9th Math Review Exercise No.7

Q.1 Choose the correct option.

i. The equation of a straight line in the slope-intercept form is written as:

(a) $\mathrm{y} = \mathrm{m}(x + \mathrm{c})$ (b) $y - y1 = m(x - x_1)$ (c) $\mathrm{y} = \mathrm{c} + \mathrm{m}x$ (d) $ax + by + c = 0$

ii. The gradient of two parallel lines is:

(a) Equal (b) Zero (c) Negative reciprocals of each other (d) Always undefined

iii If the product of the gradients of two lines is (-1), then the lines are:

(a) parallel (b) perpendicular (c) collinear (d) coincident

iv. Distance between two points $\mathrm{P}(1,2)$ and $(4,6)$ is:

(a) 5 (b) 6 (c) $\sqrt{13}$ (d) 4

v . The midpoint of a line segment with endpoints $(-2,4)$ and $(6,-2)$ is:

(a) $(4,2)$ (b) $(2,1)$ (c) $(1,1)$ (d) $(0,0)$

vi. A line passing through points $(1,2)$ and $(4,5)$ has which equation in the slope intercept form?

(a) $y = x + 1$ (b) $y = 2x + 3$ (c) $y = 3x - 2$ (d) $y = x + 2$

vii. The equation of a straight line in the pint slope form is written as:

(a) $y = m(x + c)$ (b) $y - y_1 = m(x - x_1)$(c) $y = c + mx$ (d)ax+by+c=0

viii. $2\mathrm{x} + 3\mathrm{y} - 6 = 0$ in the slope-intercept form is:

(a) $y = \frac{-2}{3}x + 2$ (b) $y = \frac{2}{3}x - 2$ (c) $y = \frac{2}{3}x + 1$ (d) $y = \frac{-2}{3}x - 2$

ix. The equation of a line in symmetric form is:

(a) $\frac{x}{a} + \frac{y}{b} = 1$ (b) $\frac{x-x_1}{1} + \frac{y-y_1}{m} = \frac{z-z_1}{1}$ (c) $ax + by + c = 0$ (d) $y - y_1 = m(x - x_1)$

x. The equation of a line in normal form is:

(a) $y = mx + c$ (b) $\frac{x}{a} = \frac{\mathrm{y}}{\mathrm{b}} = 1$ (c) $\frac{x-x_1}{\cos\alpha} = \frac{y-y_1}{\sin\alpha}$ (d) $y - y_1 = m(x - x_1)$

Answers Key

i	c	ii	a	iii	b	iv	a	v	b
vi	a	vii	b	viii	a	ix	c	x	d

Multiple Choice Questions (Additional)

1. The first component of each ordered pair (x, y) is called:
   (a) ordinate
   (b) Coordinate
   (c) orgin
   (d) Abscissa
2. All points (x, y) with $x > 0, y > 0$ lie in quadrant:
   (a) I
   (b) II
   (c) III
   (d) Iv
3. All points (x, y) with $x < 0, y < 0$ lie in quadrant:
   (a) I
   (b) II
   (c) III
   (d) Iv
4. All points (x, y) with $x > 0, y < 0$ lie in quadrant:
   (a) I
   (b) II
   (c) III
   (d) Iv
5. All points (x, y) with $x < 0, y > 0$ lie in quadrant:
   (a) I
   (b) II
   (c) III
   (d) Iv
6. Which of the following is not on the x axis:
   (a) (00)
   (b) $(a, 0)$
   (c) $(b, 0)$
   (d) $(0, c)$
7. Which of the following is not on the y axis:
   (a) (0,0)
   (b) $(0, e)$
   (c) $(0, f)$
   (d) $(g, 0)$
8. The line of which equation bisect the 1^{st} and 3^{rd} quadrant?
   (a) $x - y = 0$

(b) $x + y = 0$
(c) $y = 2x$
(d) $y = 5x$

9. The line of which equation bisect the 2^{nd} and 4^{th} quadrant?
(a) $x - y = 0$
(b) $x + y = 0$
(c) $y = -4x$
(d) $y = -6x$

10. The slope of the line is:
(a) $m = \frac{x_2 - x_1}{y_2 - y_1}$
(b) $m = \frac{y_2 - y_1}{x_2 - x_1}$

11. (c) $m = \frac{x_1 - x_2}{y_1 - y_2}$
(d) $m = \frac{y_1 + y_2}{x_1 - x_2}$

11. If m_1 and m_2 are slopes of two parallel lines then:
(a) $m_1 \times m_2 = 0$
(b) $m_1 + m_2 = 0$
(c) $m_1 - m_2 = 0$
(d) $m_1 \times m_2 = -1$

12. If m_1 and m_2 are slopes of two perpendicular lines then:
(a) $m_1 \times m_2 = 0$
(b) $m_1 + m_2 = 0$
(c) $m_1 - m_2 = 0$
(d) $m_1 \times m_2 = -1$

13. The slope line $\frac{x}{3} + \frac{y}{2} = 1$ is:
(a) $\frac{2}{3}$
(b) $-\frac{2}{3}$
(c) $-\frac{3}{2}$
(d) $\frac{3}{2}$

14. The line of which equation has slope 2 and passes through the origin?
(a) $y = x + 2$
(b) $y = 2x + 2$
(c) $y = 2x - 2$
(d) $y = 2x$

15. If a line of slope- 3 passes through origin and $\mathrm{P}(3, k)$ then value of k is:
(a) 3
(b) -3
(c) 9
(d) -9

12. For what value of k, a line passing through the points $(-3, -7)$ and $(4, k)$ has gradient $\frac{3}{7}$?:
(a) 4
(b) -4
(c) -3
(d) -7

13. If x-coordinates of two points are same then line passing through them is parallel to:
(a) x-axis
(b) y-axis
(c) origin
(d) any line

14. If x-coordinates of two points are same then line passing through them is perpendicular to:
(a) x-axis
(b) y-axis
(c) origin
(d) any line

15. If y-coordinates of two points are same then line passing through them is parallel to:
(a) x-axis (b) y-axis (c) origin (d) any line

16. For what value of k, a line passing through the points $(-3, -7)$ and $(4, k)$ has gradient $\frac{3}{7}$?:
(a) 4 (b) -4 (c) -3 (d) -7

17. If x-coordinates of two points are same then line passing through them is parallel to:
(a) x-axis (b) y-axis (c) origin (d) any line

18. If x-coordinates of two points are same then line passing through them is perpendicular to:
(a) x-axis (b) y-axis (c) origin (d) any line

19. If y-coordinates of two points are same then line passing through them is parallel to:
(a) x-axis (b) y-axis (c) origin (d) any line

20. If y-coordinates of two points are same then line passing through them is perpendicular to:
(a) x-axis (b) y-axis (c) origin (d) any line

Answer Key

1	d	2	a	3	c	4	d	5	b	6	d	7	d	8	a	9	b	10	b
11	c	12	d	13	c	14	d	15	d	16	b	17	b	18	a	19	a	20	b

Q. 2 Find the distance between two points $A(2,3)$ and $B(7,8)$ on a coordinate plane.
Solution
A(2,3), B(7,8)
Using distance formula

$$\mathbf{d} = \sqrt{(x_2 - x_1)^2 + (y_2 - y)^2}$$

putting values

$$|\overline{\mathrm{AB}}| = \sqrt{(7-2)^2 + (8-3)^2}$$
$$|\overline{\mathrm{AP}} = \sqrt{(5)^2 + (5)^2}$$
$$= \sqrt{25 + 25}$$
$$= \sqrt{50} = \sqrt{25 \times 2} = 5\sqrt{2}$$

Q. 3 Find the midpoint of the line segment joining the points $(4, -2)$ and $(-6, 3)$.
Solution
$(4, -2)$ and $(-6,3)$.
Let $\mathrm{M}(x_\mathrm{m}, y_\mathrm{m})$ be midpoint of A and B .

$$\mathrm{M}(x_\mathrm{m}, y_\mathrm{m}) = \mathrm{M}\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Putting values

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

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

$= M\left(\frac{-2}{2}, \frac{1}{2}\right)$

$= M(-1, 0.5)$

Q. 4 Calculate the gradient (slope) of the line passing through the points $(1,2)$ and $(4,6)$.

Solution

(1. 2), $(4,6)$

A(1, 2) $= (x_1, y_1)$

$B(4,6) = (r_2, y_2)$

Slope of line $AB = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-2}{4-1} = \frac{4}{3}$

Q. 5 Find the equation of the line in the form $y = mx + c$ that passes through the points $(3,7)$ and $(5,11)$.

Solution

$A(3,7), B(5,11)$

Let $A(3,7) = (x_1, y_1)$

$B(5,11) = (x_2, y_2)$

Slope $\mathrm{m} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{11-7}{5-3} = \frac{4}{2} = 2$

The equation of line in point slope form.

$y - y_1 = m(x - x_1)$

$y - 7 = 2(x - 3)$

$y - 7 = 2x - 6$

$y = 2x - 6 + 7$

$y = 2x + 1$

Q. 6 If two lines are parallel, and one line has a gradient of $\frac{2}{3}$, what is the gradient of the other lines?

Solution

Let gradient of one line $= \mathrm{m}_1 = \frac{2}{3}$

Since parallel lines have same gradient

(slope) so, gradient of other line, $\mathrm{m}_2 = 2$ i.e $\mathrm{m}_1 = \mathrm{m}_2$

Q. 7 An airplane needs to fly from clity A to coordinates $(12,5)$ to city B at coordinates $(8, -4)$. Calculate the straight-line distance between

these two cities.
Solution
City $\mathrm{A} = \mathrm{A}(12,5)$
City $\mathrm{B} = \mathrm{A}(8,-4)$
Using distance formula,
$\mathrm{d} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
putting values

$|\overline{\mathrm{AB}}| = \sqrt{(8-12)^2 + (-4-5)^2}$

$|\overline{\mathrm{AB}}| = \sqrt{(-4)^2 + (-9)^2}$

$|\overline{\mathrm{AB}}| = \sqrt{16+81}$

$|\overline{\mathrm{AB}}| = \sqrt{97}$ units

Q. 8 In a landscaping project, the path starts at $(2,3)$ and ends at $(10,7)$. Find the midpoint.
Solution:
Let start point $\mathrm{A}(2,3)$
end point $B(10,7)$
Let $\mathbf{M}(\boldsymbol{x_m}, \mathbf{y_m}) = \mathbf{M}\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$= \mathbf{M}\left(\frac{2+10}{2}, \frac{3+7}{2}\right)$

$= \mathbf{M}\left(\frac{12}{2}, \frac{10}{2}\right)$

$= \mathbf{M}(6,5)$

This required midpoint is $\mathrm{M}(6,5)$.
Q. 9 A drone is flying from point $(2,3)$ to point $(10,15)$ on the grid. Calculate the gradient of the line along which the drone is flying and the total distance travelled.
Solution
Let $\mathrm{A}(2,3) = (x_1, y_1)$
$\mathrm{B}(10,15) = (x_2, y_2)$
(a) Gradient $= \frac{y_2-y_1}{x_2-x_1} = \frac{15-3}{10-2} = \frac{12}{8} = \frac{3}{2}$
(b) By distance formula,

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

$$|\overline{AB}| = \sqrt{(10-2) + (15-3)^2}$$

$$= \sqrt{(8)^2 + (12)^2}$$

$$= \sqrt{64 + 144}$$

$$= \sqrt{208}$$

$$= \sqrt{16 \times 13}$$

$$= 4\sqrt{13} \text{ units}$$

Q. 10 For a line with a gradient of (-3) and a y-intercept of (2), write the equation of the line in:

(a) Slope-intercept form

(b) Point-slope form (using the point $(1,2)$

(c) Two-point form (using the points $(1,2)$ and $(4,-7)$

(d) Intercepts form

(e) Symmetric form

(f) Normal form

Solution:

Slope / gradient $= m = -3$

$y-$ intercept $= c = 2$

$$y = mx + c$$

$$y = -3x + 2$$

$$\Rightarrow 3x + y - 2 = 0 \text{ ... (i)}$$

(a) Slope intercept form:

$$y = -3x + 2$$

(b) Point slope form:

$$y - y_1 = m(x - x_1)$$

Put $\mathrm{m} = -3, x_1 = 1, \mathrm{y}_1 = 2$

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

(c) Two-point form using $(1,2)$, and $(4,-7)$

$$(x_1, y_1) = (1,2) \Rightarrow x_1 = 1, y_1 = 2$$

$$(x_2, y_2) = (4,-7) \Rightarrow x_2 = 4, y_2 = -7$$

Let $\dfrac{y - y_1}{y_2 - y_1} = \dfrac{x - x_1}{x_2 - x_1}$

$$\frac{y-2}{-7-2} = \frac{x-1}{4-1}$$

(d) Intercepts form:

From (i) $3x + y - 2 = 0$

$$3x + y = 02$$

Dividing "2, " we get

$$\frac{3x}{2} + \frac{y}{2} = \frac{2}{2}$$

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

$$3$$

(e) Symmetric Form

From (i) $3x + y = 2$

$$\left(\because \sqrt{3^2 + 1^2} = \sqrt{9 + 1} = \sqrt{10}\right)$$

Dividing B.S by $\sqrt{10}$

$$\frac{3x}{\sqrt{10}} + \frac{y}{\sqrt{10}} = \frac{2}{\sqrt{10}}$$

(I) Normal form

From (1)

$3x + y = 2$

$$\left(\because \sqrt{3^2 + 1} = \sqrt{9 + 1} = \sqrt{10}\right)$$

Dividing B.S by $\sqrt{10}$

$$\frac{3x}{\sqrt{10}} + \frac{y}{\sqrt{10}} = \frac{2}{\sqrt{10}}$$

Comparing with

$x\cos\ \alpha + y\sin\ \alpha = p$

$\cos\ \alpha = \frac{3}{\sqrt{10}} = 0, \sin\ \alpha = \frac{1}{\sqrt{10}} 0 \Rightarrow \alpha$ lies in Q.I.

$\alpha = 18.43$

$$\Rightarrow x\cos\ 18.43° + y\sin\ 18.43 - \frac{2}{\sqrt{10}}$$