GOVERNMENT OF TAMILNADU

Department Of Employment and Training

Course: SSC

Subject: Quantitative Aptitude

Topic: Algebra

ALGEBRA

Introduction:

In our earlier classe, we have learnt about constants, variables, like terms, unlike terms, co-efficients, numerical and algebraic expressions. Later, we have done some basic operations like addition and subtraction on algebraic expressions. Now, we shall recollect them and extend the learning.

Further, we are going to learn about multiplication and division of algebraic expression and algebraic identities.

SQUARE ROOT AND CUBE ROOT:

1) If $x^2 = y$, we say that the square root of y is x and we write $\sqrt{y} = x$.

Thus, $\sqrt{4} = 2$, $\sqrt{9} = 3$, $\sqrt{196} = 14$.

2) The cube root of a given number *x* is the number whose cube is *x*. We denote the cube root of *x* by $\sqrt[3]{x}$.

Thus, $\sqrt[3]{8} = \sqrt[3]{2 \times 2 \times 2} = 2$, $\sqrt[3]{343} = \sqrt[3]{7 \times 7 \times 7} = 7$ etc.

3) $\sqrt{xy} = \sqrt{x} \times \sqrt{y}$

IMPORTANT FORMULAE

1. $$\text{P.W.} = \frac{100 \times \text{Amount}}{100 + (R \times T)} = \frac{100 \times \text{T.D.}}{R \times T}$$

2. $$\text{T.D.} = \frac{(\text{P.W.}) \times R \times T}{100} = \frac{\text{Amount} \times R \times T}{100 + (R \times T)}$$

3. Sum = $\frac{(S.I.) \times (T.D.)}{(S.I.) - (T.D.)}$

4.(S.I.) - (T.D.) = S.I. on T.D. = $Amount/(1+R/100)^{T}$

5. When the sum is put at compound interest, then P.W.

Foot Notes:

R->Rate
T->Time
T.D-> True Discount
P.W->Present worth
S.I-> Simple Interest

BANKER'S DISCOUNT

Suppose a merchant A buys goods worth, say Rs. 10,000 from another merchant B at a credit of say 5 months. Then, B prepares a bill, called the bill of exchange. A signs this bill and allows B to withdraw the amount from his bank account after exactly 5 months.

The date exactly after 5 months is called nominally due date. Three days (known as grace days) are added to it get a date, known as *legally due date*.

Suppose B wants to have the money before the legally due date. Then he can have the money from the banker or a broker, who deducts S.I. on the face vale (i.e., Rs. 10,000 in this case) for the period from the date on which the bill was discounted (i.e., paid by the banker) and the legally due date. This amount is know as *Banker's Discount (B.D.)*.

Thus, B.D. is the S.I. on the face value for the period from the date on which the bill was discounted and the legally due date.

Banker's Gain (B.G.) = *(B.D.) - (T.D.)* for the unexpired time.

Note: When the date of the bill is not given, grace days are not to be added.

IMPORTANT FORMULAE:

1. B.D. = S.I. on bill for unexpired time.
2. B.G. = (B.D.) - (T.D.) = S.I. on T.D. = $\frac{(T.D.)^2}{P.W.}$
3. T.D.= $\sqrt{P.W. \times B.G.}$
4. B.D. = $\frac{\text{Amount x Rate x Time}}{100}$
5. T.D. = $\frac{\text{Amount x Rate x Time}}{100 + (\text{Rate x Time})}$
6. Amount = $\frac{\text{B.D. x T.D.}}{\text{B.D. - T.D.}}$
7. T.D. = $\frac{\text{B.G. x 100}}{\text{Rate x Time}}$

Foot Notes:

B.D -> Banker Discount
T.D-> True Discount
B.G->Banker's Gain
P.W->Present worth
S.I-> Simple Interest

When the product of two algebraic expressions we follow,

Multiply the signs of the terms,

Multiply the corresponding co-efficients of the terms.

Multiply the variable factors by using laws of exponents.

- For dividing a polynomial by a monomial, divide each term of the polynomial by a monomial.
- Identity: An identity is an equation is satisfied by any value that replaces its variables
- Identities give an alternative method of solving problems on multiplication of algebraic expressions and also of numbers.
- Factorisation: Expressing an algebraic expression as the product of two or more expression is called factorization.

The word algebra comes from the title of the Arabic book Ilm al-jabrwal makabala by the Persian mathematician and astronomer al-khwarizmi. Algebra is the study of mathematical symbols and rules for calculating these symbols. In arithmetic, only numbers and their arithmetical operations.

$a^m \times a^n = a^{m+n}$
$a^m / a^n = a^{m-n}$
$1/a^m = a^{-m}$
$(am)^n = a^{mn}$
If $a^n = 0$, then $a = 0$
If $a^m = a^n$ then $m = n$ $(a \neq 1)$
$A^2 - B^2 = (A + B)(A - B)$
$(A + B)^2 = A^2 + B^2 + 2AB$

$A^2 + B^2 = (A + B)^2 - 2AB$
$(A - B)^2 = A^2 + B^2 - 2AB$
$A^2 + B^2 = (A - B)^2 + 2AB$
$(A + B)^2 + (A - B)^2 = 2\times(A^2 + B^2)$
$A^2 + B^2 = ((\boldsymbol{A}+\boldsymbol{B})^2 + (\boldsymbol{A}-\boldsymbol{B})^2)/\mathbf{2}$
$(A + B)^2 - (A - B)^2 = 4AB$
$A^3 + B^3 = (A + B)(A^2 + B^2 - AB)$
$A^3 - B^3 = (A - B)(A^2 + B^2 + AB)$
$(A + B)^3 = A^3 + B^3 + 3AB(A + B)$
$A^3 + B^3 = (A + B)^3 - 3AB(A + B)$
$(A - B)^3 = A^3 - B^3 - 3AB(A - B)$
$A^3 - B^3 = (A - B)^3 + 3AB(A - B)$
$(A + B + C)^2 = A^2 + B^2 + C^2 + 2AB + 2BC + 2CA$
$(A + B + C)^3 = A^3 + B^3 + C^3 + 3(A + B)(B + C)(C + A)$
$A^3 + B^3 + C^3 = (A + B + C)^3 - 3(A + B)(B + C)(C + A)$
$A^4 - B^4 = (A^2 + B^2)(A^2 - B^2)$
$A^4 + B^4 = (A^2 + B^2 + AB) - A^2B^2$
$A^3 + B^3 + C^3 = (A + B + C)(A^2 + B^2 + C^2 - AB - BC - CA) + 3ABC$
$A^3 + B^3 + C^3 - 3ABC = = (\boldsymbol{A}+\boldsymbol{B}+\boldsymbol{C})/2 [(\boldsymbol{A}-\boldsymbol{B})^2 + (B - C)^2 + (C - A)^2]$

The system of a pair of linear equations a1x + b1y + c1 = 0 and a2x + b2y + c2 = 0 has
Constant or unique equation = $\boldsymbol{a1/a2} \neq \boldsymbol{b1/b2}$
(inconsistent) = $\boldsymbol{a1/a2} = \boldsymbol{b1/b2} \neq \boldsymbol{c1/c2}$

$a^2 + 1/a^2 = (a + 1/a)^2 - 2$
$a^2 + 1/a^2 = (a - 1/a)^2 + 2$
$a^3 + 1/a^3 = (a + 1/a)^3 - 3(a + 1/a)$
$a^3 - 1/a^3 = (a - 1/a)^3 + 3(a - 1/a)$
If $a + 1/a = k \rightarrow a^2 + 1/a^2 = k^2 - 2$
$a - 1/a = k \rightarrow a^2 + 1/a^2 = k^2 + 2$
$a + 1/a = k \rightarrow a^3 + 1/a^3 = k^3 - 3k$

$a - 1/a = k \rightarrow a^3 - 1/a^3 = k^3 + 3k$
$a^5 + 1/a^5 = (a^2 + 1/a^2)(a^3 + 1/a^3) - (a + 1/a)$
If $a + 1/a = \sqrt{3} \rightarrow a^3 + 1/a^3 = 0$
If $a^2 + 1/a^2 = k \rightarrow a + 1/a = \sqrt{k+2}$
$a - 1/a = \sqrt{k-2}$

If x+ 1/x=2 →x=1 (always)
If x+ 1/x=−2 →x= −1 (always)

PROBLEMS

1. **The degree of polynomial $336x^2 + 210x + 42$ is?**
   a) 3 b) 4 c) 42 d) 2
   Soln:
   We know, degree of ax^2+bx+c is 2.
   So, degree of $336x^2+210x+42$ is 2.

   Ans: d) 2

2. **The HCF of x^3y/m^2n^4 , x^2y^3/m^2n^2 and x^4y^2/mn^3?**
   a) x^2y/mn^2 b) x^3y^2/mn^2 c) x^2y/m^2n^4 d) yx/mn^2
   Soln:
   The HCF of x^3y/m^2n^4, x^2y^3/mn^2
   and $x^4y^2/mn^3 = x^2y/mn^2$

   Ans: a) x^2y/mn^2

3. **The LCM of (x-1) (x-2) and x^2(x-2) (x+3) is?**
   a) x-1 b) (x-1)(x-2)(x+3) c) x^2(x-1)(x-2)(x+3) d) None of these
   Soln:
   The LCM of (x-1)(x-2) and
   $x^2(x-2)(x+3) = x^2(x-1)(x-2)(x+3)$

   Ans: $x^2(x-1)(x-2)(x+3)$

4. **The HCF of $x^2-xy-2y^2$ is ?**
   a) (x-y) b)(x+) c) (2x-3y) d) None of these
   Soln:

Let $p(x) = x^2 - xy – 2y^2$

$q(x) = 2x^2 –xy –y^2$

Therefore HCF of p(x) and q(x) = 0

Ans: d) None of these

5. The LCM of the polynomials $(x+3)^2(x-2)(x+1)^2$ and $(x+1)^3(x+3)(x+4)$ is?

a) $(x-2)(x+1)^3(x+3)^2(x+4)$ b) $(x-2)(x+1)^3(x+3)(x+4)$

b) $(x-2)(x+3)(x+4)$ d) $(x-2)^2(x+1)(x+3)^2(x+4)$

Soln:

Given, $(x+3)^2 (x-2) (x+1)^2$

$(x+1)^3(x+3)(x+4)$

Therefore, Required LCM

$= (x-2) (x+1)^3(x+3)^2(x+4)$

Ans: a) $(x-2)(x+1)^3(x+3)^2(x+4)$

6. If (x+k) is the HCF of (x^2+ax+b) and (x^2+cx+d), then the value of k is?

a) (b +d)/(a+c) b) (a+b)/(c+d) c) (a-b)/(c-d) d) (b-d)/(a-c)

Soln:

Since, (x+k) is the HCF, it will divide each one of the given expressions,

Therefore, $k^2-ak+b = 0$

$k^2– ck+d= 0$

$k^2-ak+b = k^2– ck+d$

k = b-d/a-c

Ans: d) (b-d)/(a-c)

7. The HCF of (x^3+x^2+x+1) and (x^4-1) is?

a) $(x^2-1)(x^2+1)$ b) $(x+1)(x^2-1)$ c) $(x+1)(x^2+1)$ d) $(x^2+1)(x+1)(x^3+1)$

Soln:

Now,

$(x^3+x^2+x+1)=x^2(x+1)(x+1)$

$= (x^2+1)(x+1)$

$x^4-1 = (x-1)(x+1)(x^2+1)$

HCF $= (x+1)(x^2+1)$

Ans: c) $(x+1)(x^2+1)$

8. **The HCF of $(4x^3+3x^2y-9xy^2+2y^3)$ and $(x^2+xy-2y^2)$ is?**

a) $(x-2y)$ b) $(x-y)$ c) $(x+2y)(x-y)$ d) $(x-2y)(x-y)$

Soln:

Now,

$x^3+x^2+x+1= x^2(x+1)+1(x+1)$

$=(x^2+1)(x+1)$

$x^4-1 = (x-1)(x+1)(x^2+1)$

HCF $= (x-y)(x+2y)$

Ans: c) $(x+2y)(x-y)$

9. **If y = -1, then the value of $1+(1/y)+(1/y^2)+(1/y^3)+(1/y^4)+(1/y^5)$ is?**

a) -1 b) 0 c) 1 d) 2

Soln:

Now,

$1+(1/y)+(1/y^2)+(1/y^3)+(1/y^4)+(1/y^5)$

put y = -1

$= 1+(1/(-1))+(1/(-1)^2)+(1/(-1)^3)+(1/(-1)^4)+(1/(-1)^5)$

$= 1-1+1-1+1-1$

$=0$

Ans: b) 0

10. **If x and y are positive with x-y=2 and xy=24, then 1/x+1/y is equal to?**

a) 5/12 b) 1/12 c) 1/6 d) 25/6

Soln:

We have,

x –y=2 ⟹ 1

xy= 24 ⟹ 2

y(y+2)=24 (From eqn 1 x=y+2)

y =4, y= -6 but x and y are positive, so y=4

x=y+2

= 4+2

= 6

Therefore 1/x + 1/y = ¼ + 1/6 = 5/12

Ans: a) 5/12

11.The value of 'k' for which the graphs of (k – 1)x + y – 2 = 0 and (2 – k)x – 3y + 1 = 0 are parallel is?

a) -13/14 b) -12/19 c) -14/12 d) -18/17

Sollution:

Given that,(k – 1)x + y – 2 = 0 and (2 – k)x – 3y + 1 = 0

The system of a pair of linear equations a1x + b1y + c1 = 0 and a2x + b2y + c2 = 0

For parallel equation => $\boldsymbol{a1/a2} = \boldsymbol{b1/b2} \neq \boldsymbol{c1/c2}$

k–1/2–k= 1/–3

k = 12

Infinite no. of solutions

= $\boldsymbol{a1/a2} = \boldsymbol{b1/b2} = \boldsymbol{c1/c2}$

The equation of the line passing through the points (a, b) and (c, d) = Y **–** $\boldsymbol{Y1} = \boldsymbol{Y2} - \boldsymbol{Y1}/\boldsymbol{X2} - \boldsymbol{X1}\ (\boldsymbol{X} - \boldsymbol{X1})$

Here, X1 = a,

Y1 = b

X2 = c

Y2 = d

The equation of the line passing through the point (a, b) and having its slope

$y – y1 = m × (x – x1)$

Here, X1 = a,

Y1 = b

m = slope of the line

TO SOLVE LINEAR EQUATIONS IN ONE VARIABLE:

1) EQUATION OF TYPE $ax+b+ cx+d=0$

Formula, $x = – (ad+bc/a+c)$

Example: $2/x+3+ 5/x−2=0$

$x = −[2 × (−2)+ 3 × 5]/ 2+5$

$= −11/7$

2) EQUATION OF TYPE: $m/ax+b+ n/cx+d=0$

Formula, $x = −(md+nb)/mc+na$

example:

$2/3x+2+ 5/2x+1=0$

Formula, $x = −(md+nb)/mc+na$

$x = −(2 × 1+5 × 2)/2 × 2+5 × 3$

$x = −12/19$

12.Find the equation of the line passing through the point (2, -3) and having its slope 54?

a) 23 b) 22 c) 23 d) 26

solution:

Given that, (x1, y1) = (2, -3)

m = 54

Therefore, the equation of the line as point slope form is

$y – y1 = m × (x – x1)$

$y - (-3) = 5/4 \times (x-2)$

By solving, we get

$5x - 4y = 22$

13. If $x + 1/x = -2$ then the value of $x^{1000} + x^{-1000}$ is?

a) 5 b) 2 c) 1 d) 3

solution:

If $x + 1/x = -2$

$\rightarrow x = -1$ (always)

So, $x^{1000} + x^{-1000} = (-1)^{1000} + 1/(-1)^{1000}$

= 1 + 1

= 2

quadratic equations short method:

12x2 + 17x + 6 = 0

12x2 + 8x + 9x + 6 = 0

[12 * 6 = 72, 8 * 9 = 72, 8 + 9 = 17]

4x(3x + 2) + 3(3x + 2) = 0

(4x + 3)(3x + 2) = 0

x = −3/4 and x = −2/3

SHORT METHOD:

12x2 + 17x + 6 = 0

8 9 [12 * 6 = 72, 8 * 9 = 72, 8 + 9 = 17]

8/ 12 9/12

2/3 3/4

X = −2/3 −3/4

14. If X = Y = 333 and Z= 334, then the value of $X^3 + Y^3 + Z^3 - 3XYZ$

SOLUTION:

From formula

$A^3 + B^3 + C^3 - 3ABC =$

$= (A+B+C)/2\ [(A-B)^2 + (B-C)^2 + (C-A)^2]$

$= ((333+333+334)/2)\ [(333-333)^2 + (333-334)^2 + (334-333)^2]$

= 1000

15.If 999X + 888Y = 1332 and 888X + 999Y = 555 then $X^2 – Y^2$ is equal to ?

a) 8 b) 7 c) 5 d) 9

solution:

Given that 999X + 888Y = 1332 …….. (1)

888X + 999Y = 555 ……… (2)

From equations 1 and 2

X + Y = 1

And equations (1) – (2)

X – Y = 7

Therefore, $X^2 – Y^2$ = (X+Y)(X-Y)

= 1 × 7

= 7

16. The smallest among the following is $\sqrt{3}-\sqrt{2}$, $\sqrt{4}-\sqrt{3}$, $\sqrt{5}-\sqrt{4}$, $\sqrt{2}-1$

a) $\sqrt{5}-\sqrt{4}$ b) $\sqrt{5}-\sqrt{3}$ c) $\sqrt{3}-\sqrt{4}$ d) $\sqrt{6}-\sqrt{4}$

SOLUTION:

Here the difference between the square roots of two consecutive numbers is given. The difference will be the least, if the numbers are bigger.

Hence answer is $\sqrt{5}-\sqrt{4}$

Ans: **a) $\sqrt{5}-\sqrt{4}$**

17.If $x+1/x=6$ *then* $3x/2x^2+2-5x$ *will be*?

a) 5/7 b) 3/7 c) 4/7 d) 6/7

solution:

Given that $x+1x=3$

$3x2x^2+2-5x$

= $3 \times x/x\ [2x+2x-5]$

$= 3/2(x + 1/x) - 5$
$= 3/2 \times 6 - 5$
$= 3/7$

Ans: **b) 3/7**

18. **If** $x + 1/x = 3$ $\boldsymbol{then\ the\ value\ of}$ $x^4 + 1/x^4$ $\boldsymbol{will\ be}$...

a) 57 b) 37 c) 47 d) 67

Solution:

Given that $x + 1/x = 3$
Squaring on both sides, $(x + 1/x)^2 = 3^2$
$X^2 + 1x^2 + 2*x*1x = 9$
$x^2 + 1x^2 + 2 = 9$
$x^2 + 1x^2 = 7$
Squaring on both sides, $(x^2 + 1x^2)2 = 7^2$
$X^4 + 1/x^4 + 2 \times x^2 \times 1/x^2 = 49$
$X^4 + 1/x^4 + 2 = 49$
$X^4 + 1/x^4 = 47$

Ans: c) 47

19. **If x = √2+ 1 and y = 1 - √2 then the value of** $x^2 + y^2 + xy$ **will be ...**
a) 6 b) 5 c) 7 d) 9
Solution:

$x^2 + y^2 + xy = x^2 + y^2 + 2xy - xy$
$=(x+y)^2 - xy$
$=(\sqrt{2} + 1 + 1 - \sqrt{2})^2 - [(\sqrt{2} + 1)(1 - \sqrt{2})]$

$= 4 - [(1)^2 - (\sqrt{2})^2]$
$= 4 - (-1)$
$= 5$

Ans: b) 5

20. If a = -5, b = -6, c = 10 then the value of $a^3 + b^3 + c^3 - 3abc / ab + bc + ca - a^2 - b^2 - c^2$ will be ...

a) 1 b) 2 c) 3 d) 4

Solution:

Given that, a + b + c = (-5) + (-6) + 10

= -1

$\boldsymbol{a^3 + b^3 + c^3 - 3abc / ab + bc + ca - a^2 - b^2 - c^2} = (\boldsymbol{a+b+c})(\boldsymbol{a^2 + b^2 + c^2 - ab - bc - ca}) / - (\boldsymbol{a^2 + b^2 + c^2 - ab - bc - ca})$

$= -(\boldsymbol{a+b+c})$

= - (-1)

= 1

Ans: **a) 1**

21.If $x + 1/x = 2$ and x is a real number then the value of $x^{17} + 1/x^{19}$ *will be*...

a) 3 b) 2 c) 1 d) 5

solution:

Given that $x + 1/x = 2$

X = 1

$x^{17} + 1/x^{19} = 1^{17} + 1/1^{19}$

=1+1

=2

Ans: b) 2

22. If $a^3 - b^3 = 56$ and a – b, then the value of $(a^2 + b^2)$ *will be*...

a) 15 b) 20 c) 25 d) 35

Solution:

$a^3 - b^3 = 56$

$(a - b)(a^2 + b^2 + ab) = 56$

$2(a^2 + b^2 + ab) = 56$

$a^2 + b^2 + ab = 28$ .... (1)

$a - b = 2$

$(a - b)^2 = 22$

$a^2 + b^2 - 2ab = 4$ .... (2)

From equations (1) and (2) => ab = 8

$a^2 + b^2 + ab = 28$

$a^2 + b^2 + 8 = 28$

$a^2 + b^2 = 20$

Ans: b) 20

23. **If $x^4 + 1/x^4 = 23$ then the value of $(x - 1/x)^2$ *will be*....**

a) 5 b) 6 c) 4 d) 3

solution:

$x^4 + 1/x^4 = 23$

$(x^2)^2 + 1/(x^2)^2 + 2 = 23 + 2$

$(x^2)^2 + 1(x^2)^2 + 2 \times x^2 \times 1/x^2 = 25$

$(x^2 + 1/x^2)^2 = 5^2$

$x^2 + 1/x^2 = 5$

$x^2 + 1/x^2 - 2 = 5 - 2$

$x^2 + 1/x^2 - 2 \times x \times 1/x = 3$

$(x - 1/x)^2 = 3$

Ans: d) 3

11 If a – b = 3, b – c = 5 and c – a = 1 find the value of $a^3 + b^3 + c^3 - 3abc/a+b+c$ *will be*?

a) 12.5 b) 17.5 c) 15.2 d) 14.22

solution:

$a^3 + b^3 + c^3 - 3abc = 1/2(a+b+c)[(a-b)^2 + (b-c)^2 + (c-a)^2]$

$a^3 + b^3 + c^3 - 3abc/a+b+c = 1/2[(a-b)^2 + (b-c)^2 + (c-a)^2]$

$= 12[(3)^2 + (5)^2 + (1)^2]$

$= 12[9+25+1]$

$= 17.5$

Ans: b) 17.5

12. **If the graph of given linear equations 3x + 4y – 4 = 0 and k – 4y – 3x = 0 coincides with each other, then the value of k is ….**

a) 5   b) 4   c) 6   d) 7

Solution: Given that, 3x + 4y – 4 = 0

3x – 4y + k = 0

Coincides with each other, then

a1/a2= b1/b2= c1/c2

4/−4= −4/k

K = 4

Ans: b) 4

13. **If $\boldsymbol{a}$+ $\mathbf{1}/\boldsymbol{a}$=$\mathbf{1}$ then what is the value of a^3 ?**

a) -2   b) -3   c) -5   d) -1

Solution:

Given that, $\boldsymbol{a}$+ $\mathbf{1}/\boldsymbol{a}$=$\mathbf{1}$

Cubing on both sides

$(a+ 1/a)^3= 1^3$

$a^3+ 1/a^3+ 3\ (a+ 1/a)=1$

$a^3+ 1/a^3+ 3\ (1)=1$

$a^3+ 1/a^3= −2$

Put, $a^3 = t$

$t+ 1t= −2$

$t^2+ 2t+1=0$

$(t+a)^2=0$

$t= −1$

Therefore, $a^3 = - 1$

Ans: d) -1

14. **If a + b + c + d = 1, then the maximum value of (1 + a)(1 + b)(1 + c)(1 +d)?**

a)(5,2)   b) (6,7)   c) $(5/4)^4$ d) $(3,4)^2$

Solutions:

For maximum value a = b = c = d = ¼

(1 + a)(1 + b)(1 + c)(1 +d) = (1 + 1/4) (1 + 1/4) (1 + 1/4) (1 + 1/4)

$= (5/4)^4$

Ans: **c)** $(5/4)^4$

15. The three vertices of a parallelogram taken in a order are (-1, 0), (3, 1) and (2,2) respectively. Find the coordinates of the fourth vertex?

a) (-1,1) b)(-2,1) c) (1,1) d)(1,3)

solution:

Let A (-1, 0), B(3, 1), C(2, 2)and D(x, y) be the vertices of a parallelogram ABCD taken in order. Since the diagonals of a parallelogram bisect each other.

∴ Coordinates of the mid point of AC = Coordinates of the mid point of BD

$(-1+2/2, 0+2/2) = (3+x2, 1+y2)$

Therefore, $3+x/2 = 1/2$ and $y+1/2=1$

x = -2 and y = 1

Hence the fourth vertex of the Parallelogram is (-2, 1)

Ans: b)(-2,1)

16. **The co – ordinates of the vertices of a Triangle are (3, 1), (2, 3) and (-2,2) Find the co – ordinates of the Centroid of the Triangle ABC**

a) (1,3) b) 1,2) c)(1,4) d) (1,8)

SOLUTION:

Let the Co – ordinate of the centroid of Triangle ABC be (x, y), then

$(x, y) = ((x1+x2+ x3)/3, (y1+ y2+ y3)/3)$

$= (3+2-2/3, 1+3+2/3)$

= (1, 2)

Ans: b) 1,2)

17. **Find the co – ordinates of the point which divides the join of the points (2, 4) and (6, 8) externally in the ratio 5 : 3?**

a) (12,14) b) (11,12) c) (15,14) d) (12,13)

SOLUTION:

The required co – ordinates of the point which divides the join of (2, 4) and (6, 8) externally in the ratio 5 : 3 are = $(mx_2 - nx_1/m-n, my_2 - ny_1/m-n)$

Here, m : n = 5 : 3

$(x_1, y_1) = (2, 4)$ and $(x_2, y_2) = (6, 8)$

= $((5*6-3*2)/5-3, (5*8-3*4)/5-3)$

Hence the required co – ordinates = (12, 14)

Ans: a) (12,14)

18. **A (-3, 2) and B (5, 4) are the end points of a line segment, find the co – ordinates of the mid – points of the line segment?**

a) (1,2) b) (1,3) c) (1,4) d) (1,5)

SOLUTION:

Given that

$(x_1, y_1) = (-3, 2)$ and $(x_2, y_2) = (5, 4)$

The co – ordinates of the mid – point of AB =

= $(x_1 + x_2/2, y_1 + y_2/2)$

= $(-3+5/2, 2+4/2)$

= (1, 3)

Ans: b) (1,3)

19.Find the distance between the points (-5, 3) and (3, 1)?

a) $2\sqrt{17}unit$ b) 3 unit c) 4 unit d) 2.2 unit

SOLUTION:

Let $(x_1, y_1) = (-5, 3)$ and $(x_2, y_2) = (3, 1)$

Distance between the points

= $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

= $\sqrt{(3+5)^2 + (1-3)^2}$ = $2\sqrt{17}unit$

Ans: a) $2\sqrt{17}unit$