 8.06352 + 95.9964 = 176.12412$$

The molecular mass of one molecule of vitamin C is 176.12412 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

Solution:

Let's set up what we know and what we don't know.

Calcium: x g/mol

Carbon: $12.0107(1) = 12.0107$ g/mol

Oxygen: $15.9994(3) = 47.9982$ g/mol

$CaCO_3$: 100.0869 g/mol

Set up an equation to solve for the molar mass of calcium in calcium carbonate.

$$x + 12.0107 + 47.9982 = 100.0869$$

$$x + 60.0089 = 100.0869$$

$$x = 40.078$$

The molecular mass of calcium in calcium carbonate is 40.078 g/mol.

■ 7. Find the molar mass of one atom of chlorine (Cl) in one mole of magnesium chloride. $MgCl_2$ has a molar mass of 95.211 g/mol.

Magnesium (Mg) has a mass of 24.3050 g/mol

Solution:

Let's set up what we know and what we don't know.

Magnesium: 24.3050 g/mol

Chlorine: $x(2) = 2x$ g/mol

$MgCl_2$: 95.211 g/mol

Set up an equation to solve for the molar mass of one atom of chlorine in magnesium chloride.

$$2x + 24.3050 = 95.211$$

$$2x = 70.906$$

$$x = 35.453$$

The molecular mass of one atom of chlorine is 35.453 g/mol.

■ 8. Find the molar mass of bromine (Br) in one mole of potassium bromide (KBr), if KBr has a molar mass of 119.0023 g/mol, and potassium (K) has a mass of 39.0983 g/mol.

Solution:

Let's set up what we know and what we don't know.

Potassium: 39.0983 g/mol

Bromine: x g/mol

KBr: 119.0023 g/mol

Set up an equation to solve for the molar mass of bromine in potassium bromide.

$$x + 39.0983 = 119.0023$$

$$x = 79.904$$

The molar mass of bromine in potassium bromide is 79.904 g/mol.

■ 9. Find the total molar mass of iron (Fe) in one mole of ferric oxide.

Fe_2O_3 has a molar mass of 159.6882 g/mol.

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

Solution:

Even though there are two iron atoms in ferric oxide, we were asked to find the total molar mass of iron in one mole of ferric oxide so we'll use x to represent the total molar mass of iron in one mole of ferric oxide. Let's set up what we know and what we don't know.

Iron: x g/mol

Oxygen: $15.9994(3) = 47.9982$ g/mol

Fe_2O_3: 159.6882 g/mol

Set up an equation to solve for the total molar mass of iron in ferric oxide.

$$x + 47.9982 = 159.6882$$

$$x = 111.69$$

The total molecular mass of iron in one mole of ferric oxide is 111.69 g/mol.

■ 10. Find the molar mass of one atom of nitrogen (N) in one mole of caffeine ($C_8H_{10}N_4O_2$). $C_8H_{10}N_4O_2$ has a molar mass of 194.1906 g/mol.

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

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

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

Solution:

Let's set up what we know and what we don't know:

Carbon: $12.0107(8) = 96.0856$ g/mol

Hydrogen: $1.00794(10) = 10.0794$ g/mol

Nitrogen: $x(4) = 4x$ g/mol

Oxygen: $15.9994(2) = 31.9988$ g/mol

$C_8H_{10}N_4O_2$: 194.1906 g/mol

Set up an equation to solve for the molar mass of one atom of nitrogen in caffeine.

$$4x + 96.0856 + 10.0794 + 31.9988 = 194.1906$$

$$4x + 138.1638 = 194.1906$$

$$4x = 56.0268$$

$$x = 14.0067$$

The total molecular mass of one atom of nitrogen is 14.0067 g/mol.

CONVERTING BETWEEN FRACTIONS, DECIMALS, AND PERCENTS

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

Solution:

A percent can be expressed as part of 100.

$$\frac{60}{100}$$

Reduce the fraction to lowest terms.

$$\frac{6(10)}{10(10)} = \frac{6}{10} = \frac{3(2)}{5(2)} = \frac{3}{5}$$

■ 2. Convert 1.42 to a percent.

Solution:

To change a decimal to a percent, multiply it by 100.

$$1.42(100)$$

$$142\,\%$$

■ 3. Convert $33.5\,\%$ to a decimal.

Solution:

To change a percent to a decimal, divide it by 100.

$$\frac{33.5}{100}$$

$$0.335$$

■ 4. Convert $2/3$ to a percent.

Solution:

To change a fraction to a percent, first change the fraction to a decimal, then multiply the decimal by 100.

$$\frac{2}{3}$$

$$0.6667$$

$$0.6667(100)$$

$$66.67\,\%$$

■ 5. Find $15\,\%$ of 48.

Solution:

To find a percent of a number, first change the percent to a decimal by dividing it by 100.

$$\frac{15}{100}$$

$$0.15$$

Multiply the decimal by 48.

$$0.15(48)$$

$$7.2$$

■ 6. Find a mixed fraction that represents $8\,\%$ of 120.

Solution:

Divide 8 by 100 and multiply it by 120.

$$\frac{8}{100} \cdot 120$$

$$\frac{2}{25} \cdot 120$$

$$\frac{240}{25}$$

$$\frac{48}{5}$$

5 goes into 48 nine times with a remainder of 3, so the mixed number is

$$9\frac{3}{5}$$

■ 7. Convert $100/160$ to a percent.

Solution:

Reduce the fraction to lowest terms.

$$\frac{10(10)}{16(10)} = \frac{10}{16} = \frac{5(2)}{8(2)} = \frac{5}{8}$$

Set up a proportion to find the percent.

$$\frac{5}{8} = \frac{x}{100}$$

$$8x = 500$$

$$x = \frac{500}{8}$$

$$x = 62.5\,\%$$

■ 8. Convert the fraction $20/60$ to a percent.

Solution:

Reduce the fraction to lowest terms.

$$\frac{2(10)}{6(10)} = \frac{2}{6} = \frac{1(2)}{3(2)} = \frac{1}{3}$$

Set up a proportion to find the percent.

$$\frac{1}{3} = \frac{x}{100}$$

$$3x = 100$$

$$x = \frac{100}{3}$$

$$x = 33.33\,\%$$

PERCENT MARKUP

■ 1. A computer store purchases a laptop for $500. The markup amount is $150. What is the selling price?

Solution:

The selling price is the original price, plus the markup amount.

$$500 + 150$$

$$650$$

The computer store sells the laptop for $650.

■ 2. 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?

Solution:

First find the markup amount by subtracting the original price from the selling price.

$$9.00 - 6.00$$

$$3.00$$

Let x represent the percentage of the original price.

$$6.00x = 3.00$$

$$x = \frac{3}{6}$$

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

$$x = 0.5$$

$$x = 50\,\%$$

The book store marks up the book by $50\,\%$.

■ 3. A cellphone store purchases a used smartphone for $\$45$ and sells it for $\$121.50$. What percentage of the original price is the markup amount?

Solution:

First find the markup amount by subtracting the original price from the selling price.

$$121.50 - 45$$

$$76.50$$

Let x represent the percentage of the original price.

$$45x = 76.50$$

$$\frac{45x}{45} = \frac{76.50}{45}$$

$$x = 1.7$$

$$x = 170\,\%$$

The cellphone store marks up the smartphone by $170\,\%$.

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

Solution:

Find the markup amount by multiplying the original price by the percentage, divided by 100.

$$130\left(\frac{35}{100}\right)$$

$$130(0.35)$$

$$45.50$$

The bike shop marks up the bike by $\$45.50$.

■ 5. A furniture store buys a table for $\$84$ and marks up the price by $18\,\%$. What is the markup amount?

Solution:

Find the markup amount by multiplying the original price by the percentage, divided by 100.

$$84\left(\frac{18}{100}\right)$$

$$84(0.18)$$

$$15.12$$

The bike shop marks up the bike by $\$15.12$.

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

Solution:

The selling price of the car is

$$12{,}800\left(1+\frac{48}{100}\right)$$

$$12{,}800(1+0.48)$$

$$12{,}800(1.48)$$

$$18{,}944$$

The car manufacturer sells the car for $\$18{,}944$.

■ 7. 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?

Solution:

The selling price of the cookies is

$$2.25\left(1+\frac{60}{100}\right)$$

$$2.25(1+0.60)$$

$$2.25(1.60)$$

$$3.60$$

The bakery sells the dozen sugar cookies for $\$3.60$.

■ 8. 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?

Solution:

If the store paid x dollars for each dress and marked it up by $75\,\%$, then the price they're selling it for is 1.75 times the price they paid for each dress.

$$1.75x = 91$$

$$\frac{1.75x}{1.75} = \frac{91}{1.75}$$

$$x = 52$$

The store buys each dress from the manufacturer for $\$52$.

■ 9. 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?

Solution:

If the furniture store paid x dollars for the chair and marked it up by $24\,\%$, then the price they're selling it for is 1.24 times the price they paid for it.

$$1.24x = 84.94$$

$$\frac{1.24x}{1.24} = \frac{84.94}{1.24}$$

$$x = 68.50$$

The store buys the chair from the manufacturer for $\$68.50$.

■ 10. A store purchases a painting from an artist, marks it up by $12\,\%$, and sells the painting for $\$119.84$. How much did the store pay the artist for the painting?

Solution:

If the store paid x dollars for the painting and marked it up by $12\,\%$, then the price they're selling it for is 1.12 times the price they paid for it.

$$1.12x = 119.84$$

$$\frac{1.12x}{1.12} = \frac{119.84}{1.12}$$

$$x = 107$$

The store buys the painting from the artist for $\$107$.

PERCENT MARKDOWN

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

Solution:

Find the difference between the sale price and the original price.

$$\$375 - \$255 = \$120$$

Set up a ratio and plug in the values we've found.

$$\frac{\text{Discount Amouont}}{\text{Original Price}} = \frac{\text{Percent Markdown}}{100}$$

$$\frac{120}{375} = \frac{x}{100}$$

Solve for percent markdown.

$$\frac{8(15)}{25(15)} = \frac{x}{100}$$

$$\frac{8}{25} = \frac{x}{100}$$

$$25x = 800$$

$$\frac{25x}{25} = \frac{800}{25}$$

$$x = 32$$

The percent markdown is $32\,\%$.

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

Solution:

Find the difference between the sale price and the original price.

$$\$34 - \$25.50 = \$8.5$$

Set up a ratio and plug in the values we've found.

$$\frac{\text{Discount Amouont}}{\text{Original Price}} = \frac{\text{Percent Markdown}}{100}$$

$$\frac{8.5}{34} = \frac{x}{100}$$

Solve for percent markdown.

$$34x = 850$$

$$\frac{34x}{34} = \frac{850}{34}$$

$$x = 25$$

The percent markdown is $25\,\%$.

■ 3. A toy train set has an original price of $\$52$ and is now on sale for $\$44.20$. What is the percent markdown?

Solution:

Find the difference between the sale price and the original price.

$$\$52 - \$44.20 = \$7.8$$

Set up a ratio and plug in the values we've found.

$$\frac{\text{Discount Amouont}}{\text{Original Price}} = \frac{\text{Percent Markdown}}{100}$$

$$\frac{7.8}{52} = \frac{x}{100}$$

Solve for percent markdown.

$$52x = 780$$

$$\frac{52x}{52} = \frac{780}{52}$$

$$x = 15$$

The percent markdown is $15\,\%$.

■ 4. A sofa has an original price of $649 and is now on sale for $584.10. What is the percent markdown?

Solution:

Find the difference between the sale price and the original price.

$$\$649 - \$584.10 = \$64.9$$

Set up a ratio and plug in the values we've found.

$$\frac{\text{Discount Amouont}}{\text{Original Price}} = \frac{\text{Percent Markdown}}{100}$$

$$\frac{64.9}{649} = \frac{x}{100}$$

Solve for percent markdown.

$$649x = 6{,}490$$

$$\frac{649x}{649} = \frac{6{,}490}{649}$$

$$x = 10$$

The percent markdown is $10\,\%$.

■ 5. A bike has an original price of $100 and is now on sale for $65. What is the percent markdown?

Solution:

Find the difference between the sale price and the original price.

$$\$100 - \$65 = \$35$$

Set up a ratio and plug in the values we've found.

$$\frac{\text{Discount Amouont}}{\text{Original Price}} = \frac{\text{Percent Markdown}}{100}$$

$$\frac{35}{100} = \frac{x}{100}$$

Solve for percent markdown.

$$100x = 3{,}500$$

$$\frac{100x}{100} = \frac{3{,}500}{100}$$

$$x = 35$$

The percent markdown is $35\,\%$.

■ 6. 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?

Solution:

Find $40\,\%$ of $\$75$ by multiplying 75 by 0.4.

$$75 \cdot 0.4 = 30$$

The price is marked down by $\$30$, so subtract $\$30$ from the regular price of the item, $\$75$.

$$\$75 - \$30 = \$45$$

The sale price of the item is $\$45$.

■ 7. 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?

Solution:

Find $25\,\%$ of $\$749$ by multiplying 749 by 0.25.

$$749 \cdot 0.25 = 187.25$$

The price is marked down $\$187.25$. Subtract $\$187.25$ from the regular price of the smartphone, $\$749$.

$$\$749 - \$187.25 = \$561.75$$

The sale price of the smartphone is $\$561.75$.

■ 8. The regular price of a dress is $\$125$. The dress is on clearance for $80\,\%$ off. What is the sale price of the item?

Solution:

Find $80\,\%$ of $\$125$ by multiplying 125 by 0.8.

$$125 \cdot 0.8 = 100$$

The price is marked down $\$100$, so subtract $\$100$ from the regular price of the dress, $\$125$.

$$\$125 - \$100 = \$25$$

The sale price of the dress is $\$25$.

■ 9. The regular price of a doll is $\$42$. The doll goes on sale for $15\,\%$ off. What is the sale price of the item?

Solution:

Find $15\,\%$ of $\$42$ by multiplying 42 by 0.15.

$$42 \cdot 0.15 = 6.30$$

The price is marked down by $\$6.30$. Subtract $\$6.30$ from the regular price of the doll, $\$42$.

$$\$42 - \$6.30 = \$35.70$$

The sale price of the doll is $\$35.70$.

■ 10. The regular price of a rocking chair is $\$134$. The chair goes on sale for $60\,\%$ off. What is the sale price of the item?

Solution:

Find $60\,\%$ of $\$134$ by multiplying 134 by 0.60.

$$134 \cdot 0.60 = 80.40$$

The price is marked down by $\$80.40$. Subtract $\$80.40$ from the regular price of the chair, $\$134$.

$$\$134 - \$80.40 = \$53.60$$

The sale price of the rocking chair is $\$53.60$.

CALCULATING COMMISSION

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

Solution:

Find the commission by multiplying the sales by the commission percentage.

$$\$3{,}252 \cdot 0.15 = \$487.80$$

You earned $\$487.80$ in commission by selling $\$3{,}252$ worth of product.

■ 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?

Solution:

Find the commission by multiplying the sales by the commission percentage.

$$\$4{,}250 \cdot 0.06 = \$255$$

Now add $\$255$ to the hourly pay to find the total amount.

$$\$1{,}450 + 255 = \$1{,}705$$

The employee should expect $\$1{,}705$ on her paycheck.

■ 3. An employee at a furniture store earned $\$1{,}800$ in hourly pay for the month. She also sold $\$12{,}000$ worth of merchandise and will earn a commission of $8\,\%$ on those sales. What is the employee's expected paycheck before tax deductions?

Solution:

Find the commission by multiplying the sales by the commission percentage.

$$\$12{,}000 \cdot 0.08 = \$960$$

Now add $\$960$ to the hourly pay to find the total amount.

$$\$1{,}800 + 960 = \$2{,}760$$

The employee should expect $\$2{,}760$ on her paycheck.

■ 4. A car salesman makes a 9% commission on the selling price of any car he sells. If he sells a car for $\$17{,}599$, how much does he earn in commission?

Solution:

Find the commission by multiplying the sales by the commission percentage.

$$\$17{,}599 \cdot 0.09 = \$1{,}583.91$$

The car salesman earns $\$1{,}583.91$ in commission on the sale of the car.

■ 5. 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?

Solution:

Subtract his salary from the amount he wants to earn for the year.

$$\$72{,}500 - \$48{,}000 = \$24{,}500$$

Let x be the amount of car sales.

$$0.12x = \$24{,}500$$

$$\frac{0.12x}{0.12} = \frac{\$24{,}500}{0.12}$$

$$x = \$204{,}166.67$$

To earn a salary of $\$72{,}500$, the car salesman needs to sell $\$204{,}166.67$ worth of cars.

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

Solution:

Let x be the amount of makeup sales.

$$0.18x = \$1{,}772.10$$

$$\frac{0.18x}{0.18} = \frac{\$1{,}772.10}{0.18}$$

$$x = \$9{,}845$$

Brittany sold $\$9{,}845$ worth of makeup products to earn $\$1{,}772.10$ in commission.

■ 7. 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?

Solution:

Subtract the hourly pay from the total paycheck for the month.

$$\$1644.75 - \$975 = \$669.75$$

Let x be the amount of clothing sales.

$$0.075x = \$669.75$$

$$\frac{0.075x}{0.075} = \frac{\$669.75}{0.075}$$

$$x = \$8{,}930$$

Anthony sold $\$8{,}930$ worth of clothes.

■ 8. An employee at a furniture store earned $\$2{,}299.90$ last month before tax deductions. If she earns $11\,\%$ in commission and her hourly pay was $\$1{,}245$ for the month, how much money in furniture sales did she make?

Solution:

Subtract the hourly pay from the total paycheck for the month.

$$\$2{,}299.90 - \$1{,}245 = \$1{,}054.90$$

Let x be the amount of furniture sales.

$$0.11x = \$1{,}054.90$$

$$\frac{0.11x}{0.11} = \frac{\$1{,}054.90}{0.11}$$

$$x = \$9{,}590$$

The employee sold $\$9{,}590$ worth of furniture.

CALCULATING SIMPLE INTEREST

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

Solution:

We know the values of P, r, and t.

$$P = 300$$

$$r = \frac{2}{100} = 0.02$$

$t = 7$ years

Plug into the formula for simple interest.

$$I = Prt$$

$$I = 300(0.02)(7)$$

$$I = 42$$

In 7 years, you'll earn $\$42$ in interest.

■ 2. If you deposit $\$150$ into a savings account and it earns $9\,\%$ in simple interest, how much interest will you earn on the account in 5 years?

Solution:

We know the values of P, r, and t.

$$P = 150$$

$$r = \frac{9}{100} = 0.09$$

$$t = 5 \text{ years}$$

Plug into the formula for simple interest.

$$I = Prt$$

$$I = 150(0.09)(5)$$

$$I = 67.50$$

In 5 years, you'll earn $\$67.50$ in interest.

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

Solution:

We know the values of P, r, and t.

$$P = 500$$

$$r = \frac{13}{100} = 0.13$$

$$t = 12 \text{ years}$$

Plug into the formula for simple interest.

$$I = Prt$$

$$I = 500(0.13)(12)$$

$$I = 780$$

In 12 years, you'll earn $\$780$ in interest.

■ 4. If you invest $\$7{,}000$ that earns $21\,\%$ in simple interest, how much interest will you earn in 35 years?

Solution:

We know the values of P, r, and t.

$$P = 7000$$

$$r = \frac{21}{100} = 0.21$$

$$t = 35 \text{ years}$$

Plug into the formula for simple interest.

$$I = Prt$$

$$I = 7000(0.21)(35)$$

$$I = 51{,}450$$

In 35 years, you'll earn $\$51{,}450$ in interest.

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

Solution:

We know the values of P, r, and t.

$$P = 275$$

$$r = \frac{4}{100} = 0.04$$

$t = 2$ years

Plug into the formula for the total amount.

$$A = P(1 + rt)$$

$$A = 275(1 + 0.04 \cdot 2)$$

$$A = 297$$

In 2 years, you'll have $\$297$ in the account.

■ 6. If you deposit $\$50$ into a savings account that earns $8\,\%$ simple interest, how much is in the account after 22 years?

Solution:

We know the values of P, r, and t.

$$P = 50$$

$$r = \frac{8}{100} = 0.08$$

$$t = 22 \text{ years}$$

Plug into the formula for the total amount.

$$A = P(1 + rt)$$

$$A = 50(1 + 0.08 \cdot 22)$$

$$A = 138$$

In 22 years, you'll have $\$138$ in the account.

■ 7. If you invest $\$430$ that earns $17\,\%$ simple interest, how much is in the account after 6 years?

Solution:

We know the values of P, r, and t.

$$P = 430$$

$$r = \frac{17}{100} = 0.17$$

$$t = 6 \text{ years}$$

Plug into the formula for the total amount.

$$A = P(1 + rt)$$

$$A = 430(1 + 0.17 \cdot 6)$$

$$A = 868.60$$

In 6 years, you'll have $\$868.60$ in the account.

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

Solution:

We know the values of P, r, and t.

$$P = 1{,}230$$

$$r = \frac{14}{100} = 0.14$$

$$t = 10 \text{ years}$$

Plug into the formula for the total amount.

$$A = P(1 + rt)$$

$$A = 1{,}230(1 + 0.14 \cdot 10)$$

$$A = 2{,}952$$

In 6 years, you'll have $\$2{,}952$ in the account.

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