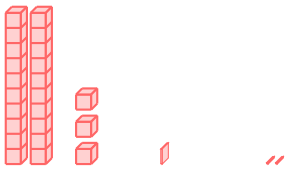
DECIMAL NUMBERS

A DEFINITION

A.1 IDENTIFYING PLACE VALUES

Ex 1:



The number of cubes is:

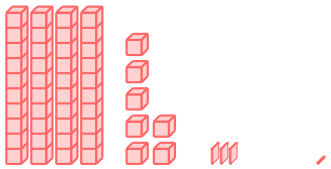
Tens	Ones	.	Tenths	Hundredths
2	3	.	1	2

Answer:

- 2 tens 3 ones 1 tenths 2 hundredths
-

Tens	Ones	.	Tenths	Hundredths
2	3	.	1	2

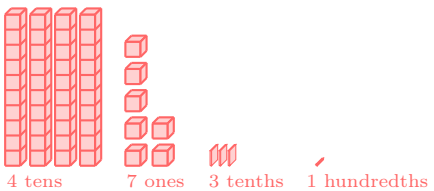
Ex 2:



The number of cubes is

Tens	Ones	.	Tenths	Hundredths
4	7	.	3	1

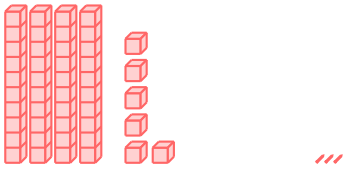
Answer:



- 4 tens 7 ones 3 tenths 1 hundredths
-

Tens	Ones	.	Tenth	Hundredths
4	7	.	3	1

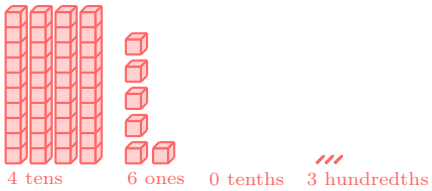
Ex 3:



The number of cubes is

Tens	Ones	.	Tenths	Hundredths
4	6	.	0	3

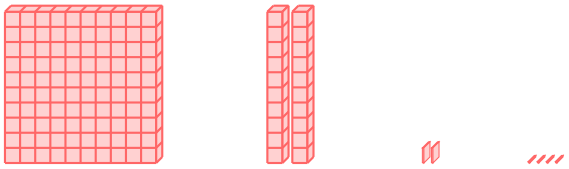
Answer:



- 4 tens 6 ones 0 tenths 3 hundredths
-

Tens	Ones	.	Tenth	Hundredths
4	6	.	0	3

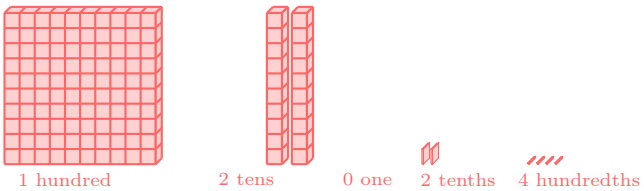
Ex 4:



The number of cubes is

Hundreds	Tens	Ones	.	Tenths	Hundredths
1	2	0	.	2	4

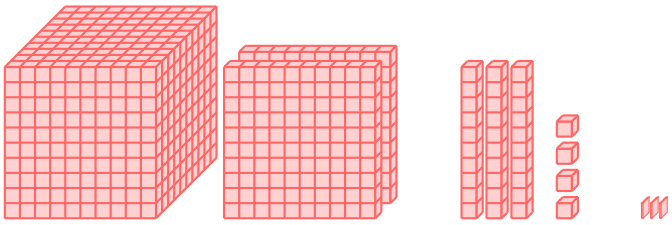
Answer:



- 1 hundred 2 tens 0 one 2 tenths 4 hundredths
-

Hundreds	Tens	Ones	.	Tenths	Hundredths
1	2	0	.	2	4

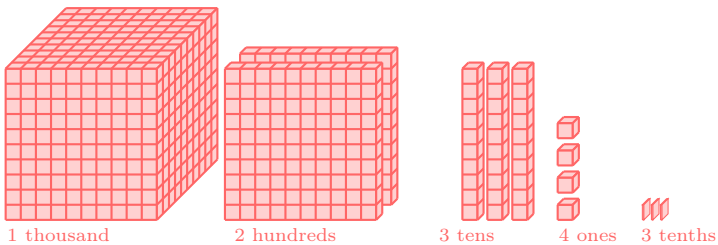
Ex 5:



The number of cubes is

Thousands	Hundreds	Tens	Ones	.	Tenths
1	2	3	4	.	3

Answer:



- 1 thousand 2 hundreds 3 tens 4 ones 3 tenths
-

Thousands	Hundreds	Tens	Ones	.	Tenths
1	2	3	4	.	3

A.2 WRITING DECIMAL NUMBERS

Ex 6:

Tens	Ones	.	Tenths	Hundredths
2	3	.	1	2

The decimal number is $\boxed{23.12}$.

Answer:

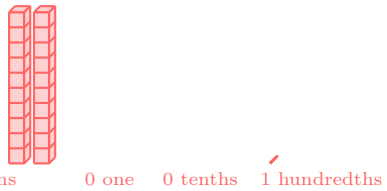
- The decimal number is 23.12.
- 

Ex 7:

Tens	Ones	.	Tenths	Hundredths
2	0	.	0	1

The decimal number is $\boxed{20.01}$.

Answer:

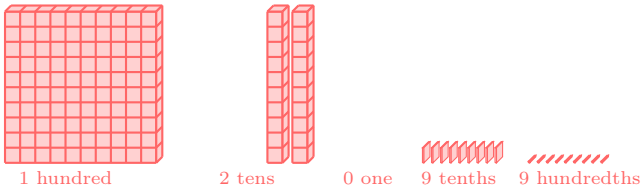
- The decimal number is 20.01.
- 

Ex 8:

Hundreds	Tens	Ones	.	Tenths	Hundredths
1	2	0	.	9	9

The decimal number is $\boxed{120.99}$.

Answer:

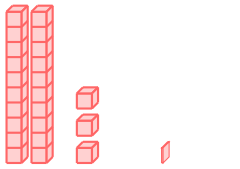
- The decimal number is 120.99.
- 

Ex 9:

Tens	Ones	.	Tenths	Hundredths
2	3	.	1	0

The decimal number is $\boxed{23.1}$.

Answer:

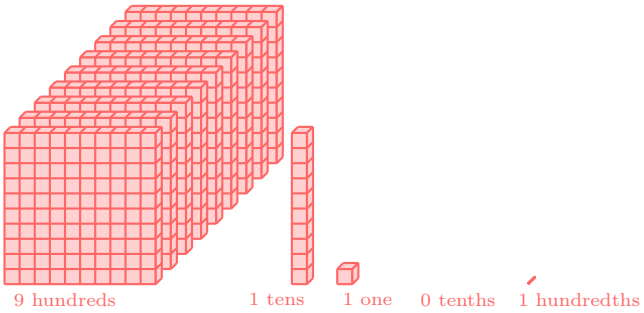
- The decimal number is $23.10 = 23.1$.
- 

Ex 10:

Hundreds	Tens	Ones	.	Tenths	Hundredths
9	1	1	.	0	1

The decimal number is $\boxed{911.01}$.

Answer:

- The decimal number is 911.01.
- 

A.3 FINDING THE DIGIT IN A PLACE VALUE

Ex 11: The digit in the hundredths place of 43.21 is $\boxed{1}$.

Answer:

- 43.21 is

Tens	Ones	.	Tenths	Hundredths
4	3	.	2	1

- The digit in the hundredths place of 43.21 is 1.

Ex 12: The digit in the tens place of 900.01 is $\boxed{0}$.

Answer:

- 900.01 is

Hundreds	Tens	Ones	.	Tenths	Hundredths
9	0	0	.	0	1

- The digit in the tens place of 900.01 is 0.

Ex 13: The digit in the tenths place of 10.04 is $\boxed{0}$.

Answer:

- 10.04 is

Tens	Ones	.	Tenths	Hundredths
1	0	.	0	4

- The digit in the tenths place of 10.04 is 0.

Ex 14: The digit in the hundredths place of 0.89 is $\boxed{9}$.

Answer:

- 0.89 is

Ones	.	Tenths	Hundredths
0	.	8	9

- The digit in the hundredths place of 0.89 is 9.

A.4 WRITING DECIMAL NUMBERS FROM FRACTIONS IN BASE 10

Ex 15: Write in decimal form:

$$\frac{3}{10} = \boxed{0.3}$$

Answer:

- $\frac{3}{10} =$  3 tenths
- $\frac{3}{10} = 0.3$

Ex 16: Write in decimal form:

$$\frac{3}{100} = \boxed{0.03}$$

Answer:

- $\frac{3}{100} =$ 0 tenths 3 hundredths
- $\frac{3}{100} = 0.03$

Ex 17: Write in decimal form:

$$\frac{5}{100} = \boxed{0.05}$$

Answer:

- $\frac{5}{100} =$ 0 tenths 5 hundredths
- $\frac{5}{100} = 0.05$

Ex 18: Write in decimal form:

$$\frac{8}{10} = \boxed{0.8}$$

Answer:

- $\frac{8}{10} =$  8 tenths
- $\frac{8}{10} = 0.8$

A.5 WRITING DECIMAL NUMBERS FROM EXPANDED FORMS

Ex 19: 4 tens + 1 one + 2 tenths + 5 hundredths = $\boxed{41.25}$

Answer:

Tens	Ones	.	Tenths	Hundredths
4	1	.	2	5
- 4 tens + 1 one + 2 tenths + 5 hundredths = 41.25
-  4 tens 1 one 2 tenths 5 hundredths

Ex 20: 2 tens + 3 ones + 5 tenths + 1 hundredths = $\boxed{23.51}$

Answer:

Tens	Ones	.	Tenths	Hundredths
2	3	.	5	1
- 2 tens + 3 ones + 5 tenths + 1 hundredths = 23.51
-  2 tens 3 ones 5 tenths 1 hundredths

Ex 21: 2 tens + 5 hundredths = $\boxed{20.05}$

Answer:

Tens	Ones	.	Tenths	Hundredths
2	0	.	0	5
- 2 tens + 5 hundredths = 20.05
-  2 tens 0 one 0 tenths 5 hundredths

Ex 22: 1 hundredth = $\boxed{0.01}$

Answer:

Ones	.	Tenths	Hundredths
0	.	0	1
- 1 hundredth = 0.01

A.6 WRITING DECIMAL NUMBERS FROM EXPANDED FORMS II

Ex 23:

$$2 + 4 \times \frac{1}{10} + 1 \times \frac{1}{100} = \boxed{2.41}$$

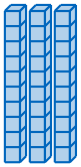
Answer:

- $2 + 4 \times \frac{1}{10} + 1 \times \frac{1}{100} =$  2 ones 4 tenths 1 hundredths
- $2 + 4 \times \frac{1}{10} + 1 \times \frac{1}{100} = 2.41$

Ex 24:

$$3 \times 10 + 1 + 2 \times \frac{1}{10} + 3 \times \frac{1}{100} = \boxed{31.23}$$

Answer:

- $3 \times 10 + 1 + 2 \times \frac{1}{10} + 3 \times \frac{1}{100} =$  3 tens 1 one 2 tenths 3 hundredths

- $3 \times 10 + 1 + 2 \times \frac{1}{10} + 3 \times \frac{1}{100} = 31.23$

Ex 25:

$$1 + 3 \times \frac{1}{100} = \boxed{1.03}$$

Answer:

- $1 + 3 \times \frac{1}{100} =$ 

- $1 + 3 \times \frac{1}{100} = 1.03$

Ex 26:

$$9 + 9 \times \frac{1}{10} + 9 \times \frac{1}{100} = \boxed{9.99}$$

Answer:

- $9 + 9 \times \frac{1}{10} + 9 \times \frac{1}{100} =$ 

- $9 + 9 \times \frac{1}{10} + 9 \times \frac{1}{100} = 9.99$

A.7 CONVERTING DECIMAL FRACTIONS TO DECIMALS

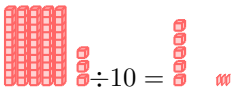
Ex 27:

$$\frac{53}{10} = \boxed{5.3}$$

Answer:

- Divide the numerator (53) by the denominator (10):

$$\frac{53}{10} = 5.3$$

- The decimal point is placed after the tenths position, resulting in 5.3.
- 

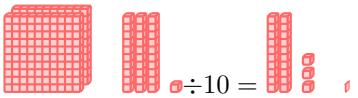
Ex 28:

$$\frac{231}{10} = \boxed{23.1}$$

Answer:

- Divide the numerator (231) by the denominator (10):

$$\frac{231}{10} = 23.1$$

- The decimal point is placed after the tenths position, resulting in 23.1.
- 

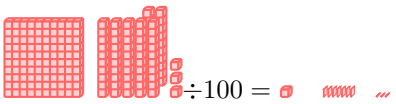
Ex 29:

$$\frac{173}{100} = \boxed{1.73}$$

Answer:

- Divide the numerator (173) by the denominator (100):

$$\frac{173}{100} = 1.73$$

- The decimal point is placed after the hundredths position, resulting in 1.73.
- 

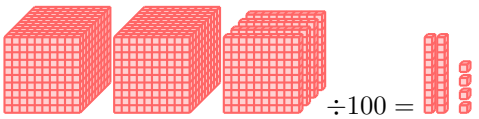
Ex 30:

$$\frac{2400}{100} = \boxed{24}$$

Answer:

- Divide the numerator (2400) by the denominator (100):

$$\frac{2400}{100} = 24$$

- The decimal point is placed after the whole number position, resulting in 24.0, which is equivalent to 24.
- 

A.8 CONVERTING DECIMALS TO DECIMAL FRACTIONS

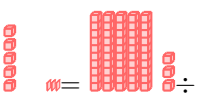
Ex 31:

$$5.3 = \frac{\boxed{53}}{\boxed{10}}$$

Answer:

- Rewrite the decimal number as a fraction:

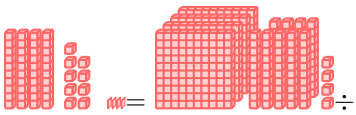
$$5.3 = \frac{53}{10}$$

- The number 5.3 means 5 ones and 3 tenths, which is equivalent to $\frac{53}{10}$.
- 

Ex 32:

$$49.4 = \frac{\boxed{494}}{\boxed{10}}$$

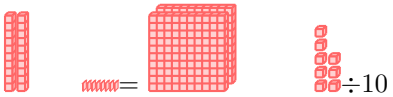
Answer:

- Rewrite the decimal number as a fraction:
$$49.4 = \frac{494}{10}$$
- The number 49.4 means 49 ones and 4 tenths, which is equivalent to $\frac{494}{10}$.
- 

Ex 33:

$$20.8 = \frac{\boxed{208}}{\boxed{10}}$$

Answer:

- Rewrite the decimal number as a fraction:
$$20.8 = \frac{208}{10}$$
- The number 20.8 means 20 ones and 8 tenths, which is equivalent to $\frac{208}{10}$.
- 

Ex 34:

$$6.82 = \frac{\boxed{682}}{\boxed{100}}$$

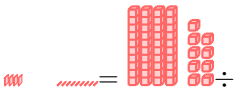
Answer:

- Rewrite the decimal number as a fraction:
$$6.82 = \frac{682}{100}$$
- The number 6.82 means 6 ones, 8 tenths, and 2 hundredths, which is equivalent to $\frac{682}{100}$.
- 

Ex 35:

$$0.49 = \frac{\boxed{49}}{\boxed{100}}$$

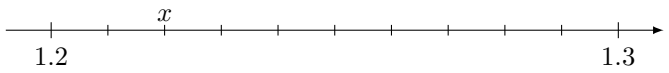
Answer:

- Rewrite the decimal number as a fraction:
$$0.49 = \frac{49}{100}$$
- The number 0.49 means 4 tenths and 9 hundredths, which is equivalent to $\frac{49}{100}$.
- 

B ON THE NUMBER LINE

B.1 IDENTIFYING DECIMAL NUMBERS ON A NUMBER LINE

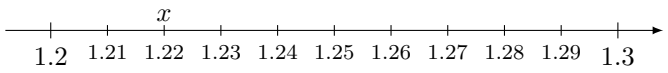
Ex 36: Find the value of x



$$x = \boxed{1.22}$$

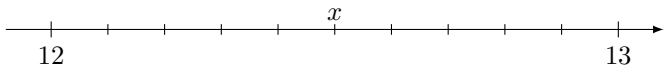
Answer:

- Each division on the number line represents 0.01.



- $x = 1.22$

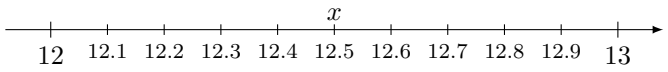
Ex 37: Find the value of x



$$x = \boxed{12.5}$$

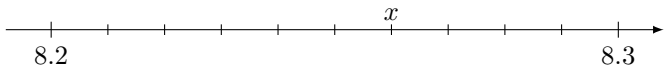
Answer:

- Each division on the number line represents 0.01.



- $x = 12.5$

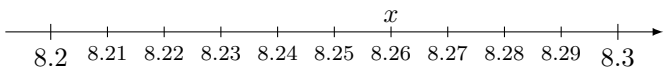
Ex 38: Find the value of x



$$x = \boxed{8.26}$$

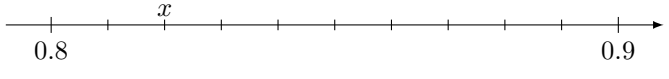
Answer:

- Each division on the number line represents 0.01.



- $x = 8.26$

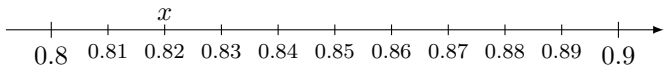
Ex 39: Find the value of x



$$x = \boxed{0.82}$$

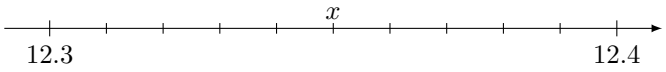
Answer:

- Each division on the number line represents 0.01.



- $x = 0.82$

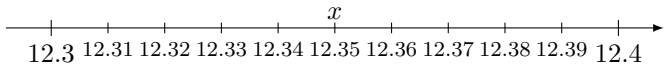
Ex 40: Find the value of x



$$x = \boxed{12.35}$$

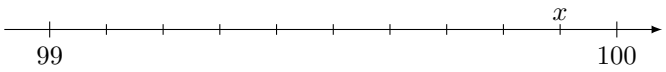
Answer:

- Each division on the number line represents 0.01.



- $x = 12.35$

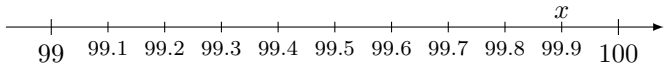
Ex 41: Find the value of x



$$x = \boxed{99.9}$$

Answer:

- Each division on the number line represents 0.1.



- $x = 99.9$

C ORDERING

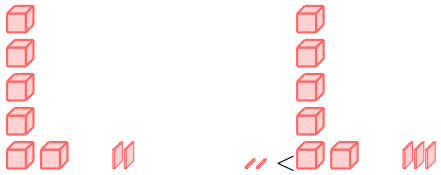
C.1 COMPARING NUMBERS

Ex 42:

$$6.22 \boxed{<} 6.3$$

Answer:

- Align the decimal points and add zeros:
  6.22
  6.30
- Compare from left to right: Both numbers have a 6 in the units place. Comparing the next digit (2 vs. 3) shows that $6.22 < 6.3$

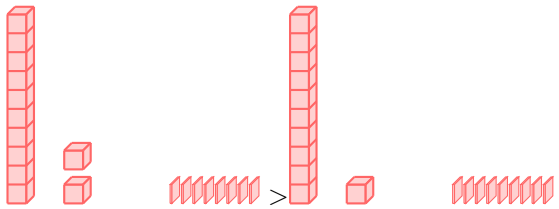


Ex 43:

$$12.8 \boxed{>} 11.9$$

Answer:

- Align the decimal points:
  12.8
  11.9
- Compare from left to right: The numbers have different units digits. Since 12 is greater than 11, $12.8 > 11.9$.

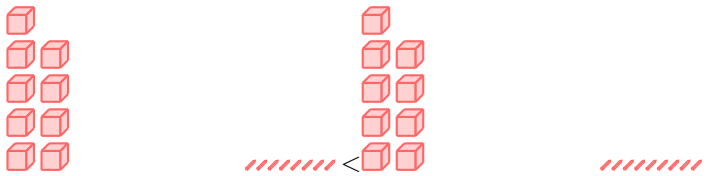


Ex 44:

$$9.08 \boxed{<} 9.09$$

Answer:

- Align the decimal points and add zeros:
  9.08
  9.09
- Compare from left to right: Both numbers have a 9 in the units place and a 0 in the tenths place. Comparing the next digit (8 vs. 9) shows that $9.08 < 9.09$.

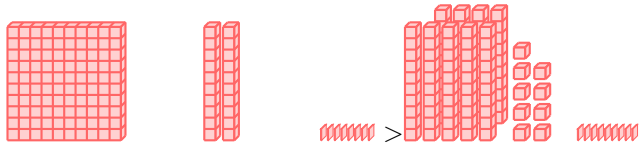


Ex 45:

$$120.8 \boxed{>} 99.9$$

Answer:

- Align the decimal points:
  120.8
  099.9
- Compare from left to right: The numbers have different hundreds digits. Since 120 is greater than 99, $120.8 > 99.9$.



C.2 COMPARING NUMBERS IN REAL-WORLD PROBLEMS

MCQ 46: Shana threw a shot put 5 times. The distances thrown were:

$$4.11 \text{ m}, 4.08 \text{ m}, 4.4 \text{ m}, 4.1 \text{ m}, 4.01 \text{ m}$$

Order these distances from shortest to longest.

Choose one answer:

- ☐ $4.1 \text{ m} < 4.08 \text{ m} < 4.01 \text{ m} < 4.11 \text{ m}$
- ☒ $4.01 \text{ m} < 4.08 \text{ m} < 4.1 \text{ m} < 4.11 \text{ m}$
- ☐ $4.11 \text{ m} > 4.1 \text{ m} > 4.08 \text{ m} > 4.01 \text{ m}$
- ☐ $4.01 \text{ m} < 4.08 \text{ m} < 4.11 \text{ m} < 4.1 \text{ m}$

Answer:

- From shortest to longest $4.01 \text{ m} < 4.08 \text{ m} < 4.1 \text{ m} < 4.11 \text{ m}$

MCQ 47: During a qualifying session, a race car driver recorded the following lap times for one circuit:

$$68.08 \text{ s}, 68.11 \text{ s}, 68.09 \text{ s}, 68.07 \text{ s}, 68.1 \text{ s}$$

Order from slowest time to fastest time.

Choose one answer:

- ☒ $68.07 \text{ s} < 68.08 \text{ s} < 68.09 \text{ s} < 68.1 \text{ s} < 68.11 \text{ s}$
- ☐ $68.11 \text{ s} < 68.1 \text{ s} < 68.09 \text{ s} < 68.08 \text{ s} < 68.07 \text{ s}$
- ☐ $68.1 \text{ s} < 68.09 \text{ s} < 68.08 \text{ s} < 68.07 \text{ s} < 68.11 \text{ s}$
- ☐ $68.07 \text{ s} < 68.09 \text{ s} < 68.08 \text{ s} < 68.11 \text{ s} < 68.1 \text{ s}$

Answer:

- From slowest time to fastest time $68.07 \text{ s} < 68.08 \text{ s} < 68.09 \text{ s} < 68.10 \text{ s} < 68.11 \text{ s}$

MCQ 48: Alex received the following marks in five different subjects:

$$12.5, 13.75, 12.25, 13.5, 14$$

Order these marks from lowest to highest.

Choose one answer:

- ☐ $12.5 < 13.5 < 13.75 < 14 < 12.25$
- ☐ $13.75 < 13.5 < 12.5 < 12.25 < 14$
- ☒ $12.25 < 12.5 < 13.5 < 13.75 < 14$
- ☐ $12.25 < 12.5 < 13.75 < 13.5 < 14$

Answer:

- From lowest to highest $12.25 < 12.5 < 13.5 < 13.75 < 14$

MCQ 49: In a baking competition, the judges scored five cakes based on presentation, flavor, and creativity. The scores were:

$$8.7, 9.2, 8.5, 9.0, 8.8$$

Order these scores from highest to lowest.

Choose one answer:

- ☒ $9.2 > 9.0 > 8.8 > 8.7 > 8.5$
- ☐ $8.5 > 8.7 > 8.8 > 9.0 > 9.2$
- ☐ $8.7 > 8.5 > 9.0 > 8.8 > 9.2$
- ☐ $9.0 > 9.2 > 8.5 > 8.7 > 8.8$

Answer:

- From highest to lowest $9.2 > 9.0 > 8.8 > 8.7 > 8.5$

D ROUNDING

D.1 ROUNDING TO THE NEAREST TENTH

Ex 50: Round to the nearest tenth:

$$12.346 \approx \boxed{12.3}$$

Answer:

- Find the digit in the tenths place: 12.346.
- Look at the digit to the right: 12.346.
- Since 4 is less than 5, keep the digit in the tenths place the same.
- Replace all digits to the right with zeros: 12.30.

The rounded number is 12.3.

Ex 51: Round to the nearest tenth:

$$5.67 \approx \boxed{5.7}$$

Answer:

- Find the digit in the tenths place: 5.67.
- Look at the digit to the right: 5.67.
- Since 7 is greater than or equal to 5, add 1 to the digit in the tenths place.
- Replace all digits to the right with zeros: 5.70.

The rounded number is 5.7.

Ex 52: Round to the nearest tenth:

$$0.891 \approx \boxed{0.9}$$

Answer:

- Find the digit in the tenths place: 0.891.
- Look at the digit to the right: 0.891.
- Since 9 is greater than or equal to 5, add 1 to the digit in the tenths place.
- Replace all digits to the right with zeros: 0.90.

The rounded number is 0.9.

Ex 53: Round to the nearest tenth:

$$0.95 \approx \boxed{1}$$

Answer:

- Find the digit in the tenths place: 0.95.
- Look at the digit to the right: 0.95.
- Since 5 is greater than or equal to 5, add 1 to the digit in the tenths place. Mathematically:

$$0.9 + 0.1 = 1.0$$

- Replace all digits to the right with zeros: 1.00.

The rounded number is 1.

D.2 ROUNDING TO THE NEAREST HUNDREDTH

Ex 54: Round to the nearest hundredth:

$$12.346 \approx \boxed{12.35}$$

Answer:

- Find the digit in the hundredths place: 12.346.
- Look at the digit to the right: 12.346.
- Since 6 is greater than or equal to 5, add 1 to the digit in the hundredths place.
- Replace all digits to the right with zeros: 12.350.

The rounded number is 12.35.

Ex 55: Round to the nearest hundredth:

$$0.99199 \approx \boxed{0.99}$$

Answer:

- Find the digit in the hundredths place: 0.99199.
- Look at the digit to the right: 0.99199.
- Since 1 is less than 5, keep the digit in the hundredths place the same.
- Replace all digits to the right with zeros: 0.990.

The rounded number is 0.99.

Ex 56: Round to the nearest hundredth:

$$0.397 \approx \boxed{0.40}$$

Answer:

- Find the digit in the hundredths place: 0.397.
- Look at the digit to the right: 0.397.
- Since 7 is greater than or equal to 5, add 1 to the digit in the hundredths place:

$$0.39 + 0.01 = 0.40$$

- Replace all digits to the right with zeros: 0.400.

The rounded number is 0.40.

Ex 57: Round to the nearest hundredth:

$$122.3421 \approx \boxed{122.34}$$

Answer:

- Find the digit in the hundredths place: 122.3421.
- Look at the digit to the right: 122.3421.
- Since 2 is less than 5, keep the digit in the hundredths place the same.
- Replace all digits to the right with zeros: 122.3400.

The rounded number is 122.34.

E MULTIPLYING BY POWERS OF 10

E.1 MULTIPLYING BY 10

Ex 58: Calculate $10 \times 5.24 = \boxed{52.4}$

Answer: $10 \times 5.\overset{\curvearrowright}{2}4 = 52.4$

Ex 59: Calculate $10 \times 10.37 = \boxed{103.7}$

Answer: $10 \times 10.\overset{\curvearrowright}{3}7 = 103.7$

Ex 60: Calculate $10 \times 0.134 = \boxed{1.34}$

Answer: $10 \times 0.\overset{\curvearrowright}{1}34 = 1.34$

Ex 61: Calculate $10 \times 20.3 = \boxed{203}$

Answer: $10 \times 20.\overset{\curvearrowright}{3} = 203$

E.2 MULTIPLYING BY 100

Ex 62: Calculate $100 \times 3.561 = \boxed{356.1}$

Answer: $100 \times 3.\overset{\curvearrowright}{5}\overset{\curvearrowright}{6}1 = 356.1$

Ex 63: Calculate $100 \times 0.03 = \boxed{3}$

Answer: $100 \times 0.\overset{\curvearrowright}{0}\overset{\curvearrowright}{3} = 3$

Ex 64: Calculate $100 \times 10.105 = \boxed{1010.5}$

Answer: $100 \times 10.\overset{\curvearrowright}{1}\overset{\curvearrowright}{0}\overset{\curvearrowright}{5} = 1010.5$

Ex 65: Calculate $100 \times 2.3 = \boxed{230}$

Answer: $100 \times 2.\overset{\curvearrowright}{3}\overset{\curvearrowright}{0} = 230$

F DIVIDING BY POWERS OF 10

F.1 DIVIDING BY 10

Ex 66: Calculate $23.2 \div 10 = \boxed{2.32}$

Answer: $2\overset{\curvearrowleft}{3}.2 \div 10 = 2.32$

Ex 67: Calculate $120.3 \div 10 = \boxed{12.03}$

Answer: $12\overset{\curvearrowleft}{0}.3 \div 10 = 12.03$

Ex 68: Calculate $\dfrac{12.1}{10} = \boxed{1.21}$

$$\frac{12.1}{10} = 1\overset{\curvearrowleft}{2}.1 \div 10$$
$$= 1.21$$

Answer:

Ex 69: Calculate $\dfrac{0.12}{10} = \boxed{0.012}$

$$\frac{0.12}{10} = \overset{\curvearrowleft}{0}.12 \div 10$$
$$= 0.012$$

Answer:

F.2 DIVIDING BY 100

Ex 70: Calculate $23.2 \div 100 =$ $\boxed{0.232}$

Answer: $\overset{\curvearrowleft}{2}\,\overset{\curvearrowleft}{3}.2 \div 100 = 0.232$

Ex 71: Calculate $12 \div 100 =$ $\boxed{0.12}$

Answer: $\overset{\curvearrowleft}{1}\,\overset{\curvearrowleft}{2}. \div 100 = 0.12$

Ex 72: Calculate $\dfrac{12.1}{100} =$ $\boxed{0.121}$

$$\frac{12.1}{100} = \overset{\curvearrowleft}{1}\,\overset{\curvearrowleft}{2}.1 \div 100$$
$$= 0.121$$

Answer:

Ex 73: Calculate $\dfrac{240.1}{100} =$ $\boxed{2.401}$

$$\frac{240.1}{100} = 2\,\overset{\curvearrowleft}{4}\,\overset{\curvearrowleft}{0}.1 \div 100$$
$$= 2.401$$

Answer: