

# Unit

# 4

## Ratios and percentages

**In this unit, you will learn how to**

- Determine the ratio between two quantities
- Calculate the ratio value
- Use different notations to express ratios
- Solve problems involving percentage calculations

## 1.1 Comparison between quantities: number of times

### Understanding

A number of times is also a comparison between quantities through the quotient between them; it can be a natural number, a decimal number, or a fraction.

The number of times one quantity is calculated over another:

$$\text{Number of times} = \text{Quantity to compare} \div \text{Base quantity}$$

### Solve

1. Mary calculated that with 10 liters of milk, she could make 3.25 pounds of capita cheese. Also, with 10 liters of milk, she could make 3 pounds of fresh cheese. How many times is the number of pounds of capita cheese made with 10 liters of milk compared to the number of pounds of fresh cheese?

PS: \_\_\_\_\_

A: \_\_\_\_\_



2. Charles bought a blender that cost him \$40 and resold it for \$45. How many times is the original price of the blender relative to the resale price?



PS: \_\_\_\_\_

A: \_\_\_\_\_

3. A grocery store sells 3 liters of pineapple juice and 9 liters of orange juice. How many times is the amount of orange juice compared to that of pineapple juice?

PS: \_\_\_\_\_

A: \_\_\_\_\_

\_\_\_\_\_



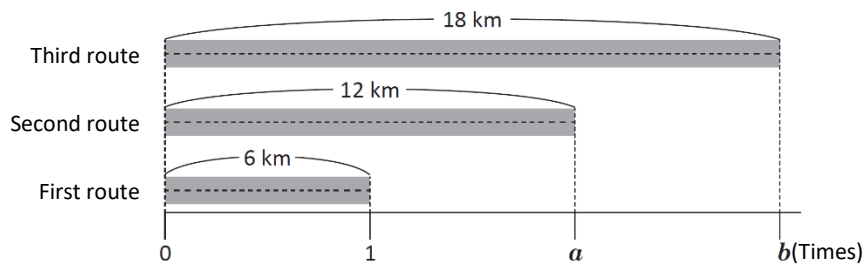
### ★ Self-challenge

John's height is 1.08 times that of Anna, while Charles's height is 1.05 times that of John. How many times is Charles's height compared to Anna's? Justify your answer.

## 1.2 Calculating the quantity to compare

### Remember

In a race, there are three routes; the first 6 km, the second 12 km, and the last 18 km.



a. How many times is the second route compared to the first?

PS: \_\_\_\_\_

A: \_\_\_\_\_

b. How many times is the third route compared to the first?

PS: \_\_\_\_\_

A: \_\_\_\_\_

### Understanding

When the base quantity and the number of times are known, then the quantity to compare is calculated as follows: **Quantity to compare = Base quantity × Number of times**

### Solve

1. An incandescent light bulb has a power of 60 W, while a low-power bulb has 0.2 times that of the incandescent bulb. What is the power of the low-power light bulb?



PS: \_\_\_\_\_

A: \_\_\_\_\_

2. Michael and Joseph work at the same company; Joseph lives 2 km from it. Michael's distance from the company is 5.5 times the distance Joseph lives. How many miles does Michael live from the company?

PS: \_\_\_\_\_

A: \_\_\_\_\_

Relative's signature: \_\_\_\_\_

## 1.3 Calculating the base quantity

### Remember

1. To attend school, Anthony walks 6 km, while Carmen walks 2 km. How many times is Anthony's distance from Carmen's?

PS: \_\_\_\_\_

A: \_\_\_\_\_

2. A farmer plants rice on 5 hectares of his land. If the area that he allocates to plant beans is 1.2 times the area to grow rice, how many hectares does the part where he sows beans have?

PS: \_\_\_\_\_

A: \_\_\_\_\_



### Understanding

When the quantity to be compared and the number of times is known, then the base quantity calculated:

$$\text{Base quantity} = \text{Quantity to compare} \div \text{Number of times}$$

For example, if Carmen traveled 9 km and this is 1.5 times what Anthony traveled then, the 9 km traveled by Carmen correspond to the quantity to compare, and the number of times is 1.5. Thus, what Anthony travels is the base quantity and can be calculated by performing:

$$9 \div 1.5 = 6$$

Therefore, Anthony traveled 6 km.

### Solve

1. In a municipality, the total amount of garbage is 1.8 times the amount of recyclable material. If 9 tonnes of waste is produced, how many tonnes of recyclable material is obtained?

PS: \_\_\_\_\_

A: \_\_\_\_\_



2. One property has a reforestation area. If the reforested zone measures 10 ha; and represents 0.7 times the total size of the land, how many hectares does the land have?



PS: \_\_\_\_\_

A: \_\_\_\_\_

## 1.4 Ratio and ratio value

### Remember

1. The length of a wooden rod is 4 m. If the size of a steel rod is 1.25 times the wooden rod, how much does the steel rod measure?

PS: \_\_\_\_\_

A: \_\_\_\_\_

2. The elevation (above sea level) of the Izalco volcano is approximately 1.6 times that of the Conchagua volcano. If the Izalco volcano is 1,950 m above sea level, what is the elevation of the Conchagua volcano?

PS: \_\_\_\_\_

A: \_\_\_\_\_



### Understanding

In general, the comparison between two quantities using the quotient between them is called **ratio**. If the values are  $a$  and  $b$ , **the ratio of  $a$  and  $b$**  is represented as  $a:b$ .

The number resulting from calculating the quotient  $a \div b$  is called **ratio value**; it can be a natural number, a decimal number, or a fraction (if written as  $\frac{a}{b}$ ).

When quantities being compared have the same unit, the value of the ratio indicates the number of times it is relative to the other.

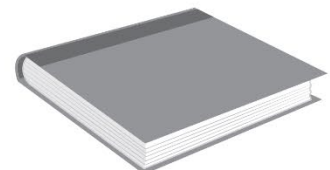


### Solve

1. Mario bought 2 liters of milk and Beatrice bought 3 liters. Write the ratio between the number of liters of milk purchased by Mario and those purchased by Beatrice, calculate the ratio value. How do you interpret this result using the number of times?



2. Charles read 26 pages of a book, while Martha read 20 pages of the same book. Write the ratio between the number of pages read by Charles and those read by Martha, and calculate the ratio value. What interpretation does this result have using the number of times?



## 1.5 Ratio between heterogeneous quantities

### Remember

1. The length of a rectangle is 0.45 times the width. If the width measures 18 cm, how much does the length measure?

PS: \_\_\_\_\_

A: \_\_\_\_\_



2. In one hour, machine A made 12 keys, and machine B made 10. Write the ratio between the keys produced by machine A and machine B. Calculate the ratio value. Interpret this result using the number of times. .



### Understanding

The quantities compared in a ratio can also be in different units of measure. When the quantity units for  $a$  and  $b$  are different, the ratio value  $a : b$  indicates the number of units available for  $a$  and  $b$ . It means how many elements there are for each unit of  $a$  and  $b$  (quantity per unit).

For example, if Michael traveled 33 m in 6 seconds, the ratio between the meters traveled and his time is 33 : 6. While the ratio value is  $33 \div 6 = 5.5$ , this indicates that Michael traveled 5.5 meters for every second.

### Solve

1. An adult person performs 200 push-ups in 5 minutes.
  - a. Enter the ratio between the number of push-ups and the time in minutes, and calculate the ratio value.
  - b. How is the result for the statement  $a$  interpret?
2. For a Science experiment, Anna dissolves 15 g of baking soda in 500 ml of water.
  - a. Write the ratio between the number of grams of baking soda and the number of milliliters of water used by Anna, and calculate the ratio value.
  - b. How is the result for the statement  $a$  interpret?



## 1.6 Antecedent and consequent

### Remember

1. The price for a pair of pants is \$40, and a dress is \$20. Write the ratio value. What interpretation does this result have using the number of times?

2. One store sold 12 pounds of sugar on Monday and 15 pounds of sugar on Tuesday.

a. Write the ratio between the number of pounds of sugar sold on Monday and the ones sold on Tuesday; calculate the ratio value.



b. How is the result for statement *a* interpreted?

### Understanding

In a ratio  $a:b$ , quantity  $a$  is called the antecedent, and quantity  $b$  is called the consequent.

In addition, it is true that:

$$\text{Antecedent} = \text{Consequent} \times \text{Ratio value}$$



Note that calculating the antecedent is similar to calculating the quantity to compare:

$$\text{Quantity to compare} = \text{Base quantity} \times \text{Number of times}$$

Replace base quantity for consequent, and number of times for ratio value.

### Solve

1. Joseph makes handmade soaps, for the mixture uses a ratio between tablespoons of olive oil and tablespoons of jasmine essence of 3:4. If he uses twelve tablespoons of jasmine essence for a mix, how many tablespoons of olive oil did he use?



2. A group of workers paves a road. The ratio between the time (in hours) and the length of the paved section (in meters) is 6: 625. If the workers paved a 1,000-m-long stretch, how many hours did it take?



Relative's signature: \_\_\_\_\_

## 1.7 Consequent calculation

### Remember

1. In an international event is the flag of Japan, whose dimensions are 6 m wide and 9 meters long. Write the ratio between the length of the flag and the width, calculate the ratio value, and interpret the result using the number of times.



2. Soluble cocoa powder is to be added to milk to give it a chocolate flavor. It is estimated that the ratio between the number of teaspoons of soluble cocoa and grams of sugar it provides is 2: 15. For 45 g of sugar, how many teaspoons of soluble cocoa were used?



### Understanding

In one ratio it is true that:

$$\text{Consequent} = \text{Antecedent} \div \text{Ratio value}$$

Calculating the consequent is similar to the base quantity calculation:

$$\text{Base quantity} = \frac{\text{Quantity to compare}}{\text{Number of times}}$$

Replace quantity to compare, write antecedent. Instead of number of times, write ratio value.



### Solve

1. In each case, calculate the consequent :

a. Antecedent = 15, Ratio value =  $\frac{5}{3}$

b. Antecedent = 7, Ratio value =  $\frac{1}{4}$

c. Antecedent = 16, Ratio value = 4

d. Antecedent = 9, Ratio value =  $\frac{3}{11}$

2. One study determined that the ratio between milliliters of cola soda and grams of sugar provided is 10: 1; How many grams of sugar does a 550 ml cola drink provide?





## 1.8 Self-evaluate your knowledge

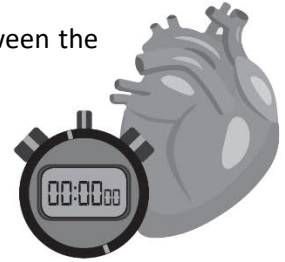
Solve and mark with an "x" the boxes you consider appropriate according to what you learned.  
Be mindful of your answers.

Item	Yes	Could improve	No	Comments
1. I calculate the number of times that one quantity is in respect to another; for example: The number of times Michael's height (166 cm) is, compared to Julia's (158 cm).				
2. I calculate the quantity to compare, for example: The capacity in liters of a bottle is three times that of a cup of $\frac{1}{4}$ litros.				
3. I calculate the base quantity: The number of books collected by Beatrice, if Mario collected 20 books that correspond to 0.8 times what Beatrice collected.				
4. I calculate the ratio value and interpret the result as the number of times. For example, the ratio between a newborn dog's weight (400 g) and the weight after four weeks (3,200 g).				
5. I calculate the ratio value and interpret the result as quantity per unit. For example, the ratio between the distance traveled by car (302 km) and the time it took to complete it (5 hours).				
6. I calculate the ratio antecedent using the consequent and the ratio value for example: a. Consequent = 10, ratio value = $\frac{3}{5}$ b. Consequent = 22, ratio value = $\frac{7}{2}$				
7. I calculate the ratio consequent using the antecedent and the ratio value, for example: a. Antecedent = 16, ratio value = $\frac{4}{3}$ b. Antecedent = 8, ratio value = $\frac{1}{5}$				

## 2.1 Percent and percentage

### Remember

Carmen estimates her heart beats 72 times every 60 seconds. Enter the ratio between the beats and the time, calculate the ratio value, and interpret this result.



### Understanding

The **percent** or **percentage** is obtained by multiplying the ratio value by 100, i.e.:

$$\text{Percentage} = \text{Ratio value} \times 100$$

After the last digit of the number indicating percentage, the symbol "%" is written. For example; if the ratio value between the number of goals and the number of attempts (in the first training) is multiplied by 100, you get:

$$\text{percentage} = 0.5 \times 100 = 50$$

It is written "50%" and reads: "fifty percent ."This number indicates that 50 out of every 100 attempts are successful.

### Solve

The table shows the number of flower arrangements sold in a store and each type made:

Flower arrangement	Sold	Made
Lilies	10	25
Roses	12	24
Daisies	6	15

a. For each type of arrangement, find the ratio between the quantities of floral arrangements sold and made.



b. What percentage of arrangements was sold, according to each type? How are these results interpreted?



c. Among the arrangements of lilies and roses, which has the highest percentage of sales?



## 2.2 Relationship between ratios and percentages

### Remember

A test has a maximum score of 15 points. A student gets 10 of the 15 points.

a. Determine the ratio between the number of points earned by the student and the maximum test score.

b. What percentage of the test did the student get?



### Understanding

In General:

- Multiplying the ratio value by 100 yields the percentage:

$$\text{Percentage} = \text{Ratio value} \times 100$$

- Dividing the percentage by 100 yields the ratio value:

$$\text{Ratio value} = \text{Percentage} \div 100$$

For example:

- The percentage that represents the ratio value 0.35 is:

$$0.35 \times 100 = 35, \text{ namely, } 35 \%$$

- The ratio value that corresponds to 95 % is:

$$95 \div 100 = 0.95$$

### Solve

1. Find the percentage that the following ratio values represent:

a. 0.05

b. 0.23

c. 0.32

d. 0.5

2. Find the ratio value that corresponds to each of the following percentages:

a. 12 %

b. 1 %

c. 70 %

d. 85 %

### ★ Self-challenge

If the ratio value is 1:2.

a. What is the corresponding percentage?

b. How do you interpret this percentage according to the quantities being compared (antecedent and consequent)?

## 2.3 Percentages greater than 100 %

### Remember

1. A company manufactures 250 computers of which, 20 came out defective.
  - a. Calculate the ratio between the number of defective computers and those manufactured by the company.



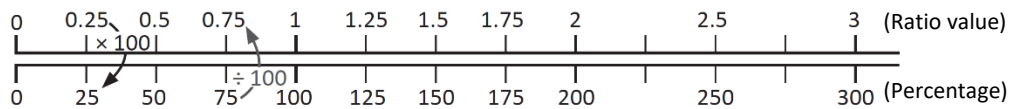
- b. What percentage of computers were defective? How do you interpret this information?

2. Connect with a line the ratio value with the related percent:

0.67	0.29	0.15	0.07
29 %	7 %	15 %	67 %

### Understanding

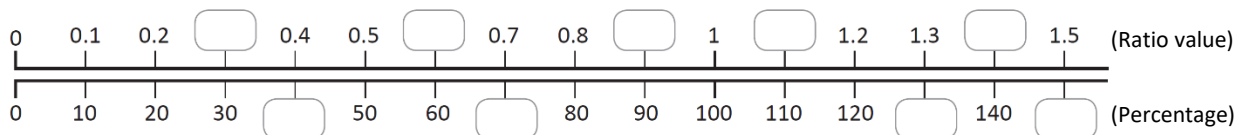
When the antecedent is greater than the consequent, the percentage obtained is greater than 100%. It occurs because the ratio value is greater than 1. The following chart shows some relationships between the ratio value and the corresponding percentage:



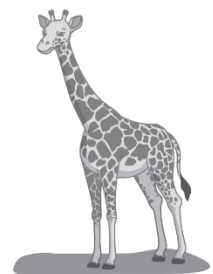
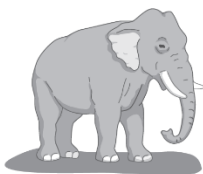
For example, the ratio value 0.75 corresponds to 75%, and the ratio value 1.25 corresponds to 125%.

### Solve

1. Fill in the boxes in the chart with the missing ratio or percent:



2. The gestation period of an elephant is 24 months, while that of a giraffe is 15 months. What is the percentage of months of gestation of the elephant in respect to the giraffe?



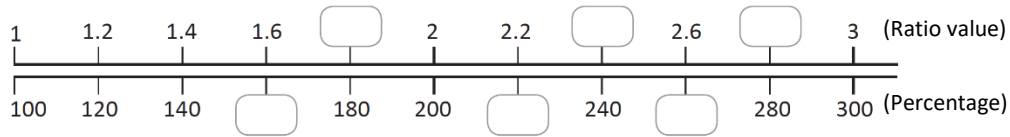
## 2.4 Calculating the antecedent using percentages less than 100%

### Remember

1. Complete the table with the corresponding percentage or ratio value:

Ratio value	0.02		0.59		0.86
Percentage		33 %		71 %	

2. Fill in the boxes in the chart with the missing ratio or percent:



### Understanding

In General:

- Calculating the value corresponding to the percentage of a quantity is equivalent to calculating the antecedent of the ratio.
- When the consequent and percentage are known and wants to find the antecedent, proceed with the following steps:
  - ① Find the ratio value from the percentage:  $\text{ratio value} = \text{percentage} \div 100$ .
  - ② Find the antecedent:  $\text{Antecedente} = \text{Consequent} \times \text{ratio value}$ .

### Solve

1. Calculate:

a. 10 % of 20 liters.

b. 30 % of 50 liters.

c. 60 % of \$200.

d. 45 % of \$110.

2. 22% of beef is protein. In 5 lbs of meat, how many pounds will be of protein?



3. 55% of an adult male's body weight is composed of water. If a man weighs 70 kg, how many kilograms of water does his body have?



Relative's signature: \_\_\_\_\_

## 2.5 Calculating the antecedent using percentages greater than 100 %

### Remember

1. The Impossible National Park has seven species of frogs and four species of toads. Calculate the percentage of frog species relative to the number of toad species.



2. Calculate 35% of 80 g.

### Understanding

In situations involving increases to the percentage, and you want to find the ratio antecedent, do the following:

- ① Find the total percentage:  $100\% + \text{percentage increase}$ .
- ② Calculate the ratio value:  $\text{percentage} \div 100$ .
- ③ Calculate the antecedent:  $\text{Antecedent} = \text{Consequent} \times \text{Ratio value}$ .

### Solve

1. A restaurant received 200 people on Friday; and 15% more on Saturday than Friday. How many people arrived on Saturday?



2. Joseph must pay a \$34 fine. If he does not pay the fine on the stipulated date, he must cancel 5% additional. How much will he be paying if it exceeds the specified due date?



## 2.6 Calculating prices with VAT

### Remember

1. The American continent has 35 countries, of which approximately 57.15% have Spanish as their official language. How many countries speak Spanish in the Americas?



2. A container initially holds 200 ml of juice, but 20% more is added during a promotion. How much juice in total will it have when in the promo?



### Understanding

Value Added Tax (VAT) is a tax paid at the time of making a purchase. In El Salvador, VAT corresponds to 13% of the original price and can be calculated in two ways:

#### First option:

- ① Calculate the ratio value corresponding to 113 % (The percentage was obtained by adding 100 % to 13 % VAT).
- ② Calculate the new price by multiplying the actual cost by the ratio value).

#### Second option:

- ① Calculate 13% of the original price.
- ② Add the original price, the amount found in step ①.

In the first option, the value of the ratio corresponding to 113 % is 1.13; then, you can perform a single step by multiplying the original price by 1.13.



### Solve

For each of the following products, calculate its price with VAT.

a. Using the **first option**:

One liter of whole milk: \$5 excluding VAT .



One bottle of oil: \$5.50 excluding VAT.



b. Using the **second option**:

A jar of honey: \$4 without VAT.



A package with 6 juices: \$3.10 without VAT.



Relative's signature: \_\_\_\_\_

## 2.7 Calculating prices and discounts

### Remember

1. One bus has 60 seats. One day, the number of people on the bus exceeded the number of seats by 35%. How many people did the bus transported?



2. If the price, without VAT, of a kitchen is \$230, what will be its price with VAT included?



### Understanding

To find the price after applying discounts, you can perform two procedures:

#### First option:

- ① Calculate the discounted price percentage:  
 $100\% - \text{discount percent}$
- ② Calculate the ratio value corresponding to the percentage obtained in ①.
- ③ Find the discounted price, multiply the ratio value by the original price.

#### Second option:

- ① Calculate the ratio value corresponding to the discount percentage.
- ② Calculate the amount corresponding to the discount.
- ③ Subtract the amount obtained in ② from the original price.

### Solve

- a. For each of the following products, find the price by applying the indicated discount.

Using the **first option**:

Jumbo size teddy bear: \$30  
15 % off

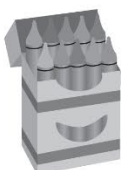


A pair of socks : \$1.50  
10 % off



- b. Using the **second option**:

A box of crayons: \$3  
25 % off



A night lamp : \$24  
12 % off





## 2.8 Calculating the consequent using percentages

### Remember

The price, excluding VAT, of a bike is \$50.

- a. Calculate the price, including VAT.



- b. Based on the VAT price, if the bike had a 25% discount, how much would it cost?

### Understanding

When you know the quantity whose percentage is greater than 100% (antecedent), and you want to find the original (consequential) quantity, do the following:

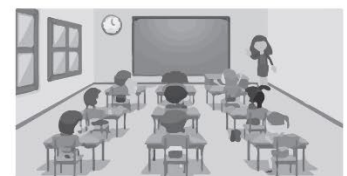
- ① Calculate the ratio value: **Ratio value = Percentage  $\div$  100**
- ② Calculate the consequent, which is the original quantity: **consequent = antecedent  $\div$  ratio value**

### Solve

1. The project's reforestation indicates that the number of trees planted this year was 110%, compared to the previous year. If 165 trees were planted this year, how many were planted the last year?



2. This year, Professor Anna has 36 students. If this is 120% compared to last year, how many students did Professor Anna have last year?



Relative's signature: \_\_\_\_\_

## 2.9 Calculating percentage and consequent

### Remember

1 A guitar costs \$70. What will be the price, if you find it with 15% off?



2. Joseph buys a can of blue paint and one of green paint. The blue paint canister contains 12 gallons, while the green paint has 150% more than the blue paint pot. How many gallons does the container hold with green paint?



### Understanding

In problems where the percentage increases, the amount corresponding to that increase is known as (antecedent); the original (consequent) amount is still unknown. Perform the following:

- ① Find the total percentage corresponding to the increase:  $100\% + \text{percentage increase}$ .
- ② Calculate the ratio value:  $\text{total percentage} \div 100$
- ③ Calculate the original (consequent) quantity: **Consequent = Antecedent  $\div$  Ratio value**

### Solve

1 An arrangement of roses costs \$24; this is 50% more than the lily arrangements. How much do lily floral arrangements cost?



2 A horse can carry approximately 20% more than its weight. If a horse transports 300 kg, what could its weight be?



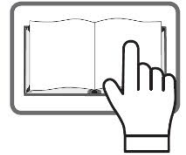
## 2.10 Calculating the consequent using percentages less than 100 %

### Remember

1. At a reading workshop, 150 people attended the event; this represents 125% of the previous year's attendees. How many people participated in the reading workshop last year?



2. Michael buys a book online; to the book's price, he must add an 8% fee for the shipment to his home. If he paid \$27 in total, what was the cost of the book without the shipping fee?



### Understanding

Even if the percentage is less than 100%, the consequent is always calculated with the formula:

$$\text{Consequent} = \text{Antecedent} \div \text{Ratio value}$$

### Solve

1. Carmen took 20 minutes to do her homework; this represents 80% of the time it took Joseph. How long did Joseph take?



2. Anna bought a bread toaster that had 35% off. If she paid \$14 less when the discount was applied, what was the original price of the toaster?



### ★ Self-challenge

When calculating 25% of 20% of a number, your result is 40. What was the original number?



## 2.12 Self-evaluate your knowledge

Solve and mark with an "x" the boxes you consider appropriate according to what you learned. Be mindful of your answers.

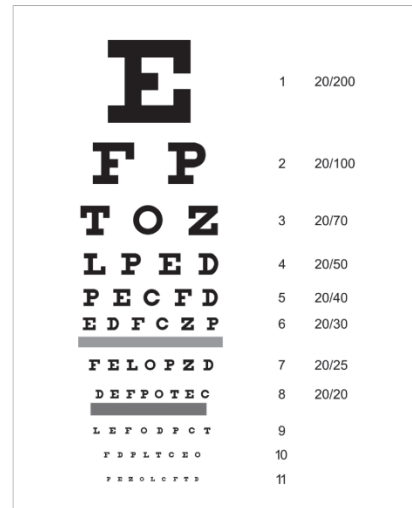
Item	Yes	Could improve	No	Comments
1. I calculate the VAT price of an item; for example: The VAT price for a coffee maker, without tax, costs \$69.				
2. I solve problems like the following: Calculate the price of a shirt by applying a 15% discount if the total cost is \$6. I solve problems like the following: Calculate Michael's height when he was seven years old if his current height is 120 cm, 3. representing 125% of his height at seven years old.				
4. I resolve problems such as the following: Determining the number of students enrolled in a school last year, whether 354 were registered this year, representing an 18% increase in students.				
5. I solve problems like the following: Determine how much John spent in total when he went to the market, if he paid \$20 on dairy, representing 32% of the total expense.				

## Application problems

1.

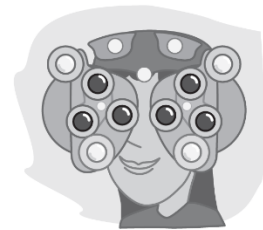
A visual acuity chart measures vision sharpness; The Snellen chart is commonly used and consists of 11 lines of capital letters. The first line has large letters. The following lines contain more letters, which gradually decrease in size.

To use it, the patient stands 20 feet from the chart, covers one eye, and reads the smallest print possible. Each line has a fraction representing the ratio between the distance in feet from the patient to the chart and the distance in feet at which a person with normal vision can read the same line as the patient; The higher the ratio between these values, the better a person's vision.



A patient with 20/20 vision can see what the average person can see on the chart when they are 20 feet away from it; this is considered "normal visual acuity"; a patient with 20/15 vision has a sharper vision, he can see at 20 feet what a normal person sees at 15 feet. A person whose vision is 20/200 is considered blind.

Carmen and Beatrice underwent a visual examination, and Carmen's results were 20/30 and Beatriz's 20/15. Who among them has the best vision? Find equivalent ratios and justify your answer.



2.

The income tax (ISR) is one of the primary sources of income for the country's economy. It is paid by people who derive their income directly from activities such as sales, real estate rental, or services. Usually, the deductions are made from the profits.

The percentage of payment of this tax depends on several factors, including salary. For example, a person whose salary is less than \$472 has no percentage discount; in other words, he does not pay taxes. Another person with a salary from \$472.01 to \$895.25 is given an automatic salary deduction or, 10% tax fee. How much money is deducted, for rent payment, to a person whose salary is \$700?

- b.  $\frac{19}{5}$       c.  $\frac{25}{7}$       d.  $\frac{8}{7}$

## Unit 4

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### Solve

- 1PS:  $3.25 \div 3$   
 A:  $\frac{13}{12}$  times.  
 2A: 1.125 times.  
 3A: 3 times.

### ★ Self-challenge

Charles' height is 1.134 times Anna's height.

Page: 71, Class: 1.2

### Remember

- a. 2 times.      b. 3 times.

### Solve

- 1PS:  $60 \times 0.2$   
 A: 12 W  
 2A: 11 km

Page: 72, Class: 1.3

### Remember

1. 3 times.  
 2. 6 Hectares

### Solve

- 1PS:  $9 \div 1.8$   
 A: 5 tons of recyclable material.  
 2. 14.28 ha

Page: 73, Class: 1.4

### Remember

1. A: 5 m  
 2. 1218.75 m Above sea level.

### Solve

- 1PS:  $2 \div 3$ ; ratio 2:3 y and ratio value  $\frac{2}{3}$

Mario bought  $\frac{2}{3}$  times the number of liters of milk than Beatrice.

- A:  $\frac{2}{3}$   
 2A: 1.3

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### Remember

- 1A: 40 cm  
 2A: 1.2

### Solve

1. a. Ratio 200:5, the ratio value is 40.  
 b. 40 push-ups are performed per minute.  
 2. a. Ratio 15:500, the ratio value is 0.03.  
 b. Ana dissolves 0.03 g of baking soda for each ml of water .

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### Remember

- 1A: 2; the price of the pair of pants is twice the price of the shirt.  
 2. a. Ratio 12 : 15, the ratio value is 0.8.  
 b. The amount of sugar sold on Monday is 0.8 times the amount of sugar sold on Tuesday.

### Solve

1. The ratio value ratio is 0.75, used  $12 \times 0.75 = 9$  tablespoons of olive oil.  
 2A: 9.6 hours.

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### Remember

- 1A:  $\frac{2}{3}$   
 2. A: 6 teaspoons of cocoa.

### Solve

1. a. Consequent =  $15 \div \frac{5}{3} = 9$   
 b. 28      c. 4      d. 33  
 2A: 55 grams.

### Remember

Ratio 72:60, the ratio value is 1.2.

### Solve

- a. Liles 0.4    b. Liles 40 %  
 Roses 0.5    Roses 50 %  
 Dasies 0.4    Dasies 40 %
- c. Roses have a higher sale percentage.

### Remember

- a. Ratio value  $\frac{2}{3}$ .  
 b. Obtained 66.6% of the test.

### Solve

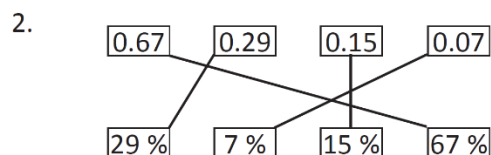
1. a.  $0.05 \times 100 = 5$ , so, 5 %.  
 b. 23 %                      c. 32 %                      d. 50 %
2. a. 0.12                      b. 0.01                      c. 0.7                      d. 0.85

### ★ Self-challenge

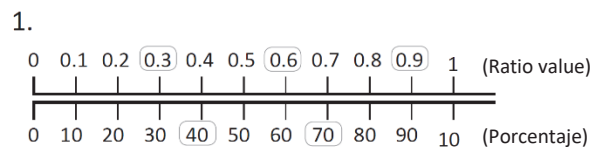
- a. 120 %  
 b. Antecedent = 5  
 Consequent = 6

### Remember

1. a. Ratio value 0.08.  
 b. 8% of the computers were defective.



### Solve

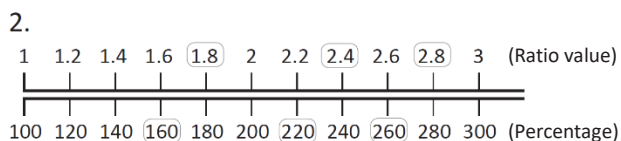


2A: 160 %

### Remember

1.

Ratio value	0.02	0.33	0.59	0.71	0.86
Percentage	2 %	33 %	59 %	71 %	86 %



### Solve

1. a. Ratio value:  $10 \div 100 = 0.1$   
 Antecedent =  $20 \times 0.1 = 2$   
**A:** 2 lt  
 b. 15 lt                      c. \$ 120                      d. \$ 49.5
2. 1.1 l b  
 3. 38.5 kg

### Remember

- 1A: 175 %    2. 28 g

### Solve

1. Total percentage  $100 \% + 15 \% = 115 \%$   
 Ratio value:  $115 \div 100 = 1.15$   
 Antecedent =  $200 \times 1.15 = 230$   
**A:** 230 people arrived on Saturday.  
 2A: 35.7 dollars

### Remember

1. Approximately 20 countries speak Spanish.  
 2. 240 ml

### Solve

- a. • Ratio value:  $113 \div 100 = 1.13$   
 New price:  $5 \times 1.13 = 5.65$   
**A:** \$ 5.65  
 • **A:** \$ 6.215
- b. • Amount of money corresponding to 13 %  
 (antecedent):  $4 \times 0.13 = 0.52$   
 I add the amount corresponding to VAT :  
 $4 + 0.52 = 4.52$   
**A:** \$ 4.52  
 • **A:** \$ 3.50



**Remember**

1. 81 people.
2. 259.9 Dollars

**Solve**

- a. Percentage:  $100\% - 15\% = 85\%$   
 Ratio value:  $85 \div 100 = 0.85$   
 Discounted price:  $0.85 \times 30 = 25.50$   
**A:** \$ 25.50  
**A:** \$ 1.35
- b. Ratio value:  $25 \div 100 = 0.25$   
 Amount corresponding to the discount:  
 $3 \times 0.25 = 0.75$   
 Discounted price:  $3 - 0.75 = 2.25$   
**A:** \$ 2.25  
**A:** \$ 21.12

**Remember**

- a**A:** \$ 56.50
- b**A:** \$ 42.375

**Solve**

1. Ratio value:  $110 \div 100 = 1.10$   
 Consequent =  $165 \div 1.10 = 150$   
**A:** 150 trees.
- 2**A:** 30 students.

**Remember**

- 1**A:** \$ 59.50
- 2**A:** 18 gal

**Solve**

1. Total percentage:  $100\% + 50\% = 150\%$   
 Ratio value:  $150 \div 100 = 1.5$   
 Consequent:  $24 \div 1.5 = 16$   
**A:** \$ 16
- 2**A:** 250 kg

**Remember**

- 1**A:** 120 people.
- 2**A:** \$ 25

**Solve**

1. Consequent =  $20 \div 0.8 = 25$   
**A:** 25 minutes.
- 2**A:** \$ 40

**Self-challenge**

The original number is 800

**Unit 5**

**Solve**

1. a.

	Chocolate	Milk	
x 3	5 cups	4 cups	x 3
	15 cups	x cups	

**A:** 12 cups of milk

b.

	Water	Lemonade	
x 6	5 glasses	2 glasses	x 6
	x glasses	12 glasses	

**A:** 30 glasses of water

- 2**A:** 9 tablespoons of oatmeal

**Self-challenge**

	Powder milk	Sugar	
x 6	2 tablespoons	$\frac{1}{2}$ spoon	x 6
	x tablespoons	3 tablespoons	

**A:** 12 tablespoons.

**Remember**

**A:** 24 cups of flour.

**Solve**

1. a.

3 : 4	12 : 16
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They are equivalent because their ratio value is  $\frac{1}{3}$

The proportion can be written  $3 : 4 = 12 : 16$

- b.  $15 : 6 = 5 : 2$
- c.  $4 : 9 = 20 : 45$
- c.  $72 : 63 = 8 : 7$

2. Yes