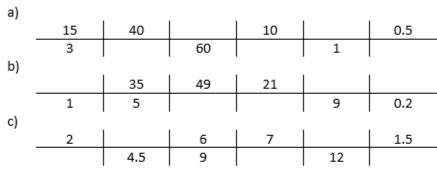# UNIT 3: PROPORTION

Exercise 1: Determine if the following pairs of magnitudes are directly related, inversely related, or they have no relationship:

a) The volume of a bale of hay and the number of sheep I can feed with it
b) The price of a loaf of bread and the number of loaves that I can buy with 5€
c) The number of times that I shower in a week and the time the soap lasts
d) The temperature outside and the number of people out in the streets
e) The number of people who recycle and the number of trees cut down
f) The number of inhabitants in a city and the amount of water they spend in a month
g) The number of towers of a castle and the time it took the assailants to conquer it
h) The average temperature on Earth and the amount of liquid water on the oceans

Exercise 2: Fill in the gaps knowing that the following magnitudes are directly proportional. Find also the value of the ratio k.

a)

15	40		10		0.5
3		60		1	

b)

	35	49	21		
1	5			9	0.2

c)

2		6	7		1.5
	4.5	9		12	

Exercise 3: Find the value of x:

a) $\dfrac{12}{8} = \dfrac{x}{26}$
b) $\dfrac{14}{x} = \dfrac{10}{15}$
c) $\dfrac{x}{18} = \dfrac{12}{6}$
d) $\dfrac{12}{6} = \dfrac{58}{x}$

Exercise 4: I need to work for nineteen days to buy a computer that costs 665€.
a) How many days would I have to work to buy a MAC that costs 1015€?
b) I'll "settle for" the new iPhone instead, and I've read that the price is 809€. If I work for twenty-three days, could I buy it?

Exercise 5: A Boeing 747 uses about 240 liters of fuel every minute.
a) How much fuel will the plane burn for a 10-hour flight?
b) If a gallon contains 4 liters, how long can the plane travel with 16200 gallons? Express the answer using hours, minutes and seconds.

Exercise 6: The same plane from the previous exercise needs 24 gallons of fuel every five miles. How much fuel will it need to fly from Malaga to Bath knowing that there's a distance of 1075 miles? Express the answer in liters.

Exercise 7: I've paid 855€ for a nine days holiday in a ski resort. How much would I have to pay for a single week?

Exercise 8: I would need seven hours and a half, in a row, to watch the first season of Castle, which has 10 episodes. But the fourth season has 23 episodes. How long is it going to take?

Exercise 9: The waiting time to ride a roller coaster is 20 minutes when 150 people are in line. How long is the waiting time when 240 people are in line?

Exercise 10: So far, the fastest mission to reach the Moon was the New Horizons, that only needed 8 hours and 35 minutes to get to the satellite. Knowing that the distance between the two celestial bodies is of about 384400 km:
   a) Find the average speed the spacecraft was travelling at.
   b) How long would it take it to reach Mars, at a distance of about 56 million km?

Exercise 11: A regular pack of Nesquik has 77 grams of sugar per 100 grams of product. Now they've launched a new product with 30% less sugar. What's the new percentage?

Exercise 12: There are 450 students in my high school. During the Solidarity Day, 14% of them joined the Escape Room activity, 8% went to the Self Defense Training workshop and 6% of them chose the App Design workshop.
   a) How many students went to each one of those activities?
   b) How many students attended some other workshops?

Exercise 13: A tourist buys a souvenir that costs 27.5€, including 17.5% of VAT. What was the price of the souvenir taxes excluded?

Exercise 14: The Amazon Prime service has increased from 19.95€/year to 36€/year. What's the percentage increase?

Exercise 15: During August 2018 the price of energy increased by 4% with respect to the previous month. On July, due to the air conditioning, I had to pay a 75€ bill. How much will I have to pay now?

Exercise 16: When the expiration date of a fresh product is getting close, in a certain supermarket they lower its price by 40%. Yesterday I felt like having a slice of salmon and I found a tray whose original price was 8.10€. What's its price now?

Exercise 17: A Math handbook had one hundred and seventeen pages, but the new edition will be published with one hundred and ninety-one pages. Find the percentage variation.

Exercise 18: The price of a car in cash is 12600€, but it can be bought on credit in 63 monthly installments of 215€ each.
   a) How much will the car cost on credit?
   b) Find the interest rate applied.

Exercise 19: Now that the crisis has ended, civil servants are getting a 1.4% increase in their salaries. If now they will get 1521€ a month, what was their salary before?

Exercise 20: The price of a Samsung Galaxy smartphone has decreased by 35% to €169. What was the original price?

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Exercise 21: Split 270€ in a directly proportional way to 3, 5 and 7

Exercise 22: Divide 350€ in a directly proportional way to 2, 5 and 7

Exercise 23: Two schools are to receive a grant from the Department of Education in proportion to their number of pupils. If one school has 450 students and the other one has 720, how would a grant of €56160 be divided between them?

Exercise 24: Three business associates, Anthony, Joseph and Ana invest €5000, €8000 and €10000 respectively, to set up a company. After some time the company makes €2300 profit. What share of the profit does each investor receive?

Exercise 25: The recipe for a cake says that it has 60% of flour, 25% of sugar, 10% of eggs and 5% of olive oil. If I want a 500 g cake, could you translate that into something that I could use, please?

Exercise 26: Fill in the gaps knowing that the following magnitudes are inversely proportional. Find also the value of the ratio k'.

a)

		5	2	10			
	40			4	32	120	0.5

b)

		20	6		1		0.5
	30	3		5		25	

c)

	1		9	3		2	
		18	8		12		0.9

Exercise 27: Each episode of my favorite TV show lasts 45 minutes. If I plan a marathon, I can watch 4 episodes in a row before the battery of my laptop runs out. If the episodes ran for 30 minutes, how many of them could I watch? How long does the battery last?

Exercise 28: We are moving all the books in the old library to the new one. 2 people will need 20 trips to carry them all. How many trips would 5 people need?

Exercise 29: We know that, at a constant temperature, the pressure and volume of a gas are inversely proportional. If a gas occupies a volume of 28 liters at a pressure of 608 torr, find the volume with a pressure of 760 torr.

Exercise 30: There are several types of trains between Córdoba and Seville. The Avant needs 45 minutes to cover the distance between them, which is of 120 km. The Media Distancia travels at an average speed of 90 km/h.
   a) At what speed travels the Avant?
   b) How long will it take the Media Distancia to go from one city to the other?

Exercise 31: My favorite food is meatballs with onion sauce, and my mom prepares it for me every weekend that I visit. With half a kilo of ground meat and a onion she can make four servings. But every once in a while two of my brothers come for lunch too. What amount of each ingredient will she need now?

Exercise 32: The price of an Avant ticket to Seville is 33.30€, but by the beginning of next year it will be increased by 1.4%. What will the new price of the trip by train be then?

Exercise 33: A regular flight needs eight hours to cover the distance between Paris and New York, travelling at a speed of 936 km/h. How long would it take the Concorde, that travelled at a speed of 2140km/h?

Exercise 34: The price of an article is found as the sum of the base price and a VAT of 14%. If the final price of a tablet is 285€, find the base price.

Exercise 35: The water in a dam can cover the needs of a city of 270000 inhabitants for a year and a half. How long would the water last if the city had 360000 inhabitants?

Exercise 36: So far I've needed 12 chickens a day to feed my 4 dragons. But now they've bred and I have two baby dragons as ravenous as their parents. How many chickens am I going to need now?

Exercise 37: The process of selection of a public examination to get a job as a teacher has three parts:
   1) Written exam
   2) Oral exam
   3) Points of experience

   To find the grade obtained by a candidate we must calculate the average of the first two exams, which is a 60% of the total final grade. The other 40% comes from the experience said candidate has.

   An aspirant to the job got a 7.5 in the written exam, a 5.25 in the oral exam, and he has 8 points of experience. What will his final grade be?

Exercise 38: Split 391€ in a directly proportional way to 5, 7 and 11

Exercise 39: The profits of a business are divided in the ratio of money invested. A, B and C invested $24000, $16000 and $12000 respectively. How much will each receive from a profit of $6500?