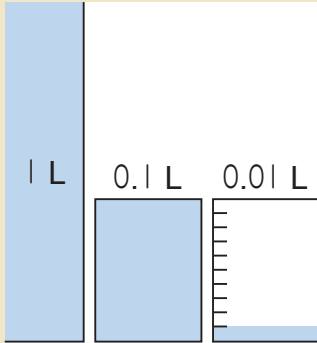


11 - 1

Decimal Numbers-I

How to Express Decimal Numbers (I)

Instruction

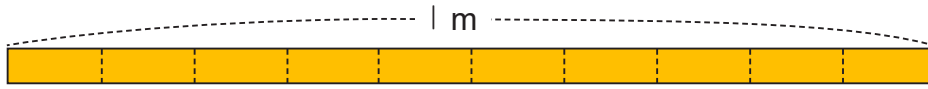


$\frac{1}{10}$ of 0.1 L is written as 0.01 L.

It is read as “zero point zero one litres.”

$\frac{1}{10}$ of 0.01 L is written as 0.001 L.

It is read as “zero point zero zero one litres.”



$\frac{1}{10}$ of 0.1 m is written as 0.01 m.

It is read as “zero point zero one metres.”

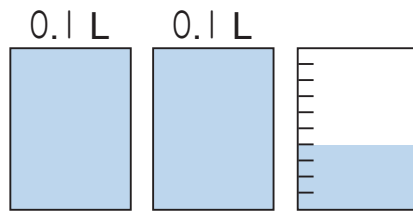


$\frac{1}{10}$ of 0.01 m is written as 0.001 metres.

It is read as “zero point zero zero one metres.”

Example

How many litres of water are in the containers shown below?



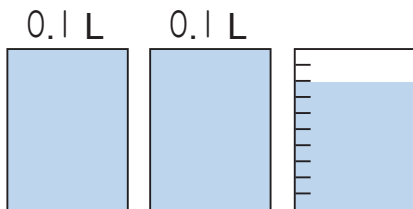
This is read as “zero point two four litres”.



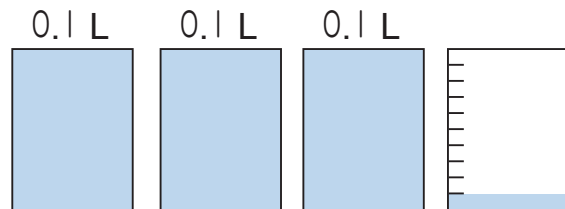
0.24 L

Answer the following the amount of water and length of tapes.

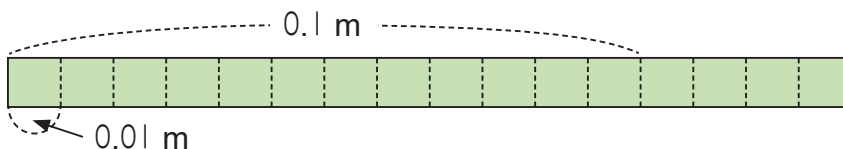
1 L



2 L



3 m



11 - 2

Decimal Numbers-I

How to Express Decimal Numbers (2)

Example 1 How many 0.01 L are needed to make 0.05 L, 0.09 L and 0.1 L, respectively?

0.05 L is made of 0.01 L.

0.09 L is made of 0.01 L.

0.1 L is made of 0.01 L.

One 0.01 L is
0.01 L.
Two 0.01 L is
0.02 L.

Answer the following questions.

1 How many 0.01 L are needed to make 0.04 L, 0.07 L, 0.12 L, and 1.23 L, respectively?

0.04 L is made of 0.01 L. 0.07 L is made of 0.01 L.

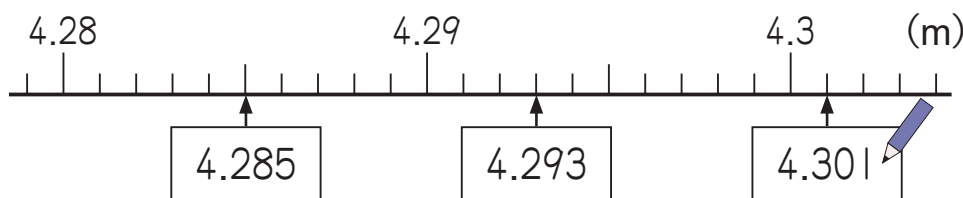
0.12 L is made of 0.01 L. 1.23 L is made of 0.01 L.

2 How many 0.001 m are needed to make 0.006 m, 0.008 m, 0.01 m, 0.1 m, respectively?

0.006 m is made of 0.001 m. 0.008 m is made of 0.001 m.

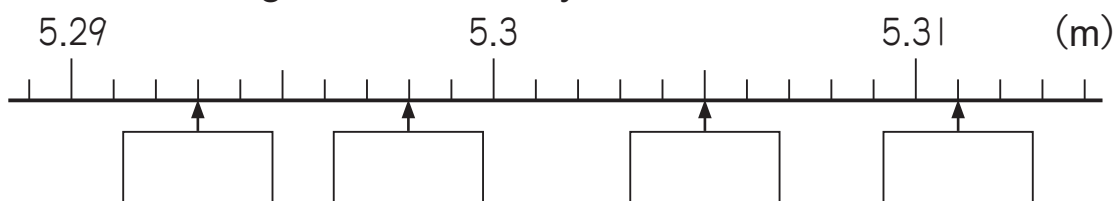
0.01 m is made of 0.001 m. 0.1 m is made of 0.001 m.

Example 2 What are the lengths indicated by the arrows?



The smallest tick shows 0.001 m.

What are the lengths indicated by the arrows?



11 - 3

Decimal Numbers-I

How to Express Decimal Numbers (3)

Instruction Think about the relations between **km** and **m**, and **kg** and **g**.

The relation between km and m:

$$1000 \text{ m} = 1 \text{ km}$$

$$100 \text{ m} \left(\frac{1}{10} \text{ of } 1 \text{ km}\right) = 0.1 \text{ km}$$

$$10 \text{ m} \left(\frac{1}{10} \text{ of } 0.1 \text{ km}\right) = 0.001 \text{ km}$$

$$1 \text{ m} \left(\frac{1}{10} \text{ of } 0.01 \text{ km}\right) = 0.0001 \text{ km}$$

The relation between kg and g:

$$1000 \text{ g} = 1 \text{ kg}$$

$$100 \text{ g} \left(\frac{1}{10} \text{ of } 1 \text{ kg}\right) = 0.1 \text{ kg}$$

$$10 \text{ g} \left(\frac{1}{10} \text{ of } 0.1 \text{ kg}\right) = 0.001 \text{ kg}$$

$$1 \text{ g} \left(\frac{1}{10} \text{ of } 0.01 \text{ kg}\right) = 0.0001 \text{ kg}$$

Example Convert the following to km or kg as indicated next to the answer box.

① 3 km 500 m (km) km ② 750 g (kg) kg

Convert the following to km or kg as indicated next to the answer box.

① 2 km 400 m (km) km ② 1 km 550 m (km) km ③ 3 km 30 m (km) km

④ 500 m (km) km ⑤ 950 m (km) km ⑥ 680 m (km) km

⑦ 4 kg 500 g (kg) kg ⑧ 1 kg 250 g (kg) kg ⑨ 2 kg 300 g (kg) kg

⑩ 900 g (kg) kg ⑪ 750 g (kg) kg ⑫ 880 g (kg) kg

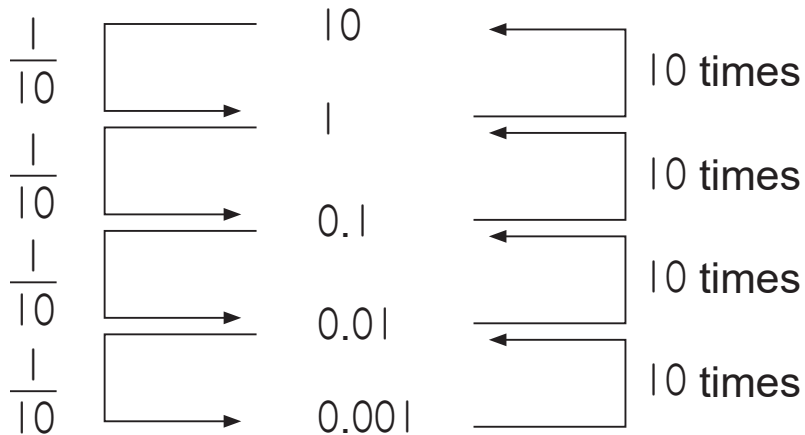
11 - 4

Decimal Numbers-I

Structure of Decimal Numbers (I)

Instruction The relationship between 1, 0.1, 0.01, and 0.001 are as follows:

Decimal numbers are just like whole numbers.



Example Write appropriate numbers in the .

1 10 times of 0.1 is .

2 100 times of 0.1 is .

Write appropriate numbers in the .

1 10 times of 0.01 is .

2 100 times of 0.01 is .

3 1000 times of 0.01 is .

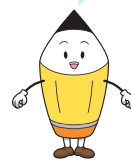
4 $\frac{1}{10}$ of 0.1 is .

5 $\frac{1}{100}$ of 0.1 is .

6 $\frac{1}{10}$ of 0.01 is .

7 $\frac{1}{100}$ of 0.01 is .

You can look carefully at the above instruction to solve these problems.

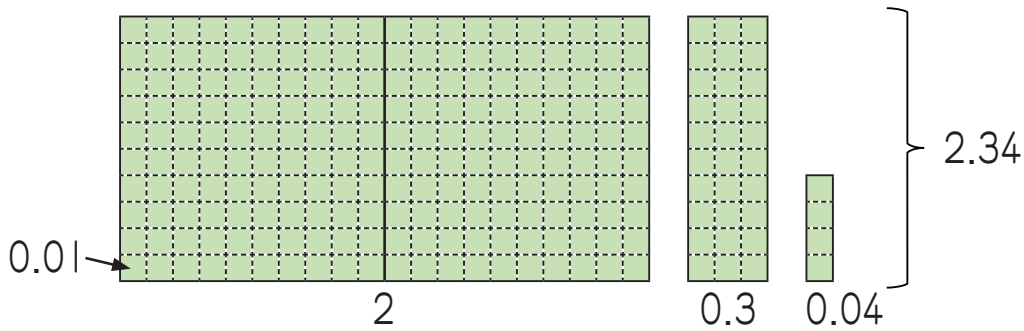


11 - 5

Decimal Numbers-I

Structure of Decimal Numbers (2)

Example 2.34 is made of 234 units of 0.01's.



2	is equal to	200	0.01's.
0.3	is equal to	30	0.01's.
0.4	is equal to	4	0.01's.
<hr/>			
2.34	is made of	234	0.01's.

The structure of decimal numbers are just like whole numbers.



Example Write appropriate numbers in the .

1 0.03 is equal to 0.01's.

2 16 units of 0.01's is equal to .

Write appropriate numbers in the .

1 0.05 is equal to 0.01's. 2 7 units of 0.01's is equal to .

3 0.63 is equal to 0.01's. 4 18 units of 0.01's is equal to .

5 1.37 is equal to 0.01's. 6 234 units of 0.01's is equal to .

7 3.04 is equal to 0.01's. 8 105 units of 0.01's is equal to .

9 0.1 is equal to 0.01's. 10 10 units of 0.01's is equal to .

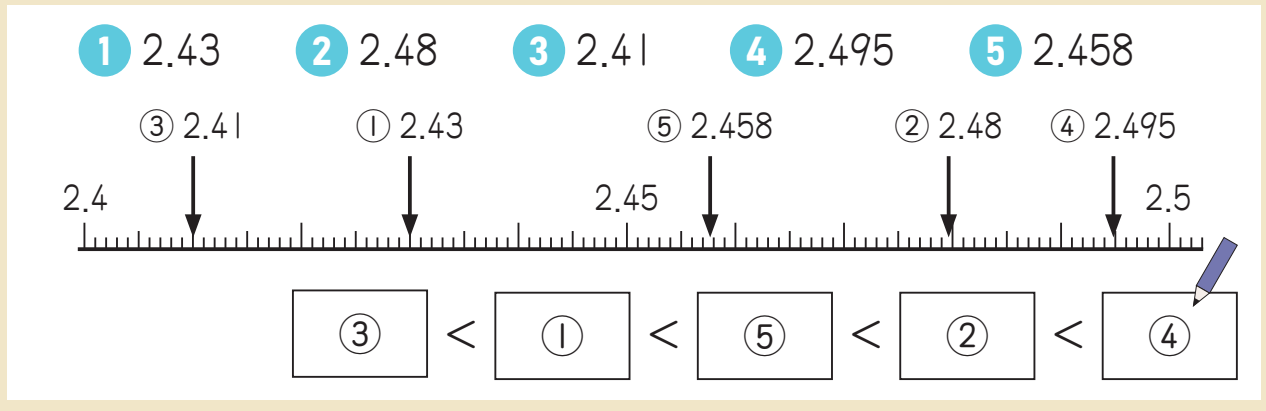
11 1 is equal to 0.01's. 12 100 units of 0.01's is equal to .

11 - 6

Decimal Numbers-I

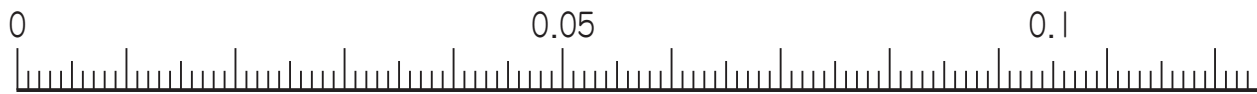
Structure of Decimal Numbers (3)

Example Put the following numbers on the number line. Then fill in the boxes using the letter in the correct order.



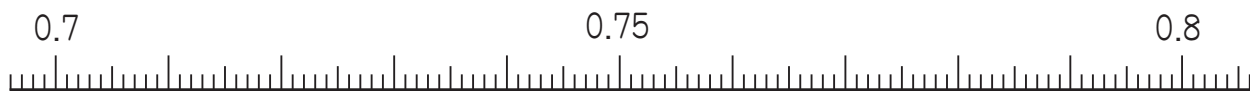
Put the following numbers on the number line. Then fill in the boxes using the letter in the correct order.

- 1** ① 0.09 ② 0 ③ 0.07 ④ 0.025 ⑤ 0.045



$\boxed{} < \boxed{} < \boxed{} < \boxed{} < \boxed{}$

- 2** ① 0.74 ② 0.71 ③ 0.73 ④ 0.775 ⑤ 0.796



$\boxed{} < \boxed{} < \boxed{} < \boxed{} < \boxed{}$

- 3** ① 0.33 ② 0.31 ③ 0.387 ④ 0.342 ⑤ 0.365



$\boxed{} < \boxed{} < \boxed{} < \boxed{} < \boxed{}$

11 - 7

Decimal Numbers-I

Structure of Decimal Numbers (4)

Example

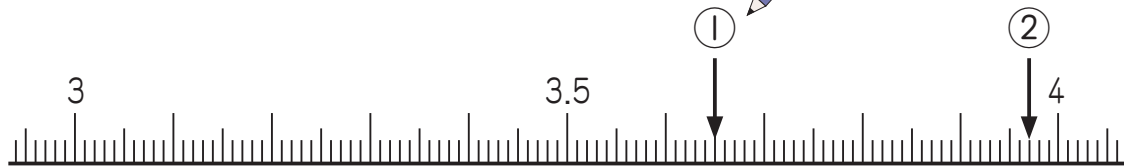
Solve the word problem and write the answer in the box. Mark where the answer belongs on the number line.

1 3 and 0.65 together

3.65

2 0.03 less than 4

3.97



Solve the word problem and write the answer in the box. Mark the answer belongs on the number line.

1 5 and 0.46 together

2 0.05 less than 6

3 0.38 less than 6

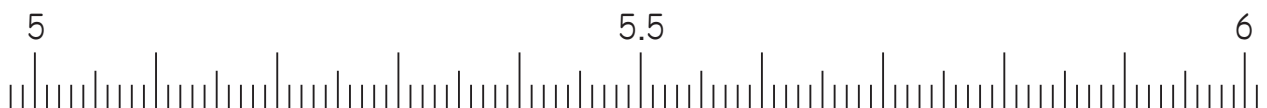
4 0.02 greater than 5

5 0.11 greater than 5

6 Five 1's, three 0.1's and eight 0.01's together

7 586 units of 0.01's together

8 525 units of 0.01's together



11 - 8

Decimal Numbers-I

Structure of Decimal Numbers (5)

Instruction

The first place to the right of the decimal point is called the **Tenths Place** (or the first decimal place) as we have already learnt. The second place to the right of the decimal point is called the **Hundredths** ($\frac{1}{100}$'s) **Place** (or the second decimal place). It is equal to $\frac{1}{100}$. The third place to the right of the decimal point is called the **Thousandths** ($\frac{1}{1000}$'s) **Place** (or the third decimal place). It is equal to $\frac{1}{1000}$.

	0.1 0.1 0.1 0.1	0.01 0.01 0.01 0.01	0.001 0.001 0.001 0.001 0.001
Ones Place	Tenths Place	Hundredths Place	Thousandths Place
2	3	4	5

Decimal Point

A decimal place to the left is multiplied by 10. A decimal place to the right is multiplied by $\frac{1}{10}$.

Example

What is 2.34 multiplied by 10?

What is 2.34 multiplied by $\frac{1}{10}$?

Tens Place	Ones Place	Tenths Place	Hundredths Place	Thousandths Place
2	3	4		
	2	3	4	
		2	3	4

10 times 23.4 $\frac{1}{10}$ 0.234

Answer the following questions.

- 1 What is 4.12 multiplied by 10?
- 2 What is 0.284 multiplied by 100?
- 3 What is 1.35 multiplied by $\frac{1}{10}$?
- 4 What is 1.54 multiplied by $\frac{1}{100}$?

11 - 9

Decimal Numbers-I

Addition of Decimal Numbers (I)

Example Calculate $1.75 + 2.64$ by using the addition algorithm.

	1	.	7	5
+	2	.	6	4

Write the two numbers so that the places are lined up.

	1	.	7	5
+	2	.	6	4
	4		3	9

Calculate as if we were adding whole numbers.

	1	.	7	5
+	2	.	6	4
	4	.	3	9

Place the decimal point in the same place as the other two numbers.

Calculate the following problems by using the addition algorithm.

1 $2.47 + 4.32$

	2	.	4	7
+	4	.	3	2

2 $1.83 + 2.65$

	1	.	8	3
+	2	.	6	5

3 $1.45 + 0.71$

		.		
		.		

4 $7.62 + 1.29$

5 $2.64 + 3.17$

6 $0.65 + 1.58$

7 $8.55 + 0.76$

8 $5.73 + 1.48$

9 $6.12 + 0.99$

10 $26.73 + 12.81$

11 $4.945 + 0.371$

12 $6.809 + 7.272$

Even if the number of digits increases, it can be calculated in the same way as a whole number.



4		5		6		7		8	
9		10		11		12			

11 - 10

Decimal Numbers-I

Addition of Decimal Numbers (2)

Example Calculate $0.526 + 0.374$ by using the addition algorithm.

	0	.	5	2	6
+	0	.	3	7	4

Write the two numbers so that the places are lined up.

	0	.	5	2	6
+	0	.	3	7	4
	0		9	0	0

Disregard the first "0" of the numbers and calculate as if we were adding whole numbers.

	0	.	5	2	6
+	0	.	3	7	4
	0	.	9	0	0

Place the decimal point in the same place as the other two numbers. With decimals, any to the right of the last digit can be crossed out.

Calculate the following problems by using the addition algorithm. Cross out any unnecessary zeros.

1 $0.56 + 0.34$

	0	.	5	6
+	0	.	3	4

2 $3.29 + 1.51$

	3	.	9	2
+	1	.	5	1

3 $0.139 + 0.241$

	0	.	1	3	9
+	0	.	2	4	1

4 $3.249 + 0.541$

5 $0.074 + 0.586$

6 $0.157 + 2.623$

7 $2.734 + 1.186$

8 $1.384 + 4.516$

9 $0.147 + 0.753$

10 $1.249 + 4.351$

11 $3.725 + 1.175$

12 $0.341 + 3.659$

4		5		6		7		8	
9		10		11		12			

11 - 11

Decimal Numbers-I

Addition of Decimal Numbers (3)

Example Calculate $3.6 + 0.835$ by using the addition algorithm.

	3	.	6		
+	0	.	8	3	5

Write the two numbers so that the places are lined up.

	3	.	6	0	0
+	0	.	8	3	5
	4		4	3	5

Think of 3.6 as 3.600. Calculate as if we were adding whole numbers.

	3	.	6	0	0
+	0	.	8	3	5
	4	.	4	3	5

Place the decimal point in the same place as the other two numbers.

Calculate the following problems by using the addition algorithm.

1 $2.8 + 0.34$

	2	.	8	0
+	0	.	3	4

2 $4.5 + 2.53$

	4	.	5	0
+	2	.	5	3

3 $1.6 + 0.948$

	1	.	6	0	0
+	0	.	9	4	8

4 $5.3 + 0.761$

5 $2.8 + 5.325$

6 $1.2 + 3.845$

7 $3.1 + 0.96$

8 $18.5 + 1.57$

9 $59.3 + 0.78$

10 $25.2 + 3.86$

11 $21 + 9.46$

12 $1 + 9.96$

Writing a 0 to align the numbers in the decimal places makes it easier to calculate.



4		5		6		7		8	
9		10		11		12			

11 - 12

Decimal Numbers-I

Subtraction of Decimal Numbers (I)

Example Calculate $3.64 - 2.76$ by using the subtraction algorithm.

	3	.	6	4
-	2	.	7	6

Write the two numbers so that the places are lined up.

	² 3	¹⁵ .	¹⁴ 6	4
-	2	.	7	6
	0		8	8

Calculate as if we were subtracting whole numbers.

	² 3	¹⁵ .	¹⁴ 6	4
-	2	.	7	6
	0	.	8	8

Place the decimal point in the same place as the other two numbers.

Calculate the following problems by using the subtraction algorithm.

1 $4.56 - 2.34$

	4	.	5	6
-	2	.	3	4

2 $3.26 - 2.48$

	3	.	2	6
-	2	.	4	8

3 $6.85 - 4.96$

		.		

4 $4.03 - 0.86$

5 $2.41 - 1.85$

6 $7.36 - 5.47$

7 $8.23 - 6.84$

8 $5.84 - 4.89$

9 $1.24 - 0.99$

10 $48.85 - 27.96$

11 $37.24 - 5.95$

12 $0.927 - 0.688$

4		5		6		7		8	
9		10		11		12			

11 - 13

Decimal Numbers-I

Subtraction of Decimal Numbers (2)

Example Calculate $0.8 - 0.35$ by using the subtraction algorithm.

	0	.	8	
-	0	.	3	5

Write the two numbers so that the places are lined up.

			⁷	¹⁰
	0	.	8	0
-	0	.	3	5
	0		4	5

Think of 0.8 as 0.80. Disregard the first "0" of the numbers and calculate as if we were subtracting whole numbers.

			⁷	¹⁰
	0	.	8	0
-	0	.	3	5
	0	.	4	5

Place the decimal point in the same place as the other two numbers.



Use 0 as necessary to subtract correctly.

Calculate the following problems by using the subtraction algorithm.

1 $0.6 - 0.37$

	0	.	6	
-	0	.	3	7

2 $4.5 - 0.25$

	4	.	5	
-	0	.	2	5

3 $5.3 - 3.16$

		.		
		.		

4 $3.2 - 1.56$

5 $5.4 - 3.69$

6 $1.4 - 0.87$

7 $6.2 - 4.56$

8 $8.6 - 7.59$

9 $0.2 - 0.15$

10 $10.6 - 9.86$

11 $1.83 - 0.936$

12 $1.14 - 1.137$

Like the addition algorithm, writing a 0 to align the numbers in the decimal places makes it easier to calculate.



4		5		6		7		8	
9		10		11		12			

11 - 14

Decimal Numbers-I

Subtraction of Decimal Numbers (3)

Example Calculate $3 - 0.456$ by using the subtraction algorithm.

	3.		
-	0.	4	5 6

	3.	0	0	0
-	0.	4	5	6
	2	5	4	4

	3.	0	0	0
-	0.	4	5	6
	2	5	4	4

Write the two numbers so that the places are lined up.

Think of 3 as 3.000. Calculate as if we were subtracting whole numbers.

Place the decimal point in the same place as the other two numbers.



Use 0 as necessary to subtract correctly.

Calculate the following problems by using the subtraction algorithm.

1 $5 - 0.25$

	5.	0	0
-	0.	2	5

2 $7 - 3.46$

	7.	0	0
-	3.	4	6

3 $3 - 1.19$

4 $6 - 5.36$

5 $1 - 0.61$

6 $8 - 7.94$

7 $2 - 1.87$

8 $4 - 3.18$

9 $10 - 9.21$

10 $42 - 9.96$

11 $9 - 0.036$

12 $2 - 1.097$

You can write a 0 to align the numbers in the decimal places. Then you can calculate it easier.



4		5		6		7		8	
9		10		11		12			

11 - 15

Decimal Numbers-I

Review

1 Write the answers in the .

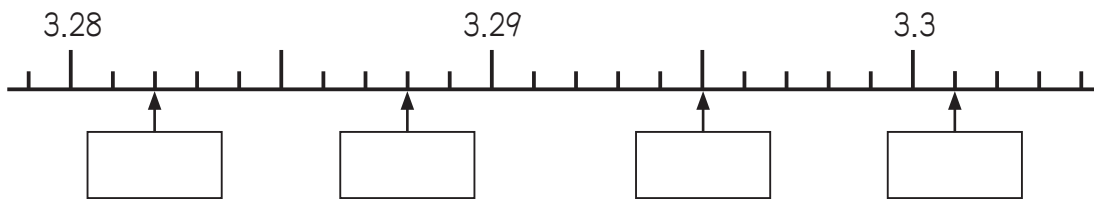
1 3.46 is equal to 3 and together.

2 1.23 is less than 1.3.

3 2.34 is equal to 1's, 0.1's, and 0.01's together.

4 1.234 is equal to 0.001's.

2 Write the number in the that the arrow points to on the number line.



3 Answer the following problems.

1 What number is 100 times as much as 0.678?

2 What number is $\frac{1}{10}$ of 0.35?

4 Calculate the following by using the algorithm.

1 $0.48 + 1.37$

2 $2.67 + 4.47$

3 $5.84 + 1.69$

4 $0.76 + 2.47$

5 $1.273 + 3.817$

6 $2 + 9.68$

7 $2.35 - 1.17$

8 $5.95 - 3.86$

9 $6.4 - 2.17$

10 $8.1 - 7.13$

11 $5 - 3.999$

12 $1 - 0.879$

1		2		3		4	
5		5		7		8	
9		10		11		12	