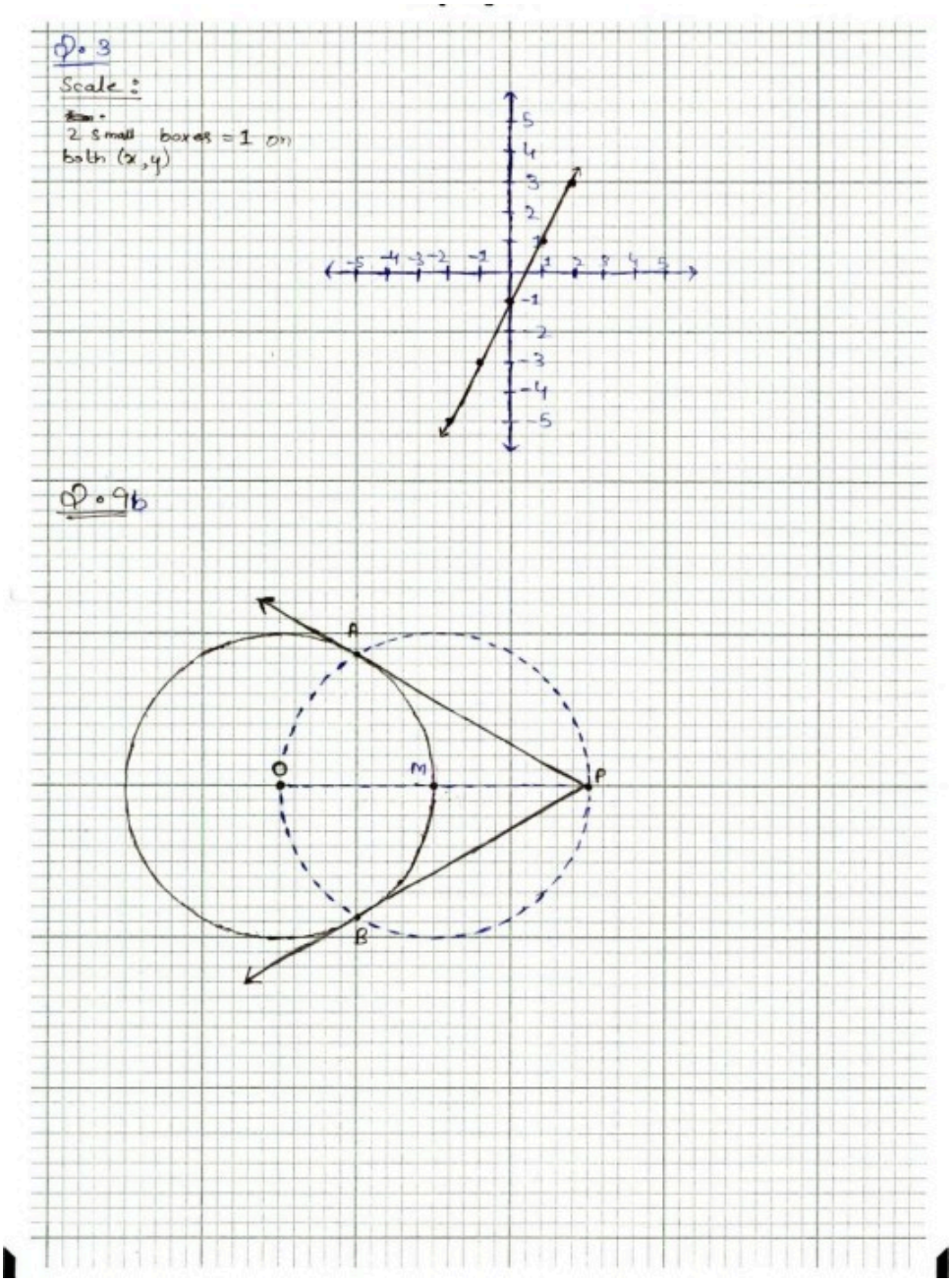
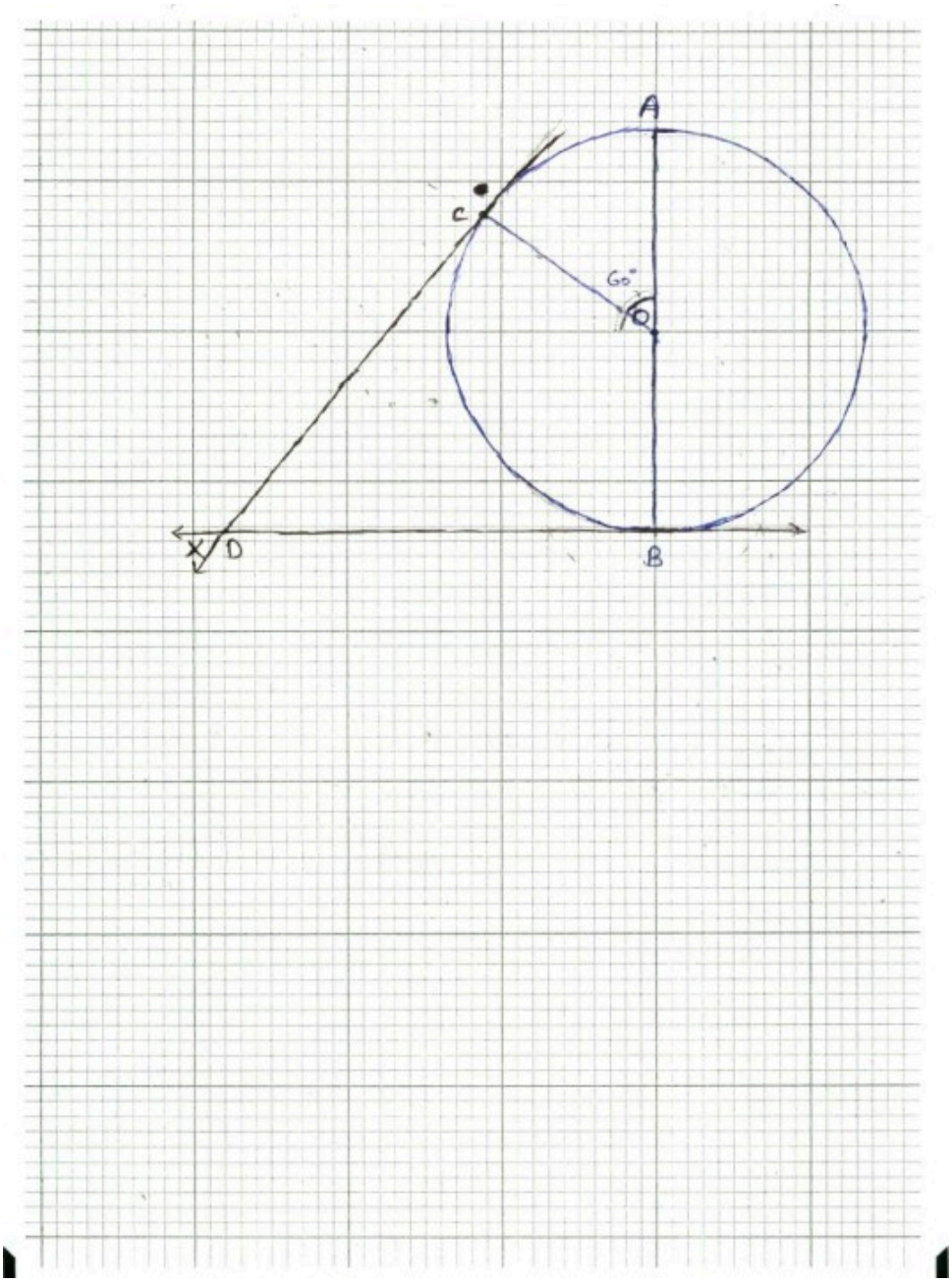
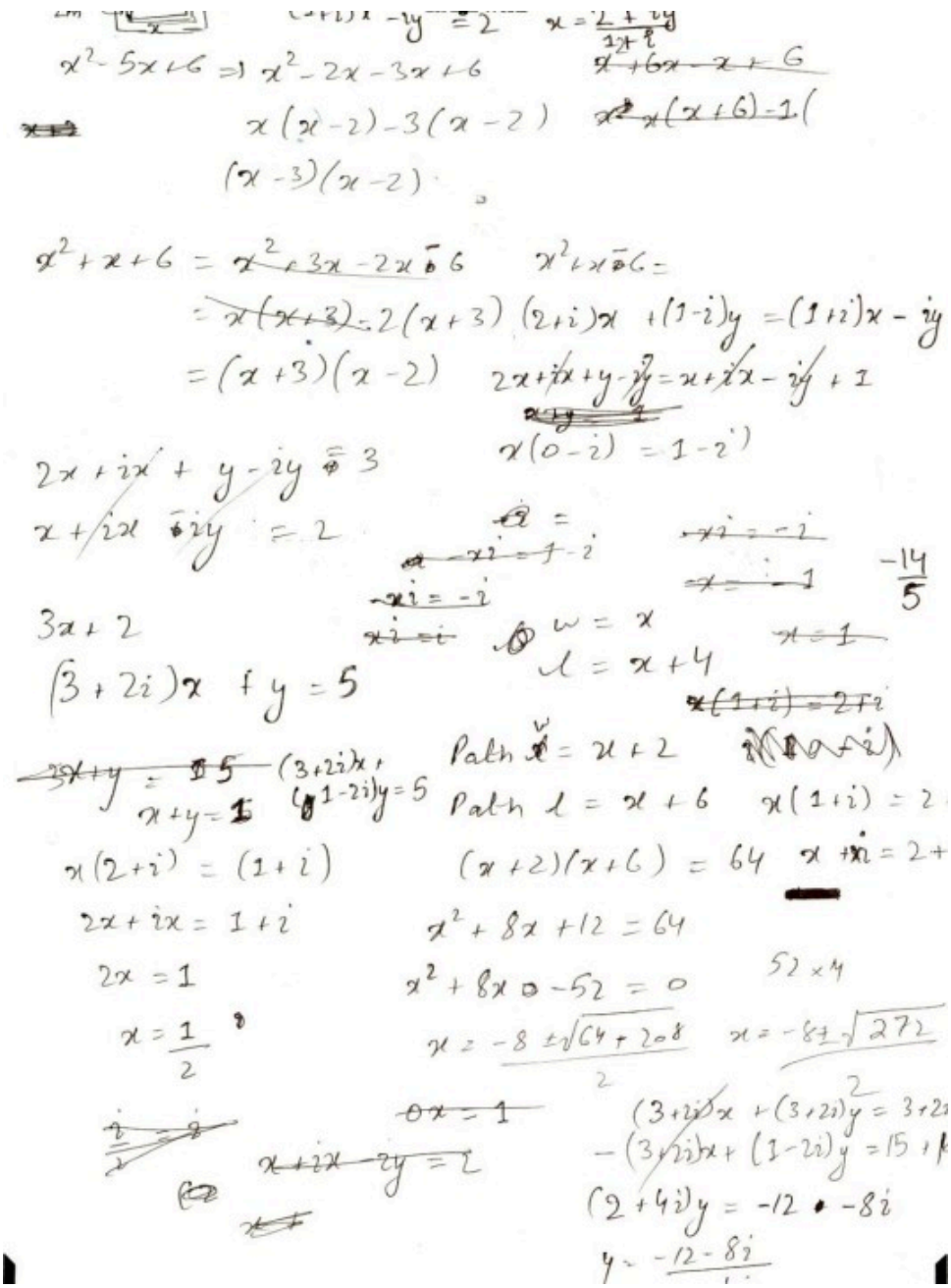

Q. 3
Scale :
2 small boxes = 1 cm
both (x, y)
Q. 9b
A
O
M
P
B


A
C
60°
O
X
D
B


$x^2 - 5x + 6 \Rightarrow x^2 - 2x - 3x + 6$
$x(x-2) - 3(x-2)$
$(x-3)(x-2)$
$x^2 + x + 6 = x^2 + 3x - 2x + 6$
$= x(x+3) - 2(x+3)$
$= (x+3)(x-2)$
$2x + ix + y - iy = 3$
$x + ix - iy = 2$
$3x + 2$
$(3+2i)x + y = 5$
$x + y = 1$
$x(2+i) = (1+i)$
$2x + ix = 1 + i$
$2x = 1$
$x = \frac{1}{2}$
$x + ix - 2y = 2$
$(2+i)x - iy = 2$
$x = \frac{2 + iy}{1+i}$
$(2+i)x + (1-i)y = (1+i)x - iy$
$2x + ix + y - iy = x + ix - iy + 1$
$x(0-i) = 1 - i$
$-14/5$
$w = x$
$l = x + 4$
Path $x = x + 2$
Path $l = x + 6$
$(x+2)(x+6) = 64$
$x^2 + 8x + 12 = 64$
$x^2 + 8x - 52 = 0$
$x = \frac{-8 \pm \sqrt{64 + 208}}{2}$
$x = \frac{-8 \pm \sqrt{272}}{2}$
$0x = 1$
$(3+2i)x + (3+2i)y = 3+2i$
$-(3+2i)x + (1-2i)y = 15 + i$
$(2+4i)y = -12 - 8i$
$y = \frac{-12 - 8i}{}$

Q. No. 2 Part (i)

Simplify: $\frac{3+4i}{5-2i}$ in form of $a+bi$

Multiply by conjugate of $5-2i$

$$= \frac{3+4i}{5-2i} \times \frac{5+2i}{5+2i}$$

$$= \frac{(3+4i)(5+2i)}{(5)^2-(2i)^2}$$

$$= \frac{3(5+2i)+4i(5+2i)}{25-4i^2}$$

$$= \frac{15+6i+20i+8i^2}{25-4(-1)}$$

$$= \frac{15+26i+8(-1)}{25+4}$$

$$= \frac{15+26i-8}{29}$$

$$= \frac{7+26i}{29}$$

$$= \boxed{\frac{7}{29} + \frac{26}{29}i}$$ Ans

Q. No. 2 Part (ii)

$f(x) = 2x+1$; $g(x) = x-3$

find $f(g(x))$ and $g(f(x))$

1) $f(g(x))$

$= f(g(x))$

$= f(x-3)$

$= 2(x-3)+1$

$= 2x-6+1$

$= \boxed{2x-5}$ Ans $\quad f(g(x)) = 2x-5$

2) $g(f(x))$

$= g(f(x))$

$= g(2x+1)$

$= (2x+1)-3$

$= 2x+1-3$

$= \boxed{2x-2}$ Ans $\quad g(f(x)) = 2x-2$

Q. No. 2 Part (iii)

Function: $y = 2x - 1$

x	-2	-1	0	1	2
y	$2(-2)-1$	$2(-1)-1$	$2(0)-1$	$2(1)-1$	$2(2)-1$
	$= -5$	$= -3$	$= -1$	$= 1$	$= 3$

Graph on graph page (1)

Q. No. 2 Part (iv)

Solve: $\left|\frac{2x-4}{6}\right| = \frac{4}{3}$ and show on number line

$\frac{2x-4}{6} = \frac{4}{3}$ or $\frac{2x-4}{6} = -\frac{4}{3}$

$3(2x-4) = 4(6)$ | $3(2x-4) = -4(6)$

$6x - 12 = 24$ | $6x - 12 = -24$

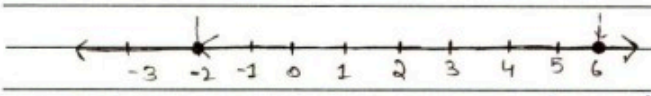
$6x = 24 + 12$ | $6x = -24 + 12$

$6x = 36$ | $6x = -12$

$x = \frac{36^{6}}{6_{1}}$ | $x = \frac{-12^{2}}{6_{1}}$

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

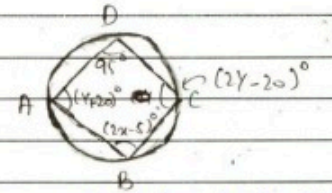
Show solution on number line:



Dotted numbers are solution to $\left|\frac{2x-4}{6}\right| = \frac{4}{3}$

Q. No. 2 Part (v)

Find x, y in cyclic quadrilateral ABCD



Sum of opposite angles in cyclic quadrilaterals is 180°

So $\angle B + \angle D = 180^\circ$ and $\angle A + \angle C = 180^\circ$

$2x - 5^\circ + 95^\circ = 180^\circ$

$2x + 90^\circ = 180^\circ$

$2x = 180^\circ - 90^\circ$

$2x = 90^\circ$

$x = \frac{90^\circ}{2}$

$\boxed{x = 45^\circ}$

$y + 20 + 2y - 20 = 180^\circ$

$y + 2y + 20 - 20 = 180^\circ$

$3y = 180^\circ$

$y = \frac{180^\circ}{3}$

$\boxed{y = 60^\circ}$

Q. No. 2 Part (vi)

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

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

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

$\frac{5x-1}{x^2-1} = 1$

Mul both sides by x^2-1

$\frac{5x-1}{x^2-1} \times x^2-1 = 1(x^2-1)$

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

$0 = x^2-5x-1+1$

$x^2-5x = 0$

$x(x-5) = 0$

$x = 0$ or $x-5 = 0$

$x = 0$ | $x = 5$

Check:

$x = 0$	$x = 5$
$\frac{2}{0-1} + \frac{3}{0+1} = 1$	$\frac{2}{5-1} + \frac{3}{5+1} = 1$
$\frac{2}{-1} + \frac{3}{1} = 1$	$\frac{2}{4} + \frac{3}{6} = 1$
$-2+3 = 1$	$\frac{1}{2} + \frac{1}{2} = 1$
$1 = 1$	$1 = 1$

Both solutions are true

Q. No. 2 Part (vii)

Length of chord is given by the formula:

$$2\sqrt{r^2 - d^2}$$

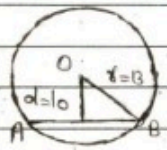
where 'r' is radius and d is distance from center

here,

$r = 13\text{cm}$

$d = 10\text{cm}$

Length of chord 'l' = ?



$$l = 2\sqrt{r^2 - d^2}$$

Putting in values of r and d

$$l = 2\sqrt{(13)^2 - (10)^2}$$

$$l = 2\sqrt{169 - 100}$$

$$l = 2\sqrt{69}$$

$$\boxed{l = 2\sqrt{69}\ \text{cm}} \quad \text{or} \quad \boxed{l = 16.613\ \text{cm}}$$

Q. No. 2 Part (viii)

Simplify : $\frac{x^2-5x+6}{x^2-4} \times \frac{x+2}{x^2+x-6}$

$= \frac{x^2-2x-3x+6}{(x)^2-(2)^2} \times \frac{x+2}{x^2+3x-2x-6}$

$= \frac{x(x-2)-3(x-2)}{(x-2)(x+2)} \times \frac{(x+2)}{x(x+3)-2(x+3)}$

$= \frac{(x-3)(x-2)}{(x-2)(x+2)} \times \frac{(x+2)}{(x-2)(x+3)}$

$= \boxed{\frac{(x-3)}{(x-2)(x+3)}}$ Ans

Q. No. 2 Part (ix)

{Circle and tangents on graph page (1)}

Construction Steps:

1) Draw circle of radius 3cm with center O.
2) Draw a point 6cm from center of circle. Point P.
3) Bisect $\overline{OP}$ to get midpoint of $\overline{OP}$, midpoint M.
4) Draw a dotted circle of radius $\overline{MP}$ or $\overline{MO}$ intersecting circle at point A and B.
5) Connect P to A and P to B
6) $\overline{PA}$ and $\overline{PB}$ are required tangent.

{circle and tangents on graph page 1}

Q. No. 3 (Page 1)

$(2+i)x + (1-i)y = 3 \quad — (1)$

$(1+i)x - iy = 2 \quad — (2)$

$\Rightarrow (1+i)x = 2 + iy$

$$x = \frac{2+iy}{1+i} \quad — (3)$$

Put (3) in eqn (1)

$$(2+i)\left(\frac{2+iy}{1+i}\right) + (1-i)y = 3$$

$$\frac{4+2iy+2i+i^2y}{1+i} + (1-i)y = 3$$

$$\frac{4+2iy+2i-y}{1+i} + (1-i)y = 3$$

$$\frac{-y+2iy+2i+4}{1+i} + (1-i)y = 3$$

$$\frac{(-1+2i)y + (4+2i)}{1+i} + (1-i)y = 3$$

Multiply both sides by $(i+1)$

$$(1+i)\left(\frac{(-1+2i)y + 4+2i}{1+i}\right) + (1+i)(1-i)y = 3(1+i)$$

$$(-1+2i)y + 4+2i + (1^2 - i^2)y = 3+3i$$

$$(-1+2i)y + (1+(-1))y = 3+3i - 4-2i$$

$$(-1+2i)y + 2y = 3-4+3i-2i$$

$$-y+2iy+2y = -1+i$$

$$y+2iy = -1+i$$

$$y(1+2i) = -1+i$$

$$y = \frac{-1+i}{1+2i}$$

Q. No. 3 (Page 2)

$$y = \frac{-1+i}{2+2i} \times \frac{1-2i}{1-2i}$$

$$y = \frac{(-1+i)(1-2i)}{1^2-(2i)^2}; \quad y = \frac{-1+2i+i-2i^2}{1+4(-1)}$$

$$y = \frac{-1+3i-2(-1)}{1+4}; \quad y = \frac{-1+3i+2}{5}$$

$$\boxed{y = \frac{1+3i}{5}}$$

Put y in (1)

$$(2+i)x + (1-i)\left(\frac{1+3i}{5}\right) = 3$$

$$(2+i)x + \frac{1+3i-i-3i^2}{5} = 3$$

$$\frac{5(2+i)x}{5} + \frac{1+2i+3}{5} = 3$$

$$\frac{(10+5i)x+4+2i}{5} = 3 \Rightarrow (10+5i)x+4+2i = 15$$

$$(10+5i)x = 15-4-2i \Rightarrow (10+5i)x = 11-2i$$

$$x = \frac{11-2i}{10+5i} \Rightarrow x = \frac{11-2i}{10+5i} \times \frac{10-5i}{10-5i}$$

$$x = \frac{(11-2i)(10-5i)}{(10)^2-(5i)^2} \Rightarrow x = \frac{110-55i-20i+10i^2}{100+25}$$

$$x = \frac{110-75i-10}{125}; \quad x = \frac{100-75i}{125}$$

$$x = \frac{25(4-3i)}{25(5)}; \quad \boxed{x = \frac{4-3i}{5}}$$

Sol set $= \left\{\frac{4-3i}{5}, \frac{1+3i}{5}\right\}$

Q. No. 4 (Page 1)

A(1,2), B(5,2), C(7,6), D(3,6)

a) Find $\vec{OA}$, $\vec{OB}$, $\vec{OC}$, $\vec{OD}$, $\vec{O}(0,0)$

$\vec{OA} = \vec{A} - \vec{O}$

$= (1,2) - (0,0)$

$= [1, 2]$

$\boxed{\vec{OA} = \hat{i} + 2\hat{j}}$

$\vec{OB} = \vec{B} - \vec{O}$

$= (5,2) - (0,0)$

$= [5, 2]$

$\boxed{\vec{OB} = 5\hat{i} + 2\hat{j}}$

$\vec{OC} = \vec{C} - \vec{O}$

$= (7,6) - (0,0)$

$= [7, 6]$

$\boxed{\vec{OC} = 7\hat{i} + 6\hat{j}}$

$\vec{OD} = \vec{D} - \vec{O}$

$\vec{OD} = (3,6) - (0,0)$

$= [3, 6]$

$\boxed{\vec{OD} = 3\hat{i} + 6\hat{j}}$

b) Find $\vec{AB}$, $\vec{DC}$, $\vec{AD}$, $\vec{BC}$

$\vec{AB} = \vec{OB} - \vec{OA}$

$= 5\hat{i} + 2\hat{j} - (\hat{i} + 2\hat{j})$

$= 5\hat{i} + 2\hat{j} - \hat{i} - 2\hat{j}$

$\boxed{\vec{AB} = 4\hat{i}}$

$\vec{DC} = \vec{OC} - \vec{OD}$

$= 7\hat{i} + 6\hat{j} - (3\hat{i} + 6\hat{j})$

$= 7\hat{i} + 6\hat{j} - 3\hat{i} - 6\hat{j}$

$\boxed{\vec{DC} = 4\hat{i}}$

$\vec{AD} = \vec{OD} - \vec{OA}$

$\vec{AD} = 3\hat{i} + 6\hat{j} - (\hat{i} + 2\hat{j})$

$= 3\hat{i} + 6\hat{j} - \hat{i} - 2\hat{j}$

$\boxed{\vec{AD} = 2\hat{i} + 4\hat{j}}$

Q. No. 4 (Page 2)

$\overrightarrow{BC} = \overrightarrow{OC} - \overrightarrow{OB}$

$= 7\hat{i} + 6\hat{j} - (5\hat{i} + 2\hat{j})$

$= 7\hat{i} + 6\hat{j} - 5\hat{i} - 2\hat{j}$

$= 7\hat{i} - 5\hat{i} + 6\hat{j} - 2\hat{j}$

$\boxed{\overrightarrow{BC} = 2\hat{i} + 4\hat{j}}$

c) Show that ABCD is a parallelogram.

In parallelogram opposite sides are equal so in parallelogram ABCD

$\overrightarrow{AB} = \overrightarrow{DC}$ and $\overrightarrow{AD} = \overrightarrow{BC}$

From part (b) we know values of $\overrightarrow{AB}$, $\overrightarrow{DC}$, $\overrightarrow{AD}$, $\overrightarrow{BC}$.

Putting in values:

$\overrightarrow{AB} = \overrightarrow{DC}$	$\overrightarrow{AD} = \overrightarrow{BC}$
$4\hat{i} = 4\hat{i}$	$2\hat{i} + 4\hat{j} = 2\hat{i} + 4\hat{j}$

As opposite sides are equal ABCD is a parallelogram

Q. No. 5 (Page 1)

Steps of construction:

1) Draw a circle of 4 cm with radius 4 cm.
2) Draw Diameter of circle AB.
3) Draw tangent $\overrightarrow{BX}$ touching circle at point B.
4) Draw angle $\angle AOC$ of 60° extend ray of angle touching circle at point C.
5) Draw tangent line to point C touching original tangent $\overline{BX}$ at point D.
6) $\overline{CD}$ and $\overline{BX}$ are required tangents, angle between $\overline{CD}$ and $\overline{BX}$ is 60°

Q. No. 5 (Page 2)