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Name - Siddhant . B
Board - CISCE
Date - 22/4/21
Subject - Maths (Chp. 8 and Chp. 12)

Class - X A
Chapters - Remainder and Factor Thm and Reflection
Total pages - 8

$28\frac{1}{2}$ / 30

Rohit

Q1) Let $f(x) = x^3 + ax^2 + bx + 6$

For $x - 2 = 0$, $x = 2$

$x - 2$ is a factor of $f(x)$ $\longrightarrow$ Given

By factor thm,

$f(2) = 0$

$\Rightarrow (2)^3 + a(2)^2 + b(2) + 6 = 0$

$\Rightarrow 8 + 4a + 2b + 6 = 0$

$\Rightarrow 4a + 2b = -14$

Dividing both sides by 2

$\therefore 2a + b = -7$ — (1)

For $x - 3 = 0$, $x = 3$

Rem $= 3$ $\longrightarrow$ Given

By Remainder thm,

Rem $= f(3)$

$\Rightarrow 3 = (3)^3 + a(3)^2 + b(3) + 6$

$\Rightarrow 3 = 27 + 9a + 3b + 6$

$\Rightarrow 3 = 33 + 9a + 3b$

$\Rightarrow 9a + 3b = -30$

Dividing both sides by 3

$\therefore 3a + b = -10$ — (2)

Subtracting (1) from (2)

$3a + \cancel{b} = -10$

$2a + \cancel{b} = -7$

$-\quad -\quad +$

$\therefore \boxed{a = -3}$

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Substituting the value of a in (1)

$-6 + b = -7$

$\therefore \boxed{b = -1}$

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Let $f(x) = x^3 - 7x^2 + 15x - 9$

For $x - 3 = 0$, $x = 3$

By Remainder thm.

$\text{Rem} = f(3)$

$= (3)^3 - 7(3)^2 + 15(3) - 9$

$= 27 - 63 + 45 - 9$

$= 72 - 72$

$\text{Rem} = 0$

Since Rem=0, $\overset{x-3}{\cancel{f(x)}}$ is a factor of $f(x)$ $\longrightarrow$ By factor thm

$$\begin{array}{r|l} & x^2 - 4x + 3 \\ \hline x-3 & x^3 - 7x^2 + 15x - 9 \\ & x^3 - 3x^2 \\ & - \quad + \\ \hline & -4x^2 + 15x \\ & -4x^2 + 12x \\ & + \quad - \\ \hline & 3x - 9 \\ & 3x - 9 \\ & - \quad + \\ \hline & 0 \end{array}$$

$\therefore f(x) = (x-3)(x^2 - 4x + 3)$

$= (x-3)[x^2 - 3x - x + 3]$

$= (x-3)[x(x-3) - 1(x-3)]$

$\therefore f(x) = (x-3)(x-1)(x-3)$

3

45
+27
72

$3x^2$

$-3x \cdot x$

$(x^2 - 6x + 9)$
$\times (x-1)$

$x^3 - 6x^2 + 9x$
$-x^2 + 6x - 9$

$x^3 - 7x^2 + 15x - 9$

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FOR EDUCATIONAL USE

Let $f(x) = x^3 - x^2 - 4x + 4$

for $\cancel{x+2}\ x-2 = 0$, $x = \cancel{-}2$

By Remainder thm.

Rem $= f(x)$

$= \cancel{(-2)^3 - (-2)^2 - 4(-2)+4}\ \ (2)^3 - (2)^2 - 4(2)+4$

$= \cancel{-8-4+8+4}\ \ 8-4-8+4$

$\therefore$ Rem $= 0$

Since Rem $= 0$, $\cancel{x+2}\ x-2$ is a factor of $f(x)$ → by factor thm

$$\begin{array}{r}
\cancel{x^2+x+6} \\
\cancel{x+2 \,\big)\, x^3-x^2+4x+4} \\
\cancel{x^3-2x^2} \\
\cancel{x^2+4x} \\
\cancel{x^2-2x} \\
\cancel{6x+4} \\
6x-12
\end{array}
\qquad
\begin{array}{r}
x^2+x-2 \\
x-2 \,\big)\, x^3-x^2-4x+4 \\
x^3-2x^2 \\
- \quad + \\
\hline
x^2-4x \\
x^2-2x \\
- \quad + \\
\hline
-2x+4 \\
-2x+4 \\
+ \quad - \\
\hline
0
\end{array}$$

$$\begin{array}{r}
\cancel{x^2-3x+} \\
\cancel{x+2 \,\big)\, x^3-x^2+4x+4} \\
\cancel{x^3+2x^2} \\
\cancel{-3x^2+4x} \\
\cancel{-3x^2-6x} \\
\cancel{10x+4}
\end{array}$$

$-2x^2$

$\cancel{-x-x}$

$+2x, -x$

x

$\therefore f(x) = (x-2)[x^2+x-2]$

$= (x-2)[x^2+2x-x-2]$

$= (x-2)[x(x+2)-1(x+2)]$

$\therefore f(x) = (x-2)(x-1)(x+2)$

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Let $f(x) = (3k+2)x^3 + (k-1)$

For $2x+1=0$, $x=-1/2$

$2x+1$ is a factor of $f(x) \longrightarrow$ Given

$\therefore$ By Factor theorem,

$f(-1/2)=0$

$\Rightarrow (3k+2)\left(\frac{-1}{2}\right)^3 + (k-1)=0$

$\Rightarrow \frac{-3k-2}{8} + \frac{k-1}{1} = 0$

$\Rightarrow \frac{-3k-2+8k-8}{8} = 0$ [L.C.M of $8,1=8$]

$\Rightarrow 5k-10=0$

$\Rightarrow 5k=10$ 3

$\therefore \boxed{k=2}$

Q5)

b) Let $f(x) = x^2-7x+2a$

For $x-2=0$, $x=2$

$x-2$ is a factor of $f(x) \longrightarrow$ Given

$\therefore$ By Factor theorem,

$f(2)=0$

$\Rightarrow (2)^2-7(2)+2a=0$

$\Rightarrow 4-14+2a=0$

$\Rightarrow -10+2a=0$

$\Rightarrow 2a=10$

$\therefore \boxed{a=5}$

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ii) Let $f(x) = ax^3 + 9x^2 + 4x - 10$

For $x+3=0$, $x=-3$

Rem $= 5$

$\therefore$ By Remainder thm,

Rem $= f(-3)$

$\Rightarrow 5 = a(-3)^3 + 9(-3)^2 + 4(-3) - 10$

$\Rightarrow 5 = -27a + 81 - 12 - 10$

$\Rightarrow 5 = -27a + 59$

$\Rightarrow 27a = 59 - 5$

$\Rightarrow a = \frac{54}{27}$ 2

$\therefore \boxed{a = 2}$

$81 - 22 = 59$

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Q6> $P(a, b)_O = (-a, -b)$

$m(-a, -b)$ y ~~t~~ $P'(a, -b)$

But $P'(3, -4)$

$\therefore P'(3, -4) = P'(a, -b)$

$\therefore \boxed{a = 3}$

$\boxed{b = 4}$

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i) In graph

ii) A' (3, -5)
iii) B' (-2, 4)
} From graph

iv) Trapezium

v) (-2, 0) and (3, 0) → From graph

$3\frac{1}{2}$

Q8> i) L_1 = x-axis
L_2 = y-axis

ii) P(5, 8) x = P'(5, -8)
Q(-3, -4) x = Q'(-3, 4)

iii) P(5, 8) y = P''(-5, 8)
Q(-3, -4) y = Q''(3, -4)

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iv) P'(5, -8) o = P''(-5, 8)

Q9> Yes, it remains a parallelogram (from graph)
A(4, -11) x = A''(4, 11)
B(5, 3) x = B''(5, -3)
C(2, 15) x = C''(2, -15)
D(1, 1) x = D''(1, -1)
} From graph

?

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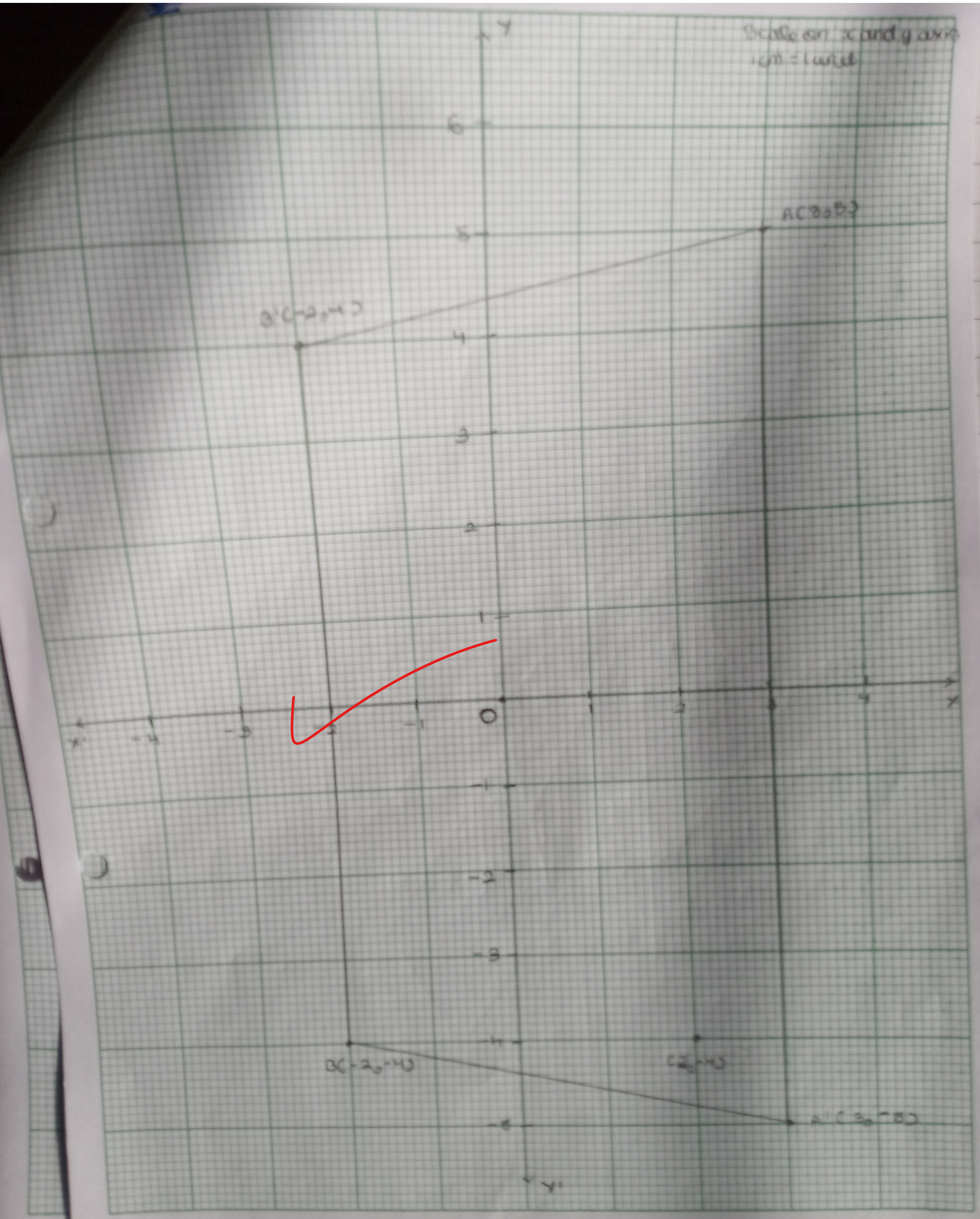

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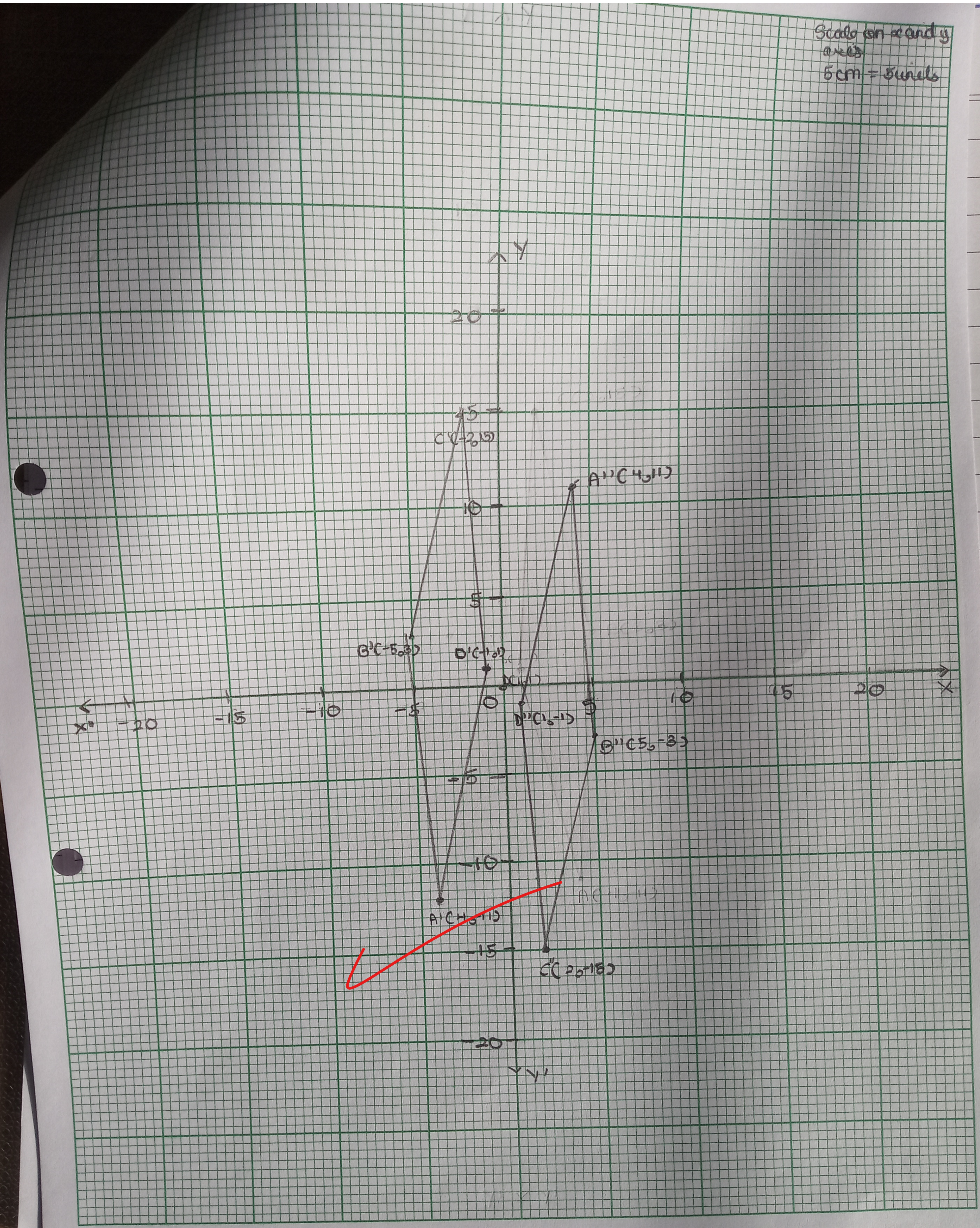

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