071 The coordinate plane

310

Characters:

T $Tutor

S $Strong

W $Weak

T So, we have come to the topic of today’s lesson, Open your notebooks and write today’s date and the topic: “The coordinate plane”.

[Any reason to choose same numbers 3 and 8? Do you want to show that different order in coordinates are different position ?T: opposite , related to common mistakes]

T Look at the picture. We need to find the seats that John and Margaret have in the theater.John has a ticket for the performance: row 3, seat 8, and Margaret has a ticket for the same performance, for row 8, seat 3.

T Who is ready to point to John’s seat on the picture?

T How did you locate John’s seat?

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T First I found the row 3. And then, in that row I located seat 8. This will be John’s seat.

T What about Margaret’s seat?

T How did you locate that?

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T I found the row 8. And then, in that row I located seat 3. This will be Margaret’s seat.

T Great. This is correct.

T In similar cases, they say sometimes that these are the coordinates of someone’s location in the theater.

T In a similar way, we can mark the location of a point on the plane.

T To do that, on the plane we shall have two perpendicular coordinate lines, х (horizontally) and у (vertically), which intersect at the point of origin.

T These lines are called the coordinate system on the plane, and the point О, the point of origin.

T The plane, upon which the coordinate system is given, is called the coordinate plane.

T On your desks you have a reference card containing the algorithm for constructing the coordinate plane.

[How do you present algorithm and constructing on the board? How about one of students read the algorithms instead teacher do? T: followed each step with teacher later : yes student can read it in this case, teacher should highli]

T To construct the coordinate plane, we need to: Plot two perpendicular lines, х (horizontally) and у (vertically);Mark the point of intersection of this lines as О; this point О is called the point of origin;Mark with arrows the positive direction on the lines: on the х axis – to the right; on the у axis - up;Indicate segment units on the positive directions of both axes.

T Using this algorithm, I shall draw the coordinate system on the board right now. And you will give me hints on the steps I need to take while constructing it. .

T What do we start with?

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T we need to draw two perpendicular lines: х (horizontally) and у (vertically)

[Meaning?Triangular ruler-a kind of teaching tool]

T To construct this, I shall use a square.

T What else do we need to mark on the drawing? Look to see what would be the next step of our algorithm.

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T The point of intersection of the lines х and у, we’ll mark with the letter О.

T What’s next?

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T We need to indicate with arrows the positive directions on the axes.

[Do students have questions why x-axis is drawn first? T: in this case, either one is okay to start but later on it is really important to read x-axis first and students just accepted them as naturally, no doubt]

T I am marking the positive directions on both axes: on the х axis- to the right, on the у axis – up. .

T What else do we need to indicate?

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T On each axis, we need to mark a unit segment.

T .To make it easier to use the coordinate system, you can also mark other whole numbers that would fit in the picture.

T Look at the picture you have in your Math Journal.

T The coordinate line х is called the abscissa axis. Write this in your notebooks.

T The coordinate line y is called the ordinate axis. Write this in your notebooks.

T Points are depicted on the coordinate plane. On this drawing, we see the point А.

T The location of points on the coordinate plane is defined by a pair of numbers which are called the coordinates of a point.

T This point A has the coordinates: 2 and -3.

[How about using comma between numbers, like (2,-3)?T: consult with editor]

T Conventionally, the notation is made as follows: after the name of the point, i.e. the letter, in the round brackets 2 numbers are written separated with either a colon or a semicolon.

[Is it possible for students to think a pair of numbers, -3 and 2, which (-3;2) will be different from (2;-3), reading A(2;-3) as third way could make students confused? How can we emphasize the importance of order of numbers?T: students already accept the as ordered pair, so do not need to add more word: student who has some culture reading content from left to right might have a confusion, but students usually this as a rule and take it with no doubt. This part is introduction to students so it]

T The notation А (2;-3) can be read in a number of ways:- point А with coordinates 2 and -3;- point А with abscissa 2 and ordinate -3;- coordinates of the point А: a pair of numbers, 2 and -3.

T Sometimes they say that the point A has the x coordinate which equals 2, and the y coordinate which equals -3.

T Now I shall use the given coordinate plane for plotting the point M with the coordinates 6 and -5. Write this in your notebooks.

T The first number in the pair, the first coordinate of the point М, which equals 6, the х coordinate is called the abscissa.

T The second number in the pair, the second coordinate of the point M, which equals -5, the у coordinate is called the ordinate.

T To plot the point M on the x axis, mark a point with the coordinate, corresponding to the first number in the coordinates of the point M, i.e. 6.

T This point will be located at the distance of 6 unit segments to the right from the point О. I will mark it as А.

T On the у axis, I shall mark a point with the coordinate, corresponding to the second number in the coordinates of the point M, i.e. -5.

T This point will be located at the distance of 5 unit segments down from the point О, because -5 is a negative number. I will mark is as В.

T Through the first obtained point А on the х axis, using a square, I shall plot a line, perpendicular to the х axis; and through the second point, B on the y axis, I shall plot a line, perpendicular to the y axis.

T Where these lines intersect, there we’ll find the location of the point M with coordinates 6 and -5.

T Look at your Math Journal: there you have the algorithm for plotting a point with given coordinates on the coordinate plane.

T To plot a point with given coordinates on the coordinate plane, you need to: on х axis, find the number corresponding to the first coordinate;through this point plot a line, perpendicular to х axis;on у axis, find the number corresponding to the second coordinate;through this point plot a line, perpendicular to у axis;the point of intersection of the two lines is the point in question.

[Or, maybe, just constructed on a graph paper? This is something to clarify with the teacher.]

[I agree! Possibly graph paper.]

T To plot the point with the given coordinates it is convenient to use the given coordinate plane which has been preliminarily divided into squares.

T Let’s do the following assignment. Use the algorithm we have to plot the point N with coordinates -5 and 6.

T You have a given coordinate plane.

T To plot a point N, we need to find the number on x axis which corresponds to which coordinate?

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T To the first one

T What number is it?

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T -5

T To mark this point, we need to separate off 5 unit segments on the x axis to the left, because -5 is a negative number.And let us not mark this point with any letter.

T Now, we have to plot a line through this point, perpendicular to the х axis.See me do it.

[This explanation and several other ones mentioning the grid/squares probably refer to constructing on a graph paper, but this needs to be clarified.]

T Please note that the plotted line coincides with the vertical line along the grid (the top of squares).

T It means that we can easily plot a desired perpendicular line simply plotting it along the grid.

T What number shall we look for on the у axis?

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T 6.

T Correct, because it corresponds to the second coordinate.

T To plot this point, you need to move along the у axis, 6 unit segments up, because 6 is a positive number.

T Let us not mark this point with a letter, since this is not the ultimate plotting, but an intermediary step.

T Through this point, we shall plot a line perpendicular to the у axis.

T You may use a square, of course.

T See how the plotted line coincides with the horizontal line along the grid.

T And it means that you can plot a perpendicular line simply along the grid.

T Where will we find the point N?

[submit clicked, medium]

correct []

[level 1]

incorrect [anything else]

[go to “no response”]

no response

T At the intersection of these lines.

T Let us mark a point on the intersection of these lines and mark it as N.

T So, if we need to mark a positive number on the х axis, it will be located to the right of O, and the negative one, to the left of O; on the у axis, positive numbers will be above O, and negative ones, below O.