EXERCISES: DIVISIBILITY

1. Can a prime number be a divisor of another number? Can a composite number be a divisor of a prime number? Explain the answer.
2. – If a number is divisible by 3 and by 7, is it also divisible by 21? Why? Show some examples.
   – If a number is divisible by 3 and by 9, is it divisible by 27? Why? Show some examples.
   – Find the greatest multiple of 7 having 2 digits.
   – Find the least multiple of 9 having 3 digits.
3. Find out all the numbers comprised between 399 and 501 which are divisible by 2 and 5 at the same time.
4. Find examples of numbers in the following situations. Explain how you obtain them.
   - 2-digit numbers having exactly two divisors.
   - 2-digit numbers having exactly three divisors.
   - 2-digit numbers having exactly four divisors.
5. Find two numbers having as divisors 200, 150 and 132.
6. Replace "**a"** by a digit so that the number 148**a** is:
   a) divisible by 5, but not by 3
   b) divisible by 3, but not by 5
   c) divisible by 3 and by 5
7. Analyze if the number 4007 is prime, explaining in detail the method employed. Do the same with the number 323.
8. Check the following properties:

   - the sum of any two prime numbers (except for 2) is never a prime number.
   - the sum of two odd and consecutive numbers is always divisible by 4.
   - the sum of any three consecutive numbers is always a multiple of 3.
9. What is the smallest natural number which is divisible by all the numbers from 1 to 10?
10. Find two different numbers so that if we divide them by 3, by 4 and by 6 we obtain always the same remainder.
11. Write three 5-digit numbers which are divisible by 4, by 7 and by 11.
12. Find out all the divisor of the following numbers:

    14 28 56 98 108 252 1080 3465
13. The l.c.m. of two numbers is 20 and their g.c.d. is 2. Which are those numbers?
14. Find two numbers knowing that their product is 5850 and their g.c.d. is 15.
15. Find which is the g.c.d. and the l.c.m. of 40 and 60 by using <u>two different ways</u>. Do the same with 80 and 120.
16. How many divisors do 156 have? Find them.

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17. Two buses depart from the same place: the first one leaves every 12 minutes whereas the second one leaves every 20 minutes. If both buses begin at 6 o'clock in the morning, at what time will they meet again? How many trips will have they done in total?

18. Some trees are to be planted on the edge of a triangular field whose sides are 96, 120 and 132 meters long, all of them at the same distance. If it is known that there will be a tree in each corner, calculate the smallest number of threes that can be planted.

19. The Oviedo's mayor orders the construction of a quadrangular fountain whose sides are 240 and 360 cm long. He also wants equally spaced water pipes around the fountain. Compute the number of water pipes to be placed in the fountain knowing that there will be one water pipe in each corner and that the distance between two consecutive water pipes is the greatest possible one.

20. One glass weighs 50 grams and a mug weighs 60 grams. How many glasses are necessary to put in one platform of a weighing scale and how many mugs in the other one in order to balance the weighing scale? Find at least two different solutions.

21. 48 boys and 60 girls have gone to a school camp. Some huts have been rented in order to accommodate always the same number of pupils of the same sex. How many pupils will be accommodated in each hut if we want to rent the smallest possible number of huts?

22. We would like to cover the land of the Villarriba's main square with prefabricated square floor tiles whose sides are an exact number of meters long. The square measures 180 m x 192 m and they want to buy the smallest possible number of equal floor tiles. How many floor tiles will they buy?

23. In Villabajo people would like to decorate the streets with green and blue floor tiles and they want the same number of green and blue floor tiles. What is the smallest number of boxes to be bought if the green floor tiles are always packed in boxes of 56 units and the blue ones are packed in boxes of 80 units?

24. They would like to pack 125 tomato cans and 175 pepper cans in boxes having the same number the cans and without mixing both products in the same box. What is the smallest number of boxes we need? How many cans there will be in each box?

25. In a warehouse there are pine boards which are 35 mm thick each. They are stacked in order to reach the same height than other stack of oak boards which are 50 mm thick each. What is the height of both stakes knowing that they are between 1.5 and 2 meters long? How many boards are there in total?

26. Find the smaller side of the square that can be formed by joining rectangular floor tiles of size 6cmx15cm. Interpret the solution graphically.

27. They want to divide a rectangle of size 12cmx20cm in squares with the greatest possible size. How many squares will we obtain? Interpret the solution graphically.

28. The master of ceremonies of a parade expects to group the participants in rows of 10, 9, 8, 7, 6, 5, 4, 3 and 2 but there is always one uncovered space. If we suppose that there are no more than 7000 people, how many people participated in the parade?

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29. It has been collected a number of eggs between 700 and 800 in a farm. In addition, it is an exact number of dozens and they can be also placed exactly in packs of 15 units each. How many eggs are there?

30. Puff pastries and shortbreads are packed in a factory of Astorga. If they want to pack 300 puff pastries and 280 shortbreads in boxes with the same number of units without mixing puff pastries and shortbreads, what is the smallest necessary number of boxes we need? How many puff pastries and shortbreads there will be in each box?

31. In the same Factory of Astorga they produce white and milk chocolate bars. Compute the number of chocolate squares of both types they have produced knowing that the product of both quantities is 13230, that their greatest common divisor is 21 and that the production of milk chocolate is greater than the one of black chocolate.

32. They have 250 roses, 180 carnations and 300 daisies in a florist. They would like to make the greatest possible bunches with the same number of flowers each and without mixing types of flowers. How many bunches can be made using all the flowers they have? How many flowers there will be in each bunch?

33. How many boxes of pencils and markers do we have to buy if we want to have the same number of pencils and markers, and the boxes have 24 pencils each and 32 markers each, respectively?

34. We want to use a piece of clothing having a length of 120 cm and a width of 80 cm to make square and equal napkins. They must have the greatest possible size and it is necessary to use all the clothing. How many napkins can we do?

35. We would like to cover a wall which is 4.5 meters long and 3 meters high by using square tiles. What must be the measure (in an exact number of decimeters) of each tile if we want to completely cover the wall without breaking any tile?

36. The previous tiles have a width of 6, 8 or 10 mm depending on their quality. The machines pack the tiles (of all quality types) stacked in boxes of same height so that in each box fits always an exact number of tiles. Which are those heights?

37. Design an exercise whose solution consists of compute the l.c.m. of 4 and 5. Design other exercise to be solved by computing the l.c.m. of 4, 5 and 6. Solve both exercises.

38. Design an exercise whose solution consists of compute the g.c.d. of 12 and 18. Design other exercise to be solved by computing the g.c.d. of 12, 18 and 20. Solve both exercises.

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