L3 Simplifying Division

3.1 Simplification

There are three different signs for showing division.

'12 divided by 4' can be written as 12 ÷ 4, $\frac{12}{4}$, 12/4. We will not use the last sign '/' right now.

The first sign, ÷, the one you are most familiar with is like the second but with dots to show where the numbers go.

3.1.1 Write down the answers to these divisions.

a. $\frac{20}{4}$ b. $\frac{18}{3}$ c. $\frac{72}{9}$

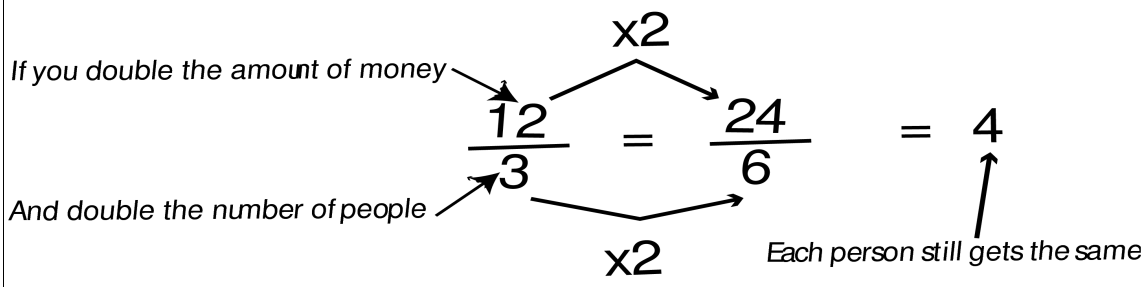
d. $\frac{144}{2}$ e. $\frac{57}{3}$ f. $\frac{108}{6}$

3.1.2 A Division pattern problem.

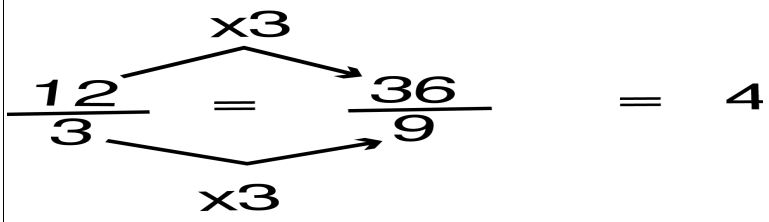
a. Rs 25 is to be divided equally between 5 people.
   i. How much does each person get?
   ii. If there were twice as much money, how much would each person get?
   Iii. If there were twice as much money and twice as many people, how much would each person get?

b. Rs 36 is to be divided equally between 12 people.
   i. How much money does each person get?
   ii. If there were half as much money and half as many people, how much would each person get?
   iii. If there were 5 times as much money and 5 times as many people, how much would each person get?
   iv. If there were 137 times as much money and 137 times as many people, how much would each person get?

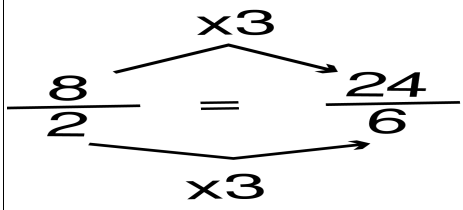
Suppose you divide Rs. 12 between 3 people. To find what each person gets you do $\frac{12}{3}$ = 4



Similarly,
If you have 3 times the amount and 3 times the number of people, each person gets the same.



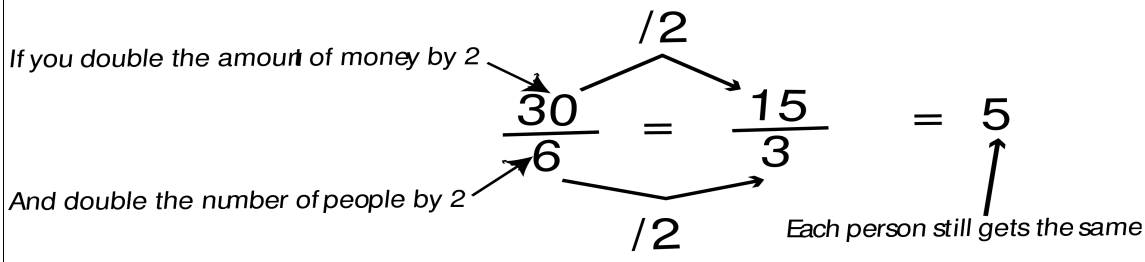
The answer to $\frac{A}{B}$ or A ÷ B is not changed when A and B are both multiplied by the same number. For example,



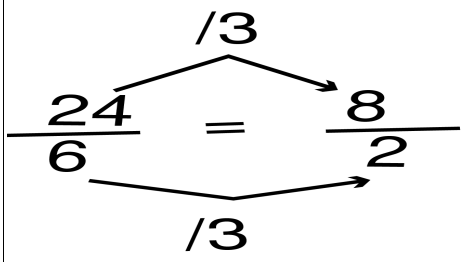
or

18 ÷ 3 = 6
x 5 x 5
90 ÷ 15 = 6

Suppose you want to divide Rs. 30 between 6 people. To find what each person gets you do 30 ÷ 6 = 5.



The answer to $\frac{A}{B}$ or A ÷ B is not changed when A and B are both divided by the same number. For example,

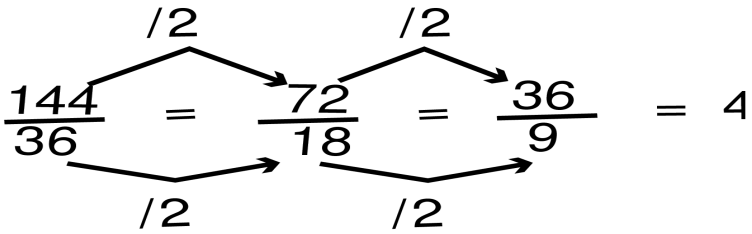


or

90 ÷ 15 = 6
÷5 ÷5
18 ÷ 3 = 6

This rule can sometimes be used to make division easier.
For example, you can divide 144 by 36 like this.

144 ÷ 36 = 72 ÷ 18 = 36 ÷ 9 = 4
or



3.1.3 Work out the following using the above rules

a. Divide 96 by 16

b. Divide 144 by 48

c. Divide 84 by 14

d. Divide 360 by 24

e. Divide 540 by 18

f. Divide 2000 by 25

3.1.4 Work these out using the rules shown above

a. $\frac{405}{45}$

b. $\frac{192}{32}$

c. $\frac{240}{16}$

3.2 More division patterns

Suppose you want to divide Rs 60 between 6 people. To find out how much each person gets you do 60 ÷ 6 = 10.

If the amount of money is doubled i.e. now we have Rs 60 x 2 = Rs 120, and we have to divide it among the same number of people i.e. 6, does each person get more money or less money?

Each person gets more money and in fact gets double the amount of money than before i.e. Rs. 20

If the amount is further increased to Rs 130, and the number of people is still 6, will each person get more than Rs. 20 or less?
Each person gets more than Rs. 20.

As the amount is increased, the money each person gets increases.

The answer (quotient, Q) of A ÷ B (or $\frac{A}{B}$ *) increases if the dividend A increases and decreases if the dividend A decreases, provided the divisor B remains the same.*

For example:
15 ÷ 5 > 10 ÷ 5 because 15 > 10, and
32 ÷ 8 < 40 ÷ 8 because 32 < 40.

Suppose you now keep the amount the same i.e. Rs. 60 and double the number of people. To find out how much each person gets you do
60 ÷ 12 = 30 ÷ 6 = 5. Each person gets Rs. 5.
i.e. if the number of persons is doubled (increased) the money each person gets has halved (decreased).

If the number of people is further increased to 15, the amount each person gets is 60 ÷ 15 = 12 ÷ 3 = Rs. 4. It has decreased also.

As the number of people increases the money each person gets decreases.

The answer (quotient, Q) of A ÷ B (or $\frac{A}{B}$ *) decreases if the divisor B increases and increases if the divisor B decreases, provided the dividend A remains the same.*

For example:
15 ÷ 5 < 15 ÷ 3, because 5 > 3 and
32 ÷ 4 > 32 ÷ 8, because 4 < 8.

Suppose you had to divide Rs. 60 among 6 people again. Each person gets 60 ÷ 6 = Rs. 10 as you have already seen.

Suppose the amount is increased to Rs 120. You know that each person gets more money i.e. Rs 120 ÷ 6 = Rs 20.

Now if you decrease the number of people to 5. Will they get more than Rs. 20 each or less?

They will get more than Rs. 20 each because the divisor has increased for the same amount (Rs. 120). They will each get 120 ÷ 5 = Rs. 24.

When we increase the amount AND decrease the number of people at the same time, the money each person gets increases.

What happens when we decrease the amount to Rs. 50 and increase the number of people to 10? The money each person gets is 50 ÷ 10 = Rs 5, which is less than the original Rs. 10.

When we decrease the amount and increase the number of people at the same time, the money each person gets decreases.

The answer (quotient, Q) of A ÷ B (or $\frac{A}{B}$ *) increases if the dividend A increases and/ or the divisor B decreases and decreases if the dividend A decreases and/ or the divisor B increases.*

For example:
15 ÷ 5 < 18 ÷ 3, because 15 < 18 and 5 > 3
32 ÷ 4 > 30 ÷ 8, because 32 > 30 and 4 < 8.

3.2.1 Insert the appropriate signs (<, >, =). Use the above rules. Do not perform the actual multiplication or division. Note you may need to simplify your division in some of the problems.

a. 52 ÷ 8	54 ÷ 8	b. 238 ÷ 9	238 ÷ 11
c. 400 ÷ 100	200 ÷ 50	d. 99 ÷ 11	88 ÷ 11
e. 278 x 47	300 x 47	f. 345 x 28	345 x 29
g. 300 x 28	350 x 28	h. 345 x 28	300 x 25
i. 30 ÷ 28	60 ÷ 14	j. 250 ÷ 50	300 ÷ 40
k. 250 ÷ 50	300 ÷ 60	l. 48 ÷ 4	24 ÷ 2

3.2.2 What we have learnt so far. Can you give an example to illustrate each of these?

a. When you multiply one of the factors of a product by 10, the resulting product is multiplied by 10.

b. When you multiply one of the factors of a product by any number, the resulting product is multiplied by that number; and when you divide one of the factors of a product by any number, the resulting product is divided by that number.

c. When one or more factors in a product are increased, the product increases and vice versa.

d. In a division operation, when we multiply (or divide) the dividend and the divisor by the same number, the quotient remains the same.

e. In a division operation, when you multiply the dividend by 10, the resulting quotient is multiplied by 10.

f. In a division operation, when you multiply the dividend by any number, the resulting quotient is multiplied by the same number.

g. In a division operation, when you increase the dividend, the resulting quotient increases, and when you decrease the dividend, the resulting quotient is decreased.

h. In a division operation, when you increase the divisor, the resulting quotient decreases, and when you decrease the divisor, the resulting quotient increases.

End of L3