IIT Madras

ONLINE DEGREE

Mathematics for Data Science 1
Indian Institute of Technology, Madras
Week 02 - Tutorial 05

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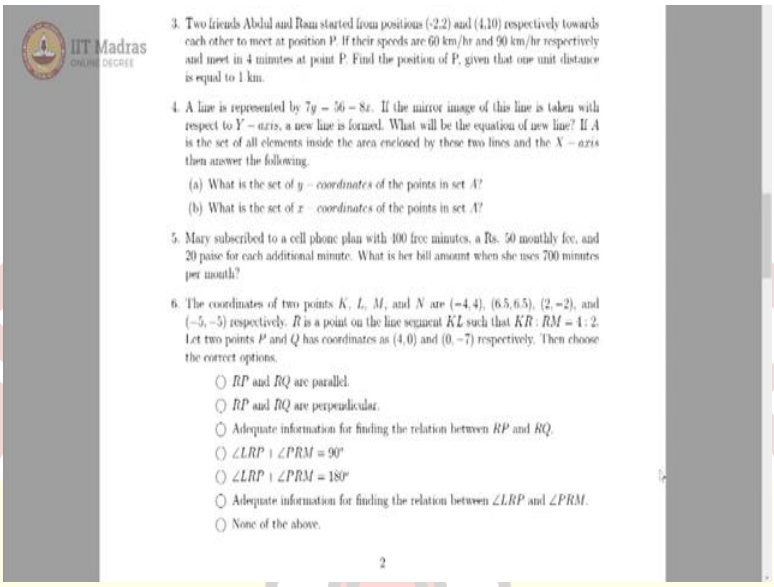

3. Two friends Abdul and Ram started from positions (-2,2) and (4,10) respectively towards each other to meet at position P. If their speeds are 60 km/hr and 90 km/hr respectively and meet in 4 minutes at point P. Find the position of P, given that one unit distance is equal to 1 km.

4. A line is represented by $7y - 56 = 8x$. If the mirror image of this line is taken with respect to $Y-axis$, a new line is formed. What will be the equation of new line? If A is the set of all elements inside the area enclosed by these two lines and the $X-axis$ then answer the following.
   (a) What is the set of $y-coordinates$ of the points in set A?
   (b) What is the set of $x-coordinates$ of the points in set A?

5. Mary subscribed to a cell phone plan with 400 free minutes, a Rs. 50 monthly fee, and 20 paise for each additional minute. What is her bill amount when she uses 700 minutes per month?

6. The coordinates of two points K, L, M, and N are $(-4,4)$, $(6.5,6.5)$, $(2,-2)$, and $(-5,-5)$ respectively. R is a point on the line segment KL such that $KR:RM = 4:2$. Let two points P and Q has coordinates as $(4,0)$ and $(0,-7)$ respectively. Then choose the correct options.
   - ○ RP and RQ are parallel.
   - ○ RP and RQ are perpendicular.
   - ○ Adequate information for finding the relation between RP and RQ.
   - ○ $\angle LRP + \angle PRM = 90°$
   - ○ $\angle LRP + \angle PRM = 180°$
   - ○ Adequate information for finding the relation between $\angle LRP$ and $\angle PRM$.
   - ○ None of the above.

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Now 5th problem, Mary has subscribed to a cell phone plan with 400 free minutes, a 50 rupee monthly fee and 20 paisa for every additional minute over 400. And the question is, what is her bill amount if she uses 700 minutes?

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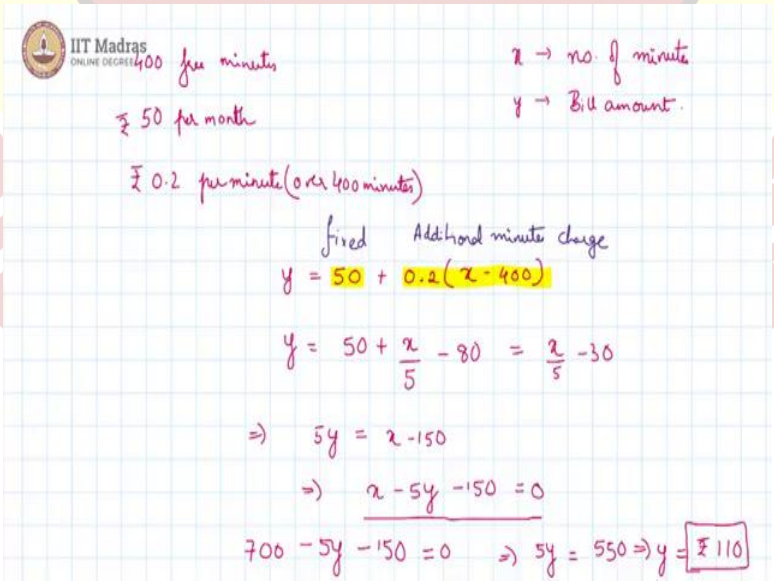

So let us put down our variables here. So there is 400 free minutes and there is a 50 rupee charge per month and we have 20 paisa that is 0.2 rupees per minute over 400 minutes. Now, our independent variable is the number of minutes, the bill is dependent on the number of

minutes, so our x variable is number of minutes and the y variable is bill amount. And what we know is for every month the bill amount will always have a 50 rupee charge, and on top of that you are being charged 0.2 for every minute over 400, which means if x is the total number of minutes, then (x – 400) (0.2) will be the charge for the additional minutes.

This is the fixed charge whereas this is the additional minutes charge, so we get a linear equation which is y = 50 + x/5(because 0.2 is 1/5) - 80 which is then (x/5) - 30 . If we simplify it further, we get 5y = x - 150 => x - 5y - 150 = 0. This is the equation that relates our bill amount to the number of minutes. So, Mary is using 700 minutes per month and we need the bill amount for that. So, if we substitute x = 700, we get, 700 - 5y - 150 = 0, this gives us 5y = 550 which implies y = Rs. 110. This is the bill amount for Mary.