

Let's REVISÉ

1. Using the laws of exponents, simplify each of the following in exponential form.

(i) $4^8 \times 4^{-2}$ (ii) $6^{-7} \div 6^4$

(iii) $3^{-4} \times (-5)^{-4}$ (iv) $(3^3)^{-2}$

(v) $\frac{4^{-8}}{5^{-8}}$

2. Simplify using the laws of exponents and express each of the following in exponential form with positive exponent.

(i) $(-7)^3 \times (-7)^5$ (ii) $6^2 \div 6^{-3}$

(iii) $4^{-5} \times 5^{-5}$ (iv) $(2^{-5} \div 4^2) \times 8^{-1}$

(v) $(3^{-1} \div 7^{-1})^2 \times \left(\frac{7}{9}\right)^{-1}$

(vi) $(4^{-5} \div 4^{-10}) \times 5^{-5}$

3. Simplify using the laws of exponents and express each of the following in exponential form with negative exponent.

(i) $\left(\frac{11}{3}\right)^7$ (ii) $\left(\frac{-5}{41}\right)^6$

(iii) $\left(\frac{-1}{3}\right)^6 \times \left(\frac{-1}{3}\right)^5$ (iv) $(-4)^4 \times \left(\frac{3}{4}\right)^4$

4. Simplify:

(i) $(2^{-1} + 3^{-1})^{-1}$ (ii) $(4^{-1} \times 5^{-1}) \times 3^{-1}$

(iii) $(3^{-1} \times 5^{-1})^2$ (iv) $(6^{-1} \div 7^{-1})^3$

5. Express the following as a power of rational numbers.

(i) $\frac{-125}{64}$ (ii) $\frac{8}{27}$ (iii) $\frac{100}{121}$ (iv) $\frac{81}{625}$

6. Simplify:

(i) $\left(\frac{4}{5}\right)^3 \times \left(\frac{4}{5}\right)^7 \div \left(\frac{4}{5}\right)^5$

(ii) $\left(\frac{3}{8}\right)^6 \times \left(\frac{3}{8}\right)^9 \times \left(\frac{3}{8}\right)^{-10}$

(iii) $(9^0)^5$ (iv) $(4^3)^0$

(v) $\left(\frac{6}{5}\right)^3 \times \left(\frac{3}{10}\right)^{-3}$ (vi) $\left(\frac{4}{9}\right)^0 \times 5$

(vii) $\left(\frac{7}{8}\right)^{-3} \div \left(\frac{4}{7}\right)^3$ (viii) $\left(\frac{13}{5}\right)^{-4} \div \left(\frac{25}{13}\right)^{-4}$

(ix) $\left[\left(\frac{2}{3}\right)^3\right]^{-2}$ (x) $\left[\left\{\left(\frac{1}{6}\right)^3\right\}^2\right]^{-1}$

7. By which number should $\left(\frac{1}{2}\right)^{-1}$ be multiplied so

that the product is equal to $\left(\frac{-4}{7}\right)^{-1}$?

8. By which number should $(-15)^{-1}$ be divided so that the quotient is equal to $(-10)^{-1}$?

9. Solve for 'x'.

$$(i) \left(\frac{2}{5}\right)^4 \times \left(\frac{2}{5}\right)^{-7} = \left(\frac{2}{5}\right)^{2x+1}$$

$$(ii) \left(\frac{2}{3}\right)^{-5} \times \left(\frac{9}{11}\right)^{-5} = (x)^{-5}$$

10. The size of a plant cell is 0.00001275 m. Express it in the standard form (scientific notation).

Multiple Choice Questions ?

1. The reciprocal of $\left(\frac{5}{7}\right)^{-3}$ is

(i) $\left(\frac{7}{5}\right)^{-3}$ (ii) $\left(\frac{5}{7}\right)^3$ (iii) $\left(\frac{7}{5}\right)^3$ (iv) $\frac{25}{343}$

2. The value of $\left(\frac{-3}{4}\right)^3 \times \left(\frac{4}{3}\right)^3$ is equal to

(i) -1 (ii) 1 (iii) $\frac{27}{64}$ (iv) $\frac{-27}{64}$

3. The value of $\left(\frac{3}{4}\right)^2 \times \left(\frac{3}{4}\right)^{-4}$ is equal to

(i) $\left(\frac{3}{4}\right)^6$ (ii) $\left(\frac{3}{4}\right)^{-6}$
(iii) $\left(\frac{4}{3}\right)^6$ (iv) $\left(\frac{4}{3}\right)^2$

4. The value of $(-2)^{-5}$ is equal to

(i) $\frac{-1}{32}$ (ii) $\frac{1}{32}$ (iii) 32 (iv) -32

5. The value of $\left(\frac{-1}{5}\right)^4 \div \left(\frac{-1}{5}\right)^8$ is equal to

(i) -625 (ii) $-\frac{1}{625}$
(iii) 625 (iv) $\frac{1}{625}$

6. The value of $(4^{-1} \times 3^{-1}) \div 3^{-1}$ is equal to

(i) 12 (ii) $\frac{1}{12}$ (iii) 4 (iv) $\frac{1}{4}$

7. The value of $\left\{2^{-1} + \left(\frac{1}{3}\right)^{-2} + 3^{-1}\right\}^0$ is equal to

(i) $\frac{59}{6}$ (ii) $\frac{6}{59}$ (iii) 1 (iv) 0

8. The scientific notation for the number 0.00000001469 is

(i) 1.469×10^{-8} (ii) 14.69×10^{-8}
(iii) 1.469×10^{-9} (iv) 1.469×10^{-10}

Mental Maths

1. Find the value of $x^3 \cdot x^2 \cdot x \cdot x^0 \cdot x^{-1} \cdot x^{-2} \cdot x^{-3}$.

2. Find the value of $\left\{3^0 + 4^0 + \left(\frac{1}{3}\right)^0 + \left(\frac{1}{4}\right)^0\right\}^{-1}$.

CHALLENGE

Simplify.

$$(i) \left[\left\{ (625)^{-\frac{1}{2}} \right\}^{\frac{-1}{4}} \right]^2$$

$$(ii) \left[5 \left(8^{\frac{1}{3}} + 27^{\frac{1}{3}} \right)^3 \right]^{\frac{1}{4}}$$

Critical Thinking



Let's REVISE

1. Add $7x^3 - 2x^2 + 5$, $3x^3 + 7x^2 - x + 1$ and $3x^2 - 5x - 2$.

2. Subtract $6x^2 - 4x + 11$ from $7x^2 - x - 3$.

3. Express the following products as monomials.

(i) $30x^{10}y^{20}z^{30} \times (10x^2y^2z^2)^2$

(ii) $(61x^{11}a^5b^3) \times (5a^3b^3c^2)^3$

4. Find the value of $5x^6 \times (-7x^2y^3) \times (-12xy^2)$ when $x = 1$, $y = 2$.

5. Determine the following products and find the value of each for $x = 1$, $y = 2$ and $z = 3$.

(i) $25x^2(1 - 3x)$

(ii) $yz(y^2 + zx)$

(iii) $x^2(z - y)$

(iv) $(5x - 3y)(-4z)$

6. Simplify the following.

(i) $(3x - 2)(2x - 3) + (5x - 3)(x + 1)$

(ii) $(5x - 3)(x + 2) - (2x + 5)(4x - 3)$

(iii) $(3x + 2y)(4x + 3y) - (2x - y)(7x - 3y)$

7. Expand each of the following.

(i) $(10x - \sqrt{2}y)^2$

(ii) $(4x + y)^2$

(iii) $(2xy - 7)(2xy - 7)$

(iv) $(5x^2 + 7)(5x^2 + 7)$

(v) $(9x + 7y)(9x - 7y)$

(vi) $(2x + 4)(2x - 4)$

(vii) $(2a + 3b)(2a - 3b)$

8. If $x^2 + \frac{1}{x^2} = 62$, find the value of:

(i) $x + \frac{1}{x}$

(ii) $x - \frac{1}{x}$

9. Evaluate each of the following by using identities.

(i) 104×96

(ii) 109×109

(iii) 99^2

(iv) $(102)^2$

(v) $215 \times 215 - 185 \times 185$

(vi) $52 \times 52 - 48 \times 48$

10. Show that:

$$(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$$

Multiple Choice Questions ?

1. Which of these is not a monomial?

(i) $6x^2y \div y$

(ii) $5xy \div xy$

(iii) 9

(iv) $4x^2 + 3x$

2. The coefficient of a in $-10ab^3$ is

(i) -10

(ii) b^3

(iii) $-10b^3$

(iv) $-10a$

3. If $x = y = 2$, then the value of $(x + y)(2x^2 - 6xy + 3y^2)$ is

(i) -16

(ii) 16

(iii) 44

(iv) 176

4. $36 \times 36 - 2 \times 36 \times 30 + 30 \times 30$ is equal to

(i) 1296

(ii) 36

(iii) 6

(iv) 0

5. If $x + \frac{1}{x} = 4$, then the value of $x^2 + \frac{1}{x^2}$ is

(i) 16

(ii) 14

(iii) 18

(iv) -16

6. If $2x - \frac{1}{2x} = 3$, then the value of $4x^2 + \frac{1}{4x^2}$ is

(i) 11

(ii) 9

(iii) 3

(iv) 0

7. If $3x + 2y = 7$ and $xy = 11$, then the value of $9x^2 + 4y^2$ is

(i) 83

(ii) 49

(iii) -83

(iv) -49

8. If $30p^2q^3$ is divided by p^2q^2 , then the quotient is

(i) 30

(ii) $30q$

(iii) $30p$

(iv) q

9. If $64x^2 - p = (8x + 2)(8x - 2)$, then the value of p is

(i) $\frac{1}{4}$

(ii) $-\frac{1}{4}$

(iii) 4

(iv) -4

10. The product of $(x^3 - 1)(x^6 + x^3 + 1)$ is equal to

(i) $x^6 - 1$

(ii) $x^8 - 1$

(iii) $x^9 - 1$

(iv) $x^{12} - 1$

11. The simplified form of $\frac{6.17 \times 6.17 - 3.83 \times 3.83}{2.34}$ is

(i) 6.17

(ii) 3.83

(iii) 2.34

(iv) 10

Mental Maths

1. If $x = 2$, $y = 3$, then find the values of $(x + y)^2$ and $(x - y)^2$.

2. Find the quotient, when $-56mnp^3$ is divided by $8mp$.

3. If the product of two numbers is $15x^2$ and their sum is $8x$, then find the numbers.

3. The relative humidity in per cent for Delhi for the month of June of a year is given below.

90 97 92 95 93 85 83 85 83 77 83
77 74 60 71 65 74 80 87 95 93 82
81 76 61 63 58 58 56 57

Construct a frequency distribution table.

4. The following data gives the weights (in g) of 50 oranges packed from a basket. Construct a grouped frequency distribution taking class intervals as 0-20, 20-40, etc.

106 107 76 82 109 107 115 93 187 95
123 125 11 92 86 70 126 68 130 129
107 111 139 119 141 81 131 136 115 128
123 75 84 90 100 18 115 104 110 98
84 99 110 80 111 7 113 204 90 82

5. Represent the following frequency distribution by means of a histogram.

Marks	Number of students
10-20	7
20-30	11
30-40	9
40-50	13
50-60	16
60-70	4
70-80	2

Table 22.23

6. The different expenditures on publishing a book are given below. Construct a pie diagram.

Printing	30%
Paper	15%
Binding charges	15%
Advertisement	20%
Royalty	10%
Misc.	10%

Table 22.24

7. The following data shows the expenditure of an individual on various items.

Item	Expenditure (in ₹)
Education	1600
Food	3200
Rent	4000
Clothing	2400
Others	3200

Table 22.25

Represent the above data with the help of a pie chart.

8. The percentages of various category of workers in a state are given in the following table. Represent the information in the form of a pie chart.

Activity category of workers	Number of hours (%)
Cultivators	40
Agricultural Labourers	25
Individual workers	12.5
Commercial workers	10
Other	12.5

Table 22.26

9. The marks of 12 students in a Maths test are as follows.

30, 40, 48, 32, 30, 32, 48, 45, 50, 50, 45, 42
Find the average marks of the students in the Maths test.

10. Prepare a cumulative frequency table for the following.

Ages	Number of persons
0-20	10
20-40	15
40-60	20
60-80	6

Table 22.27

Multiple Choice Questions ?

- A data is such that its minimum value is 62 and range is 94. Then the maximum value is
 (i) 94 (ii) 78
 (iii) 561 (iv) 156
- The range of the data 25, 18, 20, 22, 16, 6, 17, 15, 12, 30, 52, 10, 19, 8, 11 and 20 is
 (i) 6 (ii) 16
 (iii) 46 (iv) 32
- The data collected by a student about the passed percentage of students in X Board Examination for last 10 years is known as
 (i) primary data (ii) secondary data
 (iii) raw data (iv) frequency
- The data collected by a student about the brands of cars present in his locality from a local magazine is known as
 (i) primary data (ii) secondary data
 (iii) raw data (iv) frequency
- The class mark of a class is
 (i) upper limit (ii) lower limit
 (iii) $\frac{\text{upper limit} + \text{lower limit}}{2}$
 (iv) $\frac{\text{upper limit} - \text{lower limit}}{2}$
- The class mark of the class 60–80 is
 (i) 60 (ii) 75
 (iii) 70 (iv) 80
- Let m be the mid-point and l be the upper limit of a class in a continuous frequency distribution. The lower limit of the class is
 (i) $l - 2m$ (ii) $2m - l$
 (iii) $l - m$ (iv) $\frac{m + l}{2}$
- In a given data, some variables are given with particular values. To represent these graphically, we generally use
 (i) bar graph (ii) histogram
 (iii) pie chart (iv) none of these
- To represent a continuous frequency distribution, we generally use
 (i) bar graph (ii) histogram
 (iii) pie chart (iv) none of these
- Given below are the seats won by different political parties in the polling outcome of a state assembly election.

Political parties	Seats won
A	42
B	63
C	81
D	72
E	49
F	33

Table 22.28

To represent the above data we will use

- (i) histogram (ii) bar graph
 (iii) pie chart (iv) none of these

Mental Maths

- In a histogram, the class intervals or groups are taken along
 (i) the y -axis (ii) the x -axis
 (iii) both on x -axis and y -axis (iv) in between x and y axes
- In a histogram, the area of each rectangle is proportional to
 (i) the class mark of the corresponding class interval.
 (ii) the class size of the corresponding class interval.
 (iii) frequency of the corresponding class interval.
 (iv) cumulative frequency of the corresponding class interval.

Let's REVISE

1. There are 20 students in class VIII. As per the school record, their ages in years are as follows.

13 13 14 12 11 12 12 12 12 11 12 13
13 11 13 13 13 11 13 13

What is the probability that a student of this class selected at random is (i) 11 years old? (ii) 14 years old?

2. A coin is tossed 50 times and tails turns up 21 times. What is the probability of occurrence of tails?
3. A coin is tossed 100 times and tails is obtained 52 times. Now, if a coin is tossed at random, what is the probability of getting a heads?
4. A box of 10 dozen pens contains a dozen defective pens. One pen is taken out at random. What is the probability that the pen taken out is
(i) defective (ii) non-defective
5. What is the probability of selecting a vowel when a letter is chosen at random from the word 'MATHEMATICS'?
6. Find the probability that a number selected from the numbers 1 to 25 is not a prime number when each of the given numbers is equally likely to be selected.

7. Cards marked with numbers 3, 4, 5, ..., 50 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that the number on the card drawn is
(i) divisible by 7 (ii) a perfect square

8. A bag contains cards which are numbered from 2 to 90. A card is drawn at random from the bag. Find the probability that it bears

- (i) a two-digit number
(ii) a number which is a perfect square

9. A bag contains 3 red balls, 5 black balls and 6 white balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is

- (i) red (ii) white
(iii) not black (iv) red or black

10. A card is drawn at random from well-shuffled pack of playing cards. Find the probability that the card drawn is

- (i) a king or jack (ii) a non-ace
(iii) a red card
(iv) neither a king nor a queen

Multiple Choice Questions ?

- A digit is chosen at random from the digits 1, 2, 3, 4, 5, 6, 7, 8, 9. Then the probability that it is even is
(i) $\frac{1}{9}$ (ii) $\frac{2}{9}$ (iii) $\frac{1}{3}$ (iv) $\frac{4}{9}$
- A card is dropped accidentally from a pack of 52 cards. The probability that it is a king is
(i) $\frac{1}{52}$ (ii) $\frac{1}{26}$ (iii) $\frac{1}{13}$ (iv) $\frac{1}{4}$
- If two coins are tossed simultaneously, the probability of getting at least one heads is
(i) $\frac{1}{4}$ (ii) $\frac{3}{4}$
(iii) $\frac{1}{2}$ (iv) None of these
- A card is drawn at random from a well-shuffled pack of 52 cards. The probability of getting a black face card is
(i) $\frac{1}{26}$ (ii) $\frac{1}{52}$ (iii) $\frac{3}{26}$ (iv) $\frac{1}{13}$
- In a single throw of a pair of dice, the probability that the sum is a perfect square is
(i) $\frac{1}{12}$ (ii) $\frac{1}{36}$ (iii) $\frac{7}{36}$ (iv) $\frac{1}{13}$
- Which of the following cannot be the probability of an event?
(i) $\frac{5}{4}$ (ii) $\frac{1}{2}$ (iii) 4% (iv) 0.2
- An event is very unlikely to happen. Its probability is closest to
(i) 0.0004 (ii) 0.003 (iii) 0.02 (iv) 0.1
- The probability expressed as a percentage of a particular occurrence is never
(i) less than 100. (ii) less than 10.
(iii) greater than 1.
(iv) anything but a whole number.
- When you rotate the spinner, the probability of not getting the unshaded portion is
(i) $\frac{1}{8}$
(ii) $\frac{3}{8}$
(iii) $\frac{5}{8}$
(iv) $\frac{2}{4}$

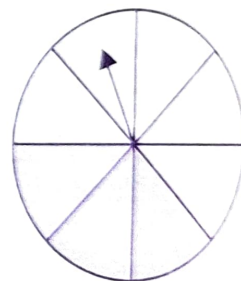


Fig. 23.3

- If $P(A)$ denotes the probability of an event A , then
(i) $P(A) < 0$ (ii) $P(A) > 1$
(iii) $0 \leq P(A) \leq 1$ (iv) $-1 \leq P(A) \leq 1$

Values

Social Skills

For a project work, a group of students of class VIII submitted a project on the probability of the number of students having their birthdays in different months of a year. The data collected for