

Logic and Arithmetic Reasoning

A - SOME TIPS ON PHYSICAL QUANTITIES AND UNITS

Greatness is anything that involves measures. Measuring means comparing quantitatively a physical quantity with a unit scale through a pre-set. The measurement quantities should always come accompanied units.

Examples of physical magnitudes and units of the International System (IS):

Greatness	Unit	Symbol
meter long		<u>m</u>
Pasta	kilogram	<u>kg</u>
Time	second	<u>s</u>

These quantities are called fundamental quantities SI, while all other physical quantities constructed from these may be called by derived variables.

Example of derived quantities:

Greatness	Name / Unit	Symbol
velocity	Meter per second	m / s
Acceleration	<u>Meter per second squared</u>	<u>m / s²</u>
Force	Newton	N (kg m / s ²)
Area	Square meter	m²
Area	Cubic meter	m³
caudal	cubic meter per second	m³ / s

Other commonly used units:

Greatness	Name / Unit	Symbol
velocity	Kilometer per hour	km / h
caudal	cubic meter per hour	m ³ / H
caudal	Liters per minute	L / min

It is essential to know how to make conversion speed units, flow rate, length, area, volume, etc.

Taking particular length greatness:

LENGTH - L (m)

		(M)
cm	10^{-2}	0.01
dm	10^{-1}	0.1
m	10th	1
dam	10^1	10
hm	10^2	100
km	10^3	1000

$$1 \text{ km} = 10 \text{ hm} = 100 \text{ dam} = 1000 \text{ m}$$

AREA - L² (m²)

		(m ²)
cm ²	10^{-4}	01 0.00
dm ²	10^{-2}	0.01
m ²	10th	1
dam ²	10^2	1 00
hm ² (there is)	10^4	1 00 00
km ²	10^6	1 00 00 00

$$1 \text{ km}^2 = 100 \text{ hm}^2 = 10,000 \text{ dam}^2 = 1 \text{ million m}^2$$

VOLUME - L³ (m³)

		(m ³)
cm ³	10^{-6}	0.000 001
dm ³ (L)	10^{-3}	0.001
m ³	10th	1
dam ³	10^3	1000
hm ³	10^6	1000000
km ³	10^9	1000000000

$$1 \text{ km}^3 = 1000 \text{ hm}^3 = 1,000,000 \text{ dam}^3 = 1 \text{ billion m}^3$$

Exercises

In multiple-choice questions consider the right one.

1. Express the value of 17 280 m in um, dam and km.
2. Express an area of 3.7 km² in: hm², h, m² and dam².
3. The Alqueva dam, will have at its maximum quota a total capacity of
Storage of four thousand one hundred million m³. Present this value by numbers in m³ hm³ dam³ and km³.
4. In the full storage level (dimension 152) of the reservoir floods a alqueva
area of 250 km². How much water is lost when it evaporates 10 cm of water? Present values hm³ dam³ and m³.
5. The area total catchment area of the Alqueva is 55000 km².
If an average rainfall occurs in a day, 75 mm over the entire basin and all this water to flow into the Alqueva reservoir, which would be the amount of water flocked?
6. To carry out a wheat sowing 300 seeds / m² wherein the density
Sowing in kg / ha if the thousand grain weight is 47g?
7. To make a 300 km journey, a particular car spends 21.9 liters of gasoline.

The) Which the automobile consumption to 100 km?
B) How many liters of gasoline are required to go through 1650 km?
8. Traveled 52 meters a ramp with slope of 3% to how many meters above starting point is?

a) one meter
b) about 17 meters
c) about 1.5 meters
d) about 15.5 meters
e) about 1.7 meter
9. The temperature at 6 hours of a given day was -2 ° C. On the same day the
at noon temperature was 17 ° C. What was the temperature increase?

a) 8,5°C
b) 17 ° C
c) 19c
d) 15 ° C
e) 20 ° C

10. A reservoir is in the form of parallelepipedal and measures 0.50 m wide, 1.20 m long and 0.70 m high. Once the reservoir with a certain amount of water, is placed inside a stone with irregular shape, which is completely covered by water. It is observed then that the water level rises one (1) cm. This means that the volume of the stone is:

- a) 0.6 m³
- b) 6 m³
- c) 6 dm³
- d) 60 dm³
- e) 600 dm³

11. A tap delivers 30 liters of water per minute. How long will it so that with the same tap is able to fill a container with 250 liters? What is the volume of water delivered by the same tap in time?

- a) about 8 minutes; 1.8 x 10³ l
- b) about 8 minutes, about 1500 l
- c) about 8 minutes; about 18 x 10³ l
- d) about 8 ½ minutes; about 1.8 m³
- e) about 8 minutes; about 1.8 hl

12. A tap fills a tank in 40 minutes, another fill the same tank 50 minutes and a third for 1 hour. If I open the taps 3 at the same time, they will take to fill the tank about:

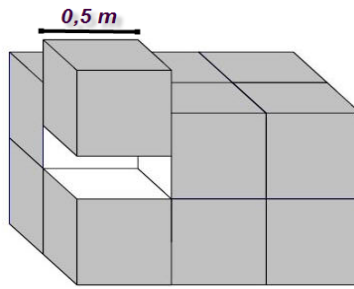
- a) 12 minutes
- b) 14 minutes
- c) 16 minutes
- d) 18 minutes
- e) 20 minutes

13. Consider that a car will have to cover the distance of 240 km between two cities according to the picture. Note that the duration is inversely proportional to speed. What is the speed corresponding to a duration of 2 h?

Speed (km / h)	20	40	50		80	100	125		200	240
Running time (h)	12	6		4.8	3		2.4	1.92	1.2	1

- The) 130
- B) 125
- w) 110
- d) 120
- e) 90

14. Fourteen workers, working 10 days 8 hours, can do 56000 meters right fabric. How many days 6 hours will be required to 9 employees to do 32,400 meters of the same fabric?
- a) 4
 - b) 6
 - c) 8
 - d) 12
 - e) 14
15. Twenty workers in 10 days 8 hours, can do 16,000 meters of right fabric. How many days it would take 10 hours to 10 workers make 32,000 meters of the same fabric?
- a) 8
 - b) 32
 - c) 10
 - d) 30
 - e) 40
16. It is known that four packaging machines operating 4 hours per day for 4 days, 40000 packaging produce. How many packs would be produced by six machines of that type, operating six hours a day for six days?
- The) 8000
 - B) 15000
 - w) 105000
 - d) 135000
 - and) 16000
17. A book is printed on 285 pages of 34 lines each with 56 letters each line. How many pages would be required to reprint the book with 38 lines per page, each with 60 letters?
- The) 130
 - B) 230
 - w) 238
 - d) 248
 - and) 250
18. Consider the six faces of a regular quadrangular prism before cutting in Equal cubes, as can be seen in Fig. The edge of each cube measuring 0.5 m. If you wish to paint the prisms using ink containers that allow paint a surface of 10 m² each.



- a) How many ink containers will have to acquire to paint the six faces of the rectangular prism?
- b) How many ink containers will have to acquire to paint the surface of all the cubes?

19. A gardener was asked to do the sowing of a circular ground

3 meter radius, charging for work worth 10 €. What would be a fair price to be charged to sow a similar ground, but with 6 meter radius?

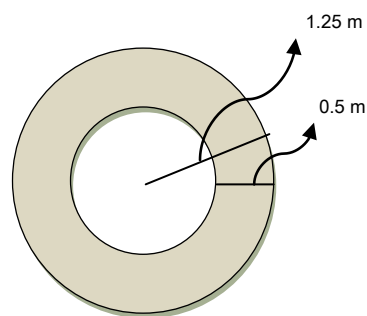
- f) 20
- g) 40
- h) 60
- i) 15
- j) 25

20. A reservoir is fed by two valves A and B: the first has a flow rate

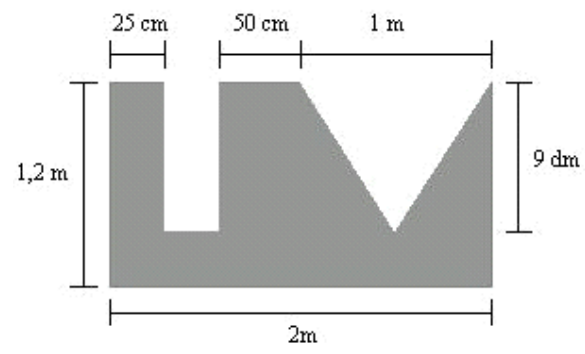
38 liters per minute and the second 47 liters per minute. The outlet of the water reservoir, takes place through a hole to let through 21 liters per minute. the two taps and leaving open the water outlet, the tank fills up in 680 minutes. What is the volume of the reservoir?

21. Determine the area of the figures:

The)



B)



22. To make the disinfection of a flock of sheep need to prepare a disinfectant solution. In the preparation of disinfectant recommended 20g per liter of water. How many kilograms of concentrated product must be applied in m^3 of water?

23. Knowing the sound propagating in air with a 340 m/s say:

The) What is the distance that lies thunder is the thunder to hear $\frac{6}{2}$ after lightning?

B) A hunter heard the echo of a sound 4 seconds after making a shot. How far was in the obstacle that led to the echo.

B - Greatest Common Divisor

Two natural numbers have always common divisors. For example, common divisors 12 and 18 are 1, 2, 3 and 6 (this means that both 12 and 18 can be divided by 1, 2, 3 and 6 and the result of this division continues to be an integer). Among them, 6 is the largest. Then call the 6 in **greatest common divisor of 12 and 18** and indicate **$\text{gcd}(12, 18) = 6$** .

Thus, the greatest common divisor of two or more numbers is called **greatest common divisor** these numbers. We use the abbreviation **mdc**

Here are some examples:

Example 1: $\text{gcd}(6, 12) = 6$ (common divisors of 6 and 12 are 1, 2, 3 and 6 and 6 It is the largest of them)

Example 2: $\text{gcd}(12, 20) = 4$ (common divisors of 12 and 20 are 1, 2 and 4 and 4 It is the largest of them)

Example 3: $\text{gcd}(20, 24) = 4$ (the common divisors of 20 and 24 are 1, 2 and 4 and 4 It is the largest of them)

Example 4: $\text{gcd}(12, 20, 24) = 4$ (common divisors, 20 and 24 are 1, 2 and 4 and 4 It is the largest of them)

Example 5: $\text{gcd}(6, 12, 15) = 3$ (the common divisors of 6, 12 and 15 are 1 and 3 and 3 It is the largest of them)

• MDC CALCULATION

One way to calculate the gcd of two or more numbers is to use the decomposition of numbers into prime factors.

- 1) *Decompose the numbers in prime factors;*
- 2) *gcd is the product of the common prime factors.*

Take the example of calculating gcd between 36 and 90: $36 = 2 \times 2 \times 3 \times 3$

$$90 = 2 \times 3 \times 3 \times 5$$

The MDC is the product of the prime factors common $\Rightarrow \text{gcd}(36,90) = 2 \times 3 \times 3$
Therefore **gcd(36,90) = 18.**

Writing the factorization of the number in the form of power we have: $36 = 2^2 \times 3^2$

$$90 = 2 \times 3^2 \times 5$$

Therefore $\text{gcd}(36,90) = 2 \times 3^2 = 18$.

O **mdc** two or more numbers, **when fatorizados**, It is the product of the factors common to them, each raised to the exponent smaller.

- **PRIME NUMBERS BETWEEN**

Two or more numbers are **coprime** when the greatest common factor between them is **1**.

Examples:

Figures 35 and 24 **are** coprime numbers, because $\text{gcd}(35,24) = 1$. Figures 35 and 21 **they are not** coprime numbers, because $\text{gcd}(35,21) = 7$.

- **MDC CALCULATION OF TWO FACTORS IN NUMBERS decomposed COUSINS**

The greatest common divisor (gcd) of two natural numbers is obtained from the intersection of natural divisors, choosing the most. The gcd can be calculated as the product of the prime factors that are common it is always taking the **smaller exponent**.

For example:

Consider the números 120 and 36

120	2		36	2
60	2		18	2
30	2		9	3
15	3		3	3
5		5	1	
1				

= 120 **2₃ . 3 . 5** and 36 = **2₂ . 3₂**

gcd (120, 36) = 2₂ 3 = 12

Exercises:

1. A florist has 100 white roses and 60 red roses and you plan to largest possible number of bouquets equal to each other. How many are the bouquets and roses how many of each color must have each of them?
2. Find the gcd between:
 - The) 9, 18
 - B) 20, 25
 - w) 4.10 to 12
 - d) 20, 25 and 50
3. There are a florist **18 daisies, 45 marigolds and 54 carnations**. It asked one of the maids to do with those flowers, branches with equal composition of flowers.
4. It is intended to divide two coils of wire 36 meters and 48 meters length, and equally large as possible. What should be the length of each of these parts.

C - Greatest Common Divisor

• MULTIPLE OF A NATURAL NUMBER

As **24 is divisible by 3** we say that **24 is a multiple of 3**. 24 is also a multiple of 1, 2, 3, 4, 6, 8, 12 and 24.

if a number is divisible by another, nonzero, then we say that it is multiple that other.

The multiples of a number are calculated by multiplying this number by the natural numbers.

Example: the multiples of 7 are:

7x0, 7x1, 7x2, 7x3, 7x4, ... = **0, 7, 14, 21, 28, ...**

Important notes:

- 1) A number have multiple infinite
- 2) Zero is a multiple of any natural number

- **MULTIPLE least common (MMC)**

Two or more numbers always have multiple common.

Let's find the common multiples of 4 and 6:

Multiple 6 : 0, 6, 12, 18, 24, 30, ...

Multiple 4 : 0, 4, 8, 12, 16, 20, 24, ...

Multiple common 4:6 : 0, 12, 24, ...

Multiple, different from zero, **12 is the least of them**. we call the **12, least common multiple** of 4 and 6.

The lowest common multiple of two or more numbers, different from zero, is called **least common multiple** these numbers. We use the abbreviation **mmc**

- **MMC CALCULATION**

We can calculate the mmc two or more numbers using factorization. Follow calculation of 24:30 MMC:

1) Decompose the numbers in prime factors

2nd) the MMC is the product of prime factors common and non-common:

$$12 = 2 \times 2 \times 3$$

$$30 = 2 \times 3 \times 5$$

$$\text{MMC}(12,30) = 2 \times 2 \times 3 \times 5$$

Writing the factorization of the numbers in the form of power, we have: $12 = 2^2 \times 3$

$$30 = 2 \times 3 \times 5$$

$$\text{MMC}(12,30) = 2^2 \times 3 \times 5$$

O mmc two or more numbers, **when fatorizados**, It is the product of the factors

common and non-common to them, each raised to the greatest exponent.

Given two **prime numbers together**, O mmc of them is the product of these numbers.

- **MDC CALCULATION OF TWO FACTORS IN NUMBERS decomposed COUSINS**

The least common multiple of two natural numbers is obtained from the intersection of multiple natural, choosing the lowest except zero. O
mmc can be calculated by product of all prime factors considered once and greatest exponent.

Example : 120 and 36

120	2	36	2
60	2	18	2
30	2	9	3
15	3	3	3
5	5	1	2 2 3 2
1			

$$= 120 \cdot 2_3 \cdot 3 \cdot 5 : 36 = 2_2 \cdot 3_2$$

$$\text{MMC} (120, 36) = 2_2 \cdot 3_2 \cdot 5 = 360$$

Exercises:

1. Calculate:

The) MMC (2,3)

B) MMC (3,5)

w) MMC (2,3,5)

d) MMC (3,4,5)

and) MMC (2,4,5)

f) MMC (3,5,6)

g) MMC (5,8,9)

H) MMC (12,15,18)

i) MMC (12,20,24)

j) MMC (20,40,50)

2. A Christmas tree, a group of lamps light up from 10 to 10 seconds
another group turns 12 in 12 seconds. At midnight they lit up the
two groups of lamps.

How many seconds then return to light up simultaneously the two groups of lamps?

3. Two travelers a business leave the same day service. The first is

Travel 12 in 12 days and the second of 18 in 18 days. After how many days out together
again?

4. Three buses depart from a road on the same day. The first part 8

in 8 days, the second in 12 days 12 and 20 the third in 20 days. After how many days will
leave together again?

5. What is the mmc numbers 12, 24 and 144?

6. At the bus stop Square X passes a bus to the Red Line

15 in 15 minutes and a bus to the yellow line 25 in 25 minutes. If the two coaches spent
together at 10 o'clock, what time they will be the first time back to spend together this
stop?

Percentage Probability and D.

1. A purchase was made in the amount of 1,500 euros was obtained a discount of 5%. What was the amount paid?
2. The graphic XPTO Ltd bought a laser printer that cost 2,000 euros. Within a month, she showed a profit of 100 euros. What percentage of the profit on the purchase price?
3. On examination for enabling drivers participated 380 candidates; it is known the percentage of failure was 15%. Calculate the number of approved.
4. On 01/03/10, an article which cost 250.00 euros had its price reduced p% of its value. On 01/04/10, the new price was again reduced by p% of its value, going to cost 211.60 euros. The price of this article at 31/03/10 was:

a) 225.80 b) 228.00 c) 228.60 d) 230.00 e) 230.80

5. A cafe are 20 people. Knowing that 8 are women, indicates the probability of choosing one of the people at random, choose a man?
6. A football team is made up of five Portuguese players, three Brazilians, two Angolans and one Spanish. Choose a player at random, what is the probability of:

The) Be Portuguese;
 B) Be Angolan;
 w) Being Brazilian;
 d) Be Spanish?
 and) Speak Portuguese?
 f) Be European?

AND. Rule three simple

1. To make a 300 km journey, a particular car spends 21.9 liters of gasoline. How many liters of gasoline are required to go through 1,600 km?
2. A car goes through an area of 480 km in 02 hours. how many kms will travel in 06 hours?

F. Ordering of rational numbers

1. Consider the following rational numbers: - 1; 2 • $-\frac{7}{8}$; 0.3; 5 $-\frac{5}{8}$; - 0.6

Write the numbers in ascending order.

a) to 1; 2 7• $-\frac{7}{8}$; - 0.6; 0.3; 5 $-\frac{5}{8}$;

b) - 1; - 0.6; 2 • $-\frac{7}{8}$; 8-5; 0.3;

c) - 0.6; - 1; 2 • $-\frac{7}{8}$; 8-5; 0.3;

d) - 1; - 0.6; $2 \frac{1}{7}$; 0.3; $5 \frac{1}{8}$;

2. Consider the following rational numbers: 1.5, $\frac{1}{4}$, $\frac{5}{2}$, 0.5, 4.8, 3. Write the numbers in descending order.
3. Consider the following rational numbers: 0.1, $\frac{1}{8}$, $\frac{7}{3}$, $\frac{6}{6}$, $\frac{9}{3}$, $\frac{3}{4}$. Write the numbers in ascending order.

Logic and efficiency G.

1. Martha and Rui helped parents in making paper flowers for decoration of your street at the time of festivals. Marta made four flowers in 20 minutes and Rui made three flowers in 15 minutes. Which of the two was more efficient, ie faster?

- The) Martha was more efficient than Rui because it made more flowers, although take more time;
- B) Rui was more efficient than Marta because it took less time to do each flower;
- w) The level of efficiency was the same because they both took on average 5 minutes to make each flower;
- d) Martha was more efficient because it took less time to do each flower.

2. From a Mr. grocery shelf Domingos da is known that the sausages are to

Tuna left and right of the eggs. The olives are right tuna. Like this:

- a) The olives are left of the eggs;
- b) The tuna is left eggs;
- c) The olives are left of sausages;
- d) The olives are right eggs.

3. Which of the five looks less like the other four?

CAO - CAR - CAT - BIRD - FISH

4. Which of the numbers does not belong to the series?

13-5 - 7 - 9 - 10 - 11 - 13

5. John, who is twelve years old, is three times older than his brother. What is the age of John when he is twice as old as his brother?

15, 16, 18, 20, 21

6. If some Smaugs are Thors and some Thors are Thrains, then some will be mandatorily Smaugs Thrains.

This statement is:

FALSE, TRUE, NEITHER

7. John is taller than Peter, and Antonio lower than John.

Which of the following would be more correct?

- a) António is taller than Peter.
- b) António is lower than Pedro.
- c) has the same height Anthony Peter.
- d) It is impossible to tell who is higher if Anthony or Peter

G. Additional Exercises

1. In a class of 28 students, only 9 practice swimming, 12 practice just football and the remaining practice the two modes. A student chosen at random, the probability of:

- a) practice swimming is $\frac{4}{7}$. b) practicing swimming is $\frac{9}{28}$. c) play football is $\frac{12}{28}$.
- d) not practicing swimming is $\frac{19}{28}$. e) none of the above.

2. Analyzing the vaccination cards of 84 children from a nursery, it was found

68 that received the vaccine against chickenpox, measles 50 received the vaccine and 12

They were not vascinas. How many of these children received both vascinas?

- a) No;
- b) 38 children;
- c) 46 children;
- d) 18 children.

3. Ana and Paula were to spin his parish each on his motorcycle. The bike Ana takes 6 minutes to complete a lap and Paula takes 9 minutes. The two friends set off simultaneously. How long then meet again at the starting place?

4. Antonio was to fill two polyps with 40 liters and 32 liters jar always using the same. What will be the capacity of this pitcher knowing that each cask took a whole number of pitchers?

5. On February 1, three friends met in the pool. André will the pool of 3 in 3 days, Joaquim go to the pool of 5 in 5 days and Jorge is from 6 in 6 days. On what day meet again in the pool?

6. Simplifies fractions, making them immovable.

7. In July this year a scientist observed an agricultural reserve blackbirds 181 of which 58 were females. Indicating the likelihood of a blackbird found, by chance, it is a female.

8. In a parking lot, the probability of a car, chosen at random, being black is five-eighths. In the park they are parked cars in 1000. How many cars **They are not black?**

9. If a candle of 36 cm, down by 1.8 mm per minute, how long will it take to consume?

- a) 20 m
- b) 30 m
- c) 2h 36 m
- d) 3h 20 m
- e) 3h 18m

10. A travel agent meets three friends. One is blonde, the other is dark and the other is Red. The agent knows that one of them is called Beth, another is called Elza and the other is called Sara. You know also that each of them will make a trip to a different country in Europe: one will go to Germany, another will go to France and the other will go to Spain. The travel agent, who wanted to identify the name and destination of each one, they gave the following information: Blonde: "I'm not going to France or Spain." The brunette, "My name is not Elza or Sara." The redhead, "Neither I nor Elza go to France." The travel agent has completed, then, rightly, that:

- The)** The blonde is Sara and goes to Spain.
- B)** The redhead is Sara and goes to France.
- w)** The redhead is Beth and goes to Spain.
- d)** The brunette is Beth and goes to Spain.
- and)** The blonde is Elza and goes to Germany.

11. Say it is not true that Peter is poor and Alberto is high, it is logically equivalent to saying that it is true that:

- The)** Pedro is not poor or Alberto is not high.
- B)** Pedro is not poor and Alberto is not high.
- w)** Pedro Alberto is poor or is not high.
- d)** if Peter is not poor, then Alberto is high.
- and)** if Peter is not poor, then Alberto is not high.

