COMPETENCY BASED QUESTIONS

X WS – 1 : MCQs → RN, Polynomials, LE

1) If a pair of equations is consistent, then the lines representing them are
(a) parallel (b) always coincident (c) intersecting or coincident
(d) always intersecting.

2) If p and q are two distinct prime numbers, then their HCF is
(a) 2 (b) pq (c) either 1 or 2 (d) 1

3) If p and q are two distinct prime numbers, then LCM (p, q) is
(a) 1 (b) p (c) q (d) pq

4) Let p be a prime number. The sum of its factor is
(a) p (b) 1 (c) p+1 (d) p−1

5) Let p be a prime number. Find a quadratic polynomial with zeroes factors of p ~~is~~
(a) $x^2 - px + p$ (b) $x^2 - (p+1)x + p$
(c) $x^2 + (p+1)x + p$ (d) $x^2 - px + (p+1)$

6) The LCM of the smallest two digit composite number and the smallest composite number is
(a) 12 (b) 20 (c) 4 (d) 44

7) The smallest number divisible by all natural numbers between 1 to 10 (both inclusive) is
(a) 2020 (b) 2520 (c) 1010 (d) 5040

8) The HCF of two consecutive positive integers is
(a) 0 (b) 1 (c) 4 (d) 2

9) Let n be a natural number. Then, LCM (n, n+1) is
(a) n (b) n+1 (c) n(n+1) (d) 1

10) If 3 is the least prime factor of m and 5 is the least prime factor of n, then the least prime factor of (m+n) is
(a) 11 (b) 2 (c) 3 (d) 5

11) If p_1 and p_2 are odd prime numbers such that $p_1 > p_2$, then $p_1^2 - p_2^2$ is
(a) an even number (b) an odd number
(c) an odd prime number (d) a prime number

12) HCF (2520, 6600) = 40 ; LCM (2520, 6600) = 252 × k, then k = ___

(a) 1650 (b) 1600 (c) 165 (d) 1625

13) If $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$, LCM(a, b, c) = 3780, find x (a) 1 (b) 2 (c) 3 (d) 4

14) If $n = 2^3 \times 3^4 \times 5^4 \times 7$, then the no. of consecutive zeroes in n is (a) 2 (b) 3 (c) 4 (d) 6

15) The product of a non-zero rational number and an irrational number is

(a) always rational (b) always irrational

(c) rational or irrational (d) none of these

16) The LCM and HCF of two rational no.s are equal, then the numbers must be

(a) prime (b) co-prime (c) composite (d) equal

17) If the sum of two no.s is 1215 and their HCF is 81, then the possible no. of pairs of such number is

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

18) If the LCM of two prime no.s p and q is 221, then the value of $3p - q$ is ___

(a) 4 (b) 28 (c) 38 (d) 48

19) If p and q are co-prime no.s, then $p^2 - q^2$ are

(a) co-prime (b) not coprime (c) even (d) odd

20) The smallest number by which $\sqrt{27}$ should be multiplied so that to get a rational number

(a) 3 (b) $\sqrt{27}$ (c) $3\sqrt{3}$ (d) $\sqrt{3}$

21) The smallest rational number by which $\frac{1}{3}$ should be multiplied so that its decimal expansion terminates after one place of decimal is

(a) $\frac{3}{10}$ (b) $\frac{1}{10}$ (c) 3 (d) $\frac{3}{100}$

22) If n is a natural number, then $9^{2n} - 4^{2n}$ is always divisible by

(a) 5 (b) 13 (c) both 5 and 13 (d) none of these

23) If n is any natural no., then $6^n - 5^n$ always ends with

(a) 1 (b) 3 (c) 5 (d) 7

24) The remainder when the square of any prime number greater than 3 is divided by 6 is
(a) 1 (b) 3 (c) 2 (d) 4

25) For any natural no. n, $25^{2n} - 9^{2n}$ is always divisible by
(a) 16 (b) 34 (c) both 16 and 34 (d) none of these

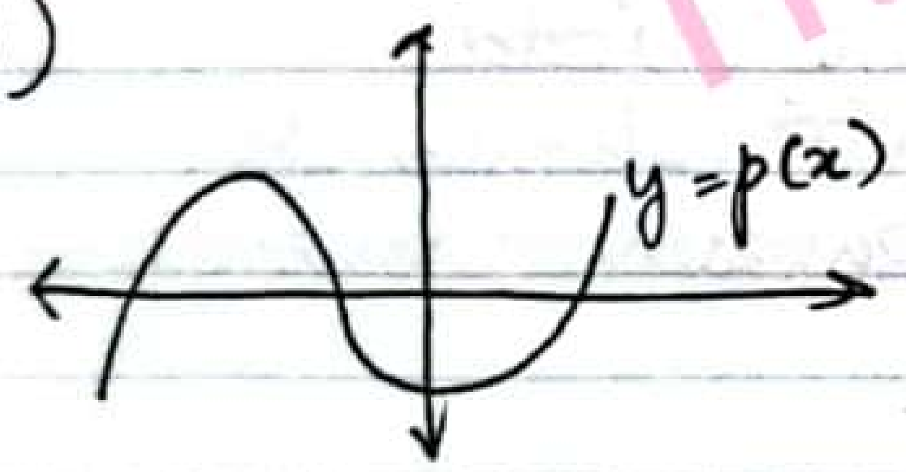
26) HCF of two positive integer is always
(a) a multiple of their LCM (b) a factor of their LCM
(c) divisible by their LCM (d) none of these

27) If $(a \times 5)^n$ ends with digit zero for every natural no. n, then a is
(a) any natural no. (b) an even no. (c) an odd no.
(d) none of these.

28) All decimal no.s are
(a) rational no.s (b) irrational no.s (c) real no.s
(d) integers.

29) How many prime no.s are of the form 10n+1 ; where $1 \le n < 10$? (a) 5 (b) 6 (c) 4 (d) 3

30) $119^2 - 11^2$ is a
(a) prime no. (b) composite no. (c) an odd prime no.
(d) an odd composite number

31)


the product of zeroes of p(x)
(a) is always +ve
(b) is always –ve
(c) is always 0
(d) cannot be determined

32) The no. of polynomials having –2 and 5 as zeroes is
(a) 1 (b) 2 (c) 3 (d) infinitely many

33) If $(a-2)x^2+3x-5$ is a quadratic polynomial, then
(a) a can take any real value
(b) a can take any non-zero value
(c) $a \neq 2$
(d) $a = 2$

34) The quadratic polynomial whose zeroes are reciprocal of the zeroes of quadratic polynomial ax^2+bx+c are
(a) $k(cx^2+ax+b)$; (b) $k(cx^2+bx+a)$ (c) $k(cx^2-bx+a)$
(d) $k(cx^2+bx-a$

35) The zeroes of $x^2+\frac{1}{6}x-2$ are

(a) $-3, 4$ (b) $-\frac{3}{2}, \frac{4}{3}$ (c) $-\frac{4}{3}, \frac{3}{2}$ (d) $-\frac{4}{3}, -\frac{3}{2}$

36) If α, β are zeroes of $p(x) = x^2 - p(x+1) - c$ such that $(\alpha+1)(\beta+1) = 0$, then $c =$ (a) 1 (b) 0 (c) -1 (d) 2

37) The zeroes of $x^2+99x+127$ are
(a) both +ve (b) both −ve (c) one +ve and one −ve (d) both equal

38) If one zero of x^2+ax+b is negative of the other, then it
(a) has no linear term and constant term is negative
(b) has no linear term and constant term is positive.

39) If α and β are zeroes of x^2-6x+k and $3\alpha+2\beta=20$, then the value of k is
(a) -8 (b) 16 (c) -16 (d) 8

40) What should be added to x^2-5x+4 so that 3 is the zero of the polynomial?
(a) 1 (b) 2 (c) 4 (d) 5

41) The zeroes of x^2+ax+a; $a\neq 0$.
(a) cannot both be +ve (b) cannot both be −ve

42) If the zeroes of ax^2+bx+c; $c\neq 0$ are equal, then
(a) c and a have opposite signs
(b) c and a have same signs.

43) If 2 and $\frac{1}{2}$ are zeroes of px^2+5x+r, then

(a) $p=r=2$ (b) $p=r=-2$ (c) $p=2, r=-2$ (d) $p=-2, r=2$

~~44) The value of k for which~~

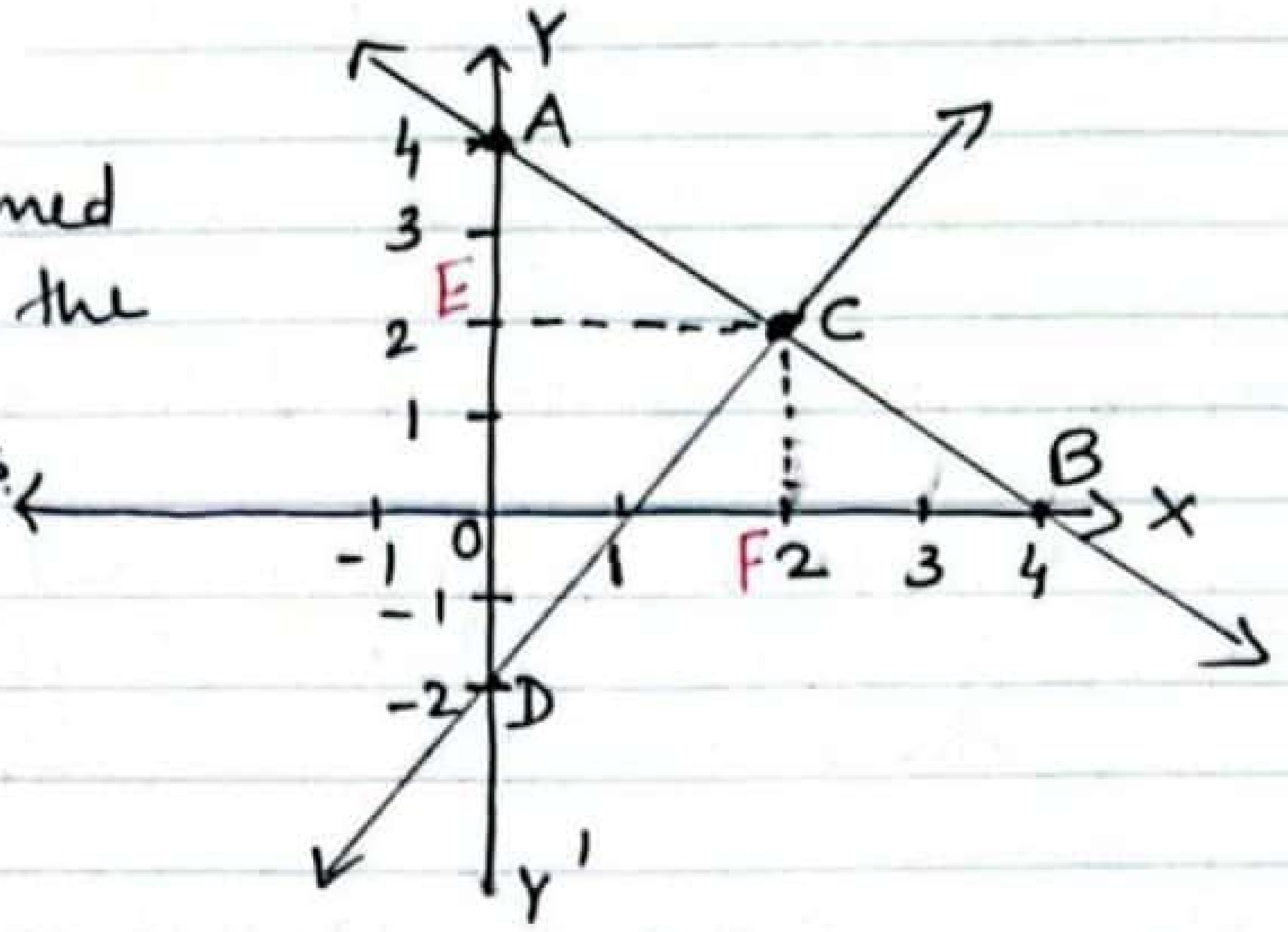
X WS-2

1) Find the area of Δ formed by these two lines and the line $x=0$ is

(a) 3 sq. units (b) 4 sq. units

(c) 6 sq. units

(d) 8 sq. units



2) One equation of a pair of dependent linear equation is $-5x+7y=2$. The second equation is

(a) $10x+14y+4=0$ (b) $-10x-14y+4=0$

(c) $-10x+14y+4=0$ (d) $10x-14y=-4$

3) The value of k for which the lines $5x+7y=3$ and $15x+21y=k$ coincide is

(a) 9 (b) 5 (c) 7 (d) 18

4) The area of Δ formed by $x=3$, $y=4$ and $x=y$ is

(a) $\frac{1}{2}$ sq. unit (b) 1 sq. unit (c) 2 sq. unit (d) none of these

5) The area of Δ formed by $y=x$, $x=6$ and $y=0$ is

(a) 36 sq. units (b) 18 sq. units (c) 9 sq. units (d) 72 sq. units

6) The area of Δ formed by the line $\frac{x}{a}+\frac{y}{b}=1$ with the coordinate axes is ___

(a) ab (b) $2ab$ (c) $\frac{1}{2}ab$ (d) $\frac{1}{4}ab$

7) If $2x-3y=7$ and $(a+b)x-(a+b-3)y=4a+b$ represents coincident lines, then a and b satisfy the equation

(a) $a+5b=0$ (b) $5a+b=0$ (c) $a-5b=0$ (d) $5a-b=0$

8) If the system of equations:

$2x+3y=7$; $2ax+(a+b)y=28$ has infinitely many solutions, then

(a) $a=2b$ (b) $b=2a$ (c) $a+2b=0$ (d) $2a+b=0$

9) If $am \neq bl$, then the system of equations $ax+by=c$ and $lx+my=n$

(a) has a unique solution (b) has no solution

(c) has infinitely many solutions (d) may or may not have a solution.

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10) If the system of eq:s $3x+y=1$; $(2k-1)x+(k-1)y=2k+1$ is inconsistent, then $k=$
(a) 1 (b) 0 (c) -1 (d) 2

11) If the system of eq:s $2x+3y=7$; $(a+b)x+(2a-b)y=21$ has infinitely many solutions, then
(a) $a=1$, $b=5$ (b) $a=5$, $b=1$ (c) $a=-1$, $b=5$ (d) $a=5$, $b=-1$

12) The value of k for which the system of linear eq:s $x+2y=3$; $5x+ky+7=0$ is inconsistent is
(a) $-\frac{14}{3}$ (b) $\frac{2}{5}$ (c) 5 (d) 10

13) The system of equations $x=0$, $y=3$ has
(a) a unique solution (b) no solution (c) two solutions
(d) infinitely many solutions

14) The pair of equations $x=4$ and $y=-3$ graphically represent lines which are
(a) coincident (b) parallel (c) intersecting at $(4,-3)$
(d) intersecting at $(-3,4)$

15) The value of k for which the system of equations $kx+y=k^2$ and $x+ky=1$ has infinitely many solutions is
(a) 1 (b) ± 1 (c) 2 (d) 4

16) If the pair of linear equations $2x-3y=0$ and $kx+6y=0$ has non-zero solutions, then the value of k is __
(a) -12 (b) 4 (c) -4 (d) 12

17) The pair of linear equations $y=0$ and $y=-5$ has
(a) one solution (b) two solutions (c) infinitely many solutions (d) no solution

18) The pair of linear equations $3x+5y=3$ and $6x+ky=8$ do not have a solution, if $k=$
(a) 5 (b) 10 (c) $\neq 10$ (d) $\neq 5$

19) For what value of k, $3x-y+8=0$ and $6x-ky+16=0$ represent coincident lines?
(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 2 (d) -2

20) If the sum of ages of a father and his son in years is 65 and twice the difference of their ages in years is 50, then the age of father is
(a) 40 years (b) 45 years (c) 55 years (d) 65 years

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X Competency based Questions (MCQs – Answers)

1) intersecting or coincident (c)
2) 1 (d)
3) pq (d)
4) p+1 (c)
5) $\alpha = 1, \beta = p$
$\alpha+\beta = 1+p$
$\alpha\beta = p$
$\therefore x^2 - (\alpha+\beta)x + \alpha\beta$
$= x^2 - (1+p)x + p$ (b)
6) Smallest two digit composite number $= 10 = 2\times5$
Smallest composite number $= 4 = 2^2$
$LCM(10,4) = 2^2\times5 = 20$ (b)
7) $LCM(1,2,3,4,5,6,7,8,9,10) = 2520$ (b)
8) 1 (b)
9) $n(n+1)$ (c)
10) m and n are odd number.
Thus, m+n is even and least prime factor is 2 (b)
11) $p_1^2 - p_2^2 = (p_1+p_2)(p_1-p_2)$
Since p_1+p_2 is an even number, $p_1^2 - p_2^2$ is also an even number (a).
eg:- Let $p_1 = 7$ and $p_2 = 5$
$p_1^2 - p_2^2 = 49 - 25 = 24$, an even number.

12) HCF × LCM = product of numbers
$40\times252\times k = 2520\times6600$
$k = \dfrac{\cancel{2520}^{10}\times\cancel{6600}}{\cancel{40}\times\cancel{252}_{1}}$ 1650 $= 1650$ (a)

13) $3780 = 5\times2^2\times3^3\times7$
$x = 3$ (c)

5	3780
2	756
2	378
3	189
3	63
3	21
	7

14) 3 (b)
$n = (2\times5)^3\times5\times3^4\times7$
$= 10^3\times5\times3^4\times7$
15) always irrational (b)
16) equal (d)
17) Let the numbers be $81x$ and $81y$
Then, $81x + 81y = 1215$
$x+y = 15$
Possible pairs are (1,14), (2,13), (4,11), (7,8). Thus, 4 pairs (c)

18) $p \times q = 221$
$\quad 13 \times 17$

$\therefore p = 17, q = 13$

$3p - q = 3 \times 17 - 13$
$= 51 - 13$
$= 38$ (c)

19) eg:- let $p = 13$ and $q = 8$
Then, $p^2, q^2 = 13^2, 8^2 = 169, 64$; co-prime (a)

20) $\sqrt{27} \times \sqrt{3} = \sqrt{81} = 9$ (c)

21) $\frac{1}{3} \times \frac{3}{10} = \frac{1}{10} = 0.1$ (a)

22) when $n = 1$, $9^2 - 4^2 = 81 - 16 = 65 = 5 \times 13$ (c)

23) when $n = 1$, $6 - 5 = \underline{1}$
$n = 2$, $6^2 - 5^2 = 36 - 25 = \underline{11}$ (a)

24) eg:- let the prime number be 7
$49 \div 6 \Rightarrow$ remainder is 1 (a)

25) when $n = 1$, $25^2 - 9^2 = 625 - 81 = 544 = 2^4 \times 34 = 16 \times 34$
when $n = 2$, $25^4 - 9^4 = (25^2 + 9^2)(25^2 - 9^2)$
$= (625 + 81)(625 - 81)$
$= 706 \times 544$
$= 2 \times 353 \times 2^4 \times 34$
(c) both 16 and 34

$2 \,|\, 706$, 353

$2 \,|\, 544$, $2 \,|\, 272$, $2 \,|\, 136$, $2 \,|\, 68$, 34

26) a factor of their LCM (b)

27) an even number (b)

28) real numbers (c)

29) $10 + 1 = 11$
$10 \times 3 + 1 = 31$
$10 \times 4 + 1 = 41$
$10 \times 6 + 1 = 61$
$10 \times 7 + 1 = 71$ (a)

30) Composite number (b)

31) is always positive (a)

32) infinitely many (d)

33) $a \neq 2$ (c)

34) $k(cx^2 + bx + a)$ (b)

35) $x^2 + \frac{1}{6}x - 2 = \frac{6x^2 + x - 12}{6}$

$= \frac{6x^2 - 8x + 9x - 12}{6} = \frac{2x(3x - 4) + 3(3x - 4)}{6}$

S $\quad$ P
1 $\quad -72$
$\quad -8, 9$

$= \frac{(2x+3)(3x-4)}{6}$

$\therefore$ The zeroes are $-\frac{3}{2}, \frac{4}{3}$ (b)

36) $p(x) = x^2 - px - p - c$

$A = 1, B = -p, C = -p - c$

$\alpha + \beta = -\frac{B}{A} = p$

$\alpha\beta = \frac{C}{A} = -p - c$

$\therefore (\alpha+1)(\beta+1) = 0$

$\Rightarrow \alpha\beta + (\alpha+\beta) + 1 = 0$

$\Rightarrow -\cancel{p} - c + \cancel{p} + 1 = 0$

$\therefore C = 1$ (a)

37) both negative (b)

38) no linear term and constant term is negative (a)

39) $a = 1, b = -6, C = k$; $\alpha + \beta = -\frac{b}{a} = 6$; $\alpha\beta = \frac{c}{a} = k$

$3\alpha + 2\beta = 20$

$\alpha + 2\alpha + 2\beta = 20$

$\alpha + 2(\alpha + \beta) = 20$

$\alpha + 12 = 20$

$\alpha = 8$

$\beta = -2$

$\therefore k = 8 \times -2$

$= -16$ (c)

40) When $x = 3$, $3^2 - 5 \times 3 + 4 = 9 - 15 + 4 = 13 - 15 = -2$.

Hence, $+2$ (b)

41) Cannot both be positive (a)

42) C and a have same sign (b)

43) $a = p, b = 5, C = r$

$\alpha + \beta = 2 + \frac{1}{2} = -\frac{b}{a}$

$\Rightarrow \frac{5}{2} = \frac{-5}{p}$

$\therefore p = \frac{-10}{5} = -2$

$\alpha\beta = 2 \times \frac{1}{2} = \frac{c}{a}$

$1 = \frac{r}{p}$

$r = p$

$\therefore r = p = -2$ (b)

X Sangya Online Test - 1 Answers

1) $\text{area}(\Delta ACD) = \frac{1}{2} \times AD \times CE = \frac{1}{2} \times 6 \times 2 = 6$ sq. units (c)

2) $-5x + 7y = 2 \quad \times(-2) \Rightarrow 10x - 14y = -4$ (d)

3) $a_1 = 5,\ b_1 = 7,\ c_1 = -3$

$a_2 = 15,\ b_2 = 21,\ c_2 = -k$

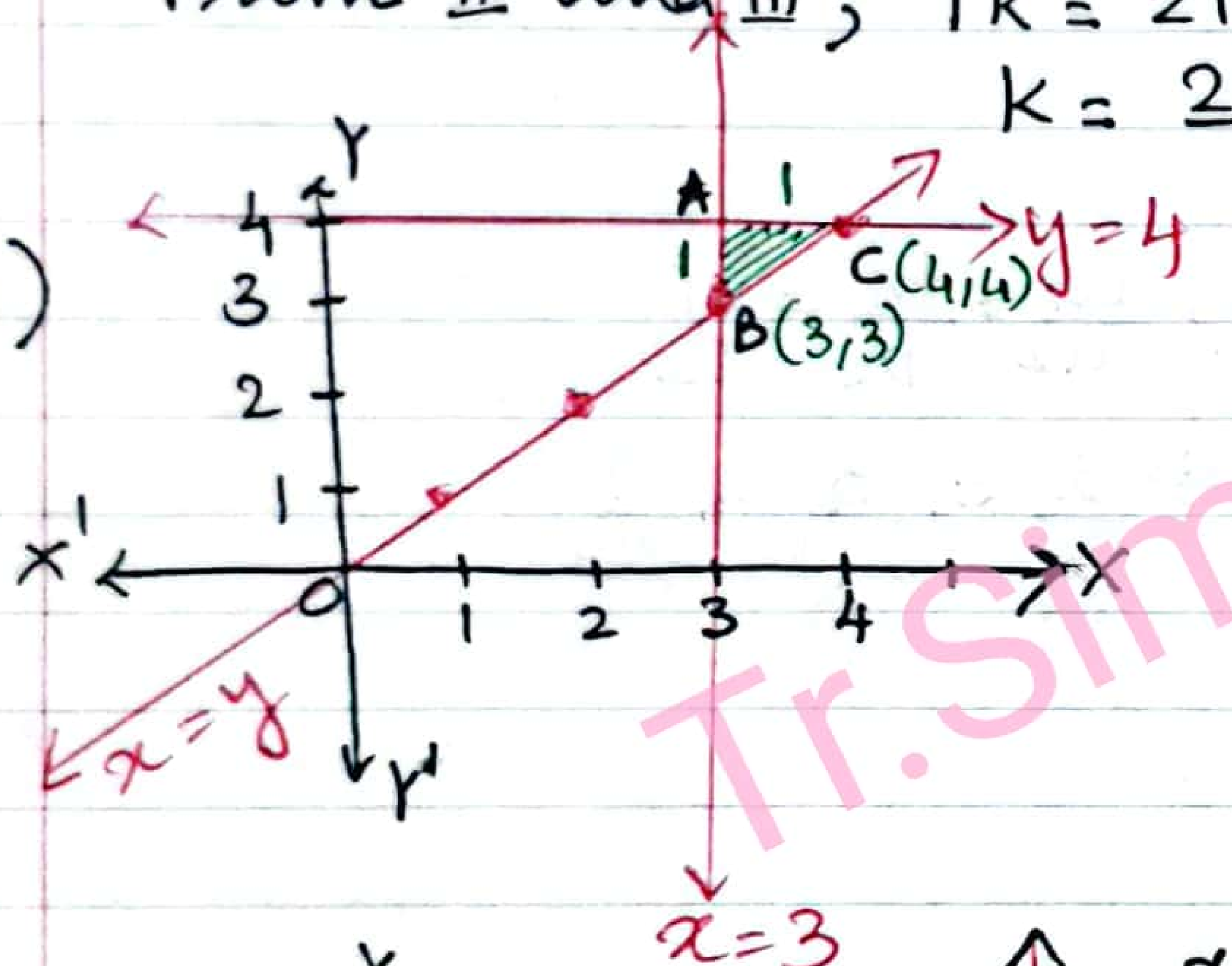
For coincident lines,

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \Rightarrow \underset{\text{I}}{\frac{5}{15}} = \underset{\text{II}}{\frac{7}{21}} = \underset{\text{III}}{\frac{\cancel{-}3}{\cancel{-}k}}$$

From II and III, $7k = 21 \times 3$

$k = \frac{21 \times 3}{7} = 9$ (a)

4)

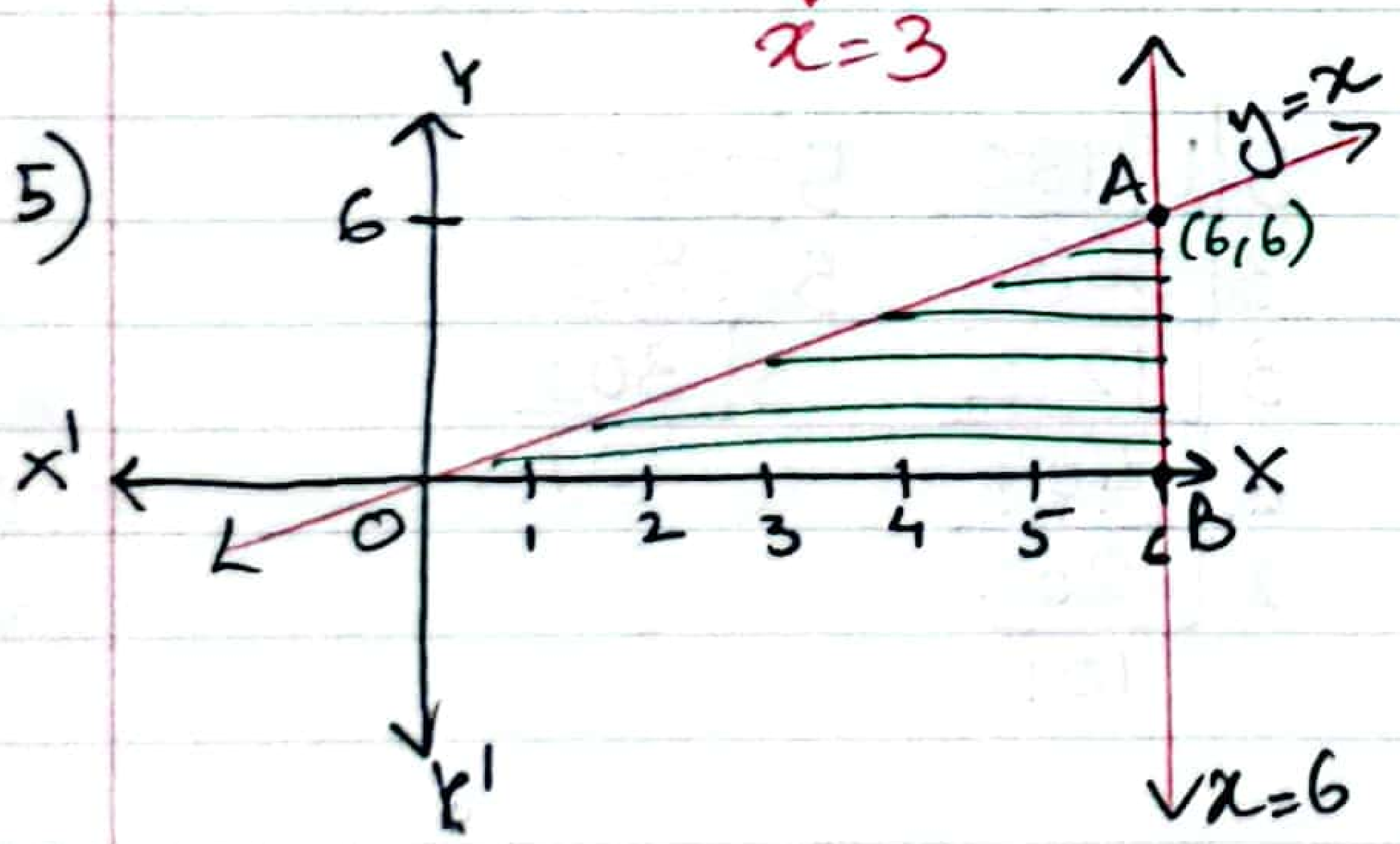


$\text{area}(\Delta ABC) = \frac{1}{2} \times AB \times AC$

$= \frac{1}{2} \times 1 \times 1$

$= \frac{1}{2}$ sq. units (a)

5)



$\text{area}(\Delta AOB) = \frac{1}{2} \times OB \times AB$

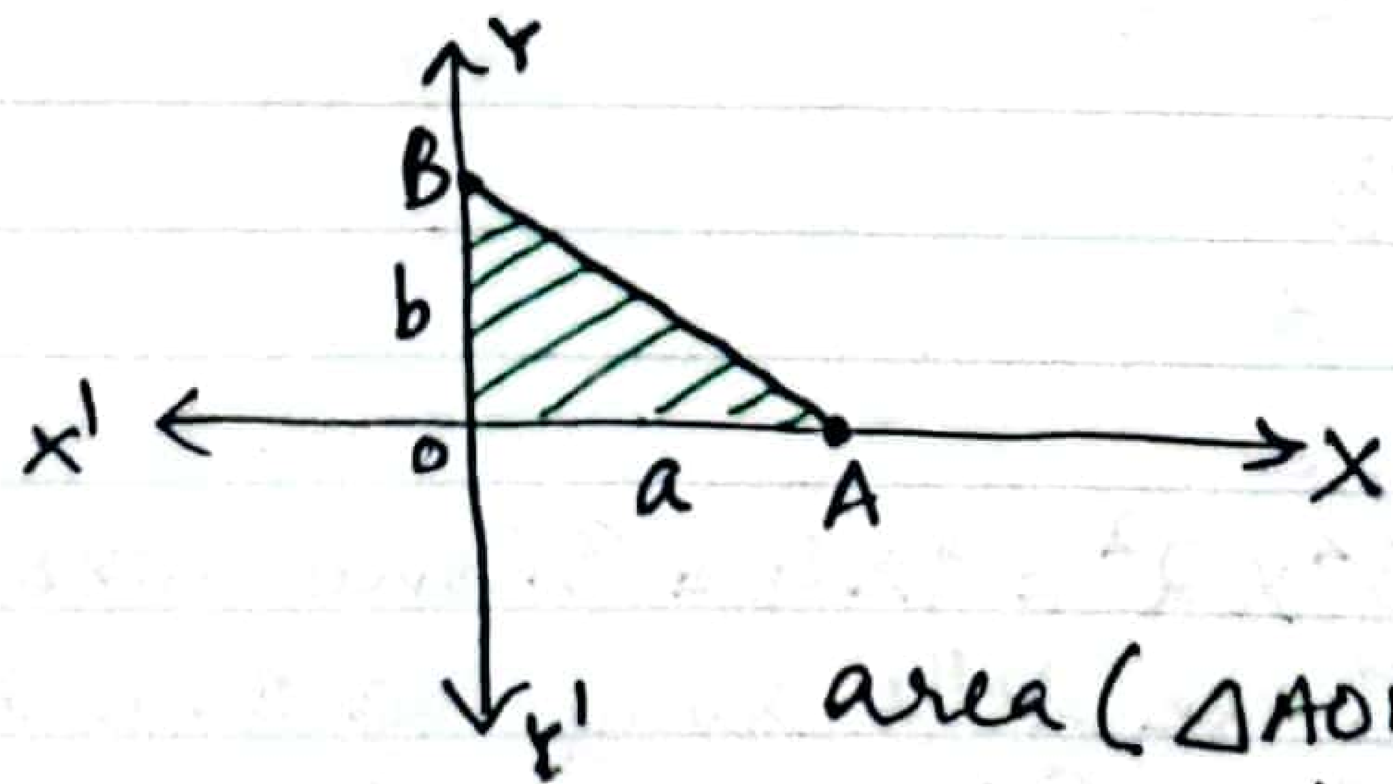
$= \frac{1}{2} \times 6 \times 6$

$= 18$ sq. units (b)

6) when $x = 0,\ y = b$

when $y = 0,\ x = a$

x	0	a
y	b	0



$\text{area}(\Delta AOB)$

$= \frac{1}{2} \times a \times b$

$= \frac{1}{2} ab$ (c)

7) $a_1 = 2, b_1 = -3, c_1 = -7$
$a_2 = a+b, b_2 = -(a+b-3), c_2 = -(4a+b)$

For coincident lines, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$$\Rightarrow \underset{\mathrm{I}}{\frac{2}{a+b}} = \underset{\mathrm{II}}{\frac{\cancel{-}3}{\cancel{-}(a+b-3)}} = \underset{\mathrm{III}}{\frac{\cancel{-}7}{\cancel{-}(4a+b)}}$$

From I and III, $\frac{2}{a+b} = \frac{7}{4a+b}$

$8a + 2b = 7a + 7b$

$a - 5b = 0$ (c)

8) $a_1 = 2, b_1 = 3, c_1 = -7$
$a_2 = 2a, b_2 = (a+b), c_2 = -28$
For infinitely many solutions, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$$\Rightarrow \underset{\mathrm{I}}{\frac{\cancel{2}^{1}}{{}_{1}\cancel{2}a}} = \underset{\mathrm{II}}{\frac{3}{a+b}} = \underset{\mathrm{III}}{\frac{\cancel{-}\cancel{7}^{1}}{\cancel{-}\cancel{28}_{4}}}$$

From I and II, $\frac{1}{a} = \frac{3}{a+b} \Rightarrow a+b = 3a$
$\Rightarrow b = 2a$ (b)

9) $am \neq bl \Rightarrow \frac{a}{l} \neq \frac{b}{m}$

has a unique solution (a)

10) $a_1 = 3,\ b_1 = 1,\ c_1 = -1$

$a_2 = 2k-1,\ b_2 = k-1,\ c_2 = -(2k+1)$

For inconsistent equations, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$$\Rightarrow \underset{\text{I}}{\frac{3}{2k-1}} = \underset{\text{II}}{\frac{1}{k-1}} \neq \underset{\text{III}}{\frac{1}{2k+1}}$$

From I and II, $3k-3 = 2k-1$

$k = 2$ (d)

11) $a_1 = 2,\ b_1 = 3,\ c_1 = -7$

$a_2 = a+b,\ b_2 = 2a-b,\ c_2 = -21$

For infinitely many solutions, $\underset{\text{I}}{\frac{2}{a+b}} = \underset{\text{II}}{\frac{3}{2a-b}} = \underset{\text{III}}{\frac{\cancel{-7}\ 1}{\cancel{-21}\ 3}}$

From I and II, $4a-2b = 3a+3b$

$a - 5b = 0$

$a = 5b \rightarrow (1)$

From II and III,

$9 = 2a-b$

$9 = 10b - b$

$9b = 9$

$b = 1$

$a = 5$ (b)

12) $a_1 = 1,\ b_1 = 2,\ c_1 = -3$

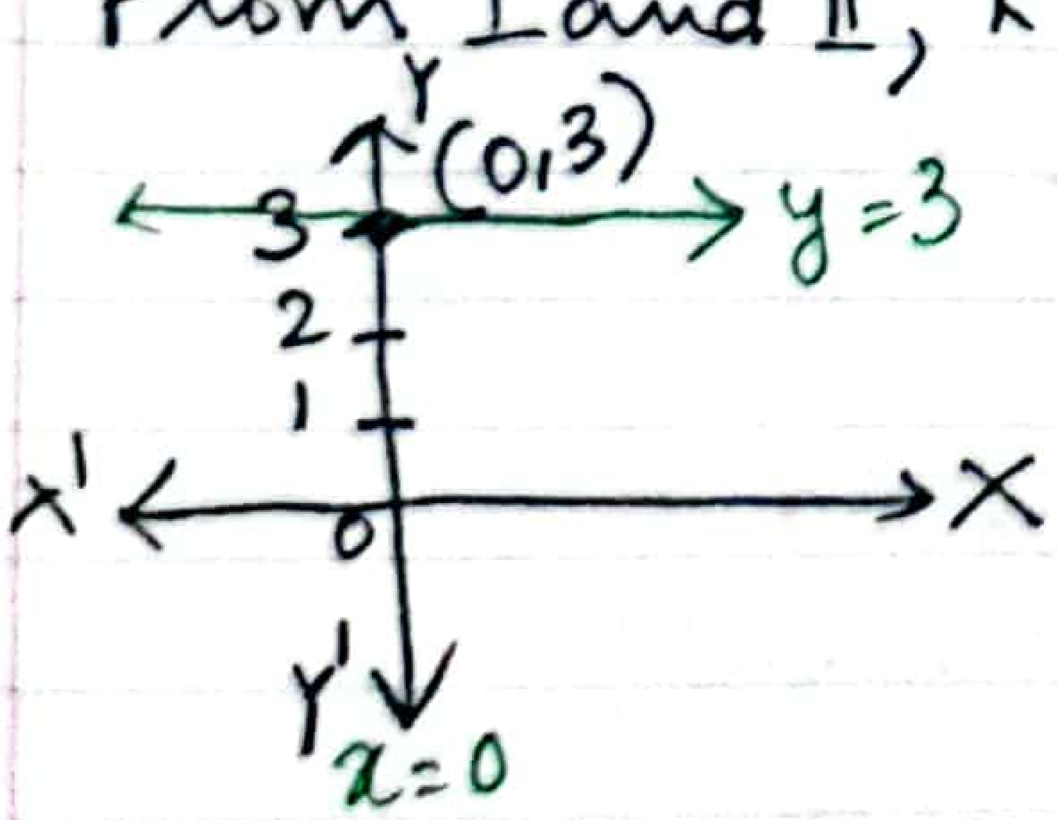
$a_2 = 5,\ b_2 = k,\ c_2 = 7$

For inconsistent equations, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$$\Rightarrow \underset{\text{I}}{\frac{1}{5}} = \underset{\text{II}}{\frac{2}{k}} \neq \underset{\text{III}}{\frac{-3}{7}}$$

From I and II, $k = 10$ (d)

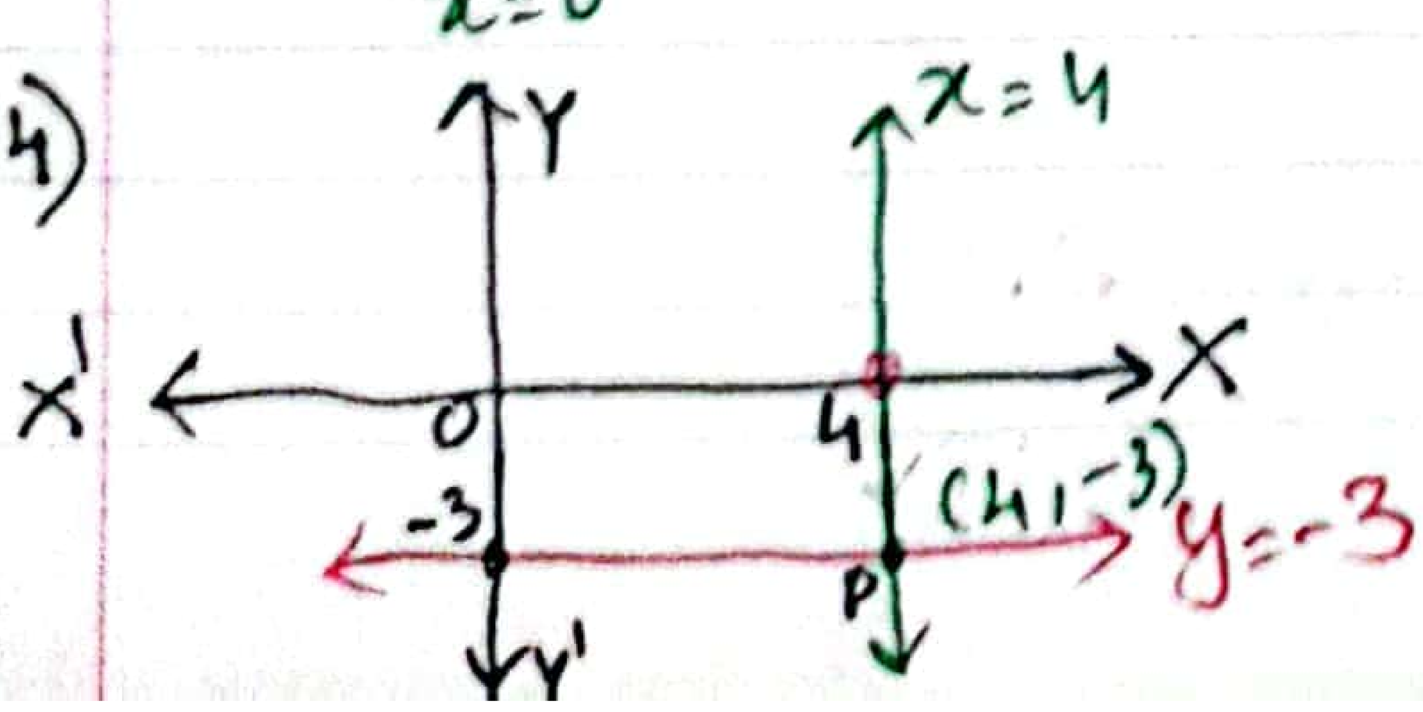
13)



a unique solution, $x = 0$

$y = 3$ (a)

14)



intersecting at $(4,-3)$ (c)

15) $a_1 = k,\ b_1 = 1,\ c_1 = -k^2$
$a_2 = 1,\ b_2 = k,\ c_2 = -1$
For infinitely many solutions, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$$\Rightarrow \underset{\text{I}}{\frac{k}{1}} = \underset{\text{II}}{\frac{1}{k}} = \underset{\text{III}}{\frac{\cancel{-}k^2}{\cancel{-}1}}$$

From I and II, $k^2 = 1$, $k = \pm 1$ | From II and III, $k^3 = 1$, $k = 1$

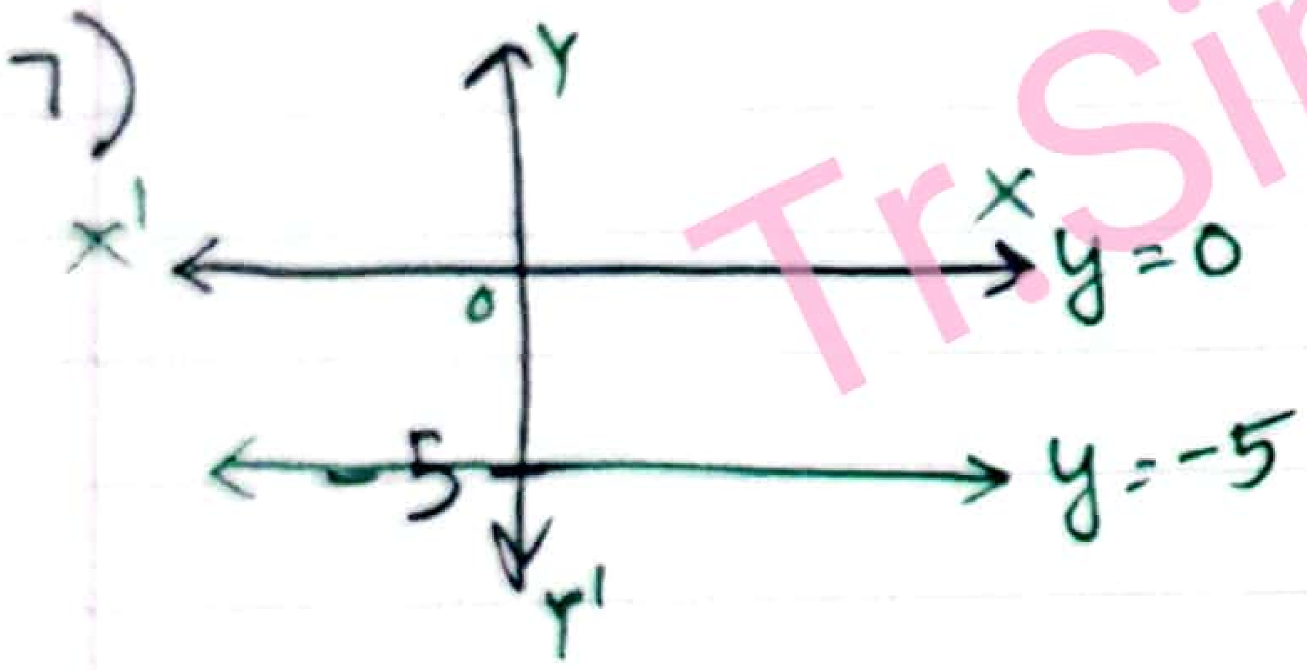
$\therefore$ the required value of k is 1 (a)

16) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ for non-zero solutions

$\frac{2}{k} = \frac{-3}{6}$

$k = \frac{12}{-3} = -4$ (c)

17)



no solution (d)

18) $a_1 = 3,\ b_1 = 5,\ c_1 = -3$
$a_2 = 6,\ b_2 = k,\ c_2 = -8$
For no solution, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$$\Rightarrow \frac{3}{6} = \frac{5}{k} \neq \frac{3}{8}$$

$k = \frac{30}{3}$ | $k \neq \frac{40}{3}$
$k = 10$ (b)

19) $a_1 = 3,\ b_1 = -1,\ c_1 = 8$
$a_2 = 6,\ b_2 = -k,\ c_2 = 16$
For coincident lines, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \Rightarrow \frac{\cancel{3}\,1}{\cancel{6}\,2} = \frac{1}{k} = \frac{\cancel{8}\,1}{\cancel{16}\,2}$

$\Rightarrow k = 2$ (c)

20)

F S

x y

$$x+y=65 \rightarrow (1)$$

$$2(x-y)=50$$

$$x-y=25 \rightarrow (2)$$

$(1)+(2)$, $2x=90$

$$x=45 \text{ (b)}$$

$$y=20$$