e-Notes of Arithmetic for class 6 (ICSE) / (Mr. Sanjay)

Chapter: Number systems.

A. Introduction: At first, we have to recall our memory from class 5 syllabi. Here we will focus on some important terms. Let us read the following terms.

1. Mathematics: Mathematics is the logical study of arrangement, quantity, shape, measurements and calculations.
2. Arithmetic: A branch of mathematics which teaches the use of numbers is called arithmetic.
3. Quantity: Anything that can be represented by number is called a quantity. Examples: Weight, distance, area, time etc.
4. Number: That which indicates the magnitude of a quantity relatively to its unit is called a number.
5. Numerals: Names or symbols for numbers are called numerals. Examples: Arabic numerals like 0, 1, 15, 29, 6043, etc; Roman numerals like V, VII, XXI, LXII, CLXXI, etc.

Number is a concept; but numeral is a representation of the number. Number is like a God; but numeral is its image.

6. Abstract number: When a number is not attached to any particular unit, then it is called an abstract number. Examples: four, five, six, ten, etc.
7. Concrete number: When a number is attached to some particular unit, then it is Examples: 5 and 7; 11 and 13; 17 and 19; etc.
8. Prime numbers: A number which has exactly two factors i.e., 1 and the number itself is called prime number. Examples: 2, 3, 5, 7, 11, 13, 17, ….. etc.
9. Co-primes: The pair of numbers (may or may not prime), not divisible by a common number other than one are called co-primes. Examples: 3 and 7, 5 and 11, 4 and 17, 17 and 20, 8 and 9, etc.
10. Composite numbers: A number which has more than two factors is called composite number. Examples: 4, 6, 8, 15, 33, 69 etc.

NOTE: 1 is neither prime nor composite because 1 has only 1 factor.

11. Twin primes: Twin prime numbers are the prime numbers differing by two. Examples: 5 and 7; 11 and 13; 17 and 19; etc.
12. Co-primes: The pair of numbers (may or may not prime), not divisible by a common number other than one are called co-primes. Examples: 3 and 7, 5 and 11, 4 and 17, 17 and 20, 8 and 9, etc.

B. Face value and place value of a digit:

The symbol '0' has no value in itself and represents no number. In the line of figures (not real number line), '0' in the first place (towards the right) indicates the absence of units; in the second place, absence of tens; in the third place, absence of hundreds; and so on.

Thus, 30 represents three tens and no units; 400 represents four hundreds, no tens and no units; 5209 represents five thousands, two hundreds, no tens and nine units. In the number 5209, '0' has no value. Here '0' is introduced to indicate the place value of 2 as well as 5. Therefore, '0' is called *Auxiliary* digit. Numbers taken in their natural order are called *Consecutive*. The art of representing by figures a number expressed in words is called *Notation*. *Successor* is 1 more than the given number. *Predecessor* is 1 less than the given number. There are two systems of place value chart – *Hindu-Arabic system* and *International system*. Keep in your mind that *plural form is not used in expanded form*.

C. Operation on large numbers:

There are four basis operations in mathematics. They are addition, subtraction, multiplication and division. Be careful about division. If I ask you: The cost of two pens is Rs. 20. Find the cost of one pen. Easily you can say your answer as Rs.10. But it is wrong answer. The cost of pens may be Rs 5 and Rs 15, or Rs. 8 and Rs. 12, …… . When the pens are not identical, you cannot divide by 2. Multiplication table must be memorized from 1 to 20 and then 25, 50.

D. Approximation / Estimation / Rounding off:

Rule 1: If the digit on the right of the rounding place is greater than or equal to 5, add 1 to the digit at the rounding place. Or else, do not change the digit at the rounding place.
Rule 2: Replace all digits to the right of the rounding place by zeros.

E. Some important solutions:

Q1. Write all possible 2-digit numbers that can be formed by using the digits 2, 7, 8; repetition of digits is allowed.
Answer: 22, 27, 28, 72, 77, 78, 82, 87 and 88.
Q2. Write the smallest 6-digit number having four different digits.
Answer: 100023.
Q3. Write the predecessor of each of the following numbers: (i) 3902, (ii) 652020.
Answer: (i) 3902 –1 = 3901. (ii) 652020 –1 = 652019.
Q4. Arrange the following numbers in descending order: 18965, 18695, 180659, 65810, 68510, 61085.
Answer: 180659 > 68510 > 65810 > 61085 > 18965 > 18695.
Q5. By how much is 15,69,748 smaller than 20,00,000?
Answer: 20,00,000 – 15,69,748 = 4,30,252.
Q6. The sum of two numbers is 60,10,203. If one of the numbers is 48,21,325, find the other.
Answer: The other number is (60,10,203 – 48,21,325) = 11,88,878.
Q7. An aeroplane covers 1,685 km per hour. How much distance will it cover in 58 hours?
Answer: The required distance = 1685 X 58 km.
= 97730 km.
Q8. A firm distributed 928 kg 125 g of food grains among 225 people affected by flood. How much food grains did a person get?
Answer: The amount of food grains that each person got = (928125 ÷ 225) g
= 4125 g
= 4 kg 125 g.
Q9. Approximate 68443675: (i) correct to the nearest ten. (ii) correct to the nearest hundred. (iii) correct to the nearest thousand. (iv) correct to the nearest ten thousand. (v) correct to the nearest lakh. (vi) correct to the nearest ten lakh. (vii) correct to the nearest crore.
Answer: (i) 68443680. (ii) 68443700. (iii) 68444000. (iv) 68440000. (v) 68400000. (vi) 68000000. (vii) 70000000.
Q10. Find the estimated quotient for each of the following: (i) 731 ÷ 22, (ii) 815 ÷ 33.
Answer: 700 ÷ 20 = 35. (ii) 800 ÷ 30 = 27.

F. Home Assignment:

Q1. Rewrite each of the following numbers using an international place-value chart.
(a) 2368, (b) 65698, (c) 204308, (d) 170830598.
Q2. Simplify: 26589 – 9670 + 368 – 88 + 8.
Q3. Multiply: 579613 X 384.
Q4. Divide and find remainder. 5248967÷ 699.
Q5. Estimate each of the following product. (a) 697 X 809. (b) 7029 X 979.
G. Home Work: Exercise 1C (page no N-15 to N-16)
Exercise 1D (page no N-20) Question no 4 to 11.

Chapter: Factors and Multiples.

A. Introduction: We have learnt about Prime number in class 5. Now we will learn factor, multiple, HCF and LCM. Read the following definitions.
1. Factor: When a number divides another number, then the divisor is called a factor of the dividend. Examples: 1,2,3,6 are the factors of 6.
2. Multiple: The product of two or more numbers is called a multiple of each of the numbers. Examples: 4 X 9 = 36, So, 36 is a multiple of 4 as well as 9.
3. Highest common factor (HCF): The highest common factor of two or more numbers is the highest number which divides each of them exactly.
4. Lowest common multiple (LCM): The lowest common multiple of two or more numbers is the lowest number which is exactly divisible by each of them or in other words, it is the lowest number which contains each of them as a factor.

B. Rules for Tests of Divisibility:

1. Divisible by 2: Any even number is divisible by 2.
2. Divisible by 3: If the sum of the digits of a number be divisible by 3, then the number is divisible by 3.
3. Divisible by 4: If the number formed by last two digits of the given number be divisible by 4, then the number is divisible by 4.
4. Divisible by 5: If the last digit of a number 0 or 5, then the number is divisible by 5.
5. Divisible by 6: If sum of the digits of an even number be divisible by 3, then it is divisible by 6.
6. Divisible by 7: Take 3 digits at a time from the right, and then add the number of the odd places and even places separately. If the difference of these numbers be divisible by 7 or 0. Then the number will be divisible by 7. Example: 132,389,264
   Sum of the odd position = 396 [132 + 264]
   Sum of the even position = 389
   Difference = 7.
   OR
7. Divisible by 7: Multiply the last digit by 5 & add that to the number formed by the remaining digits. If the result is divisible by 7, then the number is divisible by 7. This process may be continued. Example: 644; 64 + 4X5 = 84, → 8 + 4X5 = 28, which is divisible by 7.
   OR
8. Divisible by 7: Multiply the last digit by 2 & subtract that from the number formed by the remaining digits. If the result is divisible by 7 or 0, then the number is

divisible by 7. This process may be continued. Example: 644; 64 – 4X2 = 56, which is divisible by 7.

9. Divisible by 8: If the last 3 digits of a number be divisible by 8, then the number is divisible by 8.
10. Divisible by 9: If the sum of the digits of a number be divisible by 9, then the number is divisible by 9.
11. Divisible by 10: If the last digit of a number be 0, then the number is divisible by 10.
12. Divisible by 11: Take the sum of digits of odd places & even places separately. If the difference of the sum be 0 or divisible by 11, then the number is divisible by 11. Example: 3758271; ⟶ 7 + 8 + 7 = 22 & 3 + 5 + 2 + 1 = 11 ; 22 – 11 = 11.
13. Divisible by 12: If the number be divisible by 3 and 4 both, then the number is divisible by 12.
14. Divisible by 13: Take 3 digits at a time from the right, then add the number of the odd places and even places separately. If the difference of these numbers be divisible by 13 or 0, then the number will be divisible by 13. Example: 738916256

    Sum of the odd position = 994
    Sum of the even position =916
    Difference = 78.

    OR
15. Divisible by 13: Multiply the last digit by 4 & add that to the number formed by the remaining digits. If the result is divisible by 13, then the number is divisible by 13. This process may be continued. Example 2639; 263 + 9 X 4 = 299, ⟶ 29+9 x 4 = 65, which is divisible by 13.

    OR
16. Divisible by 13: Multiply the last digit by 9 & subtract that from the number formed by the remaining digits. If the result is divisible by 13 or 0, then the number is divisible by 13. This process may be continued. Example: 2639; 263 - 9X9 = 182, 182; 18 – 2X9 = 0.
17. Divisible by 14: If an even number be divisible by 7, then the number is divisible by 14.
18. Divisible by 15: If a number be divisible by 3 & 5, then the number is divisible by 15.
19. Divisible by 16: If the last 4 digits be divisible by 16, then the number is divisible by 16.
20. Divisible by 17: Multiply the last digit by 5 & subtract that from the number formed by the remaining digits. If the result is divisible by 17 or 0, the number is also divisible by 17. This process may be continued. Example: 969; 96 – 9X5 = 51, which is divisible by 17.
21. Divisible by 18: If an even number be divisible by 9, then the number is divisible by 18.
22. Divisible by 19: Multiply the last digit by 2 & add that to the number formed by the remaining digits. If the result is divisible by 19, the number is also divisible by 19. This process may be continued. Example: 399; 39 + 9X2 = 57, which is divisible by 19.

23. Divisible by 20: If the last 2 digits of a number be divisible by 20, the number is also divisible by 20.
24. Divisible by 21: Multiply the last digit by 2 & subtract that from the number formed by the remaining digits. If the result is divisible by 21 or 0, then the number is divisible by 21. This process may be continued. Example: 672; 67 – 2X2 = 63, which is divisible by 21.
25. Divisible by 21: If a number be divisible by 3 & 7, then the number is divisible by 21.
26. Divisible by 22: If an even number be divisible by 11, then the number is divisible by 22.
27. Divisible by 23: Multiply the last digit by 7 & add that to the number formed by the remaining digits. If the result is divisible by 23, then the number is divisible by 23. This process may be continued. Example: 575; ⟶57 + 5X7 = 92. 92; 9+2 X 7 = 23, which is divisible by 23.
28. Divisible by 24: If a number be divisible by 3 & 8, then the number is divisible by 24.
29. Divisible by 25: If the number formed by the last 2 digits of a number be divisible by 25, then the number is divisible by 25. In other words, if the last two digits be 25 or 50 or 75 or 00, then the number is divisible by 25.
30. Divisible by 99: If a number be divisible by 9 & 11, then the number is divisible by 99.
31. Divisible by 125: If the last 3 digits of a number are zeroes or divisible by 125, then the number is divisible by 125.
32. If a 6-digit number formed by the same digit, then the number is divisible by 3, 7, 11, 13, 37 and 39. Example: 111111 is divisible by 3, 7, 11, 13, 37 and 39. 222222 is divisible by 3, 7, 11, 13, 37 and 39. 333333 is divisible by 3, 7, 11, 13, 37 and 39 etc.
33. If a two digit number recurs 3 times, then the number is divisible by 3, 7, 13, 37 and 39. Example: 171717 is divisible by 3, 7, 13, 37 and 39. 252525 is divisible by 3, 7, 13, 37 and 39. 878787 is divisible by 3, 7, 13, 37 and 39 etc.
34. The product of two consecutive numbers is always divisible by 2. On the other words, n(n+1) is divisible by 2,when 'n' is a natural number.
35. The product of three consecutive numbers is always divisible by 6. On the other words, n(n+1)(n+2) is divisible by 6,when 'n' is a natural number.
36. The product of four consecutive numbers is always divisible by 24. On the other words, n(n+1)(n+2)(n+3) is divisible by 24,when 'n' is a natural number.

37. The product of five consecutive numbers is always divisible by 120.
38. The sum of three consecutive numbers is always divisible by 3.
39. The sum of the digits of a number is subtracted from the number; the resulting number is always divisible by 9. Example: 56842; 56842 – (5+6+8+4+2) = 56842 – 25 = 56817, now 56817 is divisible by 9.
40. The difference between two squares of odd numbers is always divisible by 8. Example: $17^2 - 5^2$ = 289 – 25 = 264; now 264 is divisible by 8.
41. The difference between two squares of even numbers is always divisible by 4. Example: $8^2 - 2^2$ = 64 – 4 = 60; now 60 is divisible by 4.

42. The sum of the cubes of three consecutive numbers is always divisible by the sum of those numbers. On the other words, $(a^3+b^3+c^3)$ is divisible by $(a+b+c)$.

C. The short-cut rule to find LCM: Take one example. Find the LCM of 2, 3, 5, 12, 15 and 24. How to solve? If you solve by your traditional method, you need more time. Follow the numbers minutely; some numbers are the factors of other number. Here 2, 3, 12 are the factors of 24, so delete these factors. Similarly 5 is a factor of 15, so delete 5. Now the remaining numbers are 15 and 24. It is clear that the LCM of 2, 3, 5, 12, 15, and 24 is the same as the LCM of 15 and 24.

D. Some textual Problems and their solutions:

Q1. Make pairs of co-prime numbers from 15, 21, 28, 16, 11.

Answer: Take the first number 15. Choose other numbers which has no common factor with 15. So, we get 15 and 28, 15 and 16, 15 and 11. Then take next number 21. Similarly take the pairs, we get 21 and 16, 21 and 11. In this way we get more pairs like 28 and 11, 16 and 11. Now write your answer directly, The pairs of co-prime numbers are: 15,28; 15,16; 15,11; 21,16; 21,11; 28,11; and 16,11.

Q2. Give two examples of numbers: (i) which is divisible by 2 but not by 4. (ii) which is divisible by 3 but not by 6. (iii) which is divisible by 4 but not by 8. (iv) which is divisible by both 2 and 8 but not by 16. (v) which is divisible by both 3 and 6 but not by 18. (vi) which is divisible by both 4 and 8 but not by 32.

Answer: (i) 6, 10, 14. (ii) 9, 15, 21. (iii) 12, 20, 28. (iv) 24, 40, 56. (v) 12, 24, 30. (vi) 16, 24, 40.

Q3. Express 23595 as a product of prime numbers.

Answer: 23595 = 3 X 7865.
= 3 X 5 X 1573.
= 3 X 5 X 11 X 143.
= 3 X 5 X 11 X 11 X 13. ∴ 23595 = 3 X 5 X 11 X 11 X 13.

Q4. Reduce $\frac{611}{1457}$.

Answer: Take HCF of 611 and 1457. We get 47. Now we divide both 611 and 1457 by 47. We get 13 and 31 respectively. $\therefore \frac{611}{1457} = \frac{13}{31}$.

Q5. Find the greatest number that will divide 37, 56, and 93, leaving the remainder 1, 2, and 3 respectively.

Answer: Here, 37 – 1 = 36; 56 – 2 = 54; 93 – 3 = 90. Now take the HCF of 36, 54 and 90. We get 18. ∴ The required greatest number = 18.

Q6. Find the smallest number which is exactly divisible by 18, 24, 36 and 42.

Answer: By the definition of LCM, the required number is the LCM of 18, 24, 36 and 42.

2	18, 24, 36, 42
2	9, 12, 18, 21
3	9, 6, 9, 21
3	3, 2, 3, 7
	1, 2, 1, 7

∴ LCM = 2 X 2 X 3 X 3 X 2 X 7 = 504.

Q7. Find the smallest number which when divide by 15, 20, 25, and 45 leaves 10 as the remainder in each case.

Answer: The LCM of 15, 20, 25, and 45 is 900.

∴ the required number = 900 + 10 = 910.

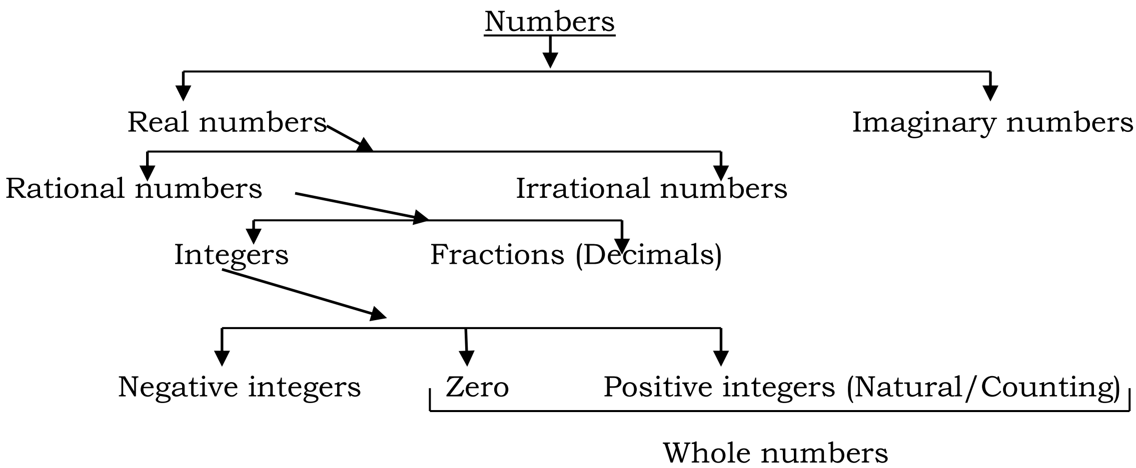
Q8. The LCM and HCF of two numbers are 252 and 6 respectively. If one of them is 42, find the other number.
Answer: We know, the product of two numbers = the product of their LCM and HCF.
∴ 42 X the required number = 252 X 6.
∴ the required number = (252 X 6) ÷ 42
= 36.

E. Home assignment:
Q1. Write all the prime numbers between 1 and 100.
Q2. Test the divisibility of the following numbers by 7.
(i) 140294, (ii) 8564. (iii) 97971, (iv) 6580, (v) 129500.
Q3. Find the HCF of (a) 120, 144, 204. (b) 180, 252, 324.
Q4. Find the LCM of (a) 24, 40, 84. (b) 112, 168, 266, 224.
Q5. If the product of two numbers is 4032 and their HCF is 12, find their LCM.

F. Home work: Exercise 2B (page no N-27) Question no 11, 12, 13.
Exercise 2D (page no N-35) Question no 4 to 12.
Exercise 2E (page no N-40) Question no 6 to 10.

Chapter: Whole Numbers.

A. Introduction: Here it is essential to learn the number system. Let us consider the following classification of number world.



B. Distributive law and whole numbers: The natural numbers including zero are called whole numbers. Or, we can say, zero and all positive integers together is called whole number. Now we will discuss about distributive law. If a, b and c are whole numbers then, a X (b + c) = a X b + a X c; and a X (b – c) = a X b – a X c. This is called distributive law. This law is useful for multiplication and simplification problems.

C. Some textual Problems and their solutions:
Q1. Find the product using the distributive property. 34627 X 9999.
Answer: 34627 X 9999 = 34627 X (10000 – 1) {using distributive law}
= 346270000 – 34627.
= 346235373.
Q2. Find the largest six-digit number which is exactly divisible by 127.
Answer: The largest six digit number is 999999.
999999 ÷ 127 gives the remainder 1.

Hence, the required number = 999999 – 1.
= 999998.

Q3. Find the smallest five-digit number which is exactly divisible by 273.

Answer: The smallest five-digit number = 10000.

10000 ÷ 273 gives the remainder 172.

∴ the required number = 10000 + (273 – 172).
= 10000 + 101.
= 10101.

Q4. Supply the missing digits: 235

$$\begin{array}{r} 235 \\ \underline{\times\ *_1} \\ *_2\, *_3\, 10 \end{array}$$

Answer: As the unit place of the product is 0; now think 5 X ? = a number whose unit digit is 0. You know 5 X 2 = 10; so the multiplier is 2. Now complete the multiplication. You must get the product as 470, but the actual product is a four-digit number. So $*_1$ never be 2. Instead of 2 you may take 4 or 6 or 8. You must get *1 is 6. Now complete the multiplication. You will get $*_2$ = 1, and $*_3$ = 4.

D. Home assignment:

Simplify the following:

Q1. 220 + 24 x 60 – 1089 ÷ 99;

Q2. 6 + 8 ÷ 2 – 2 x 1 + 5 of 2 ÷ 5;

Q3. 5 x 1335 ÷ 267 + 5;

Q4. 7240 ÷ 2 of 181 x 4 – 50;

Q5. 18 – (9 of 9 x 2) ÷ 9;

Q6. 72 + 12 of 419 – 2 of 25 – 64 of 25 ÷ 2 of 4;

Q7. (6 + 8) – (44 – 16) ÷ 2 + 5;

Q8. (8 – 4) x (15 of 4 – 15) – 4 of 25;

Q9. {6 of 145 ÷ (3 + 2)} ÷ 2 – 4 of 20;

Q10. 3 of 50 + 2 x {(18 + 17) x (30 – 5)} ÷ 5;

Q11. 2 X 2 – 2 ÷ 2 + {2 X 2 – (2 ÷ 2 + 2)};

Q12. 5 – 12 ÷ {(6 of 3 ÷ 9 + 5 X 24 ÷ 3) ÷ 7};

Q14. $15 + \{46 + 20 \text{ of } 3 \div 30 - (\overline{10+8} \times 2)\}$;

Q15. $100 - \{21 \div 3 + 2 \text{ of } 6 + (38 - \overline{21+7} + 2)\} + 13$;

Q16. $2\frac{1}{2} \div \frac{1-\frac{5}{6}}{\frac{1}{3}-\frac{1}{4}}$;

Q17. $4^2 - 2^3 + 1\frac{1}{2} - 9\frac{1}{2}$;

Q18. (64 X 0.125 X 9) ÷ (41.27 + 8.73 – 28 X 0.5);

Q19. $2\frac{3}{4} \div \frac{1}{2} \times 1\frac{1}{11}$;

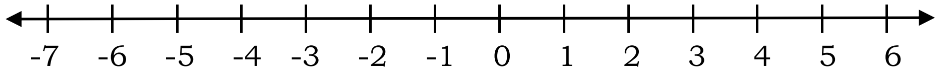
Q20. $17\frac{1}{2} - 3\frac{1}{4} \times 4\frac{3}{13} + \frac{1}{12}$;

Q21. $2 + \frac{2}{2+\frac{1}{2}}$; Q22. $\frac{1}{1+\frac{1}{1+\frac{1}{2}}}$;

D. Home work: Exercise 3A (page no N-47) Question no 7, 12.
Revision Exercise (page no N-51) All the problems.

Chapter: Integers:

A. Introduction: We are already familiar with the system of whole numbers. The Whole numbers along with negative natural numbers are called *integers*. The set of integers is denoted by I or Z. I or Z = { ...... – 5, – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, 5, ... }. We have to learn here the concept of *real number line*. Sometimes we say 'number line' only instead of 'real number line'.



Here, in between any two integers, there are infinitely many rational and irrational numbers.

B. Uses of integers: In our daily life, we come across many statements which are opposite to each other. Integers are used to express these statements in mathematical terms. For example (i) Profit is represented by positive integer and loss is represented by negative integer, (ii) Heights above sea level is represented by positive integer and depth below sea level is represented by negative integer, etc.

C. Absolute value of an integer: The whole number obtained by omitting the positive or negative sign of an integer is called the absolute value of the integer. It is denoted by writing the integer between two vertical poles, such as $|5|$, $|-7|$, $|2+5-9|$etc. The value of $|-25| = 25$, similarly $|8| = 8$.

D. Remember these: (i) There is no largest integer and no smallest integer.
(ii) Every integer has a successor and a predecessor.
(iii) Positive integers are represented on the right of 0.
(iv) Negative integers are represented on the left of 0.
(v) An integer is greater than all those integers that lie to its left on the number line.
(vi) An integer is less than all those integers that lie to its right on the number line.
(vii) '0' is neither a positive nor a negative integer.
(viii) On the number line, 0 is called the origin.

E. Home assignment:

Q1. Write the integers in ascending order:
(i)3, –2, 6, 4, –5, –10, $|-10|$, $|8|$, $|-8|$.
(ii) 152, 125, – 121, 112, $|-251|$, 0, 212, – 125.
(iii) 59, 95, – 96, $|-59|$, 0, 69, – 91, $|40|$, – 56.

Q2. Evaluate the following:
(i) (+ 475) + (+827); (ii) (– 654) + (621); (iii) (– 98) + (– 95) + (– 75);
(iv) (– 79) – (45); (v) (– 25) – (– 75); (vi) – (– 412) – (+624) – (– 469);
(vii) 85 – 65 + 89 – 58 + 71 – 75; (viii) 524 + 560 – 562 – 456 – 215 + 982;
(ix) 56 X (– 52); (x) (– 85) X (– 25); (xi) (– 11) X (– 10) X (– 25);
(xii) (– 10) X (– 20) X (+11) X (– 2); (xiii) (– 55) ÷ (– 5);
(xiv) 126 ÷ (– 14); (xv) (– 5194) ÷ 98.

Q3. Write the absolute values of the following integers:
(i) 5; (ii) – 9; (iii) 37; (iv) – 46; (v) 0; (vi) – 109; (vii) – 537; (viii) 498.

Q4. Find the product of the following (i) (52) X 9; (ii)(–64) X 31; (iii) 481 X (–25);
(iv) (–604) X (–34); (v) (–91) X (–51) X (–8);

Q5. Find the following quotients:
(i) 242 ÷ 11; (ii) (–3367) ÷ 37; (iii) 1856 ÷ (–29); (iv) (–7663) ÷ (–97);
(v) 32487÷ (–91).

F. Home work: Exercise 4A (Page no N-57-58) Question no 3 to 8.
Exercise 4B (page no N-65) Question no 4, 5, 6.
Exercise 4C (page no N-68-69) All the problems.

If you have any doubt, you may ask with the help of your parent(s) by the contact no 9434512261. Stay at home. May God safe you all.

e-Notes of Algebra for class 6 (ICSE)

Chapter: Fundamental concepts of Algebra:

A. Introduction: Algebra, like Arithmetic, is a science of numbers with this distinction that the numbers in Algebra are generally denoted by letters instead of by figures. Algebra is generalized arithmetic, in which numbers are represented by letters a, b, c, d, k, n, x, y, z, etc., called literal numbers or simply literals.

There are two types of symbols, namely constants and variables. A symbol having a fixed value is called a *Constant*. A symbol which can be assigned various values is called a *Variable*. In 9x, 9 is constant and x is variable.

B. Power; Index; Exponent: If a quantity be multiplied by itself any number of times, the product is called a power of that quantity. Thus a X a, a X a X a, a X a X a X a, &c., are powers of a. a X a is called the second power or square of a and is written a^2. Similarly, a X a X a = a^3 (third power of a or cube of a).

Note: a^2 should not be read as 'a square'; you should read 'a squared'. Similarly, a^3 should be read 'a cubed' (not 'a cube').

C. Algebraic expressions: A combination of literals and numbers connected by one or more of the symbols +, –, X, and ÷ is called an *algebraic expression*. The several parts of an algebraic expression separated by + or – sign are called the *terms* of the expression. Each of the letters which occur as factors of an algebraic product is called a *dimension* of the product, and the number of the letters is called the *degree* of the product. Thus, a^2x^5y, is said to be eight dimensions, or of the eight degree. Similarly, the degree of $ab^2c^4d^5$ is 12. An algebraic expression is said to be *homogeneous* when all its terms are of the same dimensions. Thus, the expression $5a^3b - 7a^2bc + 8b^2c^2$ is homogeneous, for each of its terms is of four dimensions.

D. Types of algebraic expressions:

1. Monomial: An algebraic expression having only one term is called a *monomial*.
Examples: 5x, –2ab, $7xy^2z$, etc.
2. Binomial: An algebraic expression having two terms is called a *binomial.*
Examples: 6y – 3, 6 + x, $a^2b + 6abc$, etc.
3. Trinomial: An algebraic expression having three terms is called a *trinomial*.
Examples: 3p – 12q + 9r, 3xy + 4yz – xz, etc.
4. Multinomial / Polynomial: An algebraic expression having two or more than two terms is called a *multinomial* or *polynomial*. Examples: $a^2 + 2b^2 + 3ab^2 - 4bc^2 + 25$, etc.

E. Like and unlike terms: Two or more terms are called like terms if they have the same literal factors. The terms which are not like are called unlike terms. Examples: 5xy and 3xy are like terms. But 6ab and 12bc are unlike terms.

F. Home assignment:

Q1. Write the following in mathematical form using signs and symbols:

(i) x increased by 13, (ii) y decreased by 10, (iii) x taken away from 20, (iv) Four times x decreased by five times y, (v) – 7 is subtracted from x, (vi) The product of 11 and p, (vii) a divided by b as a product, (viii) Quotient of z by 4 is multiplied by thrice the number y, (ix) Product of a and b subtracted from their sum, (x) x exceeds 14 by 5, (xi) 45 decreased by y gives 29, (xii) One third of the sum of x and 4 equals 10, (xiii) 16 less than the quotient of a by 2 equals 8, (xiv) Nine times m is greater than 18, (xv) c taken away from the sum of a and b, (xvi) The excess of 15 over x is 10, (xvii) My age is y years and I am more than 25 years old.

Q2. Identify which of the following algebraic expressions are polynomials. If so, write their degrees.

(i) $x^3 - 2x + 7$, (ii) $a + \frac{2}{a}$, (iii) $3a^3b - 5abc + \frac{1}{2}c^3 + 8$, (iv) $x^2 + y^2 - 3xy + \frac{5}{z}$.

Q3. Identify monomial, binomial, trinomial and polynomial from the following algebraic expressions.

(i) $x + y$, (ii) 8, (iii) p, (iv) $xy + yz + zx$, (v) $\frac{1}{x} + 3$, (vi) $2 - 3a - 5mn + 7ab + 2m$.

Q4. Find the value of:

(i) $3x + 2y$ when $x = 3$ and $y = 2$,

(ii) $a + 2b - 5c$ when $a = 2$, $b = -3$, and $c = 1$,

(iii) $2p + 3q + 4r + pqr$ when $p = -1$, $q = 2$ and $r = 3$,

(iv) $4x^3 - 5x^2 - 6x + 7$ when $x = 3$,

(v) $a^2 + b^2 + c^2 - 2ab - 2bc - 2ca + 3abc$ when $a = 2$, $b = 3$, and $c = -2$.

G. Home work:

Exercise 1A (page no A11-12) Question no 7 to 12.

Exercise 1B (page no A13-14) Question no 4 to 11.

Chapter: Fundamental Operations:

A. Introduction: In this chapter, we will study the basic operations on algebraic expressions – how to add and subtract polynomials; we shall also study the use of grouping symbols (brackets) and the simplification of algebraic expressions.

B. Addition of like terms:

The sum of two or more like terms is a like term whose co-efficient is the sum of the co-efficients of given like terms. Unlike terms never be added. Addition of like terms can be done by two methods – horizontal method and column method. In case of column method, arrange like terms in such a way that they are one below the other.

C Subtraction of like terms:

The remainder of two like terms is a like term. Subtraction of like terms can be done by two methods – horizontal method and column method. In case of column method, arrange like terms in such a way that they are one below the other. Change the sign of the term to be subtracted and then add. Actually, subtraction is the opposite operation of addition.

D. Textual problems:

Q1. Add: $7x^2y$, $8xy^2$, $-4x^2y$, $-5xy$.

Answer: $7x^2y + 8xy^2 + (-4x^2y) + (-5xy)$. [In case of monomials, apply only horizontal method]

$= 7x^2y + 8xy^2 - 4x^2y - 5xy$.

$= 7x^2y - 4x^2y + 8xy^2 - 5xy$.

$= 3x^2y + 8xy^2 - 5xy$.

Q2. Add: $3ab + 2bc$, $-5ab + 3bc$, $2ab - 5bc$. [In case of algebraic expressions, apply horizontal method or column method]

Answer: $(3ab + 2bc) + (-5ab + 3bc) + (2ab - 5bc)$.

$= 3ab + 2bc - 5ab + 3bc + 2ab - 5bc$.

$= 3ab - 5ab + 2ab + 2bc + 3bc - 5bc$.

$= 5ab - 5ab + 5bc - 5bc$.

$= 0$.

Q3. Subtract: $-7ab$ from 0.

Answer: $0 - (-7ab) = 7ab$.

Q4. Subtract: $2x - 5y$ from the sum of the binomials $x + 7y$ and $3x - 6y$.

Answer: According to question, $\{(x + 7y) + (3x - 6y)\} - (2x - 5y)$.

$= x + 7y + 3x - 6y - 2x + 5y$.

$= x + 3x - 2x + 7y - 6y + 5y$.

$= 4x - 2x + 12y - 6y$.

$= 2x + 6y$.

E. Home Assignments:

Q1. Add: (i) $x + x + x$, (ii) $xy + xy + a + a + a$, (iii) $5a^3$, $-3a^3$, $-\frac{1}{2}a^3$,

(iv) $8a - 3b + 11c$, $5b - 6a + 7c$ and $9c + 2a - 8b$,

(v) $10x^2 + 8x - 7$, $3x - 13x^2 + 5$ and $9 - 6x - 5x^2$,

(vi) $5ab + 6bc - 2ac$, $ab + 5bc - ca$, and $2ca + bc - 4ab$,

(vii) $3x^2 - \frac{1}{5}x + \frac{7}{3}$, $\frac{-1}{4}x^2 + \frac{1}{3}x - \frac{1}{6}$, $-2x^2 - \frac{1}{2}x + \frac{1}{5}$,

(viii) $6m^2n + 3mn - 2n^2$, $n^2 - mn - m^2n$ and $mn - 3n^2 - 4m^2n$.

Q2. Subtract: (i) $9ab$ from $11ab$, (ii) $12p$ from $9p$, (iii) $3x - 8y + 5z$ from $7x + 3y - 3z$,

(iv) $7x + 3y - 6z$ from the sum of $2x - y - 2z$ and $2y - 4x - 3z$,

(v) $6x^3 - 8x^2 + 4x - 2$ from $5 - 4x + 6x^2 - 8x^3$, (vi) $3r^2 + 5rs - 6s^2$ from 0.

F. Home work:

Exercise 2A (page no A17) Question no 3 to 5.

Exercise 2B (page no A19-20) Question no 2 to 4.

Exercise 2C (page no A21) All the questions.

Chapter: Linear Equations:

A. Introduction: Line is a noun. Linear is its adjective form. Linear equation represents a line in algebraic way. When the line is || to X-axis or Y-axis, the equation should have one variable; but when the line is not || to X-axis or Y-axis, the equation should have two variables.

B. What is an equation?

An algebraic equation is a statement that two expressions are equal. It may involve one or more than one variables (literal numbers). An equation containing only one variable (literal) with highest power 1 is called a *linear equation* in that variable.

C. Solving an equation:

The value of the variable which when substituted in the given equation makes LHS = RHS, is called a *solution* or *root* of the given equation. In solving a linear equation, we follow the rules given below:

Rule 1. The same number can be added to both sides of an equation.
Rule 2. The same number can be subtracted from both sides of an equation.
Rule 3. Each side of an equation can be multiplied by the same non-zero number.
Rule 4. Each side of an equation can be divided by the same non-zero number.

D. Textual problems:

Q1. Solve: 5y + 3 = 3y – 4.

Answer: 5y + 3 = 3y – 4.

=> 5y – 3y = –4 – 3.

=> 2y = –7. => y = $\frac{-7}{2}$.

Q2. Solve: (12x – 7) – (5x + 6) = 3 – (8 – 2x).

Answer: (12x – 7) – (5x + 6) = 3 – (8 – 2x).

=> 12x – 7 – 5x – 6 = 3 – 8 + 2x.

=> 12x – 5x – 2x = 3 – 8 +7 + 6.

=> 12x – 7x = 16 – 8.

=> 5x = 8.

=> x = $\frac{8}{5}$.

Q3. If 8 is subtracted from a number, we get 18. Frame an equation for the statement ans find the number.

Answer: Let the required number be x.

According to problem, The equation is x – 8 = 18.

Solution: x – 8 = 18.

=> x = 18 + 8.

=> x = 26.

Q4. The sum of two consecutive odd integers is 44. Find the two integers.

Answer: Let the 1st odd number is x.

So, the next odd number is x + 2.

According to question, x + (x + 2) = 44.

⇨ 2x +2 = 44.
⇨ 2x = 44 – 2.
⇨ 2x = 42.
⇨ X = 42 ÷ 2.
⇨ X = 21.

Now x + 2 = 21 +2 = 23. ∴ The two integers are 21 and 23.

E. Home assignment:

Q1. Solve: (i) y + 2 = – 8, (ii) $\frac{3x+5}{4}$ = 2, (iii) 5(x –1) = 2(x +3) +1,

(iv) 3(5x – 2) – 4(x +4) = 7(x – 1) + 1, (v) $\frac{2y}{3}$ – 8 = 2 – y.

Q2. One-sixth of a number added to two-third of itself yields 25. Find the number.

Q3. A boy is 4 years older than his sister. The sum of their ages is 14 years. Find their ages.

Q4. The length of a rectangle is thrice its width. If the perimeter is 56 units. Find the length and breadth of the rectangle.

Q5. If you multiply a number by 5 and take away 15, you get 20. Find the number.

F. Home work:

Exercise 3A (page no A26) Question no 2, 3, 4.
Exercise 3B (page no A27-28) Question no 2, 3, 4, 5.
Revision Exercise (page no A29) All problems.

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e-Notes of Geometry for class 6 (ICSE)

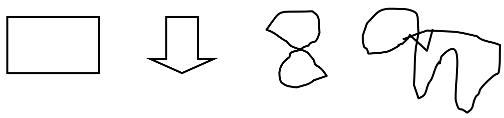
Chapter: Fundamental concepts of Geometry.

A. Introduction:

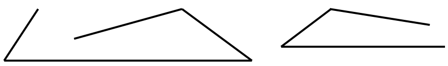
The word Geometry has been derived from two Greek words, namely 'Geo' and 'Metron'. Here 'Geo' means earth and 'Metron' means measurement. Thus, the word Geometry means *'measurement' of earth'*. A branch of mathematics that deals with points, lines, curves, surfaces and their measurements, relationships and properties is called *geometry*. In this chapter, we will learn some important definitions.

B. Some important definitions:

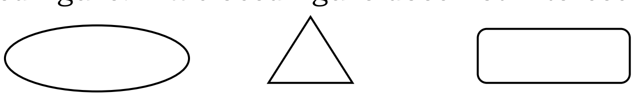
1. Point: A geometric figure, which has position only but, neither length, nor breadth, nor thickness is called a point. A point indicates by capital letter only.
2. Line: A geometric figure, which has length only, but neither breadth nor height is called a line. There are two types of lines, namely straight line and curved line.
3. Straight line: A straight path of points that extends on and on in both the direction without ever ending is called straight line. It has length only, no breadth or height.
4. Curve line: A line which is not straight is called a curve line.
5. Line segment: The shortest distance between two points is called line segment.
6. Ray: A part of a line on one side of a fixed point on it is called a ray.
7. Plane: A smooth flat two-dimensional surface which extends indefinitely in all directions is called a plane.
8. Closed figure: A figure that begins and ends at the same point is called a closed figure.



9. Open figure: A figure that does not end at the starting point is called an open figure.



10. Simple closed figure: If a closed figure does not intersect itself, it is called a simple closed figure.

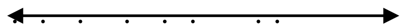


11. Linear boundary: If a figure is bounded by line segments, such a boundary is called linear boundary.
12. Curvilinear boundary: If a figure is bounded by curved lines, such a boundary is called a curvilinear boundary.

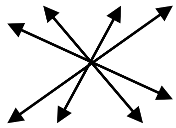
13. Parallel lines: Two different straight lines drawn in a plane are parallel if they do not meet. The distance between the parallel lines remains the same.

14. Intersecting lines: Two different straight lines having a common point drawn in a plane are called intersecting lines.

15. Collinear points: Three or more points which lie on the same straight line are called collinear points.



16. Concurrent lines: Three or more lines (in a plane) are called concurrent if and only if all of them pass through the same point.



C. Things to remember:

1. A point is a mark of position.
2. The straight path between two points A and B is called the line segment AB, represented by $\overline{AB}$. But a straight line is represented by $\overleftrightarrow{AB}$.
3. A ray is represented by $\overrightarrow{AB}$.
4. One and only one line can be drawn to pass through two given points in a plane.

D. Home assignment:

Q1. Fill in the blanks:

(i) A line segment has ……….. end points.
(ii) A line has ………… end points.
(iii) A ray has ………….. end point.
(iv) A line segment has a ……………. length.
(v) A line AB is represented by ……….. .
(vi) A ray AB is represented by ………… .
(vii) A point show a definite ………….. .
(viii) Two lines intersect in a …………… .
(ix) Two planes intersect in a …………… .
(x) The minimum number of points of intersection of three lines in a plane is …………. .
(xi) The maximum number of points of intersection of three lines in a plane is ………….. .

Q2. Which shape do the following have?

(i) The wheel of a bicycle,
(ii) A blackboard,
(iii) A page of a book,
(iv) The face of the full moon,
(v) A set-square in a geometry box,
(vi) A face of a dice.

E. Home work. Exercise 1 (page no G10) All the problems.

Chapter: Angles and Lines:

A. Introduction: Angles and lines are the basic concept of geometry. We have to learn here some important definitions.

B. Some important definitions:

1. ANGLE: A shape, formed by two lines or rays diverging from a common point.
2. RIGHT ANGLE: An angle that measures 90^0 is called a right angle.
3. ACUTE ANGLE: An angle that measures more than 0^0 but less than 90^0 is called an acute angle.

4. OBTUSE ANGLE: An angle that measures more than 90^0 but less than 180^0 is called an acute angle.
5. STRAIGHT ANGLE: An angle that measures 180^0 is called a straight angle.
6. REFLEX ANGLE (OR RE-ENTRANT ANGLE): An angle that measures more than 180^0 but less than 360^0 is called a reflex angle.
7. COMPLETE ANGLE: An angle that measures 360^0 is called a complete angle.
8. ZERO ANGLE: An angle that measures 0^0 is called a zero angle.
9. COMPLEMENTARY ANGLES: Two angles are called complementary angles if the sum of their magnitudes is 90^0.
10. SUPPLEMENTARY ANGLE: Two angles are called supplementary angles if the sum of their magnitudes is 180^0.
11. PARALLEL LINES: Two different straight lines drawn in a plane are parallel if they do not meet. The distance between the parallel lines remains the same.
12. INTERSECTING LINES: Two different straight lines having a common point drawn in a plane are called intersecting lines.

C. Things to remember:

1. The common initial point is called the vertex of the angle and the rays forming the angle are called its sides or arms.
2. The standard unit for measuring an angle is degree, denoted by ‘ ^{0}’.
3. The instrument used for measuring angles is called a protractor.
4. Two angles having the same measure are known as congruent angles or equal angles.
5. 1 complete turn = 360^0, $1^0 = 60^/$, $1^/ = 60^{//}$.

D. Home work: Exercise 2A (page no G21) Question no 4 to 18.
Revision exercise (page no G23) All the problems.

Chapter: Construction of Angles:

A. Introduction: In this chapter, you will learn how to draw accurate and scale drawing using geometrical instruments. You may be asked to construct an accurate drawing or to take measurements from a drawing. You must have the proper geometrical instruments to do this:

- A ruler (to draw or measure line segments in cm or mm)
- A divided (to help in measuring line segments accurately)
- A compasses with a sharp pencil on one end (to draw circles or arcs)
- Set-squares (to draw a particular measure of an angle)
- Another sharp pencil
- A rubber (to rub incorrect work, if any)

B. To construct angles of 60^0, 30^0, 120^0, 90^0, 45^0, and 135^0:

We must learn the construction of 60^0 angle. According to our question, we will bisect it or multiply it, and make it the required angle according to our need. Each and every standard angle is shown step by step in your text book.

C. Home work: Exercise 3 (page no G40) All the problems.
Revision exercise (page no G41-42) All the problems.

Chapter: Triangles:

A. Introduction: In this chapter, you will learn about triangle and its properties. Triangle is very important chapter for you.

B. Some important definitions:

1. TRIANGLE: A polygon having three sides is called a triangle.
2. ACUTE ANGLED TRIANGLE: A triangle who's all the three angles are acute angles is called an acute angled triangle.
3. OBTUSE ANGLED TRIANGLE: A triangle whose one angle is obtuse angle is called an obtuse angled triangle.
4. RIGHT ANGLED TRIANGLE: A triangle whose one angle is right angle is called a right angled triangle.
5. EQUILATERAL TRIANGLE: A triangle whose all the three sides are equal is called an equilateral triangle.
6. ISOSCELES TRIANGLE: A triangle whose any two sides are equal is called an isosceles triangle.
7. SCALENE TRIANGLE: A triangle whose all the sides are unequal is called a scalene triangle.
8. MEDIAN OF TRIANGLE: A line joining between the mid-point of a side and the opposite vertex is called a median of a triangle. There are three medians in a triangle.
9. ALTITUDE OF TRIANGLE: The perpendicular line from the vertex to the opposite side of a triangle is called altitude of a triangle. There are three altitudes in a triangle.

C. Properties of triangles:

1. The sum of the three angles of a triangle is 180^0.
2. As the sum of the three angles of a triangle is 180^0, if one of its angles is 90^0 or more, the other two must be acute.
3. An exterior angle of a triangle is equal to the sum of the two opposite interior angles of the triangle.
4. The sum of two sides of a triangle is always greater than the third side.
5. The three medians are concurrent lines. The common point is called *centroid*.
6. The three altitudes are concurrent lines. The common point is called *orthocenter.*

D. Home work: Exercise 4A (page no G48-49) Question no 5 to 12.
Exercise 4B (page no G51) Question no 1 to 9
Revision Exercise (page no G52) All the problems.

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