

CLASS IX

MATHEMATICS



COORDINATE GEOMETRY



Nurturing Future

Naman Vidya

Masipirhi, Hazaribagh - 825301 (Jharkhand)

Affiliated with CBSE

From the students' hearts

Dear Friends/ Readers,

We, the students of Naman Vidya, are elated to know that in accordance with NEP 2020, CBSE is introducing several changes in the teaching pedagogy for the betterment of all students. Art integration with curriculum, competency-based education, value-based education, and stress on physical fitness, is a farsighted endeavour to make our personalities wholesome and integrated -- through development of values, individuality and intellect.

We express our gratitude towards Ms. Anita Karwal, Secretary, Department of School Education, Ministry of Human Resource Development, Mr. Manoj Ahuja (Chairman, Central Board of Secondary Education), N.C.E.R.T. and Mr. Sandeep Sethi (Education Director, M.S.M.S.II), whose invaluable inputs and constant motivation have encouraged us to curate the curricular concepts in the form of interesting graphics. We find it easy to understand concepts through these art integrated graphic novels, as these are application-based and are related to our real-life scenarios.

We are thankful to our school team for having faith in us and giving us an opportunity to showcase our creativity, imagination and most importantly to make us feel that we too can contribute in the development of the education system of our country.

We have enjoyed this process and look forward to more.

Enjoy reading!

Your friend

Hitankar Jain
Class IX
Naman Vidya
Hazaribagh

PREFACE

This graphic novel, 'Coordinate Geometry', is created with the aim of thoroughly explaining the Cartesian system in an interesting and fun-filled manner. This novel aims to shed light on certain concepts in coordinate geometry using pictures and a real-life storyline, which makes it interesting to read and easier to comprehend.

Students will find it easy to understand the plot and relate it with their day-to-day life. This will help the students to understand the concepts with clarity and ease.

The story is about a boy Siddharth, class 9 student, his mother, Snehlata and maternal uncle, Mr. Sanjeev. In different situations, the uncle points out real life examples and explains the application of coordinate geometry in them. The real-life situations and the practical application of coordinate geometry therein shown in the novel, will help the readers get clear understanding of coordinate geometry without getting bored.



0962CH03

To access the comic book and additional interactive digital content, download the DIKSHA app from Google Play Store on your Android smartphone or tablet and scan the QR code using DIKSHA app.

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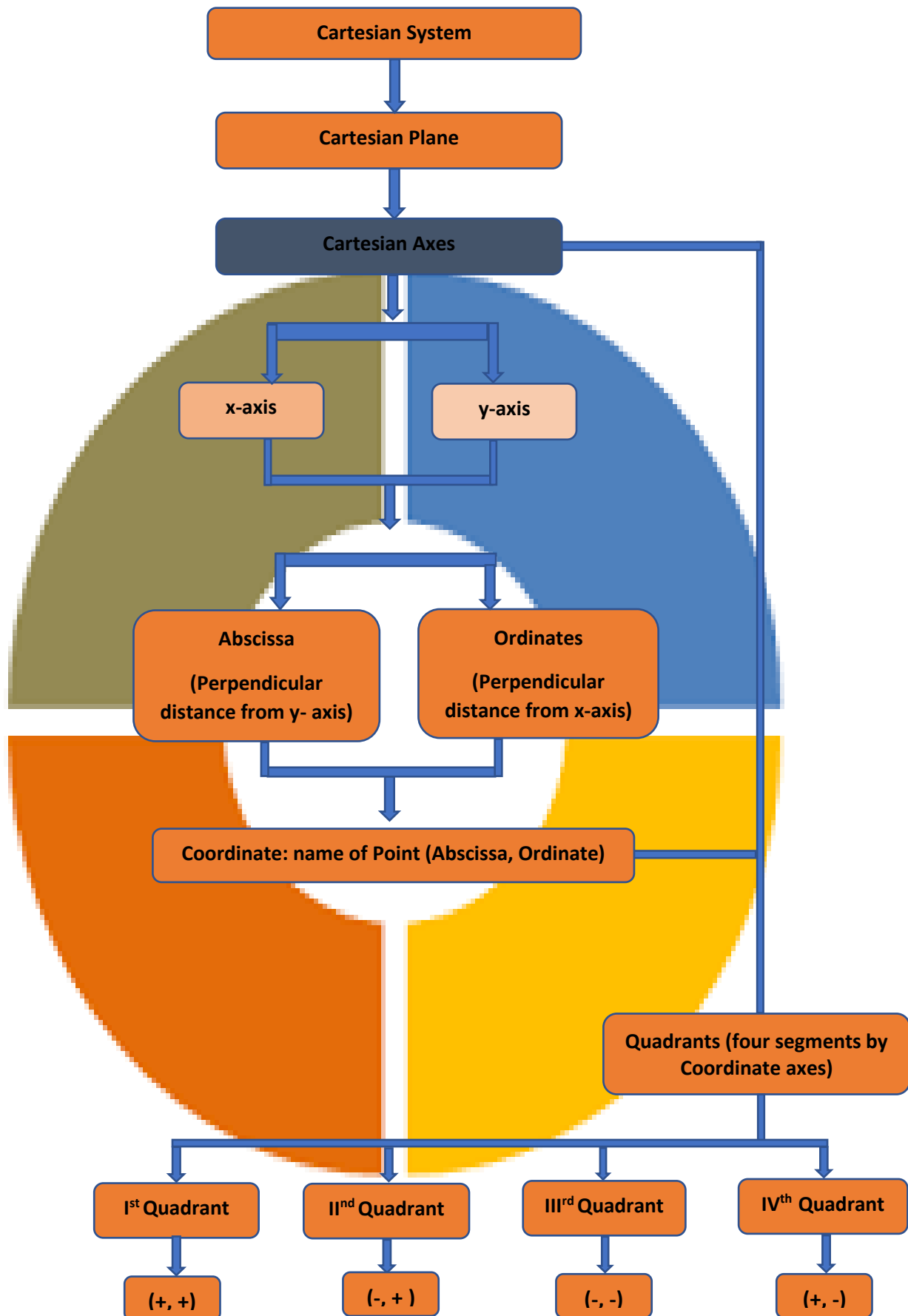
LEARNING OBJECTIVES

- 1) Determine the x & y coordinates of a point from a graph and write the coordinates of the point as an ordered pair.
- 2) Plot a point on the Cartesian plane and determine QUADRANT of the point.
- 3) Observe a given ordered pair and comment on its location.
- 4) Apply concepts of coordinate geometry and simplify given real life problems.

LEARNING OUTCOME

Develops strategies from understanding of coordinate geometry in order to locate points in a Cartesian plane.

STORY BOARD



CHARACTERS



Siddharth: A student of class 9, who is afraid of going to school after missing many days.



Snehlata:
Siddharth's mother



Sanjeev:
Siddharth's Mama
(a cartographer)



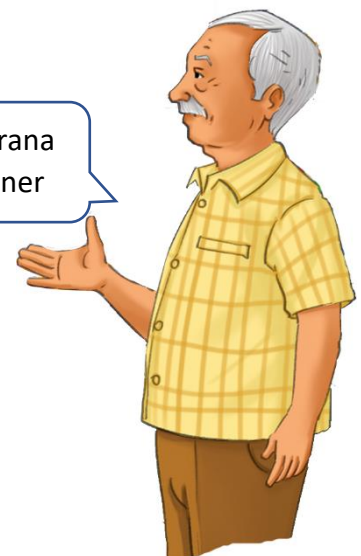
Flight co-passenger
(working on excel sheet)



Shobha: Maths
teacher of Class 9

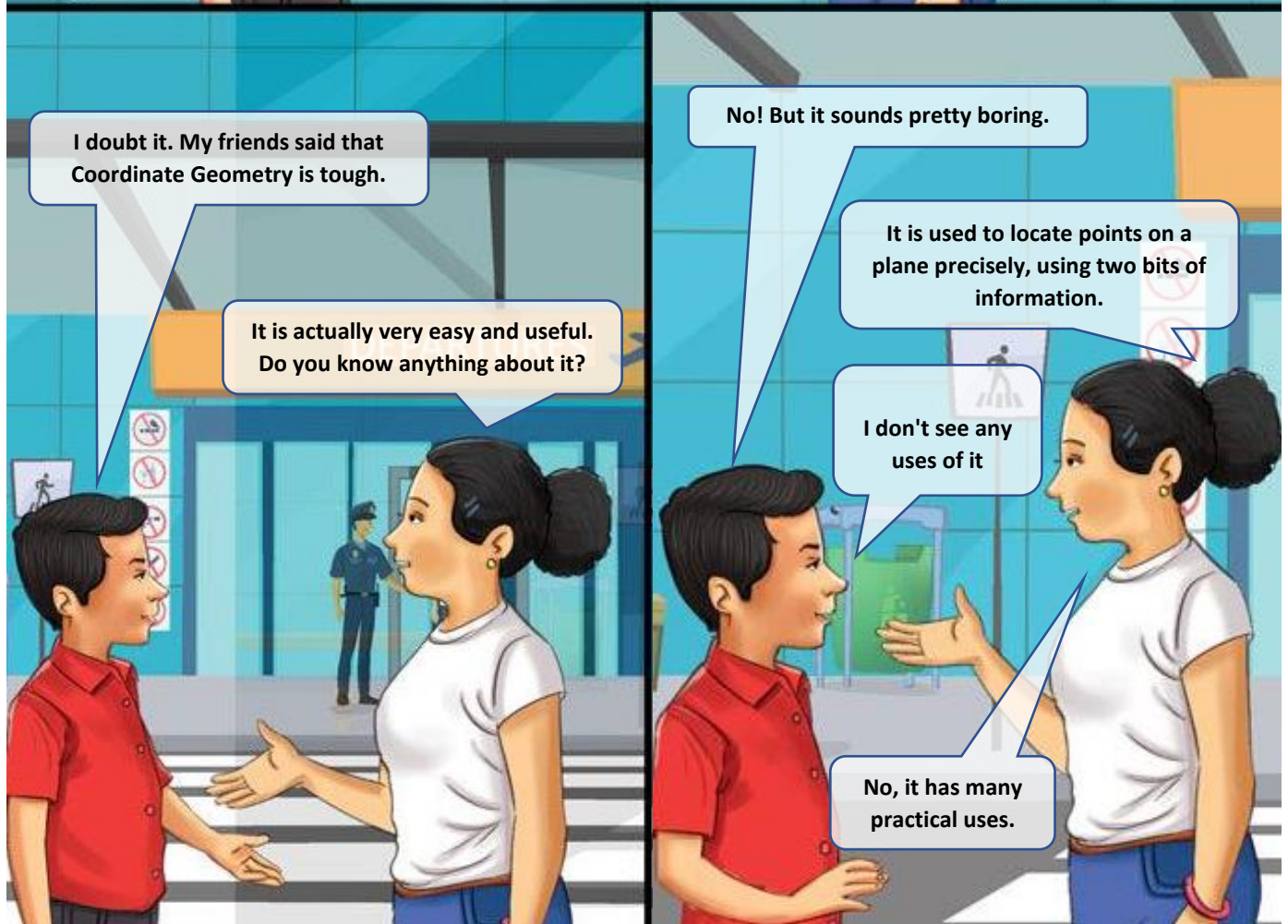


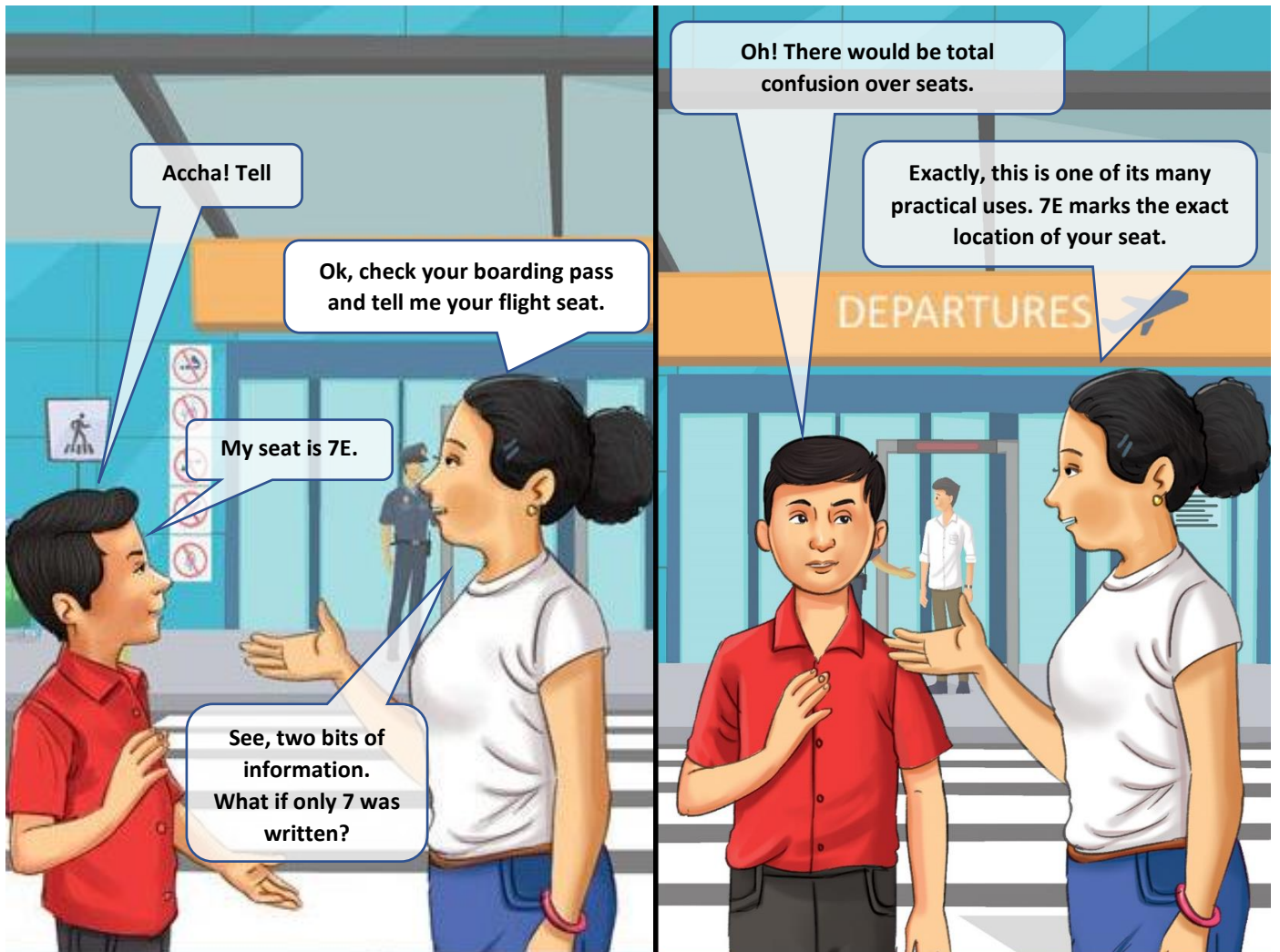
Aditya: Siddharth's
classmate



Ajay : Kirana
shop owner

Siddharth is at California Airport, returning home to Goa via Dubai.
He is with his mother, Snehlata and Mama, Sanjeev.





She takes him to the vending machine and enters the code given at the bottom of the product and pays. The mineral water comes out.

Mom, why did you enter the code to get the Mineral Water?

This gives a command to locate the product to be bought.

Command ... Is it a kind of software?

Yes. This code tells the machine in which row and column the product is located.

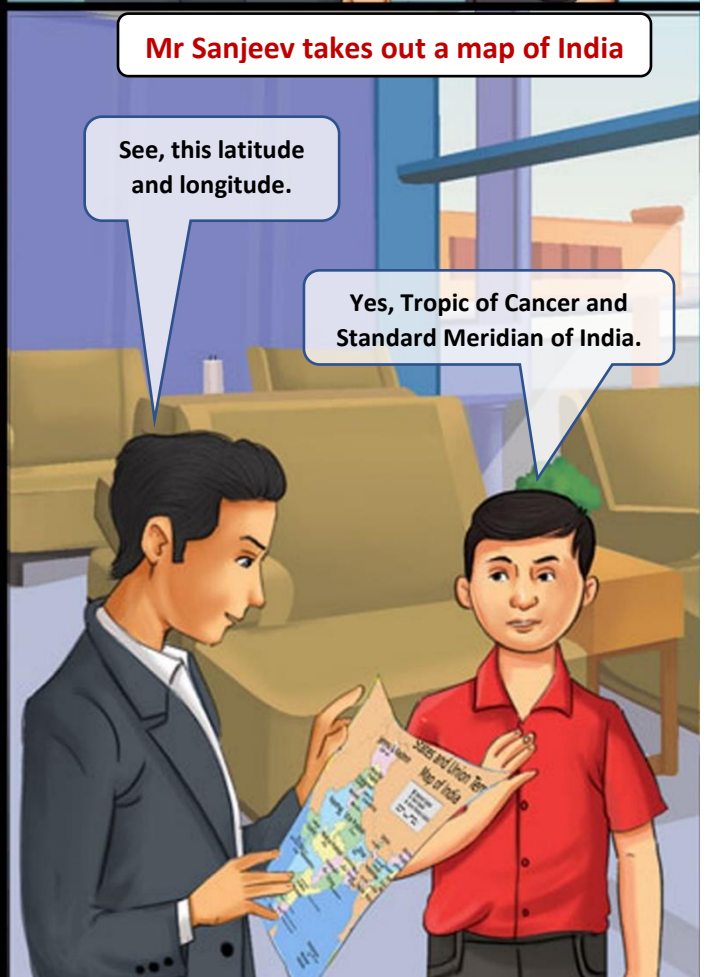
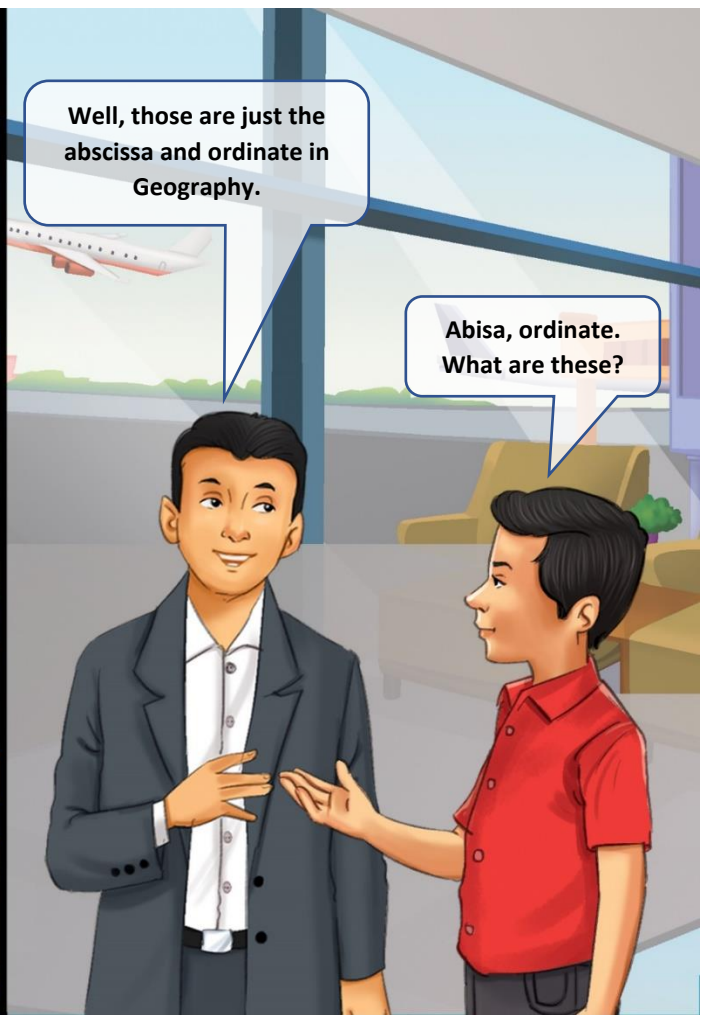
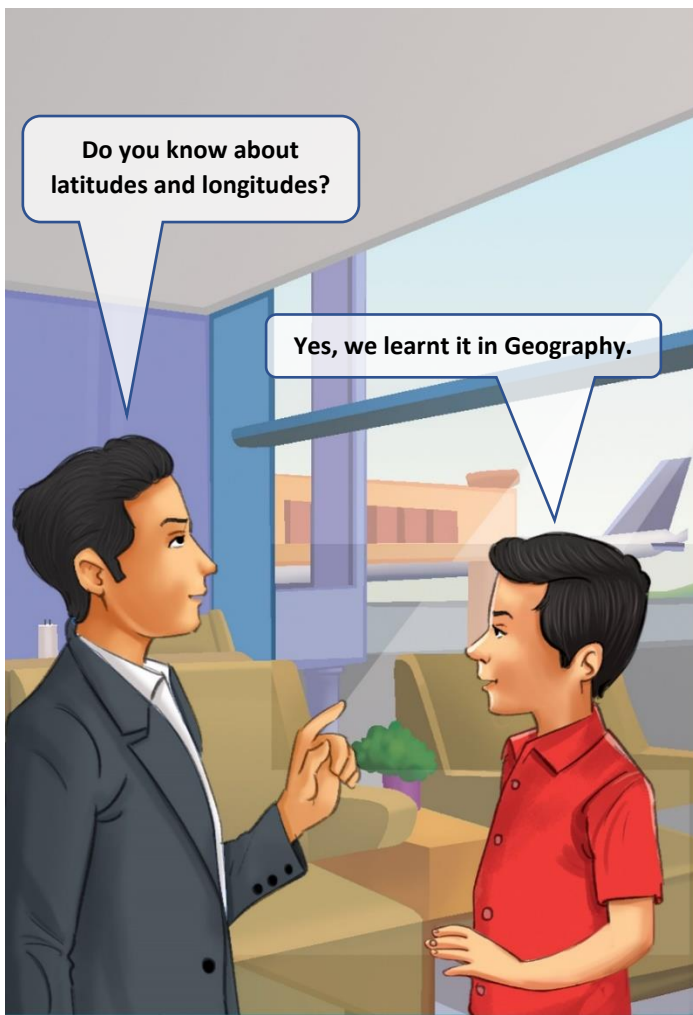
The code you entered is 307. How does it know which row and column?

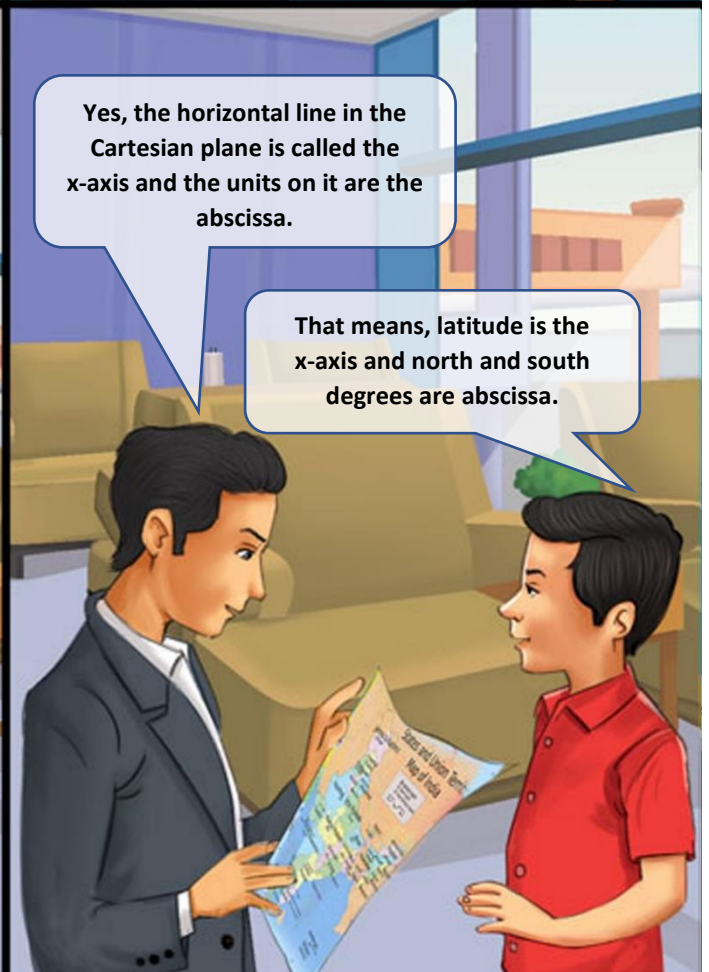
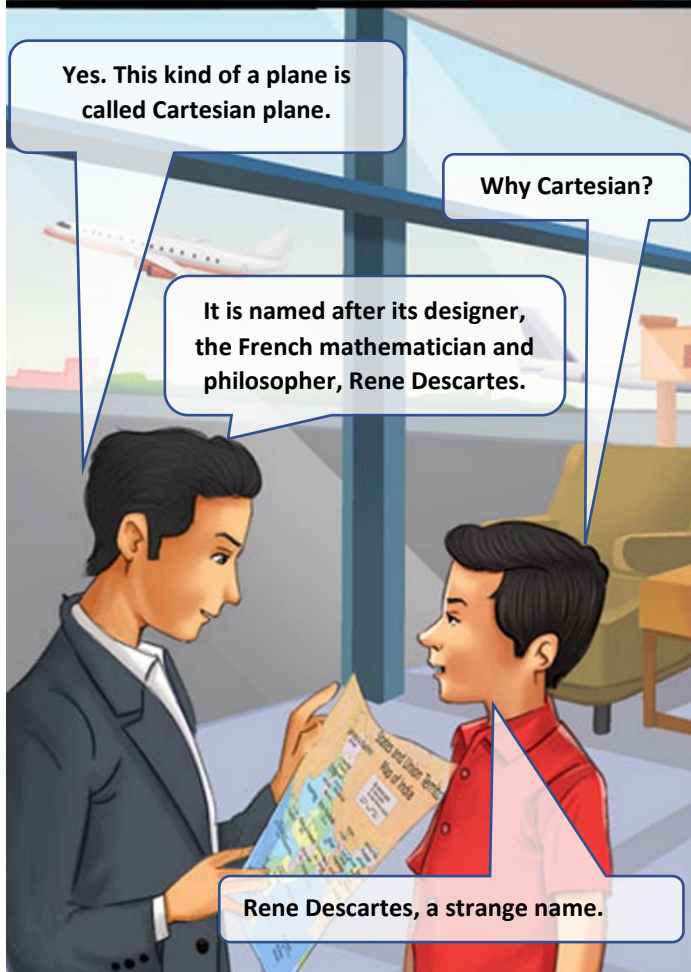
I think 3 is for row and 7 is for column.

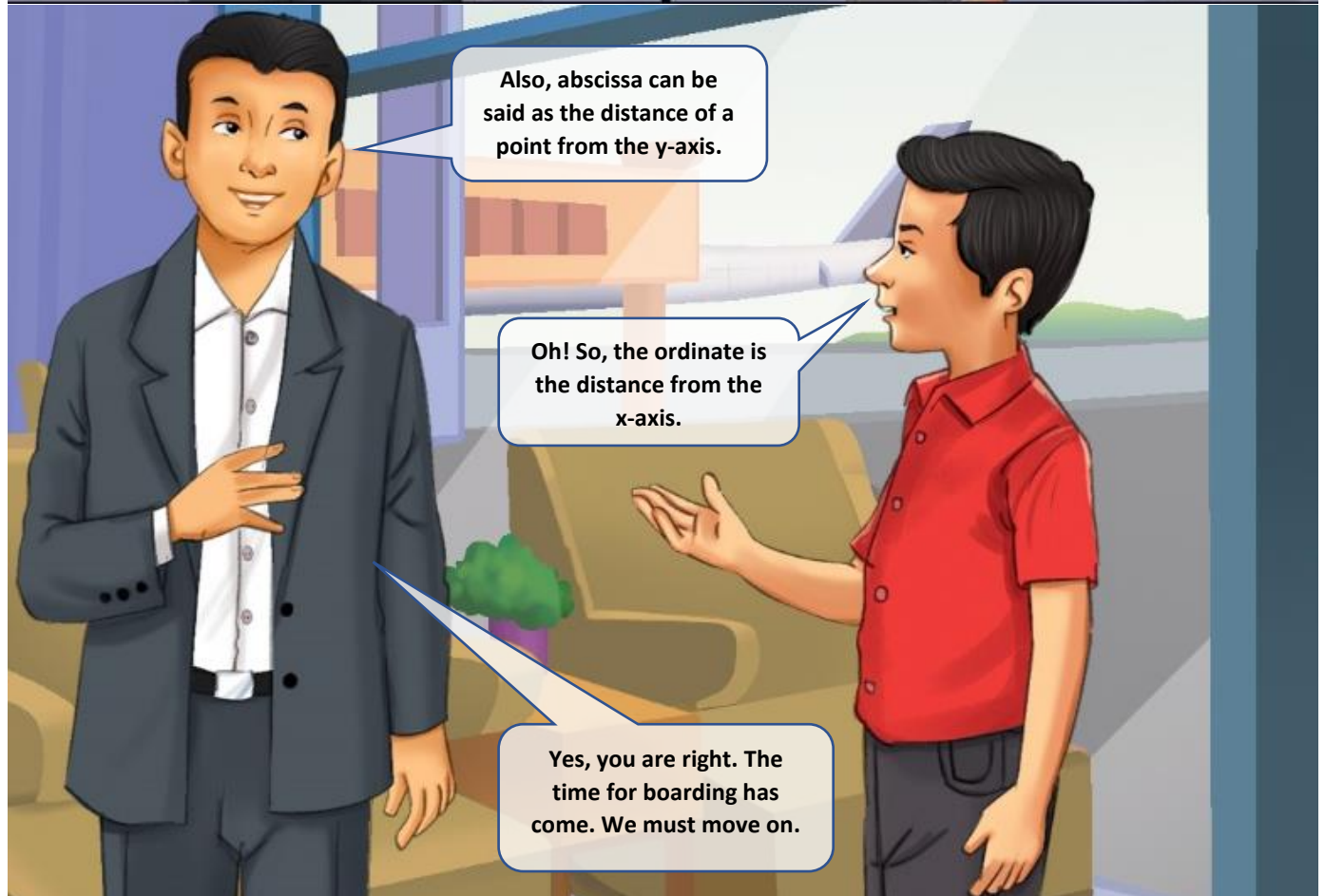


Their discussion continues in the waiting lounge of the airport...









TRY THESE - I

1. MCQ

- a) The measure of angle between the coordinate axes is ____°.
i) 0 ii) 90 iii) 180 iv) 360
- b) The ____ plane has two coordinate axes namely x-axis and y-axis.
i) Descartes ii) Cartesian iii) Descartian iv) Cartopean
- c) The vertical axis of the Cartesian plane is ____-axis.
i) x ii) y iii) z iv) t

2. Fill in the blanks.

- a) A flat, 2 dimensional figure is called a _____.
- b) The horizontal axis is also called _____.
- c) The point where the two coordinate axes meet is called _____.
- d) The study of Coordinate Geometry was developed by _____.
- e) The distance of a point from the y-axis is called _____.
- f) The distance of a point from x-axis is 0. Its ordinate is _____.

Their flight has taken off ...



Mr Sanjeev hands over the map (printed on both sides) to Siddharth...

The abscissa and ordinate divide the plane into four parts...

Good observation. Each part is called Quadrant.

Are there degrees in the Cartesian plane?

No, there are positive and negative units.

So, the abscissa has positive units and ordinate has negative.

No, it's like two number lines.

So, the abscissa and ordinate are number lines at 90 degrees to each other.

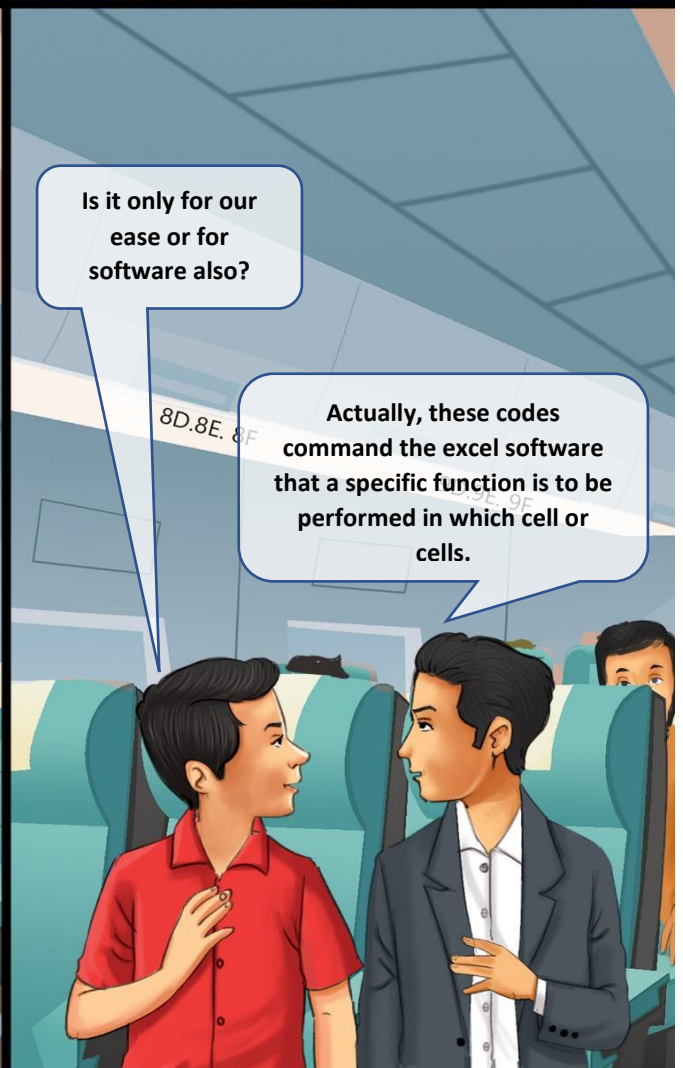
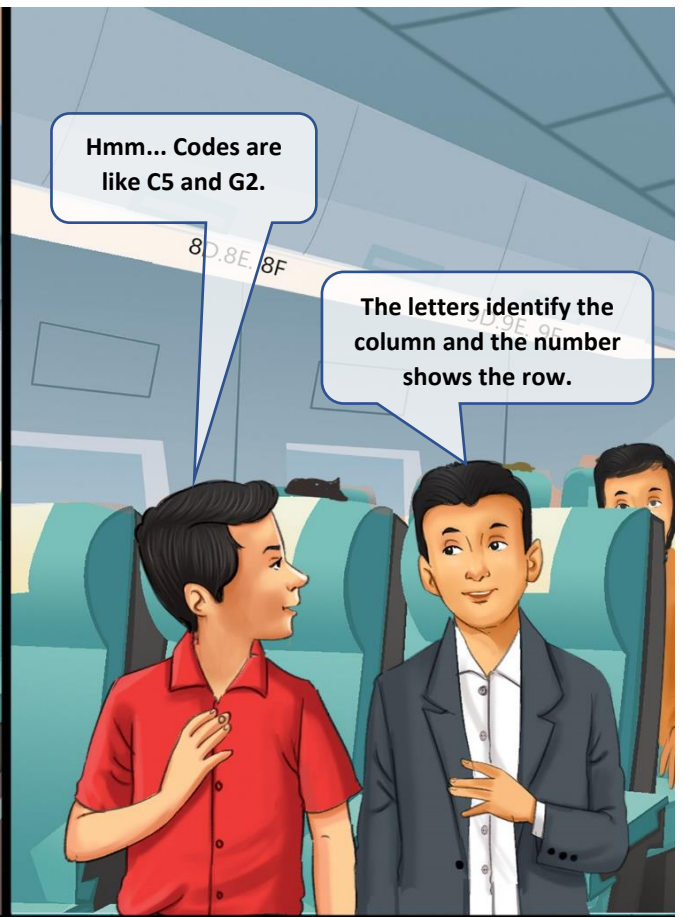
Yes. The origin is at '0' of both the number lines or the axes.

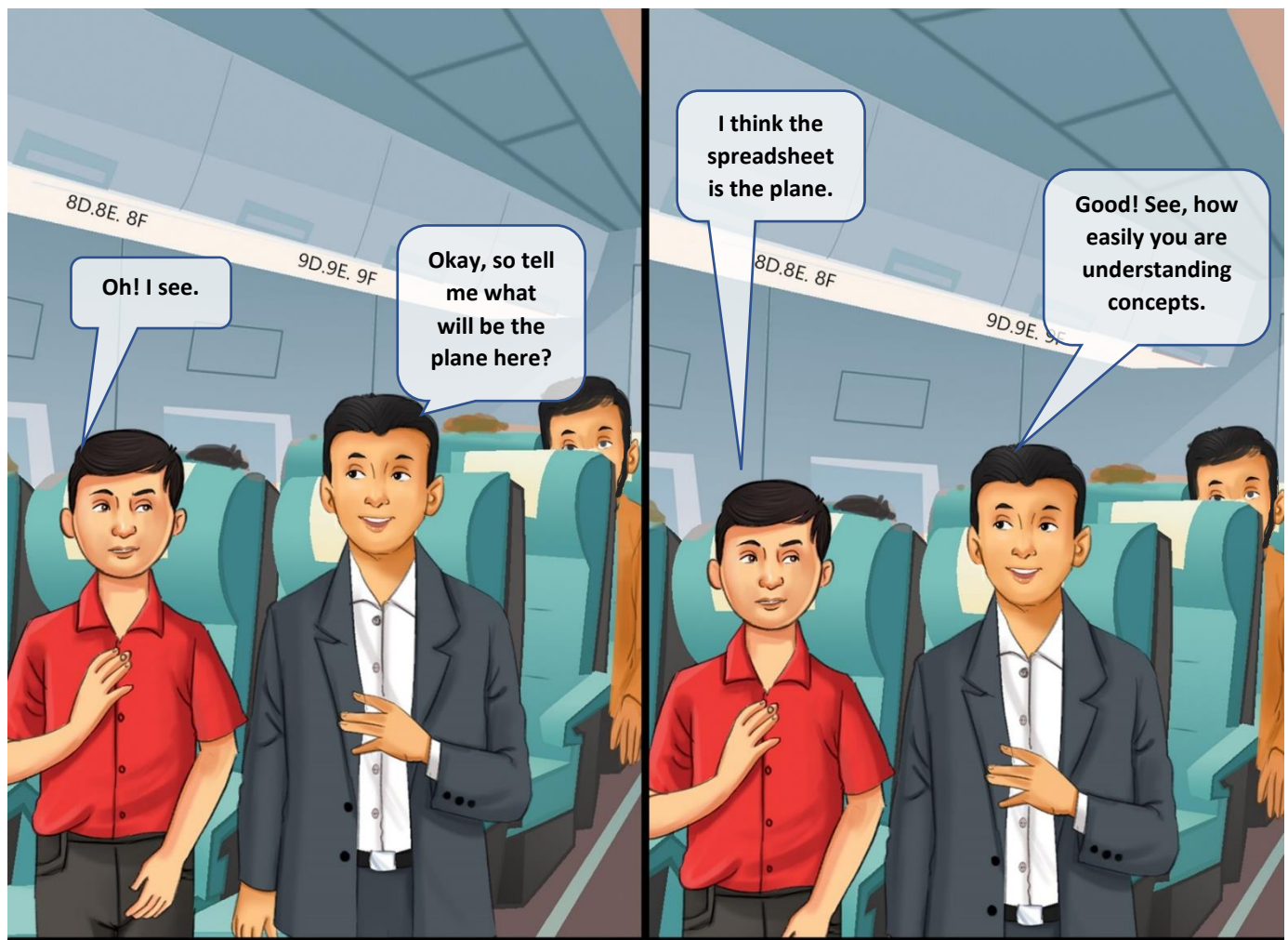




Siddharth sees a person working on his laptop in MS Excel...









TRY THESE - II

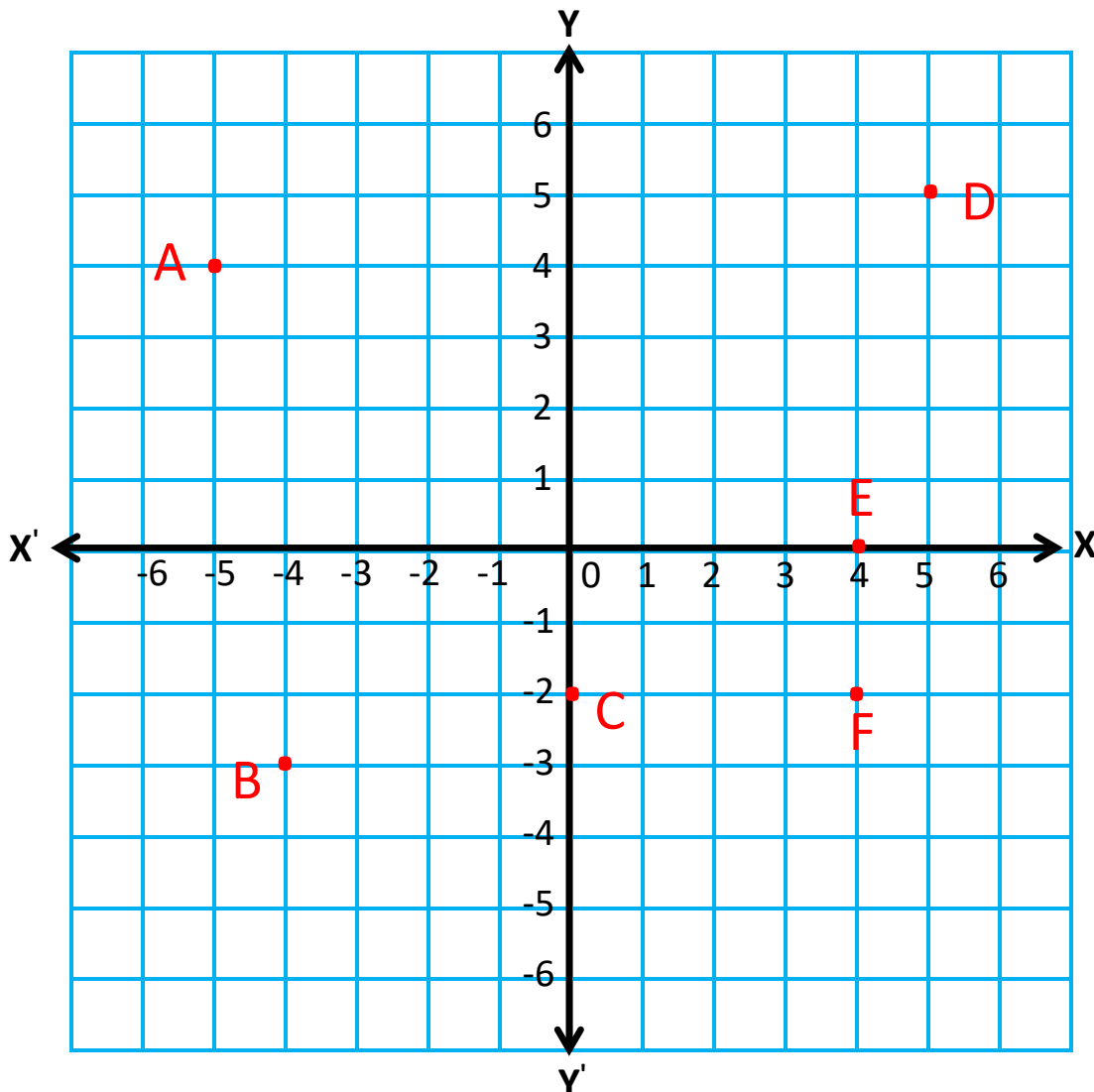
3. MCQ

- a) The abscissa in $(2, -3)$ is _____.
i) 3 ii) -3 iii) 2 iv) -2
- b) The coordinates of the point whose ordinate is 4 and which lies on the y-axis is _____.
i) $(4, 0)$ ii) $(0, 4)$ iii) $(4, 4)$ iv) can't be determined
- c) Abscissa of any point lying on the y-axis will be _____.
i) 0 ii) any integer iii) 1 iv) can't be determined

4. Fill in the blanks.

- a) The perpendicular distance of the point $(-9, 4)$ from x-axis is _____.
- b) The coordinates of the origin are _____.
- c) If the coordinates of two points are R $(7, 5)$ and S $(4, -9)$, then (abscissa of S) is _____ and (ordinate of R) is _____.

5. Write down the coordinates of each of the following points A, B, C, D, E, F.



They have landed in Dubai Airport. After buying the ticket, they enter the movie hall.

See, Siddharth, your ticket has two bits of information for seating.



Seat No. G9

My seat is G9.

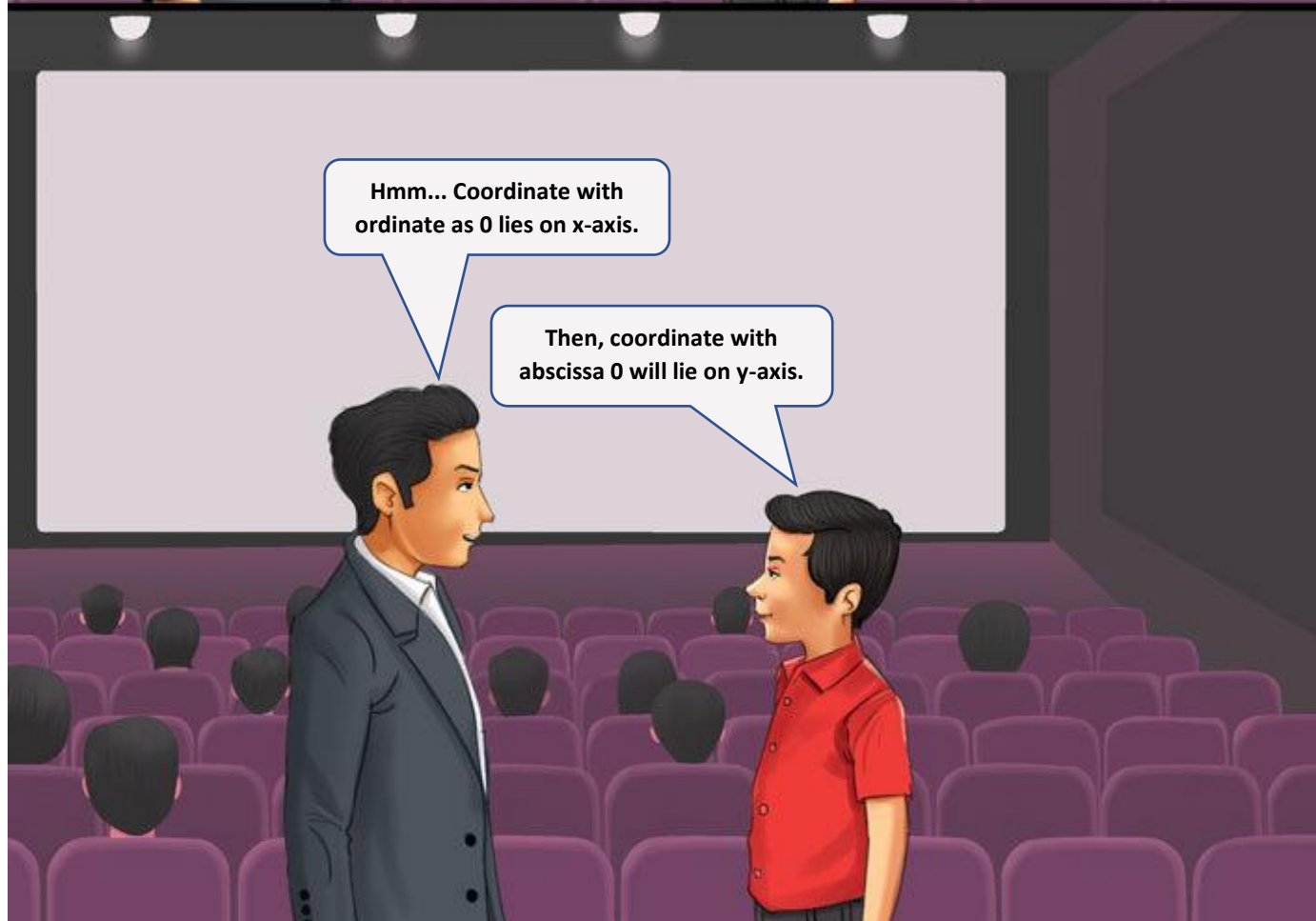
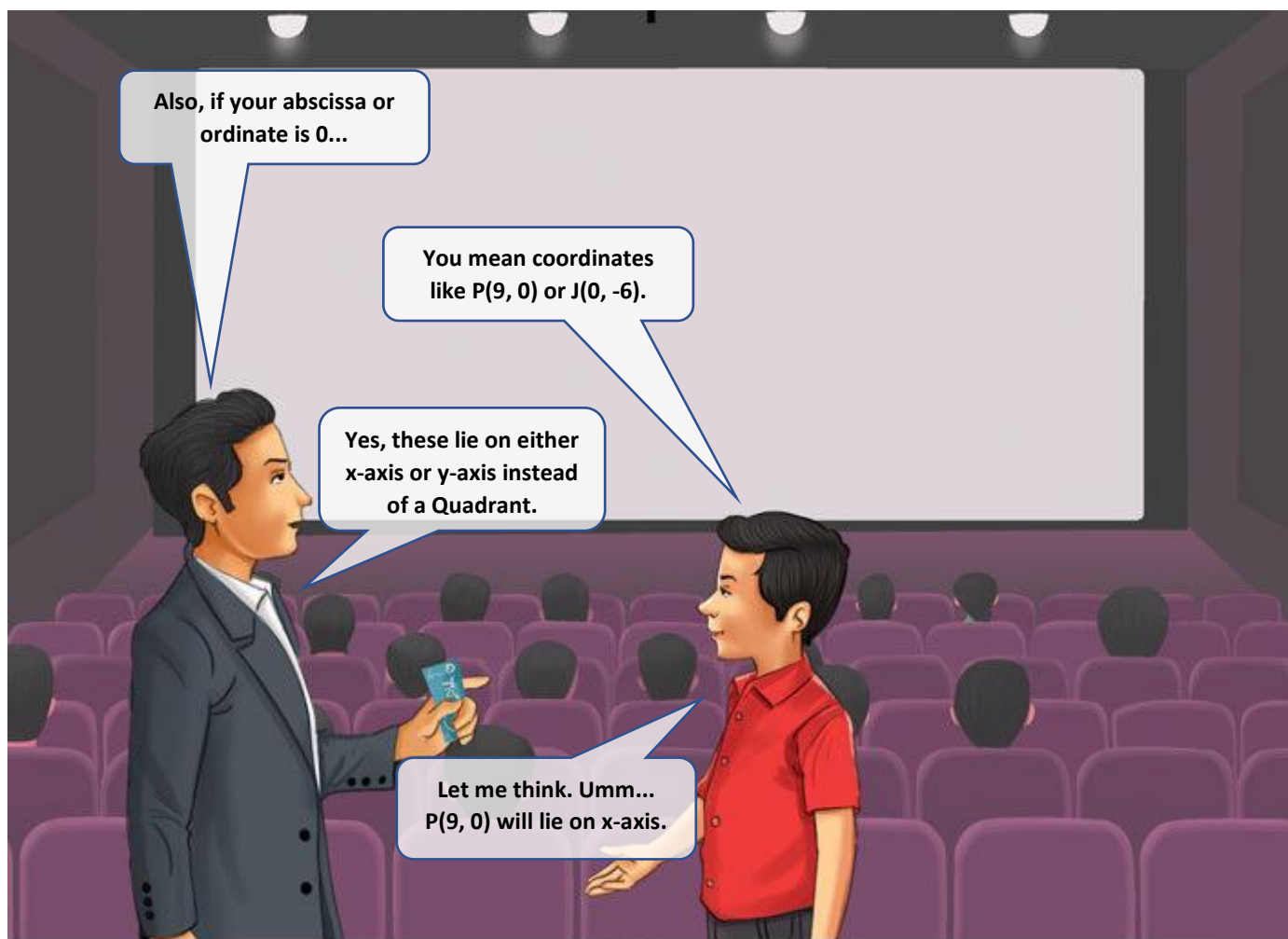
So, tell me the abscissa and ordinate of your seat number.

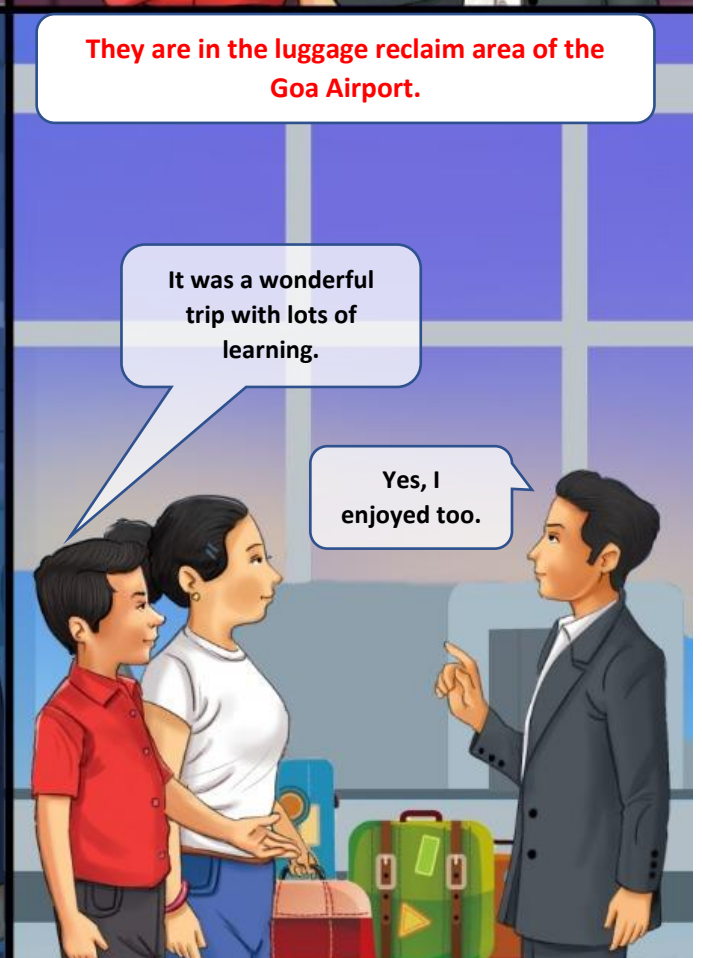
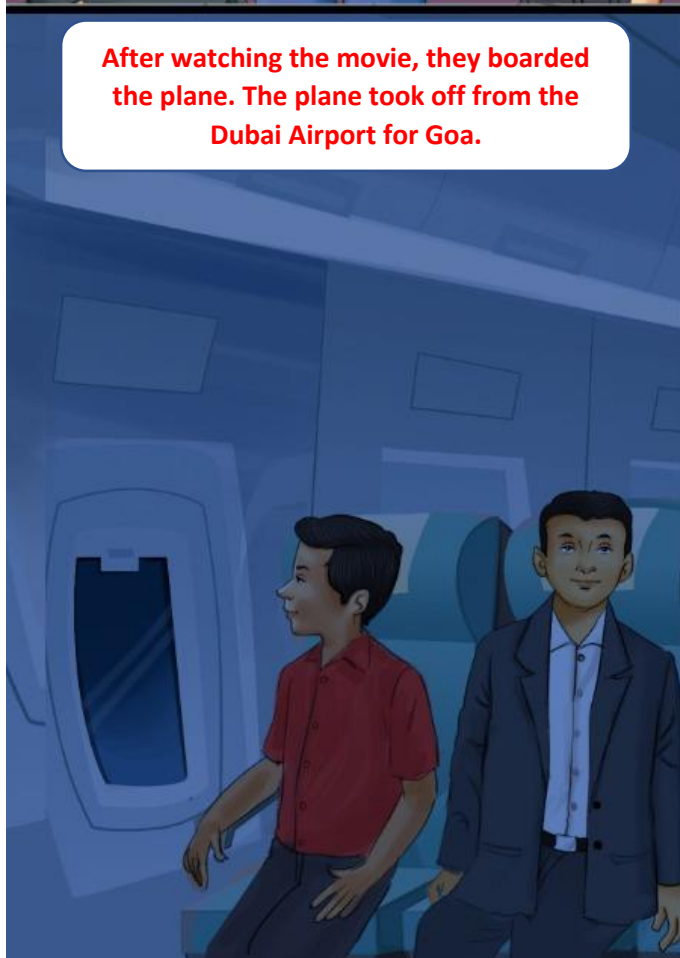
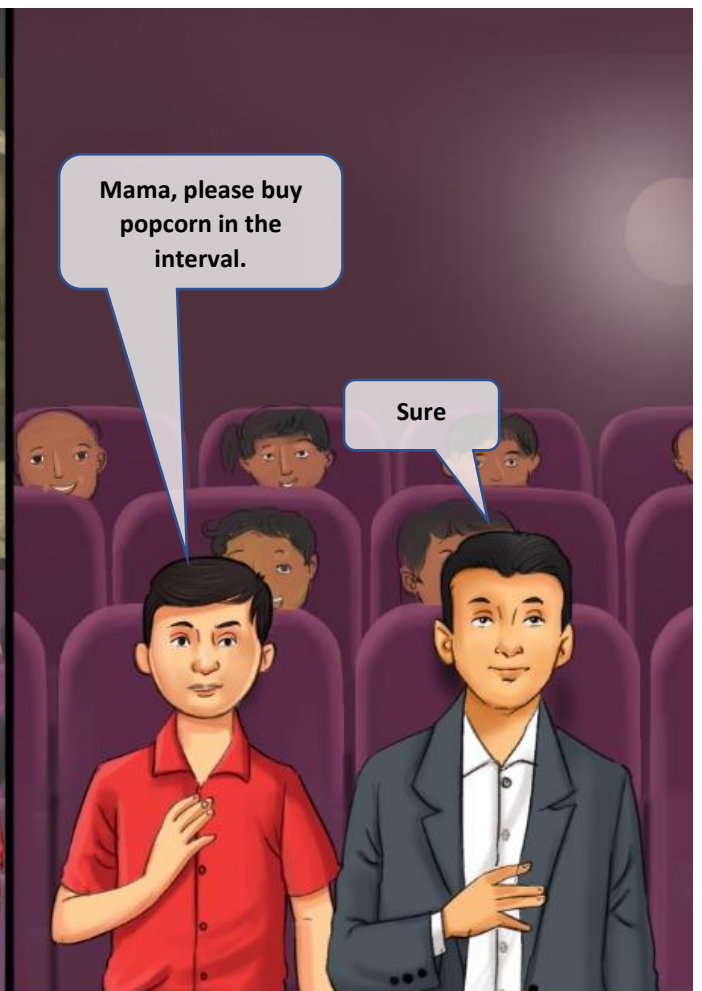
Abscissa is G and ordinate is 9.

Yes. Inside the theatre, first we go to row G and then to column 9.

Yes, this is my seat.







They are on their way to home...

Ma, see those fighter planes.

Wow! See their speed!

Yeah, they are very agile and powerful.

The planes start bombing ...

Why are they bombing?
What's wrong?

Nothing. They are practising. Goa Airport is used for these practises.

Did you know that these planes use coordinate geometry to locate enemy planes and other targets?

What, they do calculations while flying?

No, the onboard computers do it.

Wow! Coordinate Geometry has so many practical uses.

The car stops outside a Kirana store to buy some things...





After paying they continue their journey towards home

Siddharth, you actually used coordinate geometry at the shop!

Yes. "Coordinate geometry is in everyday life."

That's why it is taught in schools.

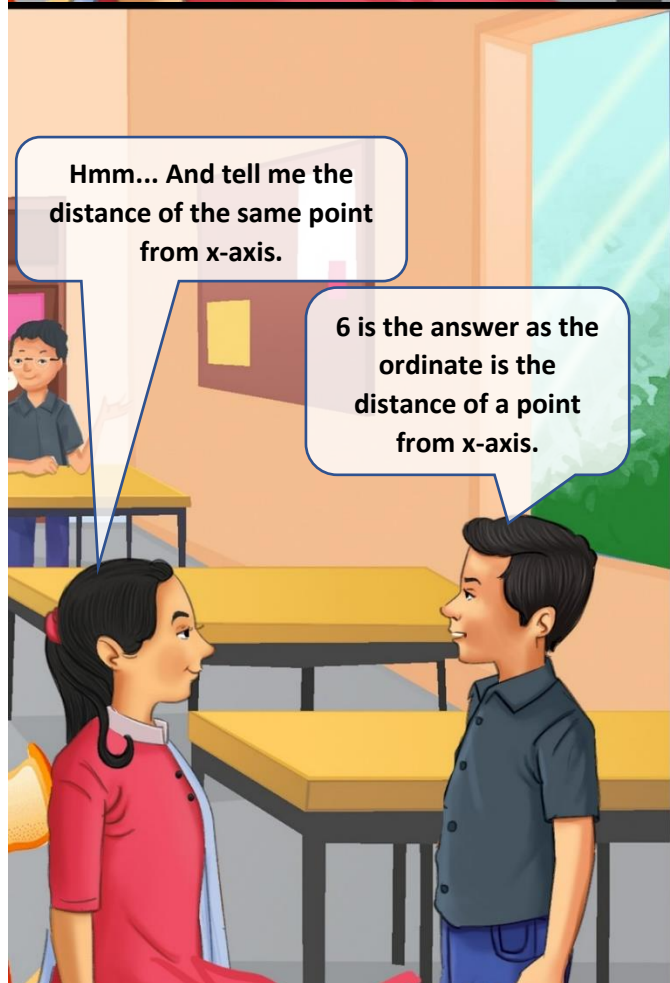
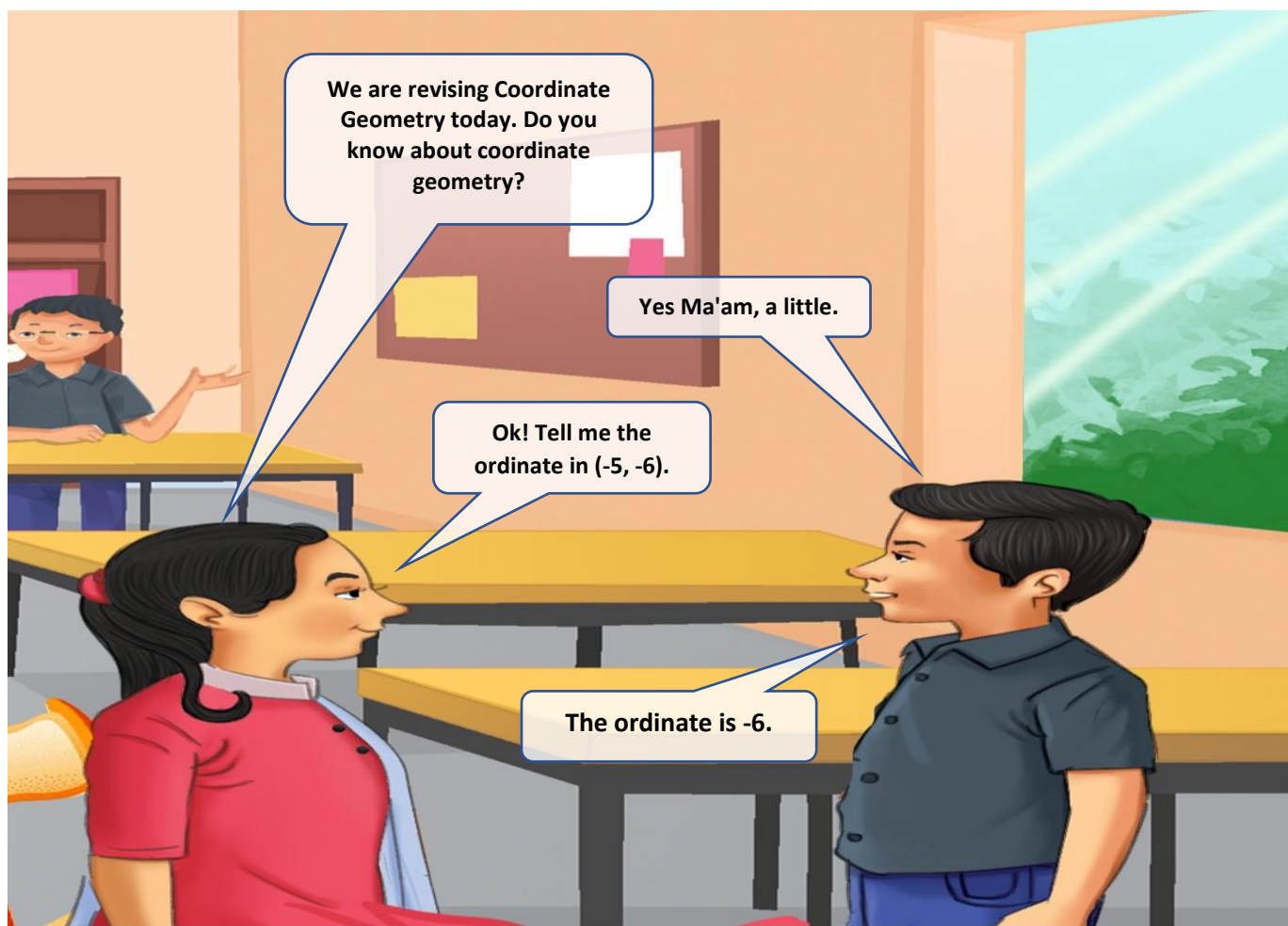


Next day Siddharth goes to school and meets his teacher in the classroom

Ma'am, where do I sit?

Sit in the 3rd row 4th column.





SOLVE THESE - III

6. MCQ

- a) Which of the following coordinates is not a point in Ist Quadrant?
i) (5, 6) ii) (4, 9) iii) (1, 0) iv) (7, 2)
- b) Point (6,0) lies in the _____ side of _____ -axis.
i) negative, x ii) positive, x iii) negative, y iv) positive, y
- c) Abscissa of a point is positive in _____ Quadrants.
i) I and II ii) III and IV iii) I and IV iv) II and III
- d) Which of the following does not lie in any of the quadrants?
i) (2, 4) ii) (0, 2) iii) (7, 3) iv) (-4, -6)

7. Fill in the blanks.

- a) The points (other than the origin) where the abscissa and ordinate are equal will lie on _____ or _____ Quadrant.
- b) The point (-9, 0) will lie on _____.
- c) A point is on the x-axis and its abscissa is 8, the ordinate will be _____.
- d) The point whose both coordinates are negative will lie in _____ Quadrant.
- e) A point in IInd Quadrant, it's abscissa would be _____. (negative/positive/zero)
- f) If the abscissa of a point is 0 and its ordinate 0, it would lie on _____.

8. Fill in the blanks.

- a) The coordinates of a point which lies on x-axis and y-axis both is _____.
- b) The coordinates of a point which lies on x-axis and whose abscissa is -8 is _____.
- c) The coordinates of a point which lies on the y-axis and whose ordinate is 7 is _____.

9. MCQ.

- a) If A(1, 2); B(4, 2); C(1, -3); D(4, -3) are four given points then the figure ABCD is a
i) Trapezium ii) Kite iii) Both of the above iv) None of the above
- b) The points A(0, 6); B(0, 0); C(6, 0) form a triangle. Its area is
i) 16 sq. units ii) 32 sq. units iii) 18 sq. units iv) 28 sq. units
- c) The distance of a point (3, -4) from the origin is _____.
i) 7 units ii) 12 units iii) 10 units iv) None of the above
- d) The point A(3, 4) ; B(4, 4) and C(9, 4) and D(8, 8) form a _____.
i) Triangle ii) Rectangle iii) Kite iv) None of the above

10. Answer these.

a) In which quadrant or axes do the following points lie?

i) $(-3, 2)$

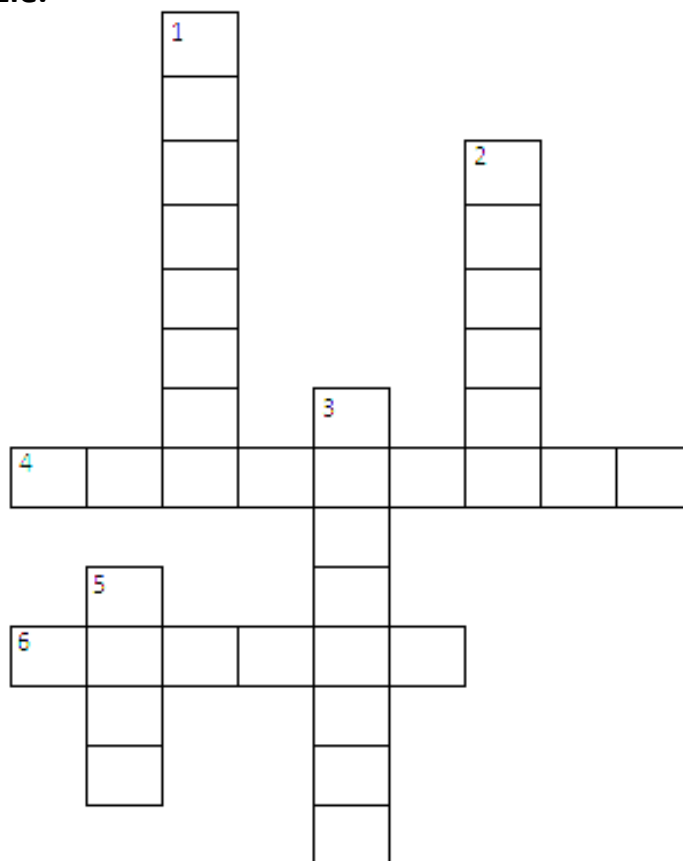
ii) $(9, 0)$

iii) $(-5, -2)$

iv) $(0, -4)$

b) If coordinates of a point are equal and their sum is equal to 8. The point is located in which quadrant or axes?

11. Crossword puzzle.



Down:

1. The distance of any point from y-axis is _____.
2. The intersection point of the axes is called _____.
3. The distance of any point from x-axis is _____.
5. The ordinate of any point on the x-axis is _____.

Across:

4. The four sections formed by the x-axis and y-axis are called _____.
6. If the coordinate of a point is $(-3, 4)$, then it lies in which quadrant?

12. Word Search Puzzle

W	L	G	Y	S	T	A	L	D	E	H	Q	A	X	J
O	T	G	J	P	I	F	A	J	O	D	Y	U	X	L
I	C	S	X	E	M	O	C	M	R	N	Y	T	H	F
B	O	C	N	R	K	T	Y	I	E	N	G	U	Y	L
N	O	K	O	P	Q	D	T	T	A	U	W	T	H	B
X	R	G	T	E	K	C	Z	O	B	Y	A	V	O	R
J	D	B	C	N	A	P	T	S	S	P	H	S	R	J
N	I	E	H	D	D	X	P	I	C	B	T	N	I	E
J	N	N	S	I	K	U	Z	F	I	X	O	T	Z	C
K	A	H	F	C	Q	H	S	D	S	U	R	C	O	E
D	T	L	X	U	A	Y	E	O	S	V	S	H	N	T
B	E	S	E	L	Z	R	S	E	A	I	D	Z	T	W
R	W	V	S	A	R	X	T	T	C	F	Q	X	A	G
N	L	R	O	R	O	E	G	E	H	T	H	J	L	C
G	I	D	J	H	R	I	B	S	S	W	Z	U	P	M

- a) The axes in the Cartesian plane are _____ to each other.
- b) _____ is the distance of any point from the y-axis.
- c) The surname of the developer of the Coordinate System is_____.
- d) The_____ line in a Cartesian plane is called x-axis.
- e) When abscissa and ordinate are written as an ordered pair, it is called _____.

SUMMARY

1. The plane where two perpendicular lines (one horizontal and other vertical) are used to determine the location of a point is called the Cartesian plane. The lines are called Coordinate axes (Axes is the plural of axis).
2. In the Cartesian plane, the horizontal line is called the x-axis and the vertical line is called y-axis.
3. The axes are perpendicular to each other and intersect each other at origin.
4. Abscissa is the distance of a point from the y-axis and ordinate is the distance of a point from the x-axis.
5. (x, y) are coordinates of a point where x is the abscissa and y is the ordinate.
6. The coordinates of the origin are $(0, 0)$.
7. The coordinate axes divide the plane into four parts called Quadrants.
8. Signs of the coordinates of a point in the first quadrant are $(+, +)$, in the second quadrant $(-, +)$, in the third quadrant $(-, -)$ and in the fourth quadrant $(+, -)$.
9. Coordinates of a point on the x-axis are of the form $(x, 0)$ and that of the point on the y-axis are $(0, y)$.

GLOSSARY

1. **Plane:** It is a flat, 2 dimensional figure. It only has length and breadth.
2. **Cartesian Plane / Coordinate Plane:** The plane where two lines perpendicular to each other are used to determine the location of a point.
3. **Origin:** The intersection point of the coordinate axes is called the origin. Its coordinate is (0, 0).
4. **Abscissa:** The distance of a point from the y-axis is called abscissa.
5. **Ordinate:** The distance of a point from the x-axis is called ordinate.
6. **Coordinate:** When abscissa and ordinate are written as an ordered pair, it is called coordinate. $P(a, o)$ is coordinate of a point P where a is the abscissa and o is the ordinate.
7. **Quadrant:** The four divisions of a plane made by the coordinate axes are called quadrants.

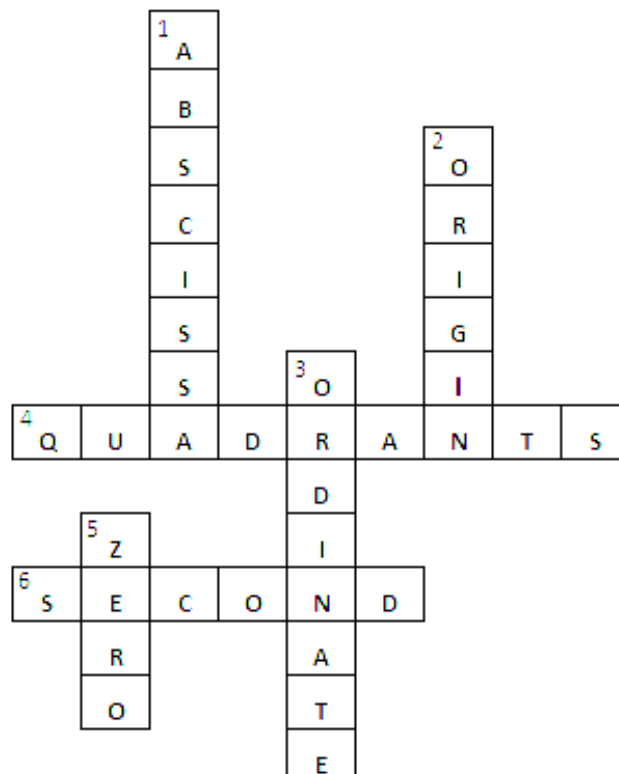
BIBLIOGRAPHY

- ❑ Mathematics Textbook for Class IX, NCERT
- ❑ Mathematics Exemplar Problems for Class IX, NCERT

ANSWER KEY

1. a) ii) 90° b) ii) Cartesian c) ii) y
2. a) Plane b) x-axis c) Origin d) Rene Descartes e) abscissa
f) Zero (0)
3. a) iii) 2 b) ii) (0, 4) c) i) 0
4. a) 4 units b) (0, 0) c) 4, 5
5. a) (-5, 4) b) (-4, -3) c) (0, -2) d) (5, 5) e) (4, 0) f) (4, -2)
6. a) iii) (1, 0) b) ii) positive, x c) iii) I and IV d) ii) (0, 2)
7. a) I or III b) x-axis c) Zero d) IIIrd e) Negative f) origin
8. a) (0, 0) b) (-8, 0) c) (0, 7)
9. a) i) Trapezium b) iii) 18 sq. units c) iv) None of the above d) i) Triangle
10. a) i) IInd ii) x-axis iii) IIIrd iv) y-axis
b) Ist Quadrant

11. Crossword



12. Word search

- a) Perpendicular b) Abscissa c) Descartes
d) Horizontal e) Coordinate

W	L	G	Y	S	T	A	L	D	E	H	Q	A	X	J
O	T	G	J	P	I	F	A	J	O	D	Y	U	X	L
I	C	S	X	E	M	O	C	M	R	N	Y	T	H	F
B	O	C	N	R	K	T	Y	I	E	N	G	U	Y	L
N	O	K	O	P	Q	D	T	T	A	U	W	T	H	B
X	R	G	T	E	K	C	Z	O	B	Y	A	V	O	R
J	D	B	C	N	A	P	T	S	S	P	H	S	R	J
N	I	E	H	D	D	X	P	I	C	B	T	N	I	E
J	N	N	S	I	K	U	Z	F	I	X	O	T	Z	C
K	A	H	F	C	Q	H	S	D	S	U	R	C	O	E
D	T	L	X	U	A	Y	E	O	S	V	S	H	N	T
B	E	S	E	L	Z	R	S	E	A	I	D	Z	T	W
R	W	V	S	A	R	X	T	T	C	F	Q	X	A	G
N	L	R	O	R	O	E	G	E	H	T	H	J	L	C
G	I	D	J	H	R	I	B	S	S	W	Z	U	P	M

DISCLAIMER

This novel is published as a supportive reading material to enable students in getting a better understanding of the topic. All the names, characters, places and events in this novel are purely fictional and imaginary. Any resemblance to a person or incident is merely coincidental.

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Training and Ideation

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(Director Education, M.S.M.S. II., Museum Trust)



The Coordinates of Success

Have you ever imagined that a journey from California to Goa, via Dubai, could turn into a voyage of discoveries and clear insights into the basics of coordinate geometry? No?

Well, this is precisely what happened with Siddharth, a student of class IX from Goa.

At the end of an extended vacation in California with his mother (Snehlata) and maternal uncle (Sanjeev, a professional cartographer), they fly back to Goa via Dubai. Having missed several days of school, Siddharth is apprehensive of coordinate geometry topic.

However, during the journey, Siddharth's uncle and mother point out various situations and explain how coordinate geometry was being used beneficially. So, by the time they reach home, Siddharth is well-versed with the basics of coordinate geometry and hence, he enters school with a new confidence.

Come, discover how he did it! It's a journey that positioned Siddharth in the positive quadrant of his Maths teacher.



Nurturing Future

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