L5 Dividing by a 2-digit number

5.1 Dividing by a 2-digit number

Example 1:
A farmer has 757 mangoes. There are two boxes he can use to package the mangoes. The smaller one holds 9 mangoes each and the larger one holds 24 mangoes each.
I. If he packs all the mangoes in the small boxes, how many boxes will he need? (757 ÷ 9)
II. If he packs all the mangoes in the large boxes, how many boxes will he need? (757 ÷ 24)

So far we know how to do the division in I. We can do the division in II. in much the same way.
Go through the table on the following page and see the similarity between dividing by single digit numbers and 2digit numbers.

Step No.	757 ÷ 9	757 ÷ 24	Working
1.	$9\overline{)757}$ 9 is greater than 7 look at the first 2 digits (75)	$24\overline{)757}$ 24 is greater than 7 look at the first 2 digits (75)	
2.	How many whole 9s are there in 75? There are 8 nines $\begin{array}{r} 8 \\ 9\overline{)757} \\ -72 \\ \hline 03 \end{array}$	How many whole 24s are there in 75? There are 3 24s in 75 $\begin{array}{r} 3 \\ 24\overline{)757} \\ -72 \\ \hline 03 \end{array}$	Look at the first digits of 24 (2)and 75 (7). 2 x 3 = 6 2 x 4 = 8 (> 7) Let us try 3. 24 x 3 = 72 (, 05) 24 x 4 = 96 (> 75)
3.	Bring down the next digit	Bring down the next digit	

	$\begin{array}{r} 8 \\ 9\overline{)757} \\ -72 \\ \hline 037 \end{array}$ How many whole 9s in 37? There are 4. 9 x 4 = 36; 9 x 5 =45 (> 37)	$\begin{array}{r} 3 \\ 24\overline{)757} \\ -72 \\ \hline 037 \end{array}$ How many whole 24s in 37? There is 1 because 24 x 1 = 24 24 x 2 = 48 (> 37)	
4.	$\begin{array}{r} 84 \\ 9\overline{)757} \\ -72 \\ \hline 037 \\ -036 \\ \hline 001 \end{array}$	$\begin{array}{r} 31 \\ 24\overline{)757} \\ -72 \\ \hline 037 \\ -024 \\ \hline 013 \end{array}$	
5.	757 ÷ 9 = 84 R 1	757 ÷ 24 = 31 R 13	

Let us do another example.

Example 2: 9386 divided by 32. (dividend = 9386; divisor = 32)

Step 1: Try and simplify the division. Both the dividend and divisor are even numbers. Divide both by 2.

$$\frac{9386}{32} = \frac{4693}{16}$$

Cannot simplify further. Continue the division with the new dividend and divisor.

Step 2: Estimate the answer.
4693 ÷ 16

4000 ÷ 20 (decreased the dividend & increased the divisor) approximate quotient is less than the actual.

2 x 2 = 4

20 x 2 = 40
20 x 20 = 400
20 x 200 = 4000
Quotient will be > 200

5000 ÷ 20 (increased the dividend and increased the divisor)
We cannot say if approximate quotient will be more or less than actual, but it will be close to actual.
2 x 25 = 50
20 x 25 = 500
20 x 250 = 5000

Actual quotient will be > 200 and somewhere near 250.

Step 3: 4693 ÷ 16

No.	4693 ÷ 16	Rough Work
1	Look at the first 2 digits How many whole 16s in 46? Answer; There are 2 whole 16s in 46	Look at the first digits of 16 and 46. 1 x 4 = 4 Try 4, 16 x 4 = 64 (too large) Try 3, 16 x 3 = 48 (too large) Try 2, 16 x 2 = 32 (< 46)
2	2 16 ⟌ 4693 - 32 149 Bring down the 9.	
3	How many whole 16s in 149? There are 9 whole 16s in 149	Look at the first 2 digits 16 > 14 16 x 10 = 160 (> 149) Try 9, 16 x 9 = 144 (< 149)

4	29 16⟌ 4693 -32 149 -144 0053 Bring down the 3.	
5	How many whole 16s in 53? Answer: There are 3 whole 16s in 53.	Look at the first digit 1 x 5 = 5 try 5, 16 x 5 = 80 (too large) try 4, 16 x 4 = 64 (too large) try 3, 16 x 3 = 48 (< 53)
6	293 16⟌ 4693 -32 149 -144 0053 0048 0005	
7	4693 ÷ 16 = 293 R5	

Step 4: Check your answer.

Quotient is 293. 293 > 200, and is close to 250.

For a more exact check, use the inverse operation.

293 x 16 = 4688

Add the remainder (5) you get back 4693 (division is correct)

Note: The remainder too gets simplified in Step 1.

So the 9386 ÷ 32 = 293 R 10 and 4693 ÷ 16 = 293 R5

511 Solve the following. You may get remainders. Check your answers and show the working.

a. 4973 divided by 62

b. 7412 divided by 81

c. 33456 ÷ 41

d. 3960 ÷88

e. 23,128 ÷ 56

f. 3293 ÷ 37

g. 975 ÷ 8

h. 2140 ÷ 12

I . 4620 ÷ 15

End of L5