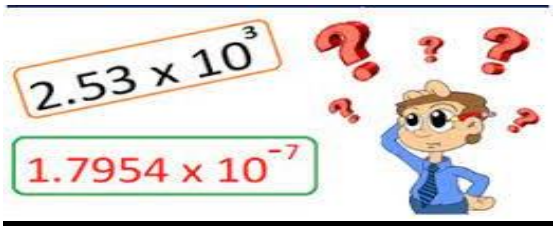
Reading pack

Grade 09

Mathematics

Lesson 13



ROUNDING OFF AND SCIENTIFIC NOTATION

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ROUNDING OFF AND SCIENTIFIC NOTATION

By studying this lesson you will be able to;

- **Identify the scientific notation and write numbers up to the millions period in scientific notation,**
- **Convert numbers expressed in scientific notation to normal form,**
- **Identify the rules related to rounding off numbers,**
- **Round off a given numbers to the nearest ten, nearest hundred, nearest thousand and nearest decimal place,**
- **Solve problems related to rounding off.**

SCIENTIFIC NOTATION

Scientific notation is a way of writing lengthy numbers. They required more space to write and difficult to read. Therefore scientists have developed a shorter method to express lengthy numbers.

Writing a number as a product of two numbers, where one is between 1 and 10 and the other is a power of 10, is known as the scientific notation.

If A is a number between 1 and 10 or 1 and n is an integer, then A x10^n is a number written in scientific notation ($1 \leq A < 10$)

Examples

1).write 80 000 in scientific notation

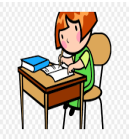
80 000 = 8 x 10 000 = 8 x 10^4

2).Write 354 in scientific notation

354 = 3.54 x 100 =3.54 × 10^2

3).Write 63.33 in scientific notation

63.33 = 6.333 x 10 6.333 x 10^1



Exercise

1).Complete the following table.

Number	1 or a number between 1 and 10 x multiple of 10	scientific notation
1).20 2).56 3).110 4).333 5).2045 6).9670 7).11325 8)123690 9).4581771 10).12000000	2 x 10	2×10^1

2).Writing each of the following numbers in scientific notation

1)5

2)36

3)72

4)500

5)8 070

6)6 570

7)1 111 000

8)56 990 777

WRITING A NUMBER BETWEEN 0 AND 1 IN SCIENTIFIC NOTATION

When a number between 0 and 1 is written in scientific notation, the index of the power of 10 is a negative integer

Examples

1) $0.1 = \frac{1}{10} = \frac{1}{10^1} = 1 \times 10^{-1}$

2) $0.08 = \frac{8}{100} = \frac{8}{10^2} = 8 \times 10^{-2}$

3) $0.00071 = \frac{7.1}{10\,000} = \frac{7.1}{10^4} = 7.1 \times 10^{-4}$

Exercise

Write each of the following numbers in scientific notation

1).0.3

2).0.54

3).0.075

4).0.0901

5).0.0063

6).0.00085

7).0000094

8).0.000022

CONVERTING NUMBERS EXPRESSED IN SCIENTIFIC NOTATION TO GENERAL FORM

Examples

1) 2.3×10^{2}

Since it is multiplied by 102, shifting the decimal point 2 places to the right.

$2.3 \times 100 = 2\ 300$

2) 1.5×10^{-3}

Since it is divided by 1 000, shifting the decimal point 3 places to the left.

$1.5 \times \frac{1}{1\ 000} = 0.0015$

Exercise

Convert the following numbers to general form.

I.	2×10^{3}	II.	1.04×10^{2}	III.	8.23×10^{5}	IV.	4.675×10^{3}	V.	2×10^{-1}
VI.	4.3×10^{-3}	VII.	9.56×10^{-4}	VIII.	6×10^{0}	IX.	8.7×10^{1}	X.	7.21×10^{0}

ROUNDING OFF NUMBERS

Rounding off to the nearest 10

- ***While rounding off to the nearest 10, if the digit in the units place is 1, 2, 3 or 4(less than 5), then the digit in the unit place is replaced by 0.***

  Examples:

  12 → 10
  34 → 30
  153 → 150
  5041 → 5040

- ***If the digit in the units place is 5 or greater than 5, then the units place is replaced by 0 and the tens place increased by 1.***

  Examples:

  45 → 50
  368 → 370
  779 → 780
  4796 → 4800

Rounding off to the nearest 100

- ***If the digit in the tens place is less than 5, then the number round off to the previous hundred.***

  Examples:

  225 → 200
  432 → 400
  3111 → 3100

- ***If the digit in the tens place is 5 or greater than 5, then the number round off to the next hundred.***

  Examples:

  354 → 400
  6085 → 6100
  4383 → 4400

Rounding off to the nearest 1000

- ***If the digit in the hundreds place is less than 5, then the number round off to the previous thousand.***

  Examples:

  3245 → 3000

  4154 → 4000

  25368 → 25000

- ***If the digit in the hundreds place is 5 or greater than 5, then the number round off to the next thousand.***

  Examples:

  1630 → 2000

  4850 → 5000

  25600 → 26000

Round off to a given decimal place

- ***When rounding off to the nearest whole number, if the digit in the first decimal place is less than 5, then the first decimal place is replaced by 0.***
  If the digit in the first decimal place is 5 or greater than 5, then the first decimal place is replaced by 0 and the whole number increased by 1.

  Examples:

  1.2 → 1

  3.45 → 3

  12.05 → 12

  4.5 → 5

  13.81 → 14

- ***When rounding off to the nearest first decimal place, if the digit in the second decimal place is less than 5, then the second decimal place is replaced by 0.***
  If the digit in the second decimal place is 5 or greater than 5, then the second decimal place is replaced by 0 and the first decimal place is increased by 1.

  Examples:

  2.31 → 2.3

  35.52 → 35.5

  40.55 → 40.6

  122.382 → 122.4

- ***When rounding off to the nearest second decimal place, if the digit in the third decimal place is less than 5, then the third decimal place is replaced by 0.***
  If the digit in the third decimal place is 5 or greater than 5, then the third decimal place is replaced by 0 and the second decimal place is increased by 1.

Examples:

1.234 → 1.23
43.678 → 43.68
102.785 → 102.79
45.421 → 45.42

Exercise

1) Round off to the nearest 10.
   I. 34 II. 49 III. 325 IV. 5127 V. 8712 VI. 4325
2) Round off to the nearest 100.
   I. 430 II. 212 III. 6225 IV. 18307 V. 16492 VI. 65555
3) Round off to the nearest 1000.
   I. 3100 II. 89760 III. 43289 IV. 143567 V. 12345 VI. 989873
4) Round off 3.1562,
   I. To the nearest whole number
   II. To the first decimal place
   III. To the second decimal place
5) Round off 53591,
   I. To the nearest 10
   II. To the nearest 100
   III. To the nearest 1000
6) When a certain number is rounded off to the nearest 10, the number 60 is obtained. Find separately the least and the greatest value that the number can take.