MATHS

BOOKS - CALCUTTA BOOK HOUSE MATHS (BENGALI ENGLISH)

GRAPHS

Examples Select The Correct Answer Mcq

1. (i) The Cartesian co-ordinates of the point $\left(\sqrt{2}, \frac{\pi}{6}\right)$ is

A. $\left(\sqrt{\frac{3}{2}}, \frac{1}{\sqrt{2}}\right)$

B. $\left(\sqrt{\frac{3}{2}}, \frac{1}{2}\right)$

C. $\left(\sqrt{3}, \frac{1}{\sqrt{2}}\right)$

D. $\left(\frac{1}{\sqrt{2}}, \frac{2}{\sqrt{2}}\right)$

Answer: A

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2. (ii) The polar form of the equation $\left(x^2+y^2\right)^{\frac{3}{2}} = a\left(x^2-y^2\right)$ in the Cartesian form is

A. $r = a\cos\theta$

B. $r = a\sin\theta$

C. $r = a\cos 2\theta$

D. $r = a\sin 2\theta$

Answer: C

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3. (iii) The Cartesian form the equation $r = a\sin\theta$ in the polar is.....

A. $x^2 + y^2 = ax$

B. $x^2 + y^2 = ay$

C. $x^2 - y^2 = ax$

D. $x^2 - y^2 = ay$

Answer: B

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Examples Short Answer Type Questions

1. (a) Plot the following points on the graph-paper and write whether they are above or below the x-axis : (i) $(3, -2)$

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2. (a) Plot the following points on the graph-paper and write whether they are above or below the x-axis :

(ii) $(-5, -5)$

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3. (a) Plot the following points on the graph-paper and write whether they are above or below the x-axis :

(iii) $(7, -7)$

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4. (a) Plot the following points on the graph-paper and write whether they are above or below the x-axis :

(iv) $(0, -9)$

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5. (b) Plot the following points on the graph paper and write whether they are on the right side or on the left side of the y-axis. (i) $(5, -7)$

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6. (b) Plot the following points on the graph paper and write whether they are on the right side or on the left side of the y-axis. (ii) $(-3, -5)$

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7. (b) Plot the following points on the graph paper and write whether they are on the right side or on the left side of the y-axis. (iii) $(-3, 4)$

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8. (b) Plot the following points on the graph paper and write whether they are on the right side or on the left side of the y-axis. (iv) $(11, 3)$

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9. Write four points on the x-axis.

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10. Write four points on the y-axis.

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11. Write the co-ordinates of a point in each of the quadrants.

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12. The distance of a point from the x-axis in the positive direction is 5 and from the y-axis in the positive direction is 7. Find the co-ordinates of the point.

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Examples Lone Answer Type Questions

1. Express the following statements in the form of simultaneous linear equations :

The total value of 3 copies (khata) and 2 pens is Rs. 44 and that of 4 copies (khata) and 3 pens is Rs. 61.

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2. Express the following statements in the form of simultaneous linear equations :

The sum of two different numbers is 80 and 3 times of the difference of the two numbers is 20 more than the greater one.

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3. Express the following statements in the form of simultaneous linear equations :

If 2 is added to both the numerator and denominator of a fraction, its value becomes $\frac{7}{9}$ and if 3 subtracted from both the numerator and denominator of it, the fraction becomes $\frac{1}{2}$.

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4. Express the following statements in the form of simultaneous linear equations :

(iv) The tens' digit of a number of two digits is double of its unit's digit. The number, obtained by reversing

the two digits of the number, is 27 less than the original number.

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5. Find the distance of the point $(6, -8)$ from both the axes.

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6. Determine the co-ordinates of the point intersection of the equation $2x + 3y = 12$ on the x-axis.

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7. Find the co-ordinates of the point of intersection of the equation $2x - 3y = 12$ on the y-axis.

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8. Find the area of the triangle formed by the graph of the equation $3x + 4y = 12$ and the co-ordinates axes.

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9. Determine the angle which the graph of the equation $x = y$ makes with the positive x-axis.

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10. Draw the graphs of the following equations : (i)

$x = 5$

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11. Draw the graphs of the following equations : (ii)

$y + 2 = 0$

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12. Draw the graphs of the following equations : (iii)

$3x - 7y = 21$

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13. Draw the graphs of the following equations : (iv)

$\frac{x}{3} + \frac{y}{4} = 0.$

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14. Express the following statements in the form of a linear equations of two variables and draw the graph of them : (i) The sum of two numbers is 15.

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15. Express the following statements in the form of a linear equations of two variables and draw the graph of them : (ii) If 2 is added to both the numerator and denominator of a fraction, the value of the fraction becomes $\frac{7}{9}$.

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16. Draw the graph of the following simultaneous linear equations :

(i) $y = 5$ and $2x + 3y = 11$

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17. Draw the graph of the following simultaneous linear equations :

(ii) $3x - 5y = 16$ and $2x - 9y = 5$.

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18. Draw the graph of the following simultaneous linear equations and determine the co-ordinates of the point of intersection of each of them. Also, find their solutions :

(i) $3x - y = 5, 4x + 3y = 11$

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19. Draw the graph of the following simultaneous linear equations and determine the co-ordinates of the point of intersection of each of them. Also, find their solutions :

(ii) $2x + 3y = 12, 2x = 3y.$

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20. Draw the graph of the equation $\frac{x}{3} + \frac{y}{4} = 2$ Also, find the area of the triangle which is produced by this graph with the co-ordinate axes.

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21. Draw the graph of the equation $x = 4, y = 3$ and $3x + 4y = 12$. Also, find the area of the triangle formed by these three graphs.

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22. Draw the graph of $y = \frac{x + 2}{3}$, Find the value of y where $x = -2$ from the graph. Also find from the graphs the value of x for which the value of y is 3.

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23. Solve : $\frac{3x-1}{2} = \frac{2x+6}{3}$ by drawing its graph.

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24. At a present your uncle is elder than you by 16 years. After 8 years, the age of your uncle will be 2 times of your age. Find the present ages of you and your uncle with the help of graphs.

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25. A boat travels 64 km in 16 hours in favor of the current and 24 km in 8 hours against the current of

the river. Find the velocity of the boat in steady water and the velocity of the current with the help of graph.

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26. (a) Find the value of t if the point $(4, t^2 - 4t + 4)$ lie on the x-axis.

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27. (b) For what value of t the point $(t^2 - (2 + \sqrt{3})t + 2\sqrt{3}, 8)$ lie on the y-axis ?

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28. (a) Find the equation of the straight line parallel to the x-axis and passing through the point $(-3, -5)$.

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29. (b) Find the equation of the straight line parallel to the y-axis and passing through the point $(-1, -7)$.

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30. (a) Determine the value of a if the straight line $ax + 7y = 3(a - 2)$ passes through the origin.

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31. (b) Determine the value of a if the straight line $2x + ay = 10(a - 30)$ passes through the point $(1, 2)$).

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32. (a) Determine the co-ordinates of the point on the straight line $2x - 3y = 12$ whose abscissa is double

of its ordinate.

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33. (b) Determine the co-ordinates of the point on the straight line $11x - 7y + 10 = 0$ whose ordinate is 3 times of its abscissa.

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34. (a) Find the polar co-ordinates of a point Cartesian co-ordinates are $(-1, 1)$.

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35. (b) Find the Cartesian co-ordinates of a point whose polar co-ordinates are $\left(\sqrt{2}, \frac{5\pi}{4}\right)$.

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36. (a) Transfer the equation $x^2 + y^2 = 2ax$ Cartesian co-ordinates into an equation of polar co-ordinates.

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37. (b) Transfer the equation $r = a\cos\theta$ of polar co-ordinates into an equation of Cartesian co-ordinates.

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38. If the values C and R denote the temperature in Centigrade and Romer scale respectively, then the relation between them is given by $\frac{C}{5} = \frac{R}{5}$.

(i) Express this relation by a graph i.e. draw a graph of this relation.

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39. If the values C and R denote the temperature in Centigrade and Romer scale respectively, then the relation between them is given by $\frac{C}{5} = \frac{R}{4}$.

(ii) What will be the temperature of a place in Romer

scale if the temperature of the place is centigrade scale be $10^{\circ} C$?

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40. Determine the area of the plane region formed by the graph of the equation $x = 6, y - 3 = 0, x + 4 = 0$ and $y + 5 = 0.$

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Exercise 3 Select The Correct Answer Mcq

1. (i) The point $(10 - 7)$ lie on the

A. first quadrant

B. second quadrant

C. third quadrant

D. fourth quadrant

Answer: D

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2. (ii) Which one of the following points lie on the second quadrant ?

A. $(0, -3)$

B. $(-3, -1)$

C. $(-3, 4)$

D. $(2, -5)$

Answer: c

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3. (iii) Which one of the following points lie on the x-axis ?

A. $(0, 2)$

B. $(10, 0)$

C. $(0, -5)$

D. $(-7, -3)$

Answer: b

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4. (iv) Which one of the following points lie on the x-axis ?

A. $(0, -5)$

B. $(-7, -5)$

C. $(11, 0)$

D. $(2, -13)$

Answer: a

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5. (v) The graph of the equation $2x + 3 = 0$ is

A. parallel to the x-axis

B. parallel to the y-axis

C. not parallel to the axis

D. passing through the origin

Answer: b

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6. (vi) The graph of the equation $ay + b = 0$ (a and b are constant and $a \neq 0, b \neq 0$)

A. is parallel to x-axis

B. is parallel to the y-axis

C. is not parallel to the axis

D. passing through the origin

Answer: a

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7. (vii) The graph of the equation $2x + 3y = 0$

A. is parallel to x-axis

B. is parallel to the y-axis

C. passes through the origin

D. passes through the point $(2, 0)$

Answer: c

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8. (viii) The graph of the equation $cx + d = 0$ (c and d are constant and $c \neq 0$) will be the equation of the y-axis when

A. $d = -c$

B. $d = c$

C. $d = 0$

D. $d = 1$

Answer: c

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9. (ix) The graph of the equation $ay + b = 0$ (a and b are constant and $a \neq 0$) will be the graph of the x-axis when

A. $b = a$

B. $b = -a$

C. $b = 2$

D. $b = 0$

Answer: d

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10. (x) If the point (a,b) be one the second quadrant, then which one of the following is correct ?

A. $ab > 0$

B. $ab < 0$

C. $ab \geq 0$

D. $ab \leq 0$

Answer: b

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11. (xi) Which one of the following straight lines is parallel to the x-axis ?

A. $x = 2$

B. $y + 3 = 0$

C. $2x = 3y$

D. $x + y = 1$

Answer: b

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12. (xii) Which one of the following straight lines is parallel to the y-axis ?

A. $x = k (k = \text{constant})$

B. $y + 7 = 0$

C. $x = y$

D. $xy = 1$

Answer: a

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13. (xiii) The point of intersection of the straight line $ax + by = c$ on the x-axis is

A. $\left(\frac{c}{a}, 0\right)$

B. $\left(-\frac{c}{a}, 0\right)$

C. $\left(0, \frac{c}{a}\right)$

D. $\left(0, -\frac{c}{a}\right)$

Answer: a

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14. (xiv) The point of intersection of the straight line $px + sqy = r$ on the y-axis is

A. $\left(\frac{r}{p}, 0\right)$

B. $\left(\frac{r}{q}, 0\right)$

C. $\left(0, \frac{r}{p}\right)$

D.

Answer: d

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15. (xv) Which one of the following straight line passes through the origin ?

A. $y = cx + d(c \neq 0, d \neq 0 \text{ and } c, d$ are constants)

B. $(k-1)x + (k+1)y = 0(k = \text{constant}, k \neq -1)$

C. $y = mx + c(m, c \text{are constant}. C \neq 0)$

D. $y = \alpha(\alpha \text{constant}, \alpha \neq 0)$

Answer: b

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16. (xvi) If the straight lines $\sqrt{p}x + \sqrt{p}y = r$ passes through the point $\left(\sqrt{p}, \sqrt{q}\right)$ then which one of the followings is correct ?

A. $\sqrt{p} + \sqrt{q} = r$

B. $p + q = r$

C. $p^2 + q^2 = r$

D. $p + q = r^2$

Answer: b

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17. (xvii) The distance of the point $(-7, -9)$ from the x-axis is

A. -7 units

B. 7 units

C. -9 units

D. 9 units

Answer: d

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18. (xviii) if $x^2 + y^2 = 0$ then the distance of the point (x, y) form the y-axis is

A. x^2 units

B. 0 units

C. y^2 units

D. Undetermined

Answer: b

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19. (xix) The straight line $x^2 + y^2 - 2px - 2qy + p^2 + q^2 = 0$ passes through the point

A. $(-p, -q)$

B. $(-p, 0)$

C. $(0, -q)$

D. (p, q)

Answer: d

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20. (xx) The polar co-ordinates of the point $\left(\sqrt{3}, 1\right)$ is

A. $\left(2, \frac{\pi}{3}\right)$

B. $\left(2, \frac{\pi}{6}\right)$

C. $\left(2, \frac{\pi}{4}\right)$

D. $\left(2, \frac{\pi}{2}\right)$

Answer: B

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Exercise 3 Short Answer Type Questions

1. (i) Write the co-ordinates of a point which is equidistant from the axes and lie on the third quadrant.

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2. (ii) Find the value of t if the point $(-t, t^2 + t + 1)$ is equidistant from the axes.

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3. (iii) Find the value of $\left(\frac{1}{a} + \frac{1}{b}\right)$ if the three points $(a, 0), (0, b)$ and $(1, 1)$ are collinear.

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4. (iv) Find the value of $\left(\frac{1}{x}, \frac{1}{y}\right)$ if the point $(x, 0), (0, y)$ and $(-1, -1)$ are collinear.

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5. (v) Determine the sum of the squares of the intersections of the axes intercepted by the straight line $\sqrt{2x} + \sqrt{3y} = \sqrt{6}$.

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6. (vi) Find the value of t if the point $(2, t^2 - 5t - 6)$ lie on the x-axis.

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7. (vii) Find the values of k for which the point $(k^2 - 6k + 8, 7)$ lie on the y-axis.

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8. (viii) Determine the coordinates of a point on the straight line $x - 5y + 24 = 0$ when the ordinate of the point is one-third of its absciass.

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9. (ix) Find the value of a if the straight line $10x + (a-1)y = 11(a-3)$ passes through the origin.

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10. (x) Find the area of the triangle formed by the straight line $2\sqrt{ax} + y = a$ with the co-ordinates axes.

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11. (xi) Find the equation of a staright line passing through $(k, -7)$ and parallel to the x-axis.

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12. (xii) Find the equation of a straight line passing through $(-a, 0)$ and parallel to the y-axis.

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13. (xiii) Find the area of the quadrilateral formed by the straight lines

$x = 0, y = 0, y + 3 = 0$ and $x = 1$ with the help of graphs.

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14. (xiv) Determine the polar co-ordinates of the point whose Cartesian co-ordinates are $(1, 1)$.

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15. (xv) Determine the Cartesian co-ordinates of the point whose polar co-ordinates are $\left(\sqrt{2}, \frac{\pi}{3}\right)$.

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16. (xvi) The distance of a point from the x-axis is 7 units on the negative directions and the distance from the y-axis is 8 units on the positive direction. Find the co-ordinates or the point.

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17. (xvii) Express the following statements in the form of simultaneous linear equations :

(a) If 2 is added to both the numerator and denominator of a fraction it becomes $\frac{5}{7}$ and If 1 is substracted from both the numerator and denominator the value of the fraction becomes $\frac{1}{2}$.

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18. (xvii) Express the following statements in the form of simultaneous linear equations :

(b) The one's unit digit of a two-digit number is twice of it's ten's unit digit. The number obtained by reversing the digits of the number is 18 more than the original number.

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Exercise 3 Long Answer Type Questions

1. Draw the graphs of the following equations : (i)

$y = 7$

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2. Draw the graphs of the following equations : (ii)

$x = -5$

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3. Draw the graphs of the following equations : (iii)

$y = \frac{1}{2}x$

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4. Draw the graphs of the following equations : (iv)

$$\frac{x}{4} + \frac{y}{3} = 1$$

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5. Draw the graphs of the following equations : (v)

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

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6. Draw the graphs of the following equations : (iv)

$$2x - 3y = 6$$

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7. Draw the graphs of the following equations : (vii)

$x = 7(y + 1)$

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8. Draw the graphs of the following equations : (viii)

$5x + 3y = 8$

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9. (a) Draw the graph of the equation $2y - 3x = 7$ Also find the value of y when $x = 2\frac{1}{2}$ and the value of x when $y = 3\frac{1}{2}$ from the graph.

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10. (b) Draw the graph of the expression $\frac{2x + 7}{3}$. Also, find the value of the expression when $x = 4$ and the value of x for which the value of the expression is 0 from the graph.

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11. Express the following statements in the form of linear equations of two variables and draw the graphs of each of the equations :

(i) The product of two numbers is 10.

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12. Express the following statements in the form of linear equations of two variables and draw the graphs of each of the equations :

(ii) The perimeter of a rectangular garden is 200 m.

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13. Express the following statements in the form of linear equations of two variables and draw the graphs of each of the equations :

(iii) At present, the age of Debleena's father is 42 year more than that of Debleena.

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14. Express the following statements in the form of linear equations of two variables and draw the graphs of each of the equations :

(iv) If 2 added to both the numerator and denominator of a fraction it becomes $\frac{4}{5}$.

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15. Draw the graphs of the following simultaneous linear equations and find the point of intersection of each pair :

(i) $x = 0$ and $2x + 3y = 15$

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16. Draw the graphs of the following simultaneous linear equations and find the point of intersection of each pair :

(ii) $x + y = 12$ and $x - y = 2$.

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17. Draw the graphs of the following simultaneous linear equations and find the point of intersection of each pair :

(iii) $4x - y = 3$ and $2x + 3y = 5$

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18. Draw the graphs of the following simultaneous linear equations and find the point of intersection of each pair :

(iv) $3x - 2y = 1$ and $2x - y = 3.$

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19. Express the following statements in the form of simultaneous linear equations and solve them by drawing graphs :

(i) The sum of two numbers is 12 and their difference is 4. Find the numbers.

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20. Express the following statements in the form of simultaneous linear equations and solve them by drawing graphs :

(ii) At present the age of a father is 28 years more

than that of his son. After 10 years the age of father will be 3 times of the age of his son. Find the present ages of both father and son.

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21. Express the following statements in the form of simultaneous linear equations and solve them by drawing graphs :

(iii) If 3 is subtracted from the numerator and 2 is added to the denominator of a fraction it becomes $\frac{1}{3}$. Again, if 4 is substracted from the numberator and 2 is subtracted form the denominator of the same fraction, it becomes $\frac{1}{2}$. Determine the fraction.

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22. Express the following statements in the form of simultaneous linear equations and solve them by drawing graphs :

(iv) A boat travels 56 km in 4 hours in favour of the current and 48 km in 8 hours against the current. Find the velocity of the boat in steady water and the velocity of the current.

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23. Express the following statements in the form of simultaneous linear equations and solve them by drawing graphs :

(v) The perimeter of the rectangular garden is 60 metres. If its length be 2 metres ore and breadth be 2 metres less than that of the previous, then the area of the garden becomes 24 sq. metres less than the previous area. Determine the length and breadth of the garden.

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24. Solve the following simultaneous linear equations by drawing graphs for them :

(i) $2x + 3y = 12, 2x = 3y$

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25. Solve the following simultaneous linear equations by drawing graphs for them :

(ii) $3x - 4y = 18, 7x + y = 11$

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26. Solve the following simultaneous linear equations by drawing graphs for them :

(iii) $4x - y = 3, 2x + 3y = 5$

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27. Solve the following simultaneous linear equations by drawing graphs for them :

(iv) $3x - 2y = 6, 3x - 2y = 3$

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28. Solve the following simultaneous linear equations by drawing graphs for them :

(v) $2x + 3y = 15, 3x - 2y = 3$

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29. Solve the following simultaneous linear equations by drawing graphs for them :

(vi) $5x - 2y = 1, 3x + 5y = 13$

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30. Solve the following simultaneous linear equations by drawing graphs for them :

(vii) $2x + 3y = 12, 2x - y = 4$

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31. Solve the following simultaneous linear equations by drawing graphs for them :

(viii) $4x - 3y = 0, 3x + 4y = 25$

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32. Solve the following simultaneous linear equations by drawing graphs for them :

(ix) $3x + 4y = 12, 5x - 4y = 20$

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33. Solve the following simultaneous linear equations by drawing graphs for them :

(x) $4x + 3y = 15, x - y = 2$

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34. Solve the following simultaneous linear equations by drawing graphs for them :

(xi) $3x - y = 5, 4x + 3y = 11$

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35. Solve the following simultaneous linear equations by drawing graphs for them :

(xii) $3x + 2y = 6, 2x - 3y = 17$

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36. Solve the following simultaneous linear equations by drawing graphs for them :

(xiii) $3x + 2y = 1, 2x - y = 3$

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37. Solve the following simultaneous linear equations by drawing graphs for them :

(xiv) $3x + 5y = 12, 3x - 5y + 18 = 0$

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38. Solve the following simultaneous linear equations

by drawing graphs for them :

(xv) $\frac{3x-1}{2} = \frac{2x+6}{2}$

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39. Solve the following simultaneous linear equations

by drawing graphs for them :

(xvi) $2x + 3y = -13, 3x - 2 = 0$

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40. Solve the following simultaneous linear equations by drawing graphs for them :

(xvii) $3x + 2y = 5, 2x - 3y = 12$

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41. The sum of two numbers is 1 If one of them is added to the thrice of the other, the result of the addition becomes 3. Find the two numbers with the help of graph.

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42. What principal will amount of Rs.560 in 3 years at 4% per annum simple interest?

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43. A monkey climbing up a pole ascends 6 metres and slips 3 metres in alternate minutes. If the pole is 60 metres high, how long will it take the monkey to reach the top?

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44. Solve the following $0 < |x - 3| \leq 10$

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45. Find the angle in radian through which a pendulum swings if its length is 75cm and the tip describes an arc of length 10cm.

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46. (a) Find the area of the triangle formed by the graph of the equations $x + y = 0, 3x = 5y$ and $y = 3x + 12.$

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47. (b) (i) Find the area of the plane region formed by the graphs of the equations $x = 4, 3x + 2y = 32$ and $7x - 4y = 40$.

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48. (b) (ii) Find the area of the plane region formed by the graphs of the simultaneous linear equations $2x + 3y = 12$ and $2x + 3y = 36$ with the co-ordinates axes.

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49. (b) (iii) Find the area of the triangle formed by joining the points `(4,8),(-4,3) and (12,2) successively.

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50. (c) Find the area of the quadrilateral formed by the four points $(4, 3), (2, 5), (0, 2)$ and $(2, 0)$ successively.

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