Part (1)

Second : Trigonometry

(1) Complete the following table :

The angle / Ratio	42° 12\	……………	……………	……………
Sin	……………	0.3214	……………	……………
Cas	……………	……………	0.5321	……………
Tan	……………	……………	……………	2.0625

(2) Complete the following :

1) 46° 36\ 24\\ = …………. In degrees.

2) 44.125° = ………… in degrees, minutes, seconds.

3) If tan θ = 1.42 where θ is the measure of an acute angle. Then θ =……..

4) If Sin θ = 0.63 where θ is the measure of an acute angle, then θ = …..

5) If Sin x = $\frac{1}{2}$ where x is an acute angle then m (∠ x) = ……..

6) If cos $\frac{x}{2}$ = $\frac{\sqrt{3}}{2}$ where x is an acute angle then m (∠ x) = …….

7) Sin 60° + Cos 30° - Tan 60° = ……….

8) Cos 60° + Sin 30° - Tan 45° = ……....

9) 2 sin 30° x Cos 60° - Tan 45° = ……....

10) Sin^2 30° + $\text{Cos}^2$30° = ……….

11) If tan (x + 10) = $\sqrt{3}$ where x is an acute angle then m (∠ x) = …….

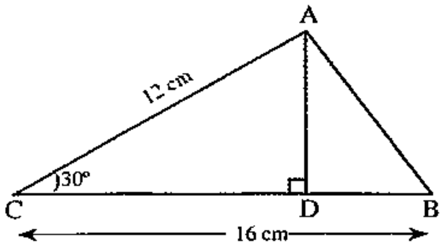
12) If tan 3x = $\sqrt{3}$ where x is an acute angle then m (∠ x) = ……..

(3) In the opposite figure:-

ABC is a triangle, $\overline{AD} \perp \overline{BC}$,

AC = 12 cm, BC = 16 cm and m (∠ C) = 30°

Complete the following



∵ sin 30 = $\frac{AD}{\dots\dots\dots}$

∴ AD = ……….. x Sin 30° = ………. cm

∵ The area of Δ ABC = ……… x AD x BC

∴ The area of Δ ABC = ……… x ……… x ……… = ………cm^2

Can you calculate the height of the triangle which is drawn from the point B on $\overleftrightarrow{AC}$? Explain your answer showing the steps of solution

(4) Choose the correct answer form those given:-

1) 4 cos 30° Tan 60° = ………

a) 3 b) $2\sqrt{3}$ c) 6 d) 12

2) If cos 2x = $\frac{1}{2}$ where x is an acute angle then m (∠ x) = ……….

a) 15° b) 30° c) 45° d) 60°

3) If tan $\frac{3x}{2}$ = 1 where x is acute angle then m (∠ x) = ……..

a) 10° b) 30° c) 45° d) 60°

4) 2 Tan 45 - $\frac{1}{\text{Cos } 60°}$ = …………

a) zero b) $\frac{1}{2}$ c) $\frac{\sqrt{3}}{2}$ d) 1

5) If cos $\frac{x}{2}$ = $\frac{\sqrt{3}}{2}$ where x is an acute angle then sin x = ……….

a) $\frac{1}{2}$ b) $\frac{1}{\sqrt{3}}$ c) $\frac{2}{\sqrt{3}}$ d) $\frac{\sqrt{3}}{2}$

6) In Δ ABC :

If m (∠ A) = 85° , Sin B = Cos B , then m (∠ C) = …………

a) 30° b) 45° c) 50° d) 60°

(5) Find the value of the following:-

1) (cos 30° - cos 60°) (sin 30° + sin 60°)

2) $\frac{1}{4}\sin^2 45° \tan^2 60° - \frac{1}{3}\sin^2 60° \tan^2 30°$

3) $\sin 45° \cos 45° + \sin 30° \cos 60° - \cos^2 30°$

4) $\frac{\sin 30° \cos 45° + \cos 30° \sin 45°}{\sin 45° \cos 60° + \cos 45° \sin 60°}$

(6) Prove that:

1) $\cos 60° = 2\cos^2 30° - 1$

2) $\tan 60° (1 - \tan^2 30°) = 2 \tan 30°$

3) $\tan^2 60° - \tan^2 45° = 4 \sin 30°$

4) $\tan 60° = \frac{2\tan 30°}{1 - \tan^2 30°}$

5) $\frac{\tan^2 30° \tan 45° \tan^2 60° + \tan 30° \tan 60°}{\sin^2 60° - \tan 45° \sin 30°}$

(7) Find the value of x in each of the following:-

1) $x \cos 30° = \tan 60°$

2) $x \sin^2 45° = \tan^2 60°$

3) $4x = \cos^2 30° \tan^2 30° \tan^2 45°$

4) $x \sin 30° \cos^2 45° = \cos^2 30°$

5) $x \sin 45° \cos 45° \tan 60° = \tan^2 45° - \cos^2 60°$

6) $\tan x = \frac{\sin 30° \cos 45° + \sin 45° \cos 30°}{\sin 45° \cos 60° + \sin 45° \sin 60°}$

(8) Find m (∠ θ) where θ is an acute angle :

1) $\sin^2 45° = \cos\theta \tan 30°$

2) $2 \sin\theta = \tan^2 60° - 2 \tan 45°$

3) $\sin\theta = \sin 45° \cos 30° + \cos 45° \sin 45°$

4) $\sin\theta \sin^2 60° = 3\sin^2 45° \cos^2 45° \cos 60°$

5) $\tan\theta = 3 (\sin 30° + \cos 30°) – 4 (\sin^3 60° + \cos^3 60°)$

6) $3 \tan^2 \theta = 4 \sin^2 30° + 8 \cos^2 60°$

(9) In the opposite Figure:-

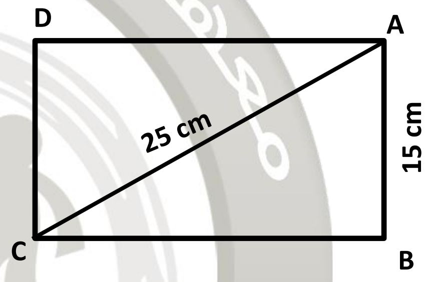
ABCD is a rectangle where AB = 15cm.

AC = 25cm.

Find:

First: m (∠ ACB)

Second: The surface area of the rectangle ABCD



(10) In the opposite figure:-

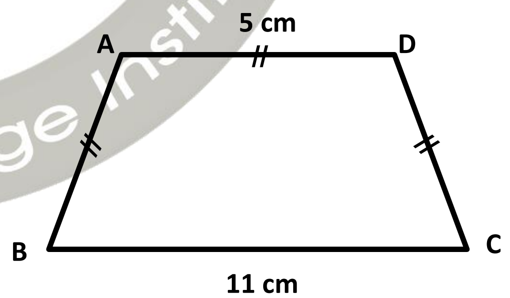
ABCD is an isosceles trapezium

where AB = AD = DC = 5cm.

BC = = 11cm, find

First : m(∠ B), m (∠A)

Second: the area of the trapezium ABCD.



Third geometry

1) Complete each of the following;-

1) The distance between the two points (9 , 0) , (4, 0) is ………
2) The distance between the two points (0 , -11), (0 , -5) is ………
3) The distance between the points (4 , -3) and the origin point is ……
4) The distance between the points (5 , 0) , (0, -12) is ………
5) The diameter length of the circle whose centre is (8 , 5) and passes through the point (4 , 2) equals………
6) If the distance between the two points (a , 0) and (0 , 1) is one length unit then a = …….
7) The distance between the points (3 , 4) and the X – axis = ………… length unit.
8) In the square ABCD: If A (2 , -5) , B (-1 , -1) then the perimeter of the square is …….. length unit and its area is …………….. square unit.

2) Answer the following questions:-

1) Find the length of $\overline{MN}$ in each of the following cases:
   a) M (2 , -1) , N (5 , 3)   b) M (-3 , -5), N (5 , 1)
   c) M (7 , -8) , N (2 , 4)   d) M (7 , -3) , N (0, 4).
2) Prove that the points A (3 , -1) , B (-4 , 6) , C (2, -2) which belong to an orthogonal Cartesian co-ordinates plane lie on the circle whose centre M (-1 , 2) then find the circumference of the circle.
3) Find the value of a in each of the following
   a) If the distance between the two points (a , 7) and (-2 , 3) equals 5.
   b) If the distance between the two points (a , 7) and (3a -1 , -5) equals 13

4) If A (x , 3) , B (3 , 2) , C (5 , 1) and if AB = BC find the value of x.

5) If the distance between the point (x , 5) and the point (6 , 1) equals $2\sqrt{5}$ find the value of x.

6) Identify the type of the triangle whose vertices are A (-2 , 4) , B (3, -1) , C (4, 5) due to its sides lengths.

7) Prove that triangle whose vertices A (5, -5), B (-1 , 7), C (15 , 15) is right angled at B, then calculate its area.

8) Prove that the points (5 , 3) , (6, -2) , (1 , -1) , (0 , 4) are vertices of a rhombus. Then find its area.

Part Two

(1) Complete each of the following :

1) The mid –point of the line segment joining the two points (2 , 5) and (4 , 3) is the point ……………

2) If (2 , 1) is the mid-point of $\overline{AB}$ where A (3, -4) and B (m, 6) then m= ………

3) If the origin point is the mid-point of the line segment $\overline{AB}$ where A (5, -2) then the co-ordinates of B (………… , ……………)

4) If $\overleftrightarrow{AB}$ // $\overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB}$ = 0.75 then the slope of $\overleftrightarrow{CD}$ is ………

5) If $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ and the slope $\overleftrightarrow{AB}$ is 0.5 then the slope of $\overleftrightarrow{CD}$ equals ……..

6) The slope of the straight line parallel to the straight line passing through the two points (2 , 3) and (-2 , 3) equals ……………

7) If the straight line $\overleftrightarrow{AB}$ is parallel to X-axis where A (8, 3) and B (2, K) then K =……………..

8) If the straight line $\overleftrightarrow{CD}$ is parallel to the Y-axis where C(m, 4) and D (-5 ,7) then m= ……..

9) ABC is a right angled triangle at B where A (1 , 4) and B(-1, -2) then the slope of $\overleftrightarrow{BC}$ = ……………

10) If the straight line which passes through the two points (a , 0) and (0 , 3) and the straight line which makes an angle of measure 30° with the positive direction of the X-axis are perpendicular then a= …………….

11) If y= m x + c represents the equation of a straight line given its slope and the length of the intercepted part of the Y-axis then

(a) The equation of the straight line when m= 1 and c=3 is ……

(b)The equation of the straight line when m= -2 and c=1 is ……

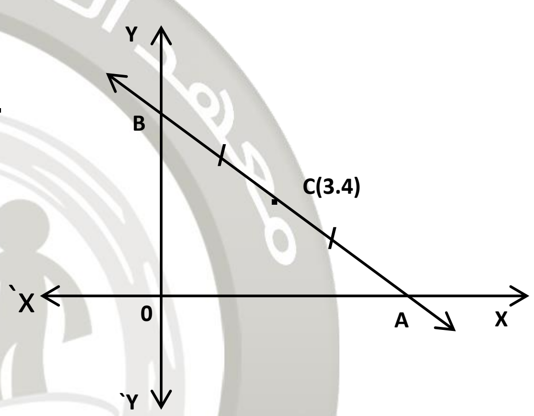
(c) The equation of the straight line when m= 3 and c=0 is ……

12) <u>In the opposite figure:</u>

C (3 , 4) is the mid-point of $\overline{AB}$

a) OA = …………………….. length unit.

b) OB = …………………. Length unit.



c) The slope of $\overleftrightarrow{AB}$ is ………………

d) The slope of $\overleftrightarrow{CO}$ is ………………

e) The slope of $\overleftrightarrow{AO}$ is ………………

f) The slope of $\overleftrightarrow{BO}$ is ………………

g) C is the centre of the circle which passes through the points

………… , ………… , …………

h) The area of Δ OAB is ………………… square unit.

i) The perimeter of Δ OAB = ……………… unit length.

j) The equation of the $\overleftrightarrow{AB}$ is ………………….

k) The equation $\overleftrightarrow{CO}$ is …………………..

Choose the correct answer from those given:

1- The distance between the point (4 , -3) and the X-axis equals ……

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

2- A circle of centre at the origin point and its radius is 2 unit length which of the following points belongs to the circle?

a) (1 , 2) b) (-2 , 1) c) ($\sqrt{3}$, 1) d) ($\sqrt{2}$, 1)

3- If (4 , 3) is the mid-point of $\overleftrightarrow{AB}$ where A (3 , 4) then the co-ordinates of B is ……………….

a) (5 , -2) b) (2 , 5) c) (5 , 2) d) (3.5 , -3.5)

4- The straight line whose equation is 2x – 3y – 6 =0 intercepts from the Y-axis a part of length …………….

a) -6 b) -2 c) $\frac{2}{3}$ d) 2

5- If the two straight lines 3 x – 4 y - 3 = 0 and k y + 3 x – 8 = 0 are perpendicular then k=…………………

a) -4 b) -3 c) 3 d) $\frac{9}{4}$

6- If the two straight lines x + y = 5 and k x + 2y = 0 are parallel then k= ……………

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

7- The area of the triangle bounded by the straight lines 3x – 4y = 12 , x=0 and y=0 is square unit equal ………….

a) 6 b) 7 c) 12 d)15

8- $\overleftrightarrow{AB}$ is straight line passing through the two points (2 , 5) and (5 , 2)

which of the following points ∈ $\overleftrightarrow{AB}$

a) (1 , 6) b) (2 , 3) c) (0 , 0) d) (3 , -4)

9- The points (0 , 0) , (3 ,0) and (0 ,4)

a) form an obtuse angles triangle

b) form an octue angled triangle.

c) form a right angled triangle.

d) are collinear.

10- If A (0, 0) , B(5 , 7) and C(5 , h) are the vertices of a right angled triangle at C then h = ……………..

a) zero b) 5 c) 7 d) -5

<u>Answer the following questions:-</u>

1- Find the co-ordinates of the mid-points of $\overline{AB}$ in each of the following:

a) A (2,4) , B(6,0)

b) A (7 , -5) , B (-3 , 5)

c) A (-3, 6) , B (3, -6)

d) A (7 , -6) , B(-1 , 0)

2- If C is the mid-point of $\overline{AB}$ find x and Y in each of the following cases:

First : A (1,5), B(3,7), C(x, y)

Second: A (-3, y) , B(9, 11) , C(x, -3)

Third: A (x, -6) , B(9, -11) , C(-3, y)

Fourth: A(x, 3), B(6, y) , C(4, 6)

3- Find the slope of the straight line which makes with the positive direction of the X-axis a positive angle of measure:

a) 30° b) 45° c) 60°

4- Using the calculator find the measure of the positive angle which is made by the straight line whose slope is m with the positive direction of the X-axis in each of the following cases:

a) m = 0.3673 b) m = 1.0246 c) m = 3.1648

5- If the points (0 , 1), (a, 3), (2, 5) are collinear find the value of a.

6- In which of the following cases, the points A, B and C are collinear? Explain your answer.

First: A (-1 , 5) , B(0 , -3) , C(2 , 1)

Second: A (-2, 1) , B(2 , 3), C(4, 4)

7- Prove that the points A (-2, 5), B (3 , 3), C (-4 , 2) are not collinear and if D (-9 , 4) prove that the figure ABCD is a parallelogram.

8- Let A (5, -6), B(3,7) and C(1, -3) , Find the equation of the straight line which passes through A and the mid-point of $\overline{BC}$

9- Find the equation of the straight line passing through the point (3, -5) and parallel to the straight line x + 2y – 7 = 0

10- Find the equation of the straight line which intercepts the two axes two positive parts of lengths 4 and 9 for X and Y-axes respectively.

11- If A (1 ,-6) , B (9, 2) find the co-ordinates of the points which divide $\overline{AB}$ into four equal parts in length.

12- Prove that the points A (6, 0), B(2, -4) and C(-4 , 2) are vertices of a right angled triangle at B then find the co-ordinates of the point D which makes the figure ABCD a rectangle.

13- If the points A (3, 2), B (4, -3) , C(-1 , -2) , D (-2, 3) are vertices of a rhombus find:

a) The co-ordinates of the point of intersection of its two diagonals.

b) The area of the rhombus ABCD.

14- If A (-1 , -1), B(2 , 3), C(6, 0), D(3 , -4) are four points on an orthogonal Cartesian co-ordinates plane. Prove that $\overline{AC}$ and $\overline{BD}$ bisect each other. What is the name of this figure?

15- ABCD is a parallelogram where A (3, -4), B(2,-1) , C(-4, 3), find the co-ordinates of point D then find the co-ordinates of point E such that the figure ABCE becomes a trapezium in which $\overline{AE} // \overline{BC}$, AE=2BC

16-If the straight line L_1 passes through the two points (3, 1) and (2, K), and the straight line L_2 makes with the positive direction of the X-axis and angle of measure 45, Find the value of K if: First : $L_1 // L_2$ second: $L_1 \perp L_2$.

17- Using the slope prove that the points A (-1, 3), B (5,1) C(6,4) D(0, 6) are vertices of a rectangle.

Model Answers

Part (1)

Second :Trigonometry

(1) Complete the following table :

The angle / Ratio	$42^\circ\ 12'$	$18^\circ\ 44'\ 51''$	$57^\circ\ 51'\ 9''$	$64^\circ\ 8'\ 1''$
Sin	0.6717	0.3214	0.8467	0.8998
Cos	0.7408	0.9469	0.5321	0.4363
Tan	0.9067	0.3394	1.5912	2.0625

(2) Complete the following:

1) 46.6067°

2) $44^\circ\ 7'\ 30''$

3) $54^\circ\ 50'\ 45''$

4) $39^\circ\ 3'$

5) 30°

6) $\frac{x}{2} = 30^\circ \Rightarrow x = 30 \times 2 = 60^\circ$

7) $\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} - \sqrt{3} = 0$

8) $\frac{1}{2} + \frac{1}{2} - 1 = 0$

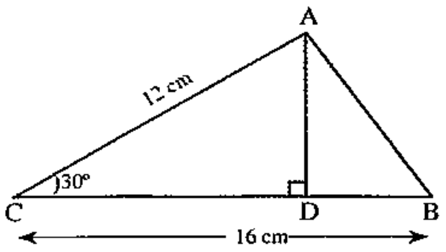
9) $2 \times \frac{1}{2} \times \frac{1}{2} - 1 = -\frac{1}{2}$

10) $(\frac{1}{2})^2 + (\frac{\sqrt{3}}{2})^2 = \frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$

11) x + 10 = 60 ⇒ x = 50°

12) 3x = 60 ⇒ x = 20°

(3) In the opposite figure:-



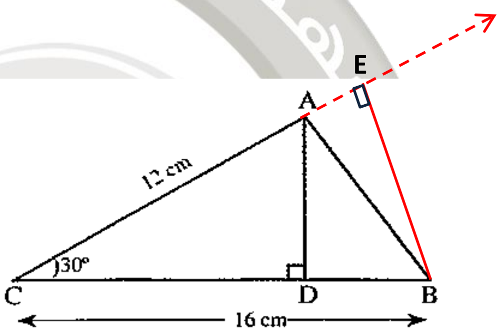
∵ sin 30° = $\frac{AD}{AC} = \frac{AD}{12}$

∴ AD = AC x Sin 30° = 12 x $\frac{1}{2}$ = 6cm

∵ The area of Δ ABC = $\frac{1}{2}$ x AD x BC

∴ The area of Δ ABC = $\frac{1}{2}$ x 6 x 16 = 48 cm^2

In Δ ADC



∵ $\overline{BE} \perp \overleftrightarrow{AC}$

∴ Δ BEC is right angled at E

∵ m (∠ C) = 30°, BC = 16 cm

∴ BE = $\frac{1}{2}$ × BC = 8 cm

(4) Choose :-

1) C) 6   2) b (30)   3) $\frac{3x}{2}$ = 45° ⇒ x = 30°

4) Zero   5) $\frac{x}{2}$ = 30 ⟶ x = 60°   d) $\frac{\sqrt{3}}{2}$

6) ∵ sin B = cos B   ∴ m (∠ B) = 45°   m(∠ C) = 50°

(5) Find the value of the following:-

1) (cos 30° - cos 60°) (sin 30° + sin 60°)

$= (\frac{\sqrt{3}}{2} - \frac{1}{2}) (\frac{1}{2} + \frac{\sqrt{3}}{2}) = (\frac{\sqrt{3}-1}{2}) (\frac{1+\sqrt{3}}{2}) = \frac{1}{2}$

2) $\frac{1}{4} \sin^2 45° \tan^2 60° - \frac{1}{3} \sin^2 60° \tan^2 30°$

$= \frac{1}{4} \times (\frac{1}{\sqrt{2}})^2 \times (\sqrt{3})^2 - \frac{1}{3} \times (\frac{\sqrt{3}}{2})^2 (\frac{1}{\sqrt{3}})^2$

$= \frac{1}{4} \times \frac{1}{2} \times 3 - \frac{1}{3} \times \frac{3}{4} \times \frac{1}{3} =$

$= \frac{3}{8} - \frac{1}{12} = \frac{7}{24}$

3) $\sin 45° \cos 45° + \sin 30° \cos 60° - \cos^2 30°$

$\frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} + \frac{1}{2} \times \frac{1}{2} - (\frac{\sqrt{3}}{2})^2 = \frac{1}{2} + \frac{1}{4} - \frac{3}{4} = 0$

4) $\frac{\sin 30° \cos 45° + \cos 30° \sin 45°}{\sin 45° \cos 60° + \cos 45° \sin 60°} = 1$

(6) Prove that:

1) $\cos 60° = 2\cos^2 30° - 1$

$\cos 60° = \frac{1}{2}$

$2\cos^2 30° - 1 \quad = 2 \times (\frac{\sqrt{5}}{2})^2 - 1$

$= 2\times \frac{3}{4} - 1 = \frac{3}{4} - 1 = \frac{1}{2}$

2) $\tan 60° (1 - \tan^2 30°) = 2 \tan 30°$

$\tan 60° (1 - \tan^2 30°) = \sqrt{3} \left(1 - \left(\frac{1}{\sqrt{3}}\right)^2\right)$

$2 \tan 30° = 2\times \frac{1}{\sqrt{3}} = \frac{2}{3}\sqrt{3}$

$= \sqrt{3} (1 - \frac{1}{3}) = \sqrt{3} (\frac{2}{3}) = \frac{2}{3}\sqrt{3}$

3) $\tan^2 60° - \tan^2 45° = 4 \sin 30°$

$\tan^2 60° - \tan^2 45° = (\sqrt{3})^2 - (1)^2$

$= 3 - 1 = 2$

$4 \sin 30° = 4 \times \frac{1}{2} = 2$

4) $\tan 60° = \frac{2 \tan 30°}{1 - \tan^2 30°}$

$\tan 60° = \sqrt{3}$

$$\frac{2\tan 30°}{1-\tan^2 30°} = \frac{2x\frac{1}{\sqrt{3}}}{1-\left(\frac{1}{\sqrt{3}}\right)^2} = \frac{\frac{2}{\sqrt{3}}}{1-\frac{1}{3}}$$

$$= \frac{2}{\sqrt{3}} \text{ x } \frac{3}{2} = \sqrt{3}$$

5) $\frac{\tan^2 30° \tan 45° \tan^2 60° + \tan 30° \tan 60°}{\sin^2 60° - \tan 45° \sin 30°}$

$$\frac{\left[\left(\frac{1}{\sqrt{3}}\right)^2 \text{ x } (1) \text{ x } (\sqrt{3})^2\right] + \left[\frac{1}{\sqrt{3}} \text{ x } \sqrt{x}\right]}{\left[\left(\frac{\sqrt{3}}{2}\right)^2 - (1 \text{ x } \frac{1}{2})\right]}$$

$$= \frac{1+1}{\left[\frac{3}{4} - \frac{1}{2}\right]} = \frac{2}{\frac{1}{4}} = 8$$

(7) Find the value of x in each of the following:-

1) x cos 30° = tan 60°

$$x = \frac{\tan 60°}{\cos 30°} = \frac{\sqrt{3}}{\sqrt{3/2}} = \sqrt{3} \text{ x } \frac{2}{\sqrt{3}} = 2$$

2) x $\sin^2$ 45° = $\tan^2$ 60°

$$x = \frac{\tan^2 60°}{\sin^2 45°} = \frac{(\sqrt{3})^2}{(\frac{\sqrt{2}}{2})^2} = 3 \div \frac{1}{2} = 3 \text{ x } 2 = 6$$

3) 4x = $\cos^2$30° $\tan^2$30° $\tan^2$45°

$$4x = \left(\frac{\sqrt{3}}{2}\right)^2 \left(\frac{\sqrt{3}}{3}\right)^2 (1)^2 = \frac{3}{4} \text{ x } \frac{3}{9} \text{ x } 1$$

$$4x = \frac{1}{4} \Rightarrow x = \frac{1}{8}$$

4) x sin 30° $\cos^2$45° = $\cos^2$30°

$$x = \frac{\cos^2 30°}{\sin 30° \cos^2 45°} = \frac{3}{4} \div \frac{1}{4} = \frac{3}{4} \text{ x } 4 = 3$$

5) x sin 45° cos 45° tan 60° = $\tan^2$45° - $\cos^2$60°

$$x = \frac{\tan^2 45 - \cos^2 60}{\sin 45° \cos 45° \tan 60°}$$

$= \frac{1-\frac{1}{4}}{\frac{\sqrt{2}}{2} x \frac{\sqrt{2}}{2} x \sqrt{3}} = \frac{3}{4} x \frac{2}{\sqrt{3}} = \frac{3}{2\sqrt{3}}$

$x = \frac{\sqrt{3}}{2}$

6) $\tan x = \frac{\sin 30° \cos 45° + \sin 45° \cos 30°}{\sin 45° \cos 60° + \sin 45° \sin 60°}$

$\text{Tan } x = \frac{\frac{1}{2} x \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} x \frac{\sqrt{3}}{2}}{\frac{\sqrt{2}}{2} x \frac{1}{2} + \frac{\sqrt{2}}{2} x \frac{\sqrt{3}}{2}} = 1$

$\therefore x = 45°$

(8) Find m (∠ θ) where θ is an acute angle:

1) $\sin^2 45° = \cos\theta \tan 30°$

$\cos\theta = \frac{\sin^2 45}{\tan 30} = \frac{1}{2} x \frac{3}{\sqrt{3}} = \frac{\sqrt{3}}{2}$

$\therefore \theta = 30°$

2) $2 \sin\theta = \tan^2 60° - 2 \tan 45°$

$2 \sin\theta = 3 - 2 = 1$

$\sin\theta = \frac{1}{2} \qquad \Rightarrow \theta = 30°$

3) $\sin\theta = \sin 45° \cos 30° + \cos 45° \sin 30°$

$\sin\theta = (\frac{\sqrt{2}}{2} x \frac{\sqrt{3}}{2}) + (\frac{\sqrt{2}}{2} x \frac{1}{2}) = \frac{\sqrt{6}+\sqrt{2}}{4}$

$\theta = 75°$

4) $\sin\theta \sin^2 60° = 3\sin^2 45° \cos^2 45° \cos 60°$

$\sin\theta = \frac{3\sin^2 45 \cos 45 \cos 60}{\sin^2} = \frac{3 x \frac{1}{2} x \frac{\sqrt{2}}{2} x \frac{1}{2}}{\frac{3}{4}}$

$\sin\theta = \frac{3\sqrt{2}}{8} x \frac{4}{3} = \frac{\sqrt{2}}{2}$

$\theta = 45°$

5) $\tan\theta = 3(\sin 30° + \cos 30°) - 4(\sin^3 60° + \cos^3 60°)$

$\tan\theta = 3\left(\frac{1}{2} + \frac{\sqrt{3}}{2}\right) - 4\left(\left(\frac{\sqrt{3}}{2}\right)^3 + \left(\frac{1}{2}\right)^3\right)$

$\tan\theta = \frac{3+3\sqrt{3}}{2} - 4\left(\frac{3\sqrt{3}}{8} + \frac{1}{8}\right)$

$= \frac{3+3\sqrt{3}}{2} - \frac{3\sqrt{3}+1}{2} = \frac{2}{2} = 1$

$\tan\theta = 1$

$\theta = 45°$

6) $3\tan^2\theta = 4\sin^2 30° + 8\cos^2 60°$

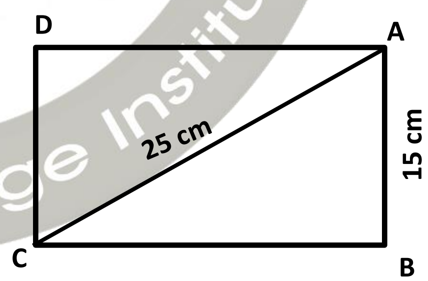
$3\tan^2\theta = 4 \times \frac{1}{4} + 8 \times \frac{1}{4} = 1 + 2 = 3$

$\tan^2\theta = \frac{3}{3} = 1$

$\tan\theta = 1$

$\theta = 45°$

(9) In the opposite Figure:-



In Δ ABC

∵ $m(\angle B) = 90°$

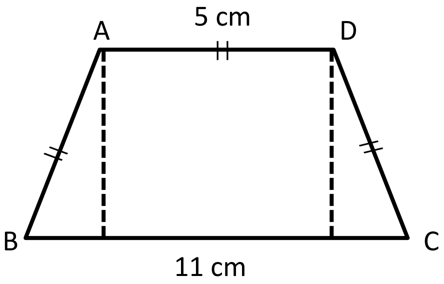
∴ $\sin(\angle ACB) = \frac{AB}{AC} = \frac{15}{25} = \frac{3}{5}$

$m(\angle(ACB) = 38° 52' 12''$

$BC = \sqrt{AC^2 - AB^2} = 20$

Area of rectangle = L x W = 20 x 15 = $300 cm^2$

(10) In the opposite figure:-



Construction: Draw

$\overrightarrow{AE} \perp \overline{BC}$. $\overrightarrow{DF} \perp \overline{BC}$

∵ AD = AB = DC = 5cm

∴ EF = 5cm , BE + CF = 11 – 5 = 6 cm.

∴ BE = FC = 3cm.

In Δ AEB

∵ m (∠ AEB) = 90 ° , AB = 5cm , BE = 3 cm.

∴ Cos ∠ (B) = $\frac{BE}{AB} = \frac{3}{5}$

∴ m ∠ (B) = 53° 7\ 48\\

$m(\angle BAE) =$ 180° - (90 + 53° 7\ 48\\) = 36° 52\ 12\\

AE = 4cm "Pythagoras"

Area of trapezium = $\frac{B_1 + B_2}{2}$ x H

= $\frac{5+11}{2}$ x 4 = 8 x 4 = 32 cm^2

Third geometry

1) Complete each of the following;-

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

$= \sqrt{(9-4)^2 + (0-0)^2} = \sqrt{25} = 5$ length unit.

2) D = $\sqrt{(0-0)^2 + (-11+5)^2} = \sqrt{36} = 6$ length unit.

3) D = $\sqrt{(4-0)^2 + (-3-0)^2} = \sqrt{16+9} = 5$ length unit.

4) D = $\sqrt{(5-0)^2 + (0+12)^2} = \sqrt{25+144} = 13$ length unit.

5) r = $\sqrt{(8-4)^2+(5-2)^2} = \sqrt{16+9} = \sqrt{25} = 5$ length unit.

∴ Diameter = 2r = 10 length unit.

6) D = $\sqrt{(a-0)^2+(0-1)^2} = 1$

$\sqrt{a^2+1} = 1$

$a^2 + 1 = 1^2 = 1$

$a^2 = 1 - 1 = 0 \Rightarrow a = 0$

7) |– 4| = 4 length unit.

8) AB = $\sqrt{(2+1)^2+(-5+1)^2} = \sqrt{9+16}$

AB = $\sqrt{25} = 5$ length unit.

P. of square = side length x 4 = 4 x 5 = 20 length unit.

area = $S^2 = 5^2 = 25$ squared length unit.

2) Answer the following questions:-

1) a) MN = $\sqrt{(5-2)^2+(3+1)^2} = \sqrt{9+16} = 5$ length unit.

b) MN = $\sqrt{(5+3)^2+(1+5)^2} = \sqrt{64+36} = 10$ length unit.

c) MN = $\sqrt{(2-7)^2+(4+8)^2} = \sqrt{25+144} = 13$ length unit.

d) MN = $\sqrt{(7+0)^2+(-3-4)^2} = \sqrt{49+49} = \sqrt{98} = 7\sqrt{2}$

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

MA = $\sqrt{(-1-3)^2+(2+1)^2} = \sqrt{16+9} = 5$ length unit.

MB = $\sqrt{(-1+4)^2+(2+2)^2} = \sqrt{9+16} = 5$ length unit.

MC = $\sqrt{(-1-2)^2+(2+2)^2} = \sqrt{9+16} = 5$ length unit.

$\because$ MA = MB = MC = r

$\therefore$ A , B, and C lie on the circle M

circumference = 2π r = 2 x 3.14 x 5 = 31.4 length unit.

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

$(5)^2 = (\sqrt{(a+2)^2 + (7-3)^2})^2$

$25 = (a+2)^2 + 16$

$(a+2)^2 = 25 - 16 = 9$

$\sqrt{(a+2)^2} = \pm\sqrt{9}$

$a + 2 = \pm 3$

a + 2 = 3 or a + 2 = -3

a = 1 or a = -5

(b) $13 = \sqrt{(3a - 1 - a)^2 + (-5 - 7)^2}$

$(13)^2 = \sqrt{(2a-1)^2 + 144}$

$169 = (2a-1)^2 + 144$

$(2a-1)^2 = 169 - 144 = 25$

$\sqrt{(2a-1)^2} = \pm\sqrt{25}$

$2a - 1 = \pm 5$

$\therefore$ 2a – 1 = 5 or 2a – 1 = -5

2a = 6 → a = 3 or 2a = -4 → a = -2

4) $\because$ AB = BC

$\therefore \sqrt{(x-3)^2+(3-2)^2} = \sqrt{(3-5)^2+(2-1)^2}$

$(\sqrt{(x-3)^2+1})^2 = \sqrt{4+1} = (\sqrt{5})^2$

$(x-3)^2+1=5$

$(x-3)^2=4$

$\sqrt{(x-3)^2} = \pm\sqrt{4}$

$x-3=\pm 2$

$x-3=2$ or $x-3=-2$

$x=5$ or $x=1$

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

$2\sqrt{5} = \sqrt{(x-6)^2+(5-1)^2}$

$(2\sqrt{5})^2 = \sqrt{(x-6)^2+16}\ )^2$

$20=(x-6)^2+16$

$(x-6)^2=20-16=4$

$\sqrt{(x-6)^2} = \pm\sqrt{4}$

$x-6=\pm 2$

$x-6=2$ or $x-6=-2$

$x=8$ or $x=4$

6) AB = $\sqrt{(3+2)^2 + (-1-4)^2} = \sqrt{25+25} = \sqrt{50}$

BC = $\sqrt{(4-3)^2 + (5+1)^2} = \sqrt{1+36} = \sqrt{37}$

AC = $\sqrt{(4+2)^2 + (5-4)^2} = \sqrt{36+1} = \sqrt{37}$

∵ AC = BC = $\sqrt{37}$

∴ Δ ABC is an isosceles Δ

7) AB = $\sqrt{(5+1)^2 + (-5-7)^2} = \sqrt{36+144} = 6\sqrt{5}$

BC = $\sqrt{(15+1)^2 + (15-7)^2} = \sqrt{256+64} = \sqrt{320} = 8\sqrt{5}$

CA = $\sqrt{(15-5)^2 + (15+5)^2} = = \sqrt{100+400} = 10\sqrt{5}$

$AC^2 = (10\sqrt{5})^2 = 500$

$AB^2 + BC^2 = 180 + 320 = 500$

∵ $AC^2 = AB^2 + BC^2$

∴ ABC is right-angled Δ at B

8) A (5 , 3) , B (6 , -2) , C (1 , -1) , D (0 , 4)

AB = $\sqrt{(6-5)^2 + (-2-3)^2} = \sqrt{1+25} = \sqrt{26}$

BC = $\sqrt{(6-1)^2 + (-2+1)^2} = \sqrt{25+1} = \sqrt{26}$

CD = $\sqrt{(1-0)^2 + (-1-4)^2} = \sqrt{1+25} = \sqrt{26}$

DA = $\sqrt{(5-0)^2 + (3-4)^2} = \sqrt{25+1} = \sqrt{26}$

∵ AB = BC = CD = DA.

∴ A, B, C, and D are vertices of Rhombus.

AC = $\sqrt{(5-1)^2 + (3+1)^2} = \sqrt{16+16} = \sqrt{32}$

BD = $\sqrt{(6-0)^2 + (-2-4)^2} = \sqrt{36+36} = \sqrt{72}$

Area of the rhombus = $\frac{1}{2} \times d_1 \times d_2$

= $\frac{1}{2} \times \sqrt{32} \times \sqrt{72} = 24$ (u.l.)^2

Part Two

(1) Complete each of the following :

1- midpoint $= \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$= \left(\frac{2+4}{2}, \frac{5+3}{2}\right) = (3, 4)$

2- $(2, 1) = \left(\frac{m+3}{2}, \frac{6-4}{2}\right)$

$\frac{m+3}{2} = 2 \longrightarrow m + 3 = 4$

$\longrightarrow m = 4 - 3 = +1$

3- B (-5 , 2) because the origin point is the mid point.

Or we can use the rule of mid point.

4- 0.75 $\longrightarrow m_1 = m_2$

5- $m_1 = \frac{-1}{m_2} \longrightarrow \frac{-1}{0.5} = -2$

6- $m_1 = m_2 = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-3}{2+2} = 0$

7- If $\overleftrightarrow{AB}$ // x-axis

∴ its slope = 0

$\frac{K-3}{2-8} = 0 \Rightarrow K - 3 = 0 \Rightarrow K = 3$

8- $\overleftrightarrow{CD}$ // y –axis

The slope is undefined where the denominater equal to zero.

Slope $\frac{7-4}{-5-m}$ $\Rightarrow -5 - m = 0 \Rightarrow m = -5$

9- m_1 of $\overleftrightarrow{AB} = \frac{4+2}{1+1} = \frac{6}{2} = 3$

m_2 of $\overleftrightarrow{BC} = -\frac{1}{3}$

because $\overleftrightarrow{AB} \perp \overleftrightarrow{BC}$, then $m_2 = \frac{-1}{m_1}$

10- $m_1 = \frac{3-0}{0-a} = -\frac{3}{a}$

$m_2 = \tan 30 = \frac{\sqrt{3}}{3}$

$m_1 \times m_2 = -1$

$-\frac{3}{a} \times \frac{\sqrt{3}}{3} = -1$

$\frac{\sqrt{3}}{a} = 1$

$\therefore a = \sqrt{3}$

11- a) y = x + 3

b) y = -2x + 1

c) Y = 3x

12- A (x , 0) , B(0, y)

$\because$ C (3 , 4) is midpoint

$\therefore \left(\frac{x+0}{2}, \frac{y+0}{2}\right) = (3, 4)$

$\frac{x}{2} = 3 \rightarrow x = 6$

$\frac{y}{2} = 4 \rightarrow y = 8$

a) OA = 6 L.U.

b) OB = 8 L.U.

c) $m = \frac{8-0}{0-6} = \frac{8}{-6} = \frac{-4}{3}$

d) m = $\frac{4-0}{3-0} = \frac{4}{3}$

e) m = $\frac{0-0}{0-0}$ = 0

f) m = $\frac{8-0}{0-0}$ = undefined

g) A, B, O

h) $\frac{1}{2}$x 6 x 8 = 24 square unit

i) AB = $\sqrt{8^2 + 6^2} = \sqrt{64 + 36} = 10$

Perimeter = 6 + 10 + 8 = 24 L.U.

j) m of $\overleftrightarrow{AB} = \frac{-4}{3}$, C = 8

y = - $\frac{4}{3}$ x + 8

k) m of $\overleftrightarrow{CO} = \frac{4}{3}$, C = 0

y = $\frac{4}{3}$x

Second : Choose

1) b	4) d	7) a	10) a
2) c	5) d	8) a	
3) c	6) d	9) c	

Answer the following questions

1- Midpoint $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

a) M = $\left(\frac{2+6}{2}, \frac{4+0}{2}\right)$ = (4 , 2)

b) M = $\left(\frac{7-3}{2}, \frac{-5+5}{2}\right)$ = (2 , 0)

c) M = $\left(\frac{-3+3}{2}, \frac{-6+0}{2}\right)$ = (0 , -3)

d) $\left(\frac{7-1}{2}, \frac{-6+0}{2}\right)$ = (3 , -3)

2- a) $(x , y) = \left(\frac{1+3}{2} , \frac{5+7}{2}\right) = (2 , 6)$

X=2 , y = 6

b) $(x , -3) = \left(\frac{-3+9}{2} , \frac{y+11}{2}\right) = (3 , \frac{y+11}{2})$

$x = 3 , \frac{y+11}{2} = -3 \longrightarrow y + 11 = -6 \longrightarrow y = -17$

c) $(-3 , y) = \left(\frac{x+9}{2} , \frac{-6-11}{2}\right) = \left(\frac{x+9}{2} , -8.5\right)$

$\frac{x+9}{2} = -3 \longrightarrow x + 9 = -6 \longrightarrow x = -15 , y = -8.5$

d) $(4 , 6) = \left(\frac{x+6}{2} , \frac{3+y}{2}\right)$

$\frac{x+6}{2} = 4 \longrightarrow x + 6 = 8 \longrightarrow x = 2$

$\frac{3+y}{2} = 6 \longrightarrow 3 + y = 12 \longrightarrow y = 9$

3- a) $m = \tan 30° = \frac{\sqrt{3}}{3}$

b) $m = \tan 45° = 1$

c) $m = \tan 60° = \sqrt{3}$

4- a) $\theta = \tan^{-1} 0.3673 = 20° \; 10' \; 6''$

b) θ = shift tan ($\tan^{-1}$) $1.0246 = 45° \; 41' \; 46''$

c) $\theta = \tan^{-1} 3.1648 = 72° \; 27' \; 53''$

5- ∵ the points are collinear.

∴ the slope of $\overleftrightarrow{AB}$ = slope of $\overleftrightarrow{BC}$ where A (0,1), B(a ,3) , C(2,5)

m_1 of $\overleftrightarrow{AB} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-1}{a-0} = \frac{2}{a}$

m_2 of $\overleftrightarrow{BC} = \frac{3-5}{a-2} = \frac{-2}{a-2}$

$\frac{2}{a} = \frac{-2}{a-2}$

-2a = 2a-4 ⟶2a + 2a = 4

4a = 4 ⟶ a = 1

6- m_1 of $\overleftrightarrow{AB} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5+3}{-1-0} = -8$

m_2 of $\overleftrightarrow{BC} = \frac{-3-1}{0-2} = \frac{-4}{-2} = 2$

$\because m_1 \neq m_2$ $\therefore$ A , B and are not collinear.

Second : m_1 of $\overleftrightarrow{AB} = \frac{3-1}{2+2} = \frac{2}{4} = \frac{1}{2}$, m_2 of $\overleftrightarrow{BC} = \frac{4-3}{4-2} = \frac{1}{2}$

$\because m_1 = m_2$, B is a common point.

$\therefore$ A , B, and C are collinear.

7- Slope of $\overleftrightarrow{AB} = \frac{3-5}{3+2} = \frac{-2}{5}$

Slope of $\overleftrightarrow{BC} = \frac{2-3}{-4-3} = \frac{1}{7}$

$\because$ slope of $\overleftrightarrow{AB} \neq$ slope of $\overleftrightarrow{BC}$

$\therefore$ A , B. and C are not collinear

Slope of $\overleftrightarrow{CD} = \frac{2-4}{-4+9} = \frac{-2}{5}$

Slope of $\overleftrightarrow{DA} = \frac{4-5}{-9+2} = \frac{-1}{-7} = \frac{1}{7}$

$\because$ slope of $\overleftrightarrow{BC}$ = slope of $\overleftrightarrow{DA}$

$\because$ slope of $\overleftrightarrow{AB}$ = slope of $\overleftrightarrow{DA}$

$\therefore \overleftrightarrow{AB} // \overleftrightarrow{CD}$, $\overleftrightarrow{BC} // \overleftrightarrow{DA}$

$\therefore$ ABCD is a parallelogram.

8- midpoint of $\overline{BC} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$D = \left(\frac{3+1}{2}, \frac{7-3}{2}\right) = (2, 2)$

A(5 , -6) , D (2, 2)

m of $\overleftrightarrow{AD}$ = $\frac{y_2 - y_1}{x_2 - x_1} = \frac{2+6}{2-5} = \frac{-8}{3}$

∵ A (5, -6) lies on the s.line

∴ A satisifies the equation of s.L.

∴ y = $\frac{-8}{3}$ x + C at A (5, -6)

-6 = $\frac{-8}{3}$x 5 + c

-6 = $\frac{-40}{3}$ + c

C= -6 + $\frac{40}{3}$ = - $\frac{18}{3}$ + $\frac{40}{3} = \frac{22}{3}$

y = $\frac{-8}{3}$x + $\frac{22}{3}$

Or

m = $\frac{y - y_1}{x - x_1}$

$\frac{-8}{3} = \frac{y+6}{x-5}$

$-8x + 40 = 3y + 18$

3y = - 8x + 22

y = $\frac{-8}{3}x = \frac{22}{3}$

9- $m_1 = \frac{-\text{co efficient of x}}{\text{co efficient of y}} = \frac{-1}{2}$

or x+2y-7=0

2y=-x + 7

y = $\frac{-1}{2}$x + $\frac{7}{2}$

∴ m_1 = - $\frac{1}{2}$

∵ the two st. lines are parallel

∴ $m_1 = m_2$ = - $\frac{1}{2}$

∴ y = mx + c

y = - $\frac{1}{2}$x + C at (3 , -5)

-5 = - $\frac{1}{2}$x 3 + C

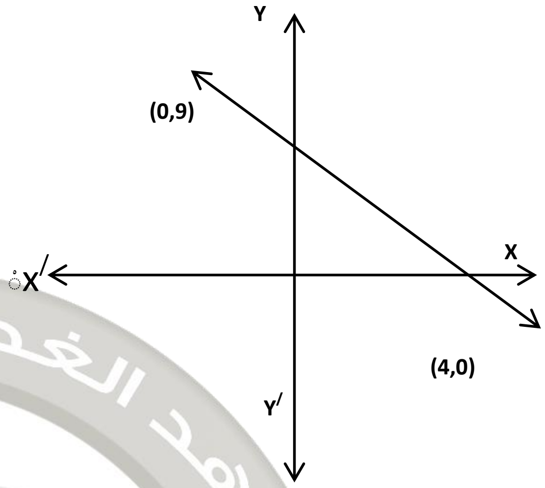
-5 = - $\frac{3}{2}$ + c → c = -5 + $\frac{3}{2} = \frac{-7}{2}$ ⇒ y = - $\frac{1}{2}$ x - $\frac{7}{2}$

10- ∵ the st. line cuts x-axis at 4

∴ (4 , 0) ∈ the st. line

∵ The s. line cuts y axis at 9

∴ (0 , 9) ∈ the st. line.



m = $\frac{y_2 - y_1}{x_2 - x_1} = \frac{9-0}{0-4} = \frac{-9}{4}$

y = mx + c → y = - $\frac{9}{4}$x + c

at (0 , 9) → c = 9

y = $\frac{-9}{4}$ x + 9

11- let C is the midpoint of $\overline{AB}$

C = $\left(\frac{1+9}{2}, \frac{-6+2}{2}\right) = (5, -2)$

Let D is the midpoint of $\overline{CB}$

D = $\left(\frac{5+9}{2}, \frac{-2+2}{2}\right) = (7, 0)$

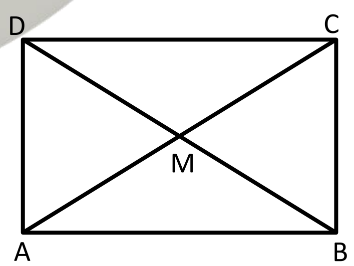
Let E is the mid-point of of $\overline{AC}$

E = $\left(\frac{5+1}{2}, \frac{-2-6}{2}\right)$ = (3 , - 4)

12- AB = $\sqrt{(6-2)^2 + (0+4)^2} = \sqrt{32}$

BC = $\sqrt{(2+4)^2 + (-4-2)^2} = \sqrt{72}$

CA = $\sqrt{(6+4)^2 + (0-2)^2} = \sqrt{104}$



∵ $CA^2 = 104$

∵ $AB^2 + BC^2 = 32 + 72 = 104$

∴ $CA^2 = AB^2 + BC^2 = 104$

∴ ABC is right angles Δ at B

If M is the point of inter section of the two diagonals $\overline{AC}$ and $\overline{BD}$

$\therefore$ M is a mid-point of $\overline{AC}$ and $\overline{BD}$

M= $\left(\frac{6-4}{2}, \frac{0+2}{2}\right)$ = (1 , 1)

Let D (x , y)

(1 , 1) = $\left(\frac{x+2}{2}, \frac{y-4}{2}\right)$

$\frac{x+2}{2}$ = 1 → x + 2 = 2 → x=0

$\frac{y-4}{2}$ = 1 → y - 4 = 2 → y=6

D = (0 , 6)

13- let m is the point of intersection of its two diagonals.

$\therefore$ m is the mid point of $\overline{AC}$

m = $\left(\frac{3-1}{2}, \frac{2-2}{2}\right) = (1, 0)$

AC = $\sqrt{(3+1)^2 + (2+2)^2} = \sqrt{16+16} = \sqrt{32}$ l.u.

BD = $\sqrt{(4+2)^2 + (-3-3)^2} = \sqrt{36+36} = \sqrt{72}$ l.u.

Area of the rhombus = $\frac{1}{2}$ x d_1 x d_2

= $\frac{1}{2}$ x $\sqrt{32}$ x $\sqrt{72}$ = 24 $(lu)^2$

14- midpoint of $\overline{AC}$ = $\left(\frac{-1+6}{2}, \frac{-1+0}{2}\right) = (2.5, -0.5)$

midpoint of $\overline{BD}$ = $\left(\frac{2+3}{2}, \frac{3-4}{2}\right) = (2.5, -0.5)$

$\because$ The point of $\overline{AC}$= the mid point $\overline{BD}$

$\therefore$ $\overline{AC}$ and $\overline{BD}$ bisect each other.

AB = $\sqrt{(2+1)^2 + (3+1)^2} = \sqrt{9-16} = 5$ l.u.

BC = $\sqrt{(6-2)^2 + (0-3)^2} = \sqrt{16+9} = 5$ l.u.

CD = $\sqrt{(6-3)^2 + (0+4)^2} = \sqrt{9+16} = \sqrt{25} = 5$ l.u.

DA = $\sqrt{(3+1)^2 + (-4+1)^2} = \sqrt{16+9} = \sqrt{25} = 5$ l.u.

AC = $\sqrt{(6+1)^2 + (0+1)^2} = \sqrt{49+16} = \sqrt{50}$ l.u.

BD = $\sqrt{(3-2)^2 + (-4-3)^2} = \sqrt{1+49} = \sqrt{50}$ l.u.

∵ AB = BC = CD = DA

∵ AC = BD

∴ ABCD is a square .

15- M is the midpoint of $\overline{AC}$ and $\overline{BD}$

m(x_1 , Y_1) = $\left(\frac{-4+3}{2}, \frac{3-4}{2}\right) = \left(-\frac{1}{2}, -\frac{1}{2}\right)$

$\left(-\frac{1}{2}, -\frac{1}{2}\right) = \left(\frac{x+2}{2}, \frac{y-1}{2}\right)$

$\frac{x+2}{2} = -\frac{1}{2}$ ⟶ x + 2 = -1 ⟶ x = -3

$\frac{y-1}{2} = -\frac{1}{2}$ ⟶ y - 1 = -1 ⟶ y = 0

D (-3 , 0)

∵ ABCD is aparallelogram.

∴ AE = 2BC

∴ AD = DE = BC

∴ D is mid point of $\overline{AE}$

(-3 , 0) = $\left(\frac{3+x}{2}, \frac{4+y}{2}\right)$

$\frac{3+x}{2} = -3 \longrightarrow 3 + x = -6 \longrightarrow x = -9$

$\frac{-4+y}{2} = 0 \longrightarrow -4 + Y = 0 \longrightarrow Y = 4$

E (-9 , 4)

16- First:

$m_1 \frac{y_2 - y_1}{x_2 - x_1} = \frac{k-1}{2-3} = \frac{k-1}{-1}$

m_2 tan 45° = 1

$\because L_1 // L_2$

$\therefore \frac{k-1}{-1} = 1 \Rightarrow k - 1 = -1 \longrightarrow k = 0$

Second : $L_1 \perp L_2$

$m_1 m_2 = -1$

$\frac{k-1}{-1} \times 1 = -1$

$K - 1 = 1 \longrightarrow k = 2$

17- using the slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

m_1 of $\overline{AB} = \frac{1-3}{5+1} = \frac{-2}{6} = -\frac{1}{3}$

m_2 of $\overline{BC} = \frac{4-1}{6-5} = \frac{3}{1} = 3$

m_3 of $\overline{CD} = \frac{6-4}{0-6} = \frac{-2}{6} = -\frac{1}{3}$

m_4 of $\overline{DA} = \frac{6-3}{0+1} = \frac{3}{1} = 3$

$\because$ slope of $\overline{AB}$ = slope of $\overline{CD}$

, slope of $\overline{BC}$ = slope of $\overline{CD}$

$\therefore \overline{AB} // \overline{CD}$, $\overline{BC} // \overline{DA}$

$\because$ slope of $\overline{AB}$ × slope of $\overline{BC} = \frac{-1}{3} \times 3 = -1$

$\therefore \overline{AB} \perp \overline{BC}$

$\therefore$ ABCD is a rectangle.