Using long division in the world around us

Long division in our world:

Example 1:

78 volunteers volunteered in the food bank, and the total number of working hours was 9,689 in a year. If each volunteer worked the same number of hours equally. How many hours did each volunteer work in a year?

Sol:

Number of working hours of each volunteer = 9,689 ÷ 78 = 124 hours

78 × 1 = 78
78 × 2 = 156
78 × 3 = 234
78 × 4 = 312
78 × 5 = 390
78 × 6 = 468

$$\begin{array}{r|l} & 124 \\ \hline 78 & 9{,}689 \\ & 78 \\ \hline & 188 \\ & 156 \\ \hline & 329 \\ & 312 \\ \hline & 17 \end{array}$$

9,689	÷	78	=	124	R 17
dividend		divisor		quotient	remainder

Example 2:

During a charity campaign for the Food Bank, 6,982 food packages were collected and placed in 93 food cartons, where each carton contains the same number of food packages. If the Food Bank wants to put the largest number of food packages in each carton, then how many packages will each carton contain?

Sol:

Number of packages will each carton contain = 6,982 ÷ 93 = 75 packages

93 × 1 = 93
93 × 2 = 186
93 × 3 = 279
93 × 4 = 372
93 × 5 = 465
93 × 6 = 558
93 × 7 = 651
93 × 8 = 744

$$\begin{array}{r|l} & 75 \\ \hline 93 & 6{,}982 \\ & 651 \\ \hline & 472 \\ & 465 \\ \hline & 7 \end{array}$$

6,982	÷	93	=	75	R 7
dividend		divisor		quotient	remainder

(1) Answer each of the following:

1) Sara likes to take photos with her new camera; she took 427 photos in 15 days. **How many photos did she take in each day?**

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2) A primary school is planning to a trip to the museum. There are 464 students. If each bus has 45 seats, **how many buses will be needed to fill all the students?**

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3) A Zookeeper wants to give each monkey at the zoo an equal number of bananas. There 37 monkeys in the zoo and 567 bananas**, how many bananas does each monkey get? And how many are left over for him?**

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4) Ahmed has 1,378 oranges and need to pack them up equally in 25 boxes. **How many oranges in each box?**

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(2) Choose the correct answer:

1) If 384 ÷ 16 = 24 , then the dividend is ……..

a. 384 b. 16 c. 24 d. 0

2) If 40 ÷ 5 = 8 , then the remainder is ……..

a. 40 b. 5 c. 8 d. 0

3) If 29 ÷ 3 = 9 R2 , then the divisor is ……..

a. 29 b. 3 c. 9 d. 2

4) If Mona has 17 oranges and she wants to distribute them equally among 3 of her friends, how many oranges are left?

a. 17 b. 3 c. 5 d. 2

5) Salma made 47 cookies which she will distribute equally in tiny glass jars. If each jar is to contain 6 cookies each, how many cookies will not be placed in a jar?

a. 47 b. 5 c. 6 d. 7

6) Noha baked cookies for her classmates. If she can placed 12 cookies on a tray. How many trays will she need to prepare 276 cookies?

a. 12 b. 21 c. 22 d. 23

7) Ahmed has 120 crayons distribute them among 6 of his friends, how many crayons are left?

a. 0 b. 1 c. 2 d. 3

8) Which is the correct relation represents the following statement:
(distribute 16 crayons equally among 4 students)

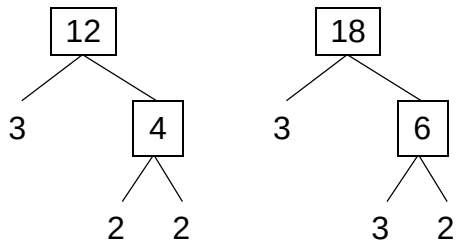
a. 16 × 4 b. 16 ÷ 4 c. 16 + 4 d. 16 – 4

Factorize the number into its prime factors

▶ Use Venn diagram to find (G.C.F) and (L.C.M):

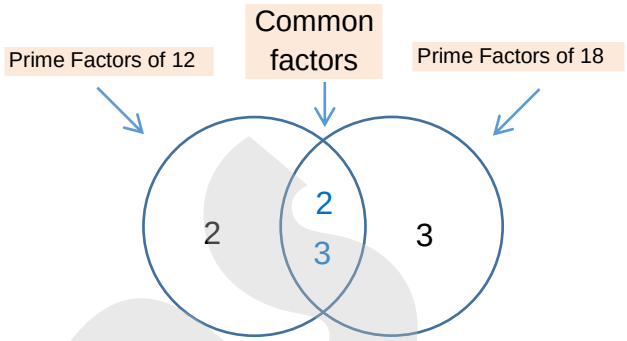
EX: Find (G.C.F) and (L.C.M) of the numbers 12, 18 by using Venn diagram

Sol:



12 = 2 × 2 × 3
18 = 2 × 3 × 3

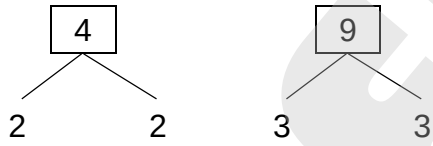
Venn diagram



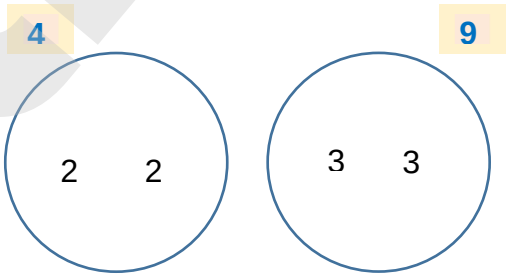
- From Venn diagram:

G.C.F = 2 × 3 = 6 (Multiply the common factors inside Venn diagram)
L.C.M = 2 × 2 × 3 × 3 = 36 (Multiply all the numbers inside Venn diagram)

EX: Find (G.C.F) and (L.C.M) of the numbers 4, 9 by using Venn diagram



4 = 2 × 2
9 = 3 × 3



- From Venn diagram:

G.C.F = 1
L.C.M = 2 × 2 × 3 × 3 = 36 (Multiply all the numbers inside Venn diagram)

▶ Notes:

- The common factor of all numbers is 1
- The greatest common factor (G.C.F) of any two prime numbers is 1
- The G.C.F of the two numbers which haven't any common prime factors is 1
- The common multiple of all numbers is 0
- The (L.C.M) of any two prime numbers is their product.

(1) Use Venn diagram to find (G.C.F) and (L.C.M) of each of the following:

18 and 24

20 and 30

36 and 42

5 and 7

6 and 15

10 and 35

(2) Choose the correct answer:

1) The common factor of all numbers is ……..

a. 0 **b.** 1 **c.** 2 **d.** 3

2) The G.C.F of any two prime numbers is ……..

a. 0 **b.** 1 **c.** 2 **d.** 3

3) The common multiple of all factors is …….

a. 0 **b.** 1 **c.** 2 **d.** 3

4) The greatest common factor of 6 and 8 is ……

a. 1 **b.** 2 **c.** 3 **d.** 4

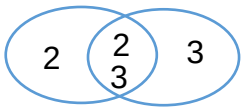
5) The greatest common factor of 2 and 3 is ……

a. 1 **b.** 2 **c.** 3 **d.** 6

6) From the following Venn diagram: the G.C.F of the representing numbers is …….

a. 4 **b.** 9

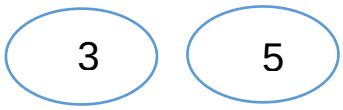
c. 6 **d.** 36



7) From the following Venn diagram: the L.C.M of the representing numbers is …….

a. 1 **b.** 3

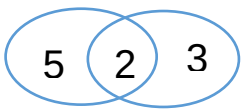
c. 5 **d.** 15



8) The following Venn diagram represents the prime factorization of two numbers which are ……

a. 3 and 5 **b.** 2 and 3

c. 2 and 5 **d.** 6 and 10



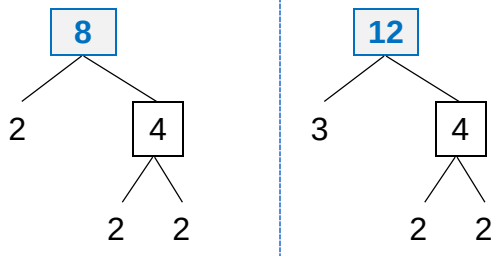
Writing numerical expression by using (G.C.F)

Writing numerical expression by using (G.C.F):

EX: Sarah wanted to make a number of cartons to donate to charitable organizations; if she had 8 boxes of cheese and 12 bags of legumes, what is the largest number of cartons that can be made so that all cartons include the same number of items?

Sol:

1. Prime factorization



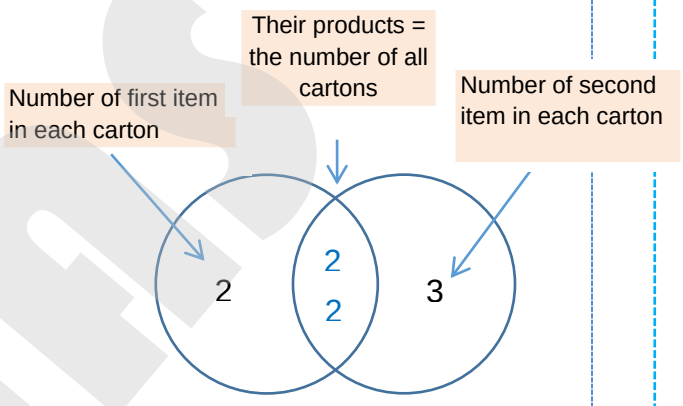
$8 = 2 \times 2 \times 2$

$12 = 2 \times 2 \times 3$

$4 \times (2 + 3)$

G.C.F

2. Venn diagram



- **Using distributive property:**

$4 \times (2 + 3)$

4: Number of all cartons; 2: Number of first item in each carton; 3: Number of second item in each carton

So, Numerical expression: $(4 \times 2) + (4 \times 3)$

The total number of items: $8 + 12 = 20$

Means that: We have 4 cartons each carton has 2 boxes of cheese and 3 bags of legumes

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EX: The students collected 36 boxes of cheese and 48 bags of legumes. What is the largest number of baskets of food that can be prepared without any food left?

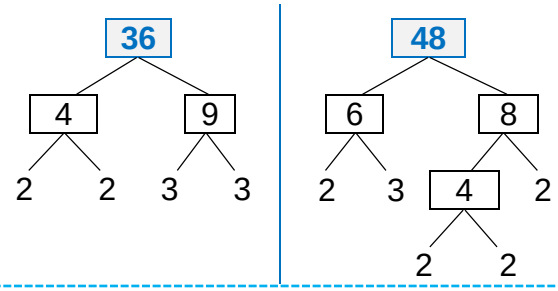
Sol:

$36 = 2 \times 2 \times 3 \times 3$

$48 = 2 \times 2 \times 3 \times 2 \times 2$

$= 12 \times (3 + 4)$

$= (12 \times 3) + (12 + 4)$



(1) Use the (G.C.F) to write the numerical expression of each of the following:

1) Samy has 6 oranges and 10 bananas. What is the largest number of bags that can be made so that all bags include the same number of items?

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2) The students collected 20 boxes of cheese and 40 bags of legumes. What is the largest number of baskets of food that can be prepared without any food left?

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3) Amir has 24 of red marbles and 36 of green marbles. What is the largest number of bags that can be made so that all bags include the same number of marbles?

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4) Karim 48 pencils and 18 crayons. What is the numerical expression of the greatest number of sets that can be made so that all sets include the same number of items?

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(2) Choose the correct answer:

1) The following expression represents the greatest number of bags can be made from apples and bananas respectively: (12 × 6) + (12 × 4) , then the number of all bags is ……

a. 12 **b.** 4 **c.** 6 **d.** 120

2) The following expression represents the greatest number of trays can be made from cookies and croissant respectively: (3 × 4) + (3 × 7) , then the number of cookies in each tray is ……

a. 3 **b.** 4 **c.** 7 **d.** 12

3) The following expression represents the greatest number of bags can be made from potatoes and carrot respectively: (6 × 6) + (6 × 3) , then the total number of carrots in all bags is ……

a. 6 **b.** 36 **c.** 18 **d.** 9

4) The following expression represents the greatest number of bags can be made of red and green marbles respectively: (5 × 2) + (5 × 4) , then the total number of marbles in all bags is ……

a. 10 **b.** 20 **c.** 30 **d.** 40

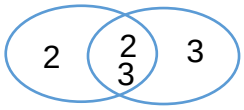
5) The following expression represents the greatest number of baskets water and juice bottles respectively: (10 × 3) + (10 × 5) , then the number of all bottles in each basket is ……

a. 10 **b.** 8 **c.** 15 **d.** 80

6) The following expression represents the greatest number of bags can be made from mangos and bananas respectively, then the number of all bags is ……

a. 4 **b.** 9

c. 6 **d.** 36



Factorize the least common multiple

▶ Adding and subtracting fractions with like denominators:

Ahmed has 3 equal bags of oranges. He wanted to taste the fruit inside each bag to make sure of its quality, the following table represents that:

			The sum
The whole	$\frac{6}{6}$	$\frac{6}{6}$	$\frac{6}{6}+\frac{6}{6}=\frac{12}{6}=2$
What Ahmed ate	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{3}{6}+\frac{4}{6}=\frac{7}{6}=1\frac{1}{6}$
remainder	$\frac{6}{6}-\frac{3}{6}=\frac{3}{6}$	$\frac{6}{6}-\frac{4}{6}=\frac{2}{6}$	$\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$

- **Generally:** when we add or subtract any two fractions with like denominators, we add or subtract the numerators with the same denominators.

EX: $\frac{1}{5}+\frac{2}{5}=\frac{3}{5}$ *EX:* $\frac{2}{5}+\frac{4}{5}=\frac{6}{5}=1\frac{1}{5}$

EX: $\frac{5}{7}-\frac{3}{7}=\frac{2}{7}$ *EX:* $2\frac{1}{6}-\frac{3}{6}=1\frac{4}{6}$

▶ Adding and subtracting fractions with unlike denominators:

Ahmed wanted to make a meal of oranges and pears by use half bag of oranges and $\frac{1}{4}$ of bag of pears, the following table represents that:

			The L.C.M of denominators	The sum
The whole	$\frac{6}{6}$	$\frac{4}{4}$	**6** = 2 × 3 **4** = 2 × 2 **L.C.M** = 2 × 3 × 2 = 12	$\frac{12}{12}+\frac{12}{12}=2$
What Ahmed ate	$\frac{3}{6}$	$\frac{1}{4}$		$\frac{6}{12}+\frac{3}{12}=\frac{9}{12}$
remainder	$\frac{6}{6}-\frac{3}{6}=\frac{3}{6}$	$\frac{4}{4}-\frac{1}{4}=\frac{3}{4}$		$\frac{6}{12}+\frac{9}{12}=\frac{15}{12}=1\frac{3}{12}$

- **Generally:** when we add or subtract any two fractions with unlike denominators, we change the unlike denominators into like denominators by using the L.C.M of two denominators

Exercises 4: factorize the least common multiple

(1) Find the result:

$\frac{3}{5}+\frac{1}{5}=$	$\frac{2}{7}+\frac{6}{7}=$	$5\frac{1}{4}+\frac{2}{4}=$ .....
$\frac{1}{4}+\frac{2}{4}=$	$\frac{1}{6}+\frac{5}{6}=$	$2\frac{3}{8}+1\frac{7}{8}=$ .....
$\frac{3}{11}+\frac{7}{11}=$	$\frac{2}{3}+\frac{2}{3}=$	$1+\frac{2}{9}=$ .....
$\frac{7}{8}-\frac{3}{8}=$	$3\frac{5}{6}-1\frac{1}{6}=$	$3-\frac{3}{4}=$ .....
$\frac{3}{5}-\frac{1}{5}=$	$5\frac{3}{7}-\frac{6}{7}=$	$5-1\frac{2}{7}=$ .....
$\frac{7}{13}-\frac{4}{13}=$	$4\frac{2}{5}-1\frac{4}{5}=$	$1-\frac{3}{8}=$ .....
$\frac{1}{5}+\frac{1}{8}=$	$\frac{3}{7}+\frac{2}{5}=$	$2\frac{1}{3}+1\frac{1}{2}=$ .....
$\frac{1}{4}+\frac{1}{12}=$	$\frac{1}{4}+\frac{2}{3}=$	$1\frac{3}{5}+\frac{1}{3}=$ .....
$\frac{7}{10}+\frac{5}{6}=$	$\frac{3}{4}+\frac{4}{5}=$	$3\frac{2}{8}+2\frac{1}{6}=$ .....
$\frac{5}{6}-\frac{3}{8}=$	$\frac{1}{4}-\frac{1}{5}=$	$1\frac{1}{12}-\frac{5}{9}=$ .....
$\frac{5}{6}-\frac{7}{12}=$	$\frac{5}{6}-\frac{1}{2}=$	$6\frac{4}{5}-2\frac{1}{4}=$ .....
$\frac{3}{4}-\frac{2}{3}=$	$\frac{5}{7}-\frac{2}{3}=$	$3\frac{2}{3}-1\frac{2}{5}=$ .....

(2) Choose the correct answer:

1) $\frac{5}{6} - \frac{3}{5} =$ .....

a. $\frac{7}{30}$ b. $\frac{8}{30}$ c. $\frac{9}{30}$ d. $\frac{1}{3}$

2) The equivalent fraction of $\frac{12}{15}$ is .....

a. $\frac{2}{5}$ b. $\frac{3}{4}$ c. $\frac{4}{5}$ d. $\frac{1}{3}$

3) $2\frac{3}{4} + 1\frac{2}{3} =$ .....

a. $3\frac{5}{12}$ b. $4\frac{5}{12}$ c. $\frac{17}{12}$ d. 4

4) $\frac{5}{8} + \frac{\text{.....}}{\text{.....}} = 1$

a. $\frac{1}{8}$ b. $\frac{3}{8}$ c. $\frac{5}{8}$ d. $\frac{7}{8}$

(3) Answer the following:

1) Salma bought $3\frac{1}{2}$ kg of tomato, and $1\frac{1}{4}$ kg of onion. **How much vegetables did she buy?**

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2) Basma walked $2\frac{3}{4}$ km on Sunday, and $1\frac{1}{3}$ km on Monday. **What distance did she walk in all?**

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3) Ali bought a bottle of juice contains $1\frac{3}{4}$ liters of orange juice. He drank $\frac{2}{5}$ liter of juice. **How much of juice is left in the bottle?**

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