20 Graphs

By studying this lesson you will be able to;

- identify functions,
- draw graphs of functions of the form $y = mx$ and $y = mx + c$ and identify their characteristics,
- identify the gradient and intercept of a straight line graph,
- plot straightline graphs of equations of the form $ax + by = c$
- identify the relationship between the gradients of straight lines which are parallel to each other.

Do the following exercise to recall what has been learnt in previous grades regarding graphs.

Review Exercise

1. i. Draw a coordinate plane with the x and y axes marked from – 5 to 5 and mark the points A (– 4,– 4) and B (4,– 4) on it. Mark the points C and D such that $ABCD$ is a square and write the coordinates of C and D.

ii. Write the equation of each side of the plane figure $ABCD$.

2. Draw a coordinate plane with the x and y axes marked from – 4 to 4.

i. Draw two straight lines, one parallel to the x axis and the other parallel to the y axis passing through the point (4, – 4).

ii. Draw another two straight line, one parallel to the x axis and the other parallel to the y- axis passing through the point (– 3, 2).

iii. Write the coordinates of the two points at which the lines in (i) and (ii) above intersect each other.

iv. Write the equations of the axes of symmetry of the plane figure obtained in (iii) above.

20.1 Functions

We have come across relationships between different quantities in various situations. Carefully observe the relationship between the two quantities given below.

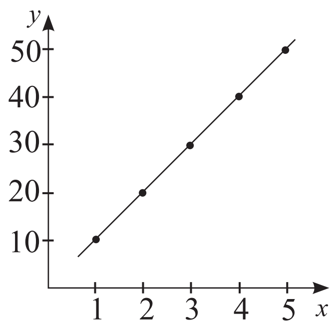
Let us suppose that beads are sold at 10 rupees per gramme. The prices of different amounts of beads is shown below.

Beeds (g)		Price (Rs)
1	$\longrightarrow$	$1 \times 10 = 10$
2	$\longrightarrow$	$2 \times 10 = 20$
3	$\longrightarrow$	$3 \times 10 = 30$
4	$\longrightarrow$	$4 \times 10 = 40$

Accordingly, it is clear that the price of x grammes of beeds is Rs $10x$. Moreover, if the price of x grammes of beeds is represented by Rs y, then we can write $y = 10x$.

Let us take the amount of grammes of beeds as x and the corresponding price as Rs y.

By plotting the price (y) against the amount of grammes of beeds (x) for different values of x using the above relationship, we obtain the following graph.



In the above function $y = 10x$, the index of the independent variable x is 1. Therefore it is called a linear function.

When a linear function is given, the values of y corresponding to different values of x can be found as follows.

Example 1

For each of the linear functions given below, calculate the values of y corresponding to the given values of x and write them as ordered pairs.

i. $y = 2x$ (values of x: $-2, -1, 0, 1, 2$)

ii. $y = -\frac{3}{2}x + 2$ (values of x: $-4, -2, 0, 2, 4$)

i. $y = 2x$

x	$2x$	y	Ordered pairs (x, y)
-2	2×-2	-4	$(-2, -4)$
-1	2×-1	-2	$(-1, -2)$
0	2×0	0	$(0, 0)$
1	2×1	2	$(1, 2)$
2	2×2	-4	$(2, 4)$

ii. $y = -\frac{3}{2}x + 2$

x	$-\frac{3}{2}x + 2$	y	Ordered pairs (x, y)
-4	$-\frac{3}{2} \times -4 + 2$	8	$(-4, 8)$
-2	$-\frac{3}{2} \times -2 + 2$	5	$(-2, 5)$
0	$-\frac{3}{2} \times 0 + 2$	2	$(0, 2)$
2	$-\frac{3}{2} \times 2 + 2$	-1	$(2, -1)$
4	$-\frac{3}{2} \times 4 + 2$	-4	$(4, -4)$

Exercise 20.1

Find the values of y corresponding to the given values of x and write them as ordered pairs.

i. $y = 3x$ (values of x: $-2, -1, 0, 1, 2$)

ii. $y = 2x + 3$ (values of x: $-3, -2, -1, 0, 1, 2, 3$)

iii. $y = -\frac{1}{3}x - 2$ (values of x: $-6, -3, 0, 3, 6$)

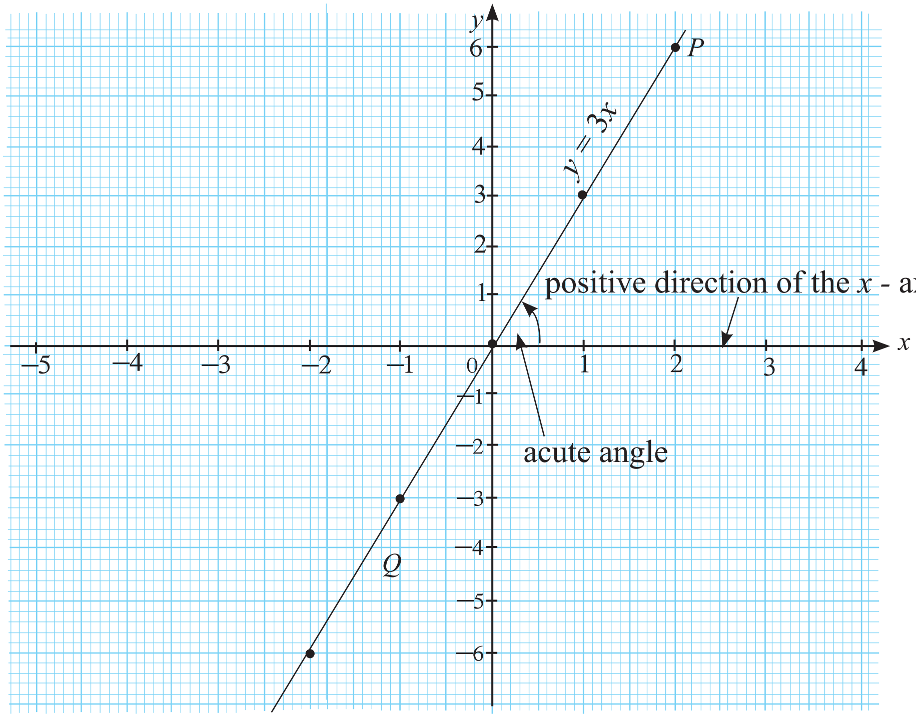
20.2 Functions of the form $y = mx$ and the gradient of the graph of such a function

Linear functions such as $y = 3x$, $y = -2x$ and $y = x$ are examples of functions of the form $y = mx$. Let us obtain ordered pairs of values of x and y by constructiong a table as follows, to draw the graph of $y = 3x$ for the values of x from -2 to $+2$.

$y = 3x$

x	$3x$	y	(x, y)
-2	3×-2	-6	$(-2, -6)$
-1	3×-1	-3	$(-1, -3)$
0	3×0	0	$(0, 0)$
1	3×1	3	$(1, 3)$
2	3×2	6	$(2, 6)$

By plotting the above ordered pairs in a coordinate plane, we obtain the graph of the function $y = 3x$ as shown below.



Let us consider some characteristics of the above drawn graph.

- The graph is a straight line
- It passes through the point (0, 0)
- It makes an acute angle counterclockwise with the positive direction of the x - axis

- When any point on the line other than the origin is considered, the value of $\dfrac{y \text{ coordinate}}{x \text{ coordinate}}$ of that point is a constant (a constant value).

For example,

when the point P is considered, $\dfrac{y \text{ coordinate}}{x \text{ coordinate}} = \dfrac{6}{2} = 3$

when the point Q is considered, $\dfrac{y \text{ coordinate}}{x \text{ coordinate}} = \dfrac{-3}{-1} = 3$

Moreover, this constant value is equal to the coefficient m of x of a function of the form $y = mx$. This constant value is called the **gradient** of the graph.

The gradient can be a positive value or a negative value.

Now, let us explain the behavior of functions of the form $y = mx$ through the activity given below.

Activity 1

1. a. Complete the tables given below for the selected positive values of m to obtain coordinates of points to draw the graphs of the given functions of the form $y = mx$, and draw the graphs on one coordinate plane.

(i) $y = x$ (ii) $y = +3x$ (iii) $y = +\frac{1}{3}x$

x	– 2	0	2
y	___	___	+2

x	– 1	0	1
y	– 3	___	___

x	– 3	0	3
y	___	___	+ 1

b. Complete the tables given below for the selected negative values of m to obtain coordinates of points to draw the graphs of the given functions of the form $y = mx$ and draw the graphs on one coordinate plane.

(i) $y = -x$ (ii) $y = -3x$ (iii) $y = -\frac{1}{3}x$

x	– 2	0	2
y	___	___	–2

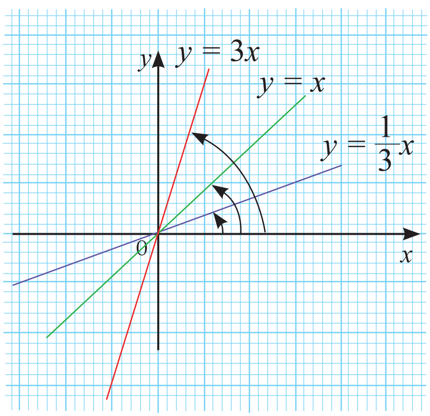
x	– 1	0	1
y	___	0	___

x	– 3	0	3
y	1	___	___

Observe the relationship between the angle that a graph makes with the positive direction of the x -axis and the gradient (value of m) by considering the graphs obtained in (a) and (b) above.

By doing the above activity you would have obtained the following graphs.

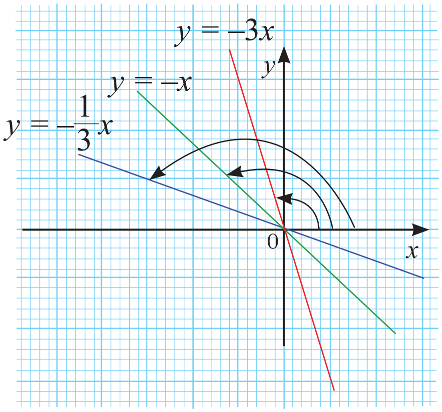
(a) Graphs obtained when the gradient is positive



★ When the gradient (value of m) is positive, the angle that the graph forms counter clockwise with the positive direction of the x-axis is an acute angle.

⋆ As the value of the gradient increases in the order $\frac{1}{3}$, 1, 3 the magnitude of the angle formed by the graph of the function with the positive direction of the x-axis counterclockwise increases.

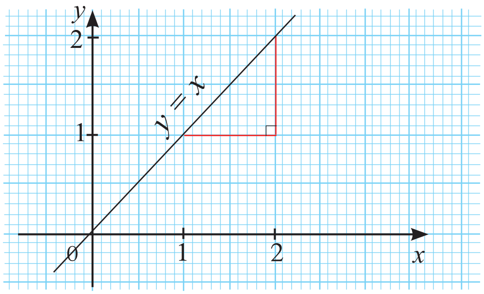
(b) Graphs obtained when m is negative



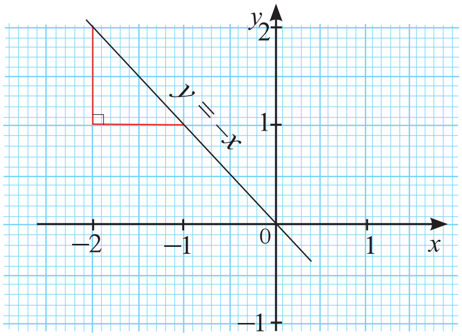
⋆ When the value of the gradient (value of m) is negative, the angle formed with the positive direction of the x-axis counterclockwise is an obtuse angle.

⋆ As the value of the gradient (value of m) increases in the order $-3, -1, -\frac{1}{3}$ the magnitude of the angle formed by the graph of the function with the positive direction of the x-axis counterclockwise increases.

Note: Gradient of a graph



The gradient of the graph of the function $y = x$ is 1. This means that when the value of x increases by one unit, the value of y also increases by one unit.



The gradient of the graph of the function $y = -x$ is -1. This means that when the value of x increases by one unit, the value of y decreases by one unit.

Example 1

Write the gradient of the graph of each of the functions given below without drawing the graph.

i. $y = 2x$

ii. $y = -5x$

iii. $y = -\frac{1}{2}x$

i. Gradient $(m) = 2$

ii. Gradient $(m) = -5$

iii. Gradient $(m) = -\frac{1}{2}$

Example 2

i. Draw the graphs of the functions $y = 2x$ and $y = -3x$ on the same coordinate plane by selecting suitable values for x.

ii. Using the above drawn graphs, find the value of x when $y = 3$, and the value of y when $x = 2$.

i. $y = 2x$

x	-2	-1	0	1	2
$+2x$	2×-2	2×-1	2×0	2×1	2×2
y	-4	-2	0	2	4

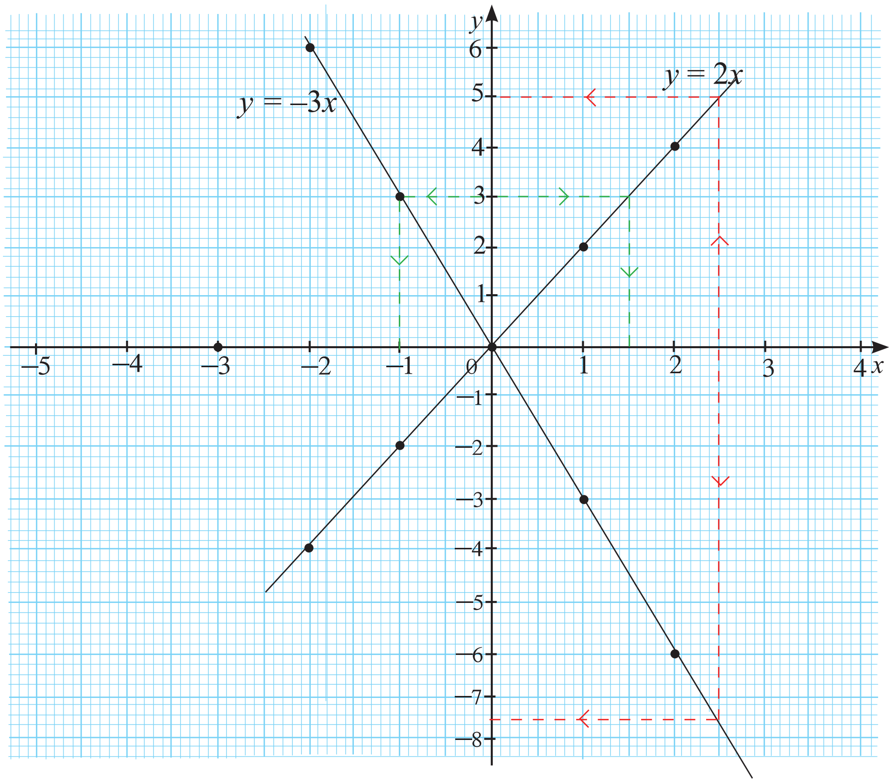
$(-2, -4)$ $(-1, -2)$ $(0, 0)$ $(1, 2)$ $(2, 4)$

$y = -3x$

x	-2	-1	0	1	2
$-3x$	-3×-2	-3×-1	-3×0	-3×1	-3×2
y	6	3	0	-3	-6

$(-2, 6)$ $(-1, 3)$ $(0, 0)$ $(1, -3)$ $(2, -6)$

By plotting the above ordered pairs on the same coordinate plane, graphs of the following form will be obtained.



ii. To find the value of y when $x = 2.5$, the line $x = 2.5$, should be drawn (indicated by the red line) and the y -coordinate of the points of intersection of this line with the two graphs should be obtained.

If we consider the function $y = 2x$, the value of y is 5 when the value of x is 2.5

If we consider the function $y = -3x$, the value of y is -7.5 when the value of x is 2.5

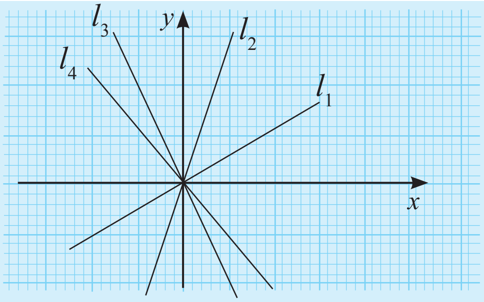
To find the value of x when $y = 3$, the line $y = 3$ should be drawn (indicated by the green line) and the x - coordinate of the points of intersection of this line with the two graphs should be obtained.

If we consider the function $y = 2x$, the value of x is $1\frac{1}{2}$ when the value of y is 3.

If we consider the function $y = -3x$, the value of x is -1 when the value of y is 3.

Exercise 20.2

1. For each of the functions given by the following equations, select and write the corresponding graph, from the graphs l_1, l_2, l_3, and l_4 .



i. $y = 3x$ **ii.** $y + 2x = 0$
iii. $2y - x = 0$ **iv.** $y + \frac{3}{2}x = 0$

2. The value of a Singapore dollor in Sri Lankan rupees is 100. By taking the amount of Singapore dollors as x and the corresponding value in Sri Lankan rupees as y, the relationship between Singapore dollors and Sri Lankan rupees can be written as a function as $y = 100x$.

i. Prepare a suitable table of values to draw the graph of the above function. (Use the values 1, 2, 3 and 4 for x)
ii. Draw the graph of the above function.
iii. Using the above drawn graph, find the value of 4.5 Singapore dollors in Sri Lankan rupees.
iv. Using the graph, find how much 250 Sri Lankan rupees are in Singapore dollors.

3. For the statements given below, mark a '✓' in front of the correct statements and a '✗' in front of the incorrect statements.

i. For functions of the form $y = mx$, the direction of the graph is decided by the sign of m. (....)

ii. When the graph of a function of the form $y = mx$ is given, the graph of $y = -mx$ cannot be obtained by considering symmetry about the y - axis. (....)

iii. For a straight line passing through the origin, the ratio of the y - coordinate to the x - coordinate of any point on the line other than the origin is equal to its gradient. (....)

iv. Although the point $(-2, 3)$ lies on the straight line given by $2y + 3x = 0$, it does not lie on the straight line given by $2y - 3x = 0$. (....)

v. The graph of a function of the form $y = mx$ need not pass through the point (0,0). (....)

4. i. Construct a table of values to draw the graphs of the functions given by $y = \frac{1}{3}x$, $3y = 2x$ and $y = -1\frac{1}{3}x$ by taking the values of x to be $-6, -3, 0, 3$ and 6.

ii. Draw the above graphs on the same coordinate plane.

iii. Write the x - coordinate of each of the three points at which the line $y = 1$ intersects the above three graphs.

5. i. Fill in the blanks in the incomplete table given below to draw the graph of the function $y = -\frac{2}{3}x$.

x	-6	-3	0	3	6
y	4	____	____	-2	____

ii. Draw the graph of the above given function using the values in the completed table.

iii. Using the graph, find the value of y when $x = -2$.

iv. Does the point $(-\frac{2}{3}, \frac{2}{3})$ lie on the above graph? Explain your answer with reasons.

v. Using the coordinates of three points on the line, calculate the ratio of the y - coordinate to the x - coordinate. Write the relationship between this value and the gradient.

20.3 Graphs of functions of the form $y = mx + c$ and functions given by $ax + by = c$

Graphs of functions of the form $y = mx + c$

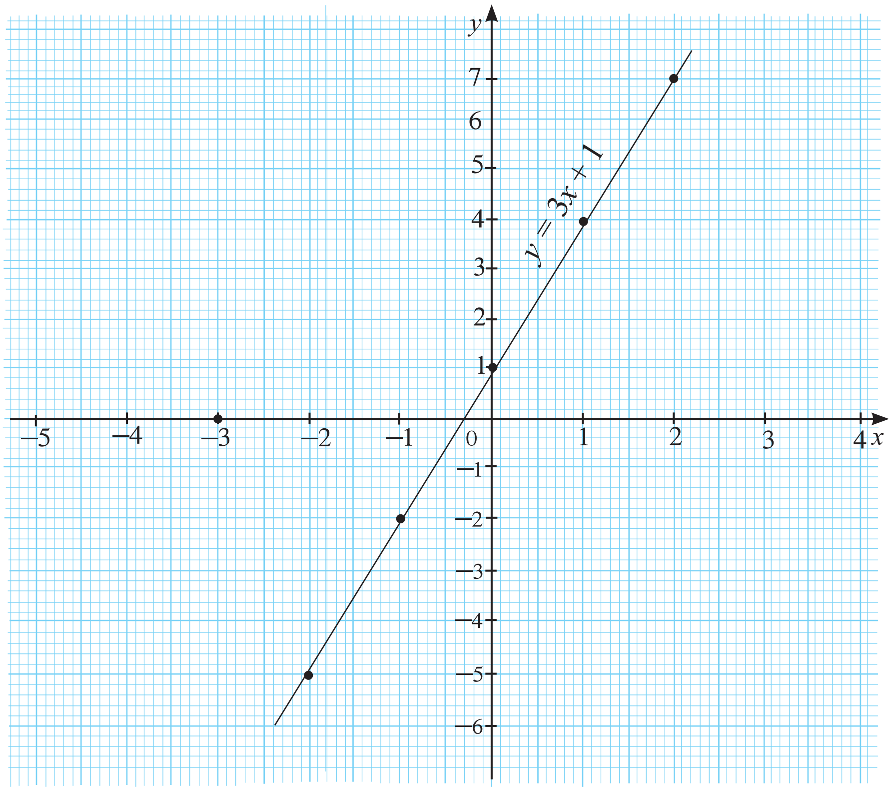
Let us first consider functions of the form $y = mx + c$. Let us draw the graph of the function $y = 3x + 1$.

To do this, let us first develop a lable of values as shown below.

$y = 3x + 1$

x	$3x + 1$	y	(x, y)
-2	$3 \times -2 + 1$	-5	$(-2, -5)$
-1	$3 \times -1 + 1$	-2	$(-1, -2)$
0	$3 \times 0 + 1$	1	$(0, 1)$
1	$3 \times 1 + 1$	4	$(1, 4)$
2	$3 \times 2 + 1$	7	$(2, 7)$

The graph that is obtained when the function is plotted on a coordinate plane using the ordered pairs in the above table of values is shown below.



By observing the above graph, the following characteristics can be identified.

- It is a straight line graph.
- The straight line intersects the y - axis at (0, 1).
- The straight line makes an acute angle counterclockwise with the positive direction of the x- axis. The value of m of this line is + 3. This means that when the variable x increases by 1 unit, the variable y increases by 3 units.
- The value representing c in the equation y = $3x + 1$ is + 1. The y cordinate of the point at which the straight line intersects the y - axis is also 1. These two values are equal.

The distance, from the origin to the point where the straight line intersects the y - axis is known as the intercept. The intercept of this line is + 1.

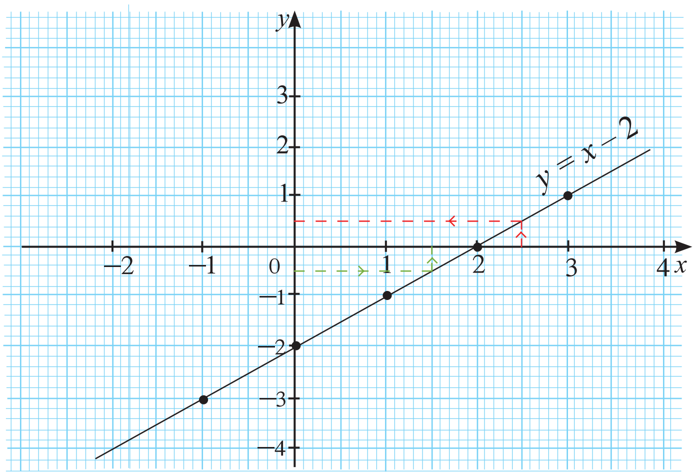
Accordingly, the gradient of the graph of a function of the form $y = mx + c$ is m and the intercept is c.

Example 1

Prepare a suitable table of values and draw the graph of the function $y = x - 2$. Using the graph, find the following.

i. The intercept.
ii. The value of y when $x = 2.5$
iii. The value of x when $y = -\frac{1}{2}$

x	-1	0	1	2	3
$y = x - 2$	-3	-2	-1	0	1



i. Intercept $(c) = -2$.

ii. $y = \frac{1}{2}$ when $x = 2.5$.

iii. $x = 1\frac{1}{2}$ when $y = -\frac{1}{2}$.

Example 2

Without drawing the graph, write the gradient and the intercept of the graph of each of the functions given by the following equations.

i. $y = -2x + 5$
ii. $y + 3x = -2$

i. $y = -2x + 5$ is of the form $y = mx + c$.
Accordingly, the gradient $(m) = -2$
The intercept $(c) = 5$

ii. Let us first write $y + 3x = -2$ in the form $y = mx + c$.
That is, $y = -3x - 2$.
Accordingly, the gradient $(m) = -3$
The intercept $(c) = -2$

Example 3

Prepare suitable tables for the functions $y = 2x$,
$y = 2x + 1$ and $y = 2x - 3$, and draw their graphs on the same coordinate plane.

i. Write the gradient and intercept of each graph by observing the equation.
ii. Write a special feature that you can observe in the graphs.

$y = 2x$

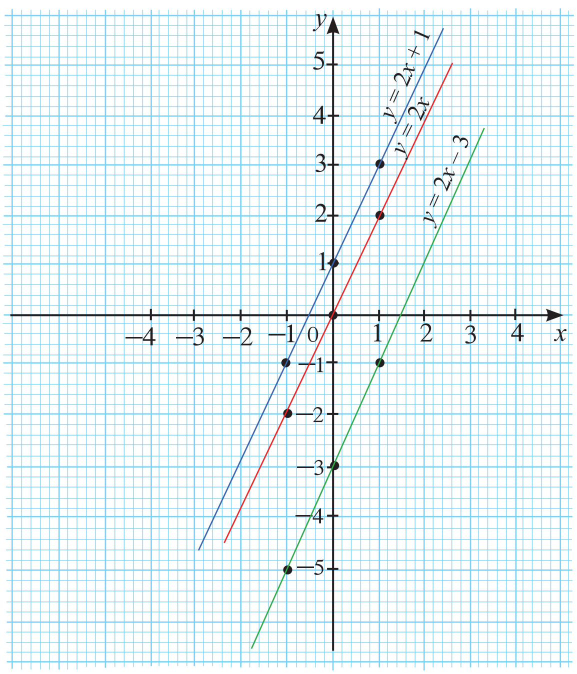
x	–1	0	1
y	–2	0	2

$y = 2x + 1$

x	–1	0	1
y	–1	1	3

$y = 2x - 3$

x	–1	0	1
y	–5	–3	–1



$y = 2x$
gradient = 2; intercept = 0

$y = 2x + 1$
gradient = 2; intercept = + 1

$y = 2x - 3$
gradient = 2; intercept = –3

By observing the equations of the graphs it is clear that the gradients of the three graphs are the same.By observing the graphs it can be seen that the lines are all parallel to each other. Therefore, it is clear that if the gradients of two or more linear functions are equal to each other, then their graphs will be parallel straight lines.

Graphs of functions given by equations of the form *ax* + *by* = *c*

Now let us consider the graphs of functions given by equations of the form $ax + by = c$. It is easy to prepare the table of values by writing this equation in the form $y = mx + c$.

Consider the following example.

Example 1

Prepare a suitable table of values and plot the graph of the function given by the equation $3x + 2y = 6$.

Using the graph that is drawn,

i. write the coordinates of the points at which it intersect the main axes.
ii. writethe gradient and intercept.

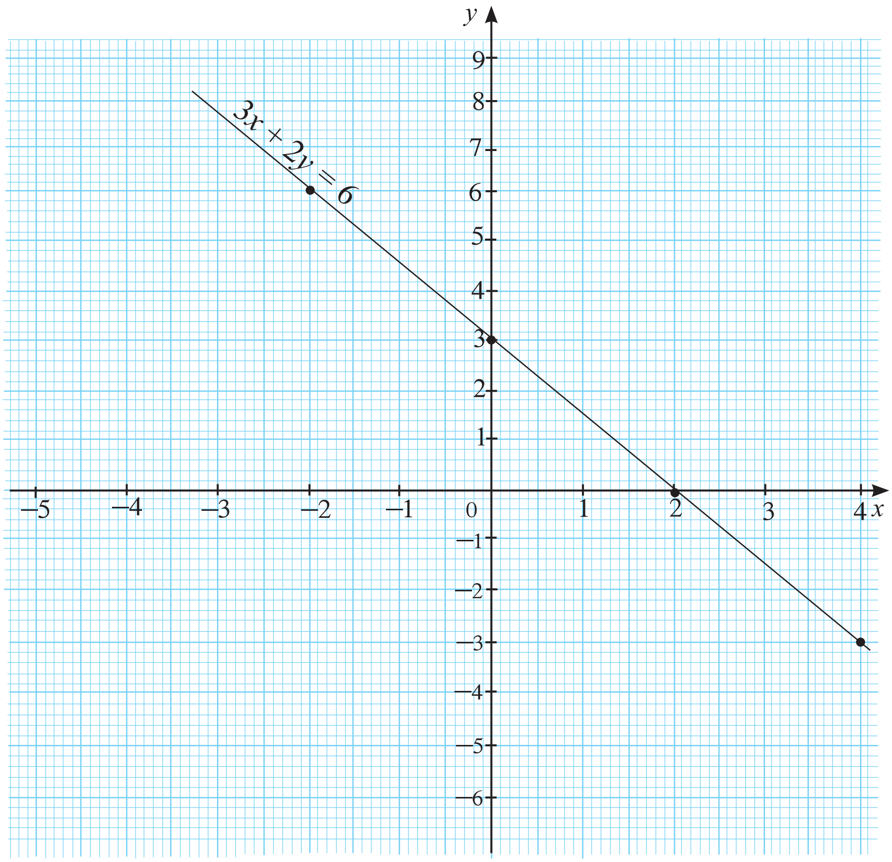
First let us change this equation to the form $y = mx + c$

$$3x + 2y = 6$$
$$2y = -3x + 6$$
$$y = -\frac{3}{2}x + 3.$$

Let us obtain the coordinates of points that lie on the graph of this function from the following table of values and use them to draw the graph.

x	$-\frac{3}{2}x+3$	y
-2	$-\frac{3}{2}\times-2+3$	6
0	$-\frac{3}{2}\times 0+3$	3
2	$-\frac{3}{2}\times 2+3$	0
4	$-\frac{3}{2}\times 4+3$	-3

$(-2, 6)$ $(0,3)$ $(2, 0)(2, 0)(4, -3)$



i. The graph intersects the y - axis at (0, 3) and the x- axis at (2, 0).

ii. Gradient $(m) = -\frac{3}{2}$, intercept $(c) = 3$

Note:

- Observe that the graph of $3x + 2y = 6$ intersects the y axis at the point $(0, 3)$ and that the y coordinate of that point is equal to the coefficient of x in the equation $3x + 2y = 6$.
- Observe that the graph of $3x + 2y = 6$ intersects the x axis at the point $(2, 0)$ and the x coordinate of that point is equal to the coefficient of y in the equation $3x + 2y = 6$.
- Note that the graph of $3x + 2y = 6$ can be plottted by joining the points $(0, 3)$ and $(2, 0)$, without preparing a table of values.

Exercise 20.3

1. For each of the functions given by the equations in parts (a) and (b), write the gradient and intercept without drawing the corresponding graphs and write whether the graph makes an acute or obtuse angle counterclockwise with the positive direction of the x - axis.

(a) i. $y = x + 3$ **ii.** $y = -x + 4$ **iii.** $y = \frac{2}{3}x - 2$ **iv.** $y = 4 + \frac{1}{2}x$

(b) i. $2y = 3x - 2$ **ii.** $4y + 1 = 4x$ **iii.** $\frac{2}{3}x + 2y = 6$

2. For each of the functions given below, find the coordinates of the points at which the graph of the function intersects the two axes and plot the graph of each function using these two points.

(a) i. $y = 2x + 3$ **ii.** $y = \frac{1}{2}x + 2$

(b) i. $2x - 3y = 6$ **ii.** $-2x + 4y + 2 = 0$

3. Using the information given below, write the equation of each straight line.

Gradients (m)	Intercept (c)	Equation of the function
i. $+2$	-5	$y = 2x - 5$
ii. -3	$+4$	
iii. $-\frac{1}{2}$	-3	
iv. $\frac{3}{2}$	$+1$	
v. 1	0	

4. An incomplete table of values prepared to draw the graph of the function $y = -3x - 2$ is given below.

x	-2	-1	0	1	2
y	______	______	-2	______	-8

i. Fill in the blanks.
ii. Draw the graph of the above function.
iii. Draw the straight line given by $y = x$ on the same coordinate plane and write the coordinates of the point of intersection of the two lines.

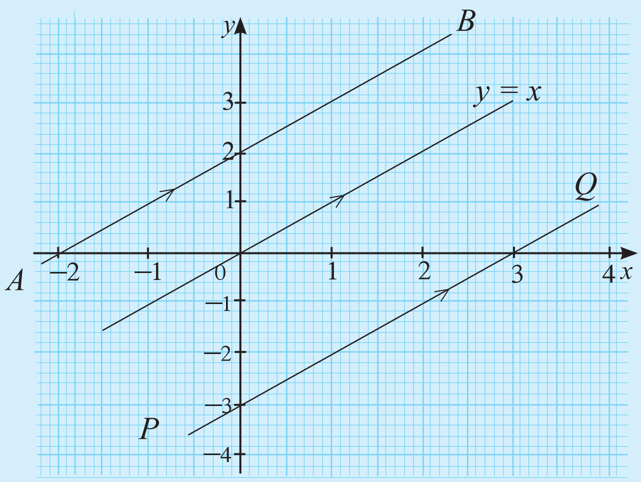
5. By selecting suitable values for x, construct a table of values and draw the graphs of the following functions on the same coordinate plane.

i. $y = x$ **ii.** $y = -2x + 2$ **iii.** $y = \frac{1}{2}x + 1$ **iv.** $y = -\frac{1}{2}x - 3$

6. Draw the graphs of the functions given by the following equations for the values of x from -4 to $+4$.

a. $-3x + 2y = 6$ and $3x + 2y = -6$
b. $y + 2x = 4$ and $-2x + y = -4$

7. Write the equations of the straight lines AB and PQ in the following figure.



Miscellaneous Exercise

1. For the statements given below, mark a "√" in front of the correct statements and a "×" in front of the incorrect statements.

i. For all m, the graph of a function of the form $y = mx + c$ is a straight line which is not parallel to the main axes. (............)

ii. For a function of the form $y = mx + c$, the value of m determines the direction of the straight line graph and the value of c determines the point where the graph intersects the y - axis. (............)

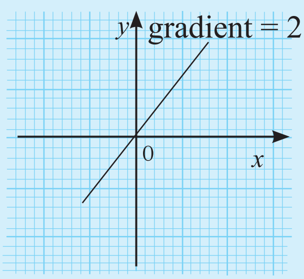
iii. It is not necessary for c to be zero, for the graph of a function of the form $y = mx + c$ to pass through the origin, (............)

iv. The graphs of the functions given by the equations $y_1 = m_1x + c_1$ and $y_2 = m_2x + c_2$ will be parallel when $m_1 = m_2$. (............)

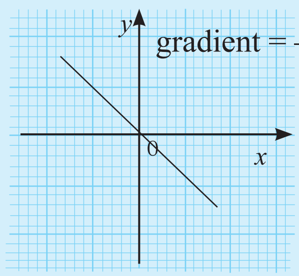
v. A straight line given by $y = mx + c$, intersects the y-axis above the x-axis only when $m > 0$, and $c > 0$. (............)

2. Write the equations of the functions of the graphs sketched below.

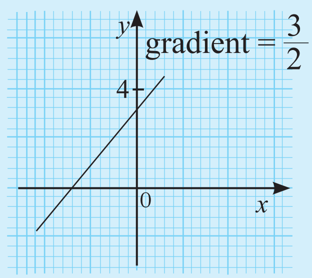
i.



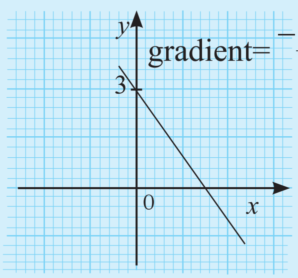
ii.



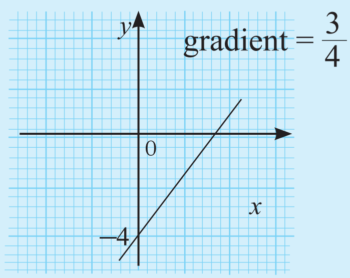
iii.



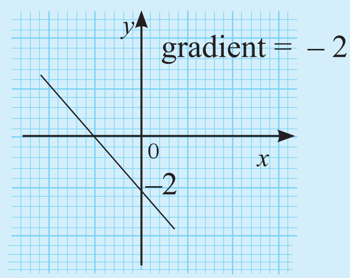
iv.



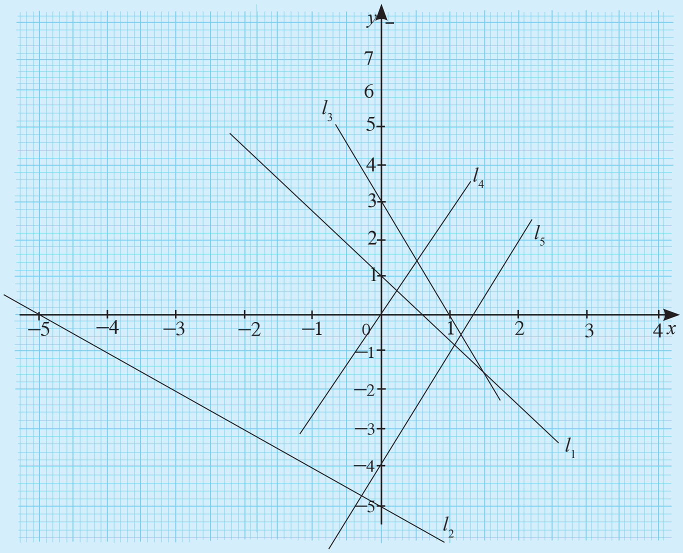
v.



vi.



3. Select and write the graph corresponding to each of the given functions.



Function

i. $y = 3x - 4$
ii. $y = -2x + 1$
iii. $y = -x - 5$
iv. $y = -3x + 3$
v. $y = +3x$

4. The gradient of the straight line given by $4x + py = 10$ is $-\frac{4}{3}$.

i. Find the value of *p*. **ii.** Write the intercept.
iii. Write the equation of the straight line with gradient –2 which passes through the point at which the above given straight line intersects the *y* - axis.

Summary

- The gradient of the graph of a function of the form $y = mx + c$ is m and the intercept is c.

- If the gradients of two or more linear functions are equal to each other, then their graphs will be parallel straight lines.

Revision Exercise – Second Term
Part I

1. The price of a dozen books of a certain type is Rs 240. Find the maximum number of books that can be bought for Rs 150.

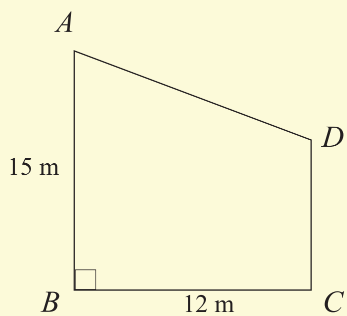
2. The price of a certain item is Rs 85000. If a discount of 20% is given when an outright purchase is made, using calculator find the amount that a customer has to pay when purchasing the item outright.

3. Simplify $\dfrac{(x^{-3})^0}{(2x^{-1})^2}$.

4. **i.** Round off 12.673 to the nearest second decimal place.
ii. Round off 4873 to the nearest hundred.

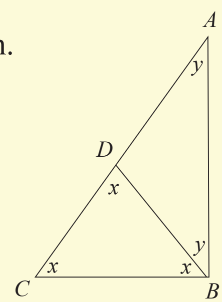
5. **i.** Write 5.62×10^{-3} in general form.
ii. Write 348 005 in scientific notation.

6. *ABCD* is the side view of a vertical wall of a house. If it is required to fix a bulb at an equal distance from *A* and *D* and 10 m from *B*, indicate its position by a rough sketch.



7. Solve $5\{3(x + 1) - 2(x - 1)\} = 10$

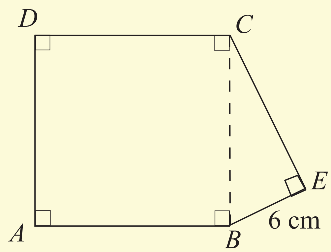
8. Find the values of x and y using the data in the given diagram.



9. Make r the subject of the formula $V = I\,(R + r)$.

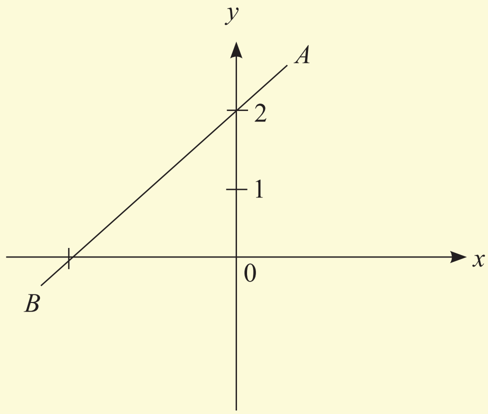
10. A square of side length 11 cm is made from a thin wire. Find the diameter of the largest circular bangle that can be made using this wire. (Use $\frac{22}{7}$ for the value π).

11. The area of the square $ABCD$ is 100 cm^2. If BE = 6 cm, find the perimeter of the figure.



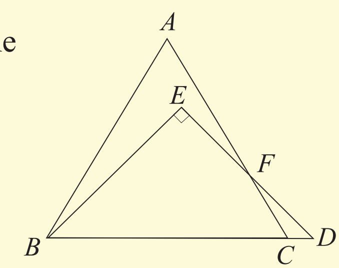
12. The gradient of the straight line AB is 3. Which of the following points are located on AB?

$(1, -5)$, $(-1, -1)$, $(\frac{1}{3}, -3)$, $(-\frac{1}{3}, 1)$



13. A group of Sri Lankans employed in a foreign country sent 25000 US dollars as aid for those affected by floods. How much is this amount in Sri Lankan rupees? (Assume that 1US dollar =150 Sri Lankan rupees)

14. ABC is an equilateral triangle. If $E\hat{F}A = 20^{\circ}$, find the magnitude of $A\hat{B}E$.



Part II

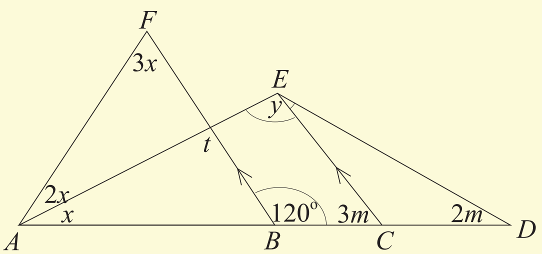
1.

x	-2	-1	0	1	2
y	-5	....	1	....	7

An incomplete table of values prepared to draw the graph of a function of the form $y = 2x - 1$ is given above.

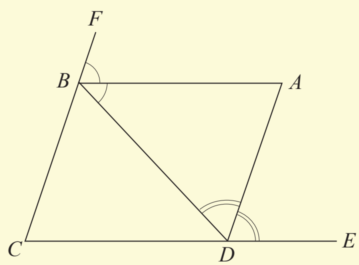
i. Fill the blanks in the table.
ii. Draw the graph of the above function on a suitable coordinate plane.
iii. If the point $(-5, k)$ is located on the above line, find the value of k.
iv. Write the equation of the straight line which is parallel to the line drawn in (ii) above and which passes through the point (0, 2).

2. (a) The straight lines BF and CE are parallel. Using the data given in the figure, find the following.



i. The values of x, t, y and m.
ii. The magnitude of $A\hat{E}D$.

(b) In the following figure, the bisectors of the angles $D\hat{B}F$ and $B\hat{D}E$ intersect at A.



i. Express the magnitude of $A\hat{B}D$ in terms of the magnitudes of $B\hat{D}C$ and $D\hat{C}B$.

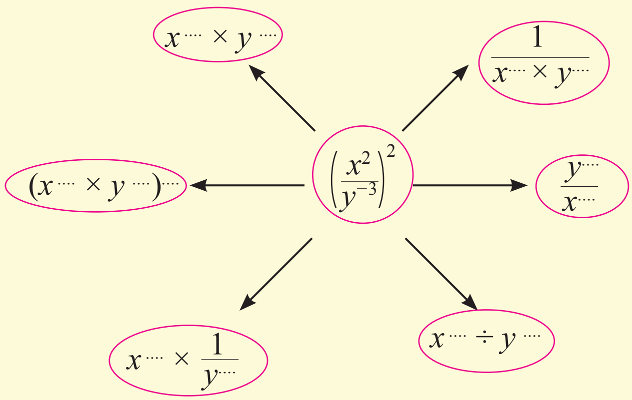
ii. Express the magnitude of $A\hat{D}B$ in terms of the magnitudes of $D\hat{C}B$ and $C\hat{B}D$.

iii. Using the results of (I) and (II) above, show that $B\hat{A}D = 90^{\circ} - \dfrac{B\hat{C}D}{2}$.

3. (a) Simplify the expressions given below and write the answers in terms of positive indices.

(i) $\dfrac{(a^{-3})^2 \times (b^{\frac{1}{2}})^8}{(a^2 \times b^3)^{-2}}$ (ii) $\dfrac{x^3 \times (2y)^2 \times t^3}{(2y^0)^3 \times x^{-2} \times (t^{-\frac{1}{2}})^2}$

(b) Fill in the blanks.



4. i. Draw a straight line segment AB such that $AB = 8$ cm. Mark the point C such that $B\hat{A}C = 60^\circ$ and $AC = 5$ cm.

ii. Draw the locus of points which are 2 cm from AB and located on the same side of AB as C.

iii. Mark the point P which is located on the locus drawn in (ii) above and is equidistant from AC and AB.

iv. Name the two points on AB which are 3 cm from P as Q_1 and Q_2. Measure and write the distance between Q_1 *and* Q_2.

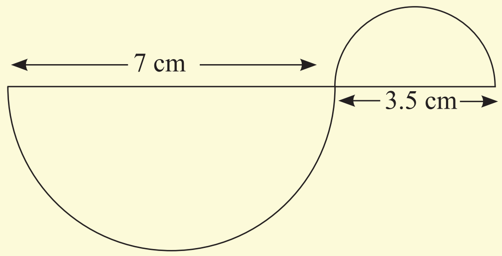
5. Write the order in which you need to press the keys of a calculator to simplify the following expressions and obtain their values using a calculator.

(i) $\dfrac{3.2 \times 5.83}{4.72}$ (ii) $\dfrac{2.5^2 \times 8.3}{4.7}$ (iii) $520 \times 20\%$ (iv) $\sqrt{\dfrac{20 \times 9}{5}}$

6. Express the distance to each planet from Earth in scientific notation.

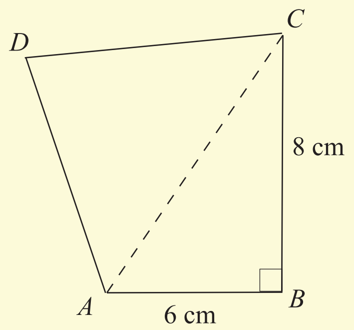
i. The distance from Earth to planet A is 427 000 000 km.
ii. The distance from Earth to planet B is 497 000 000 km.

7. (a) The shape shown below is made using a thin metal wire. (Use $\frac{22}{7}$ for the value π).

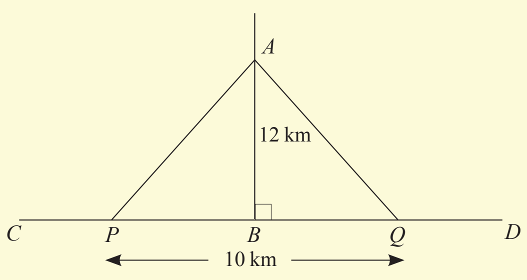


i. Find the total length of metal wire used to make this structure.
ii. If the price of 1m of this metal wire is Rs 120, find the price of the metal wire required for this structure.

(b) If the perimeter of the equilateral triangle ADC is 30 cm, find the perimeter of the figure.



8. As shown in the figure, AB and CD are two straight roads which are perpendicular to each other. AP and AQ too are two straight roads located as shown in the figure. A factory located at A produces two types of items. To store them, the warehouses P and Q located on CD at an equal distance from B are used. The distance between P and Q is 10 km. Giving reasons, explain which roads you would select to transport the items from A to P and Q using the same lorry so that the transport cost is the least.



9. (a) Make a the subject of the $A = \frac{h}{2}(a + b)$ formula. Find the value of a when $A = 70, h = 10, b = 8$.

(b) Solve.

(i) $2m + 3n = 6$
$2m - 7n = -14$

(c) Solve.

i. $2x + 3\{2(x + 2) + 3(x - 4)\} = 10$

ii. $\frac{2(x + 1)}{3} - 5 = \frac{x - 1}{3}$

iii. $3\left[1 + \frac{(2x - 1)}{3}\right] = 2(3 - x)$

10. **i.** If the price of a dozen eggs is Rs 186, find the price of 25 eggs.

ii. The price of 1 litre of petrol is Rs 117. A certain motorbike requires 3 litres of petrol to travel 180 km. What is the minimum amount he needs to spend on petrol to travel 330 km?

iii. A son employed in a foreign country sends 5000 Sterling Pound to his parents. What is the value of this amount in Sri Lankan rupees? (Assume that 1 Sterling Pound = 190 Sri Lankan rupees).

A

Algebraic form	වීජීය ආකාරය	அட்சரகணித வடிவம்
Axioms	ප්‍රත්‍යක්ෂ	வெளிப்படை உண்மைகள்

B

Bisector	සමච්ඡේදකය	இருகூறாக்கி

C

Capacity	ධාරිතාව	கொள்ளளவு
Circle	වෘත්තය	வட்டம்
Circumference	පරිධිය	பரிதி
Construction	නිර්මාණය	அமைப்பு
Constant distance	නියත දුර	மாறாத் தூரம்
Cube	ඝනකය	சதுரமுகி

D

Diameter	විෂ්කම්භය	விட்டம்
Direct Proportion	අනුලෝම සමානුපාතය	நேர்விகிதசம
Division	බෙදීම	வகுதத்ல்

E

Equal distance	සමාන දුර	சம தூரம்

F

Fixed point	අචල ලක්ෂ්‍යය	நிலையான புள்ளி
Foreign currency	විදේශ මුදල්	வெளிநாட்டு நாணயம்
Formula	සූත්‍රය	சூத்திரம்
Function	ශ්‍රිතය	சார்பு

G

Gradient	අනුක්‍රමණය	படித்திறன்
Graph	ප්‍රස්තාරය	வரைபு

H

Hypotenuse	කර්ණය	செம்பக்கம்

I

Index	දර්ශකය	சுட்டிகள்
Intercept	අන්තඃඛණ්ඩය	வெட்டுத்துண்டு
Interior angles	අභ්‍යන්තර කෝණ	அகக்கோணங்கள்
Intersection	ඡේදනය	இடைவெட்டு தல

K

Key	යතුර	சாவி
Key board	යතුරු පුවරුව	சாவிப்பலகை

L

Locus	පථය	ஒழுகக்

M

Multiplication	ගුණ කිරීම	பெருக்கல்

P

Parallel	සමාන්තර	சமாந்தரம்
Parallel lines	සමාන්තර රේඛා	சமாந்தரக்கோடுகள்
Perpendicular	ලම්බය	செஙகு் தது்
Perpendicular bisector	ලම්බ සමච්ඡේදකය	இருசமவெட்டிச் செங்குத்து
Power	බලය	வலு
Proportion	සමානුපාතය	விகிதசமன்
Pythagorus Connection	පයිතගරස් සම්බන්ධය	பைதகரஸ் தொடர்பு

Q

Quantity	රාශිය	கணியம்

R

Radius	අරය	ஆரை
Right angle	සෘජුකෝණය	செங்கோணம்
Right angled triangle	සෘජුකෝණික ත්‍රිකෝණය	செங்கோண முக்கோணி
Rules of indices	දර්ශක නීති	சுட்டி விதிகள்

S

Scientific notation	විද්‍යාත්මක අංකනය	விஞ்ஞான முறைக் குறிப்பீடு
Simple equations	සරල සමීකරණ	எளிய சமன்பாடுகள்
Simultaneous equations	සමගාමී සමීකරණ	ஒருங்கமை சமன்பாடுகள்
Straight line	සරල රේඛාව	நேர்கோடு
Subject	උක්තය	எழுவாய்
Substitution	ආදේශය	பிரதியிடல்

T

Theorem	ප්‍රමේයය	தேற்றம்
Triangle	ත්‍රිකෝණය	முக்கோணம்

U

Unknown	අඥාතය	தெரியாக்கணியம்

V

Verify	සත්‍යාපනය	வாய்ப்புப்பார்த்தல்

Lesson Sequence

Contents	Numbers of Periods
First term	
1. Number Patterns	03
2. Binary Numbers	03
3. Fractions	05
4. Percentages	06
5. Algebraic Expressions	05
6. Factors of the Algebraic Expressions	05
7. Axioms	04
8. Angles related to straight lines and parallel lines	07
9. Liquid Measurements	03
Second term	
10. Direct proportion	06
11. Calculator	02
12. Indices	03
13. Round off and Scientific Notation	05
14. Loci and Constructions	09
15. Equations	06
16. Angles of a triangle	09
17. Formulae	02
18. Circumference of circle	05
19. Pythagoras relation	04
20. Graphs	04
Third term	
21. Inequalities	03
21. Sets	07
23. Area	05
24. Probability	05
25. Angles of polygons	05
26. Algebraic fractions	03
27. Scale drawings	08
28. Data representation and prediction	10