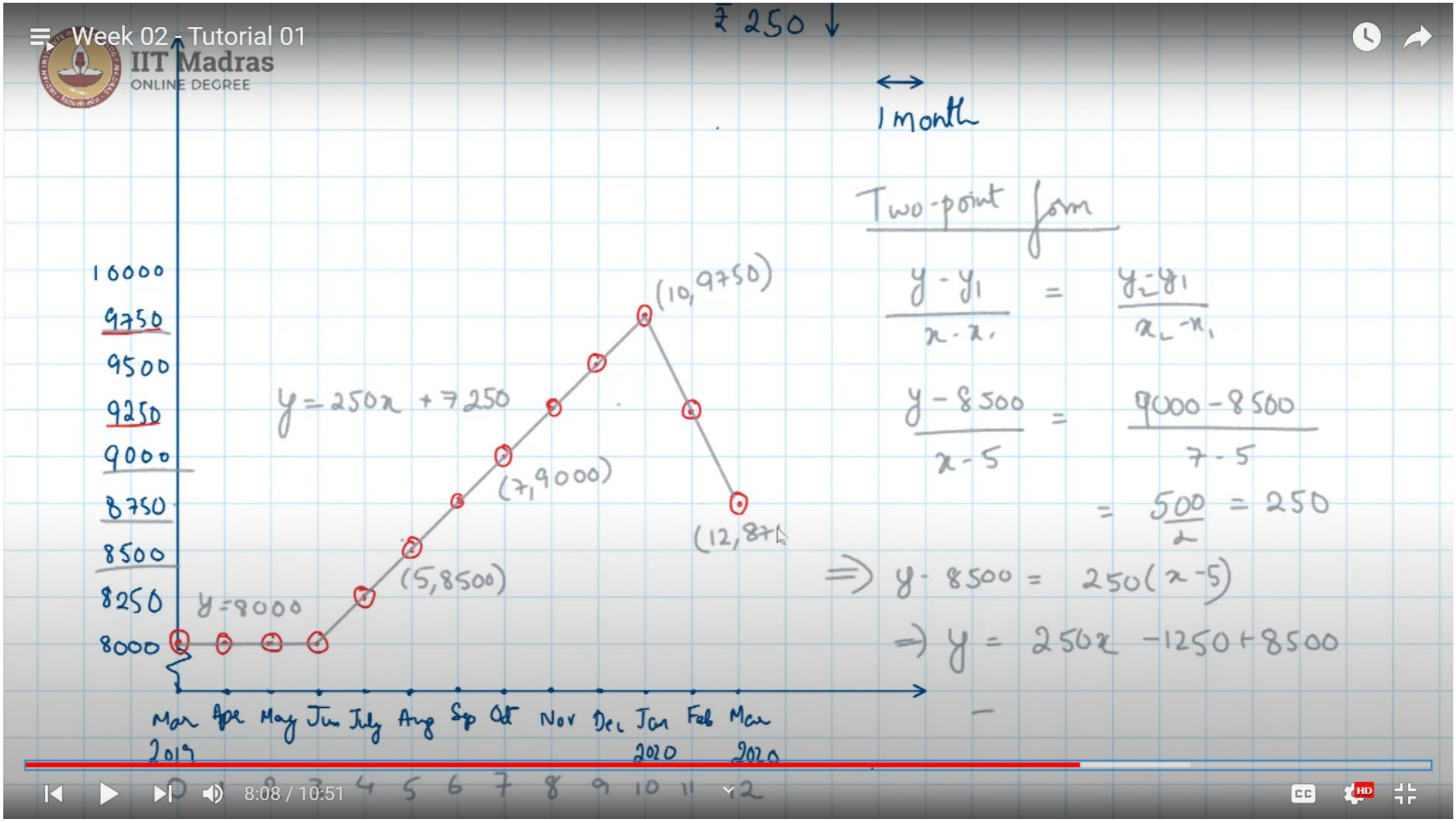
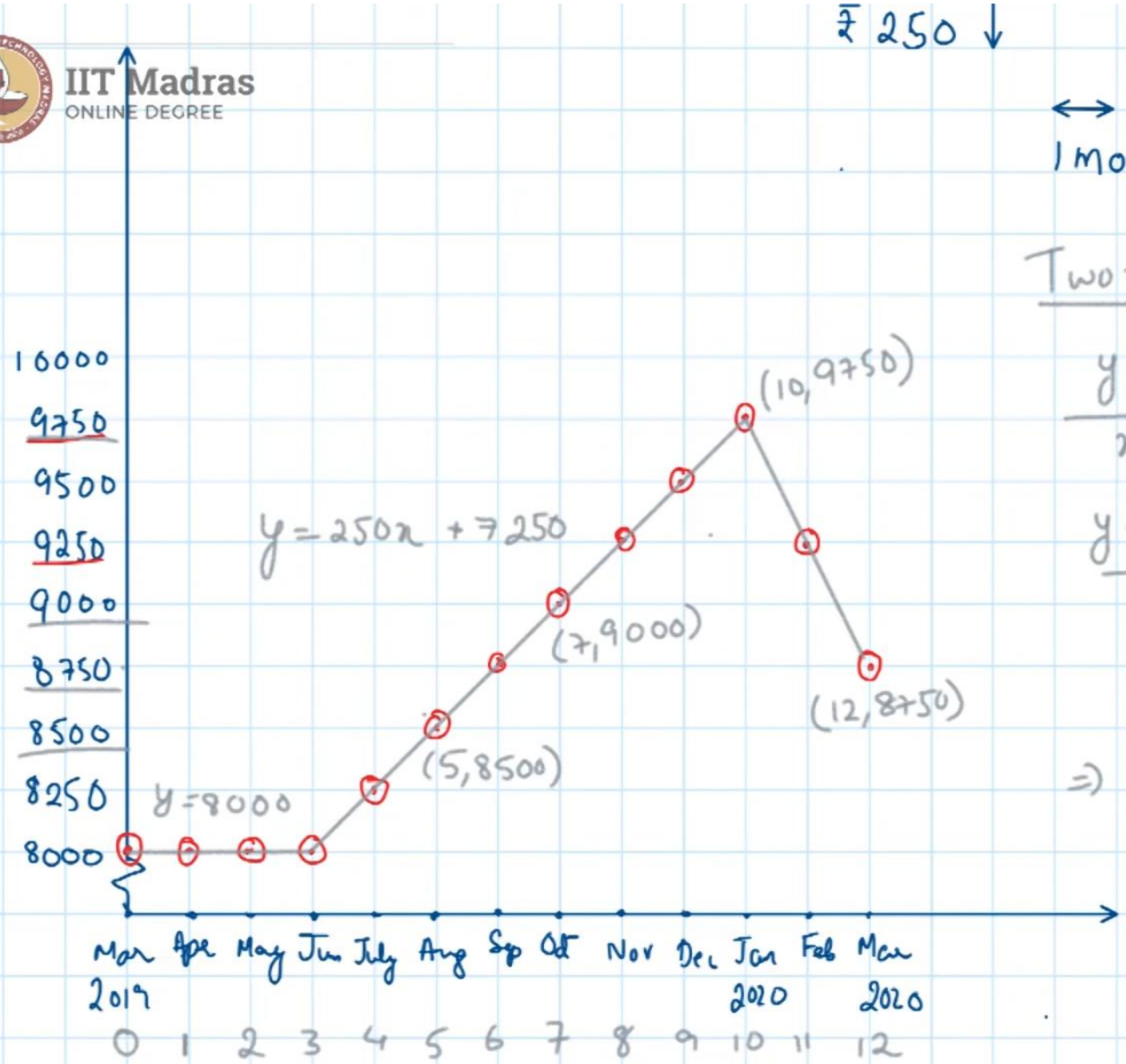
- Area of triangle
- Slope of a line
- Parallel and perpendicular lines
- Representation of Line

1. A company launches a mobile A and sets the selling price at Rs. 8000 for the month of March 2019. The mobile was sold at that price till Jun 2019. Due to increasing demand, the company decided to increase the price by Rs. 250 each month. A new mobile B with selling price of Rs. 6000 came in market in January 2020. Because of this, the selling price of A dropped down at a rate of Rs. 500 per month from January till it became constant in March 2020.
   (a) Draw a clear graph of mobile A's price (vertical axis) versus month (horizontal axis).
   (b) What was the price of mobile A in December?
   (c) Calculate the slope of mobile A's price from January to March 2020.
   (d) Calculate the price of mobile A in March 2020.
2. A farmer has a triangular field ABC as shown in figure below. If watering costs Rs. 10 per unit square, how much would he have to pay for whole field? If the fencing wire around the field costs Rs.5 per unit, how much would he have to pay for three rounds of fencing around his field?


Week 02 - Tutorial 01
IIT Madras
ONLINE DEGREE
₹ 250
1 month
Two-point form
$\frac{y-y_1}{x-x_1} = \frac{y_2-y_1}{x_2-x_1}$
$\frac{y-8500}{x-5} = \frac{9000-8500}{7-5}$
$= \frac{500}{2} = 250$
$\Rightarrow y - 8500 = 250(x-5)$
$\Rightarrow y = 250x - 1250 + 8500$
$y = 250x + 7250$
$y = 8000$
(5, 8500)
(7, 9000)
(10, 9750)
(12, 87
16000
9750
9500
9250
9000
8750
8500
8250
8000
Mar 2019
Apr
May
Jun
July
Aug
Sep
Oct
Nov
Dec
Jan 2020
Feb
Mar 2020
0 1 2 3 4 5 6 7 8 9 10 11 12
8:08 / 10:51



Two-point form

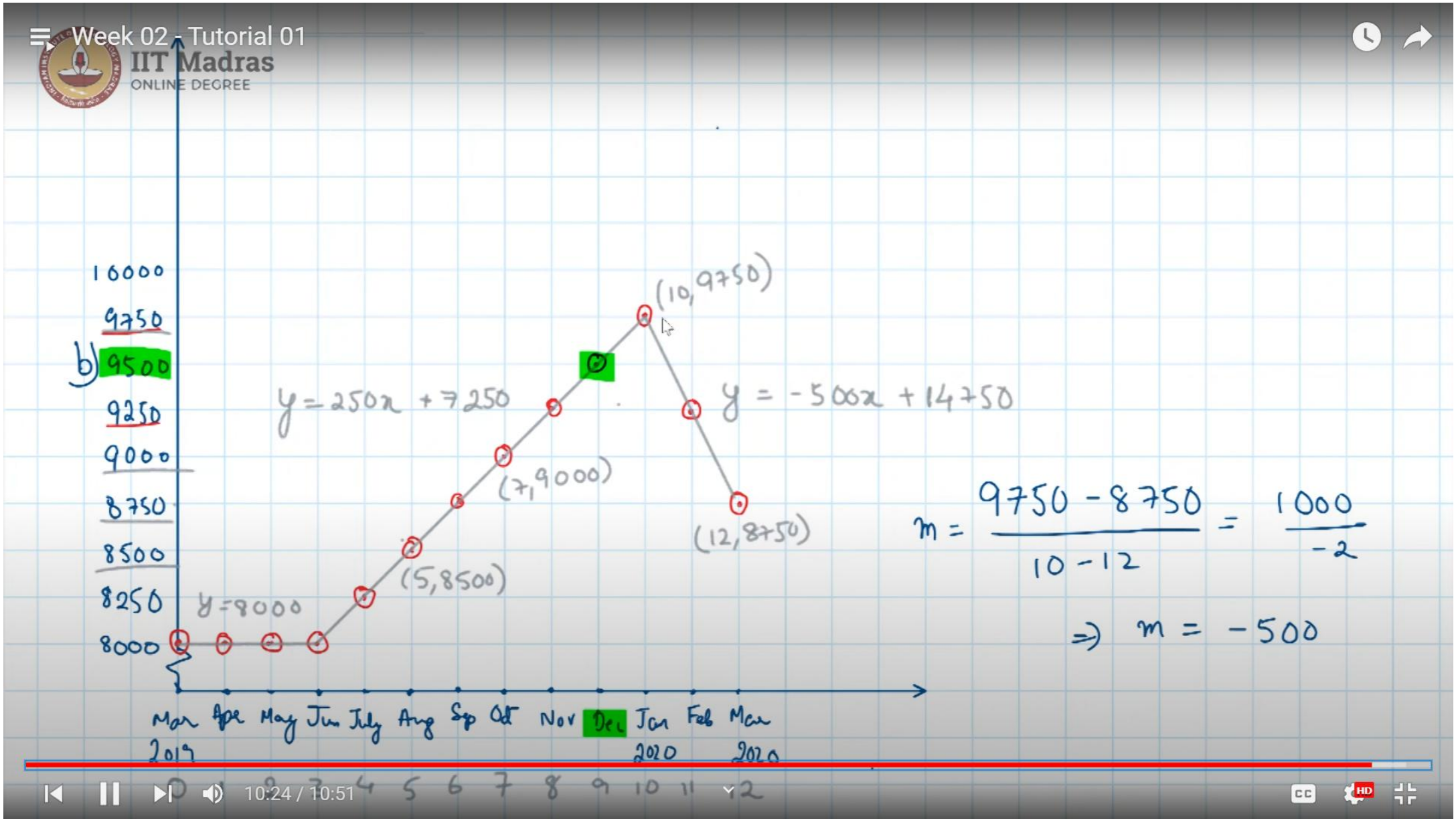
$$\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{y - 8750}{x - 12} = \frac{9750 - 8750}{10 - 12}$$

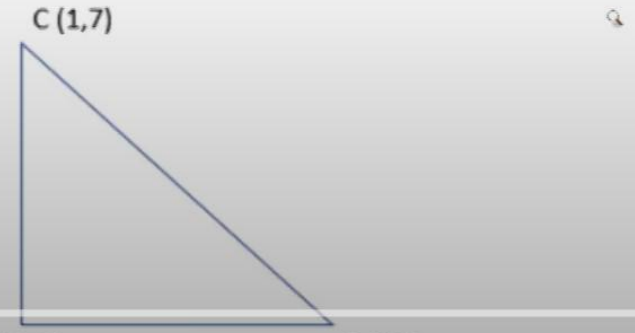
$$= \frac{1000}{-2} = -500$$

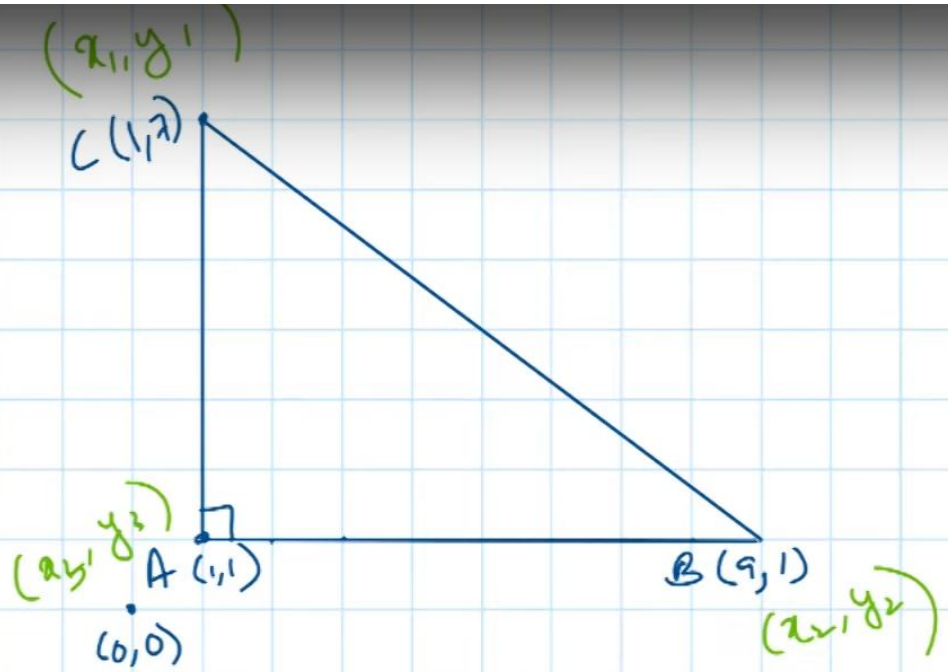
$$\Rightarrow y - 8750 = -500x + 6000$$

$$\Rightarrow y = -500x + 14750$$


Week 02 - Tutorial 01
IIT Madras
ONLINE DEGREE
16000
9750
b) 9500
9250
9000
8750
8500
8250
8000
y = 8000
(5, 8500)
(7, 9000)
(10, 9750)
(12, 8750)
y = 250x + 7250
y = -500x + 14750
m = (9750 - 8750) / (10 - 12) = 1000 / -2
⇒ m = -500
Mar 2019
Apr
May
Jun
July
Aug
Sep
Oct
Nov
Dec
Jan 2020
Feb
Mar 2020
0 1 2 3 4 5 6 7 8 9 10 11 12
10:24 / 10:51

2. A farmer has a triangular field ABC as shown in figure below. If watering costs Rs. 10 per unit square, how much would he have to pay for whole field? If the fencing wire around the field costs Rs.5 per unit, how much would he have to pay for three rounds of fencing around his field?





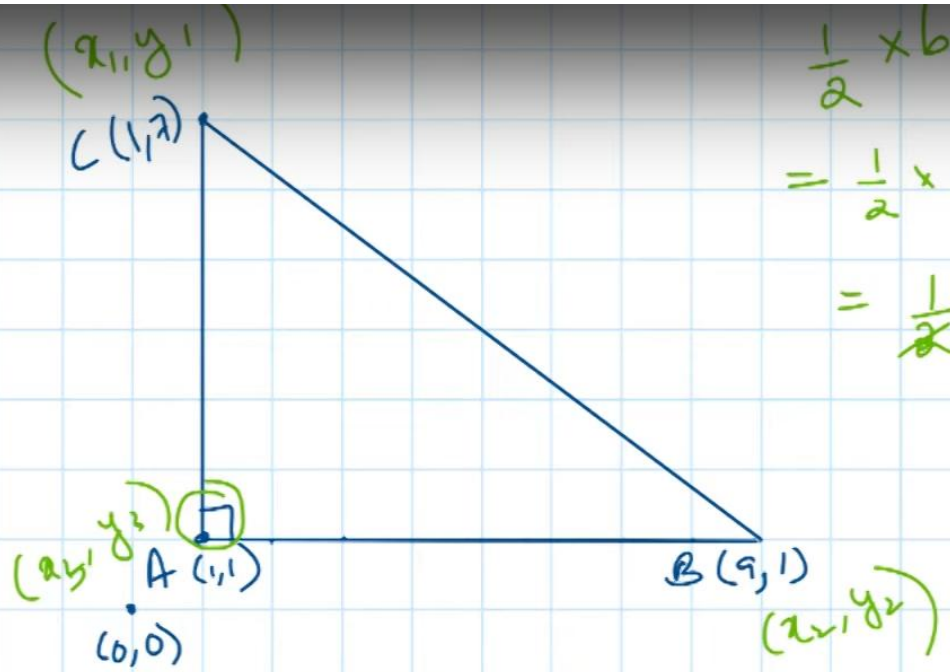
$$\text{Area} = \frac{|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|}{2}$$

$$= \frac{|1(1-1) + 9(1-7) + 1(7-1)|}{2}$$

$$= \frac{|1 - 54 + 6|}{} = \frac{48}{} = 24 \text{ sq. units}$$

Week 02 - Tutorial 02

IIT Madras
ONLINE DEGREE



$\frac{1}{2} \times b \times h$

$= \frac{1}{2} \times AB \times AC$

$= \frac{1}{2} \times 8 \times 6$

$= 24$ sq. units

$$\text{Area} = \frac{|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|}{2}$$

$$= \frac{|1(1-1) + 9(1-7) + 1(7-1)|}{2}$$

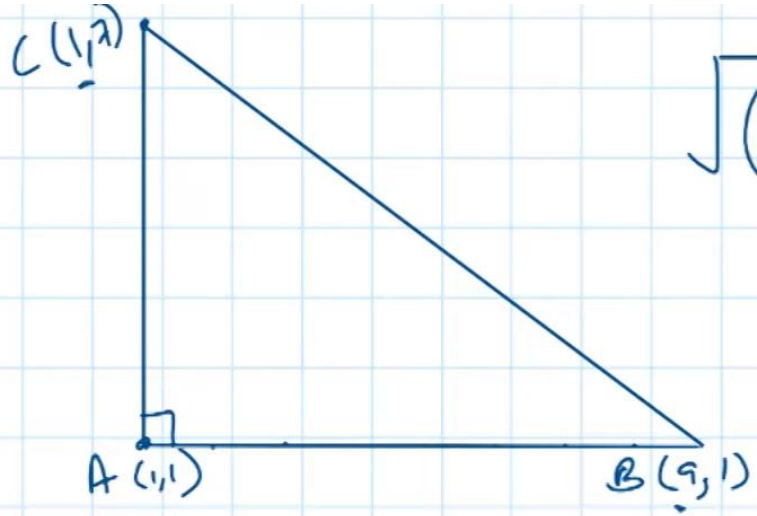
$$= \frac{|1 - 54 + 6|}{} = \frac{48}{} = 24 \text{ sq. units}$$

4:46 / 7:36

BC + CA + AB

$= 8 + 10 + 6$

$= 24$ units



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

$$= \sqrt{(-8)^2 + (6^2)}$$

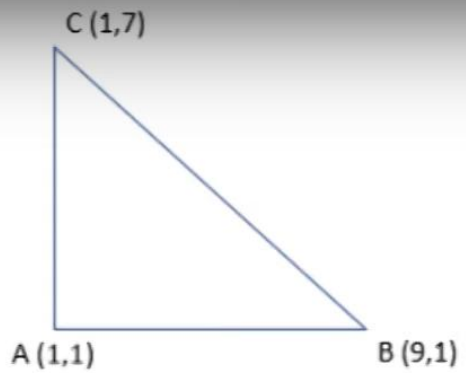
$$= \sqrt{64 + 36}$$

$$= \sqrt{100}$$

$$= 10$$

$24 \times 3 = 72$ units of wire.

$72 \times 5 = ₹\ 360$

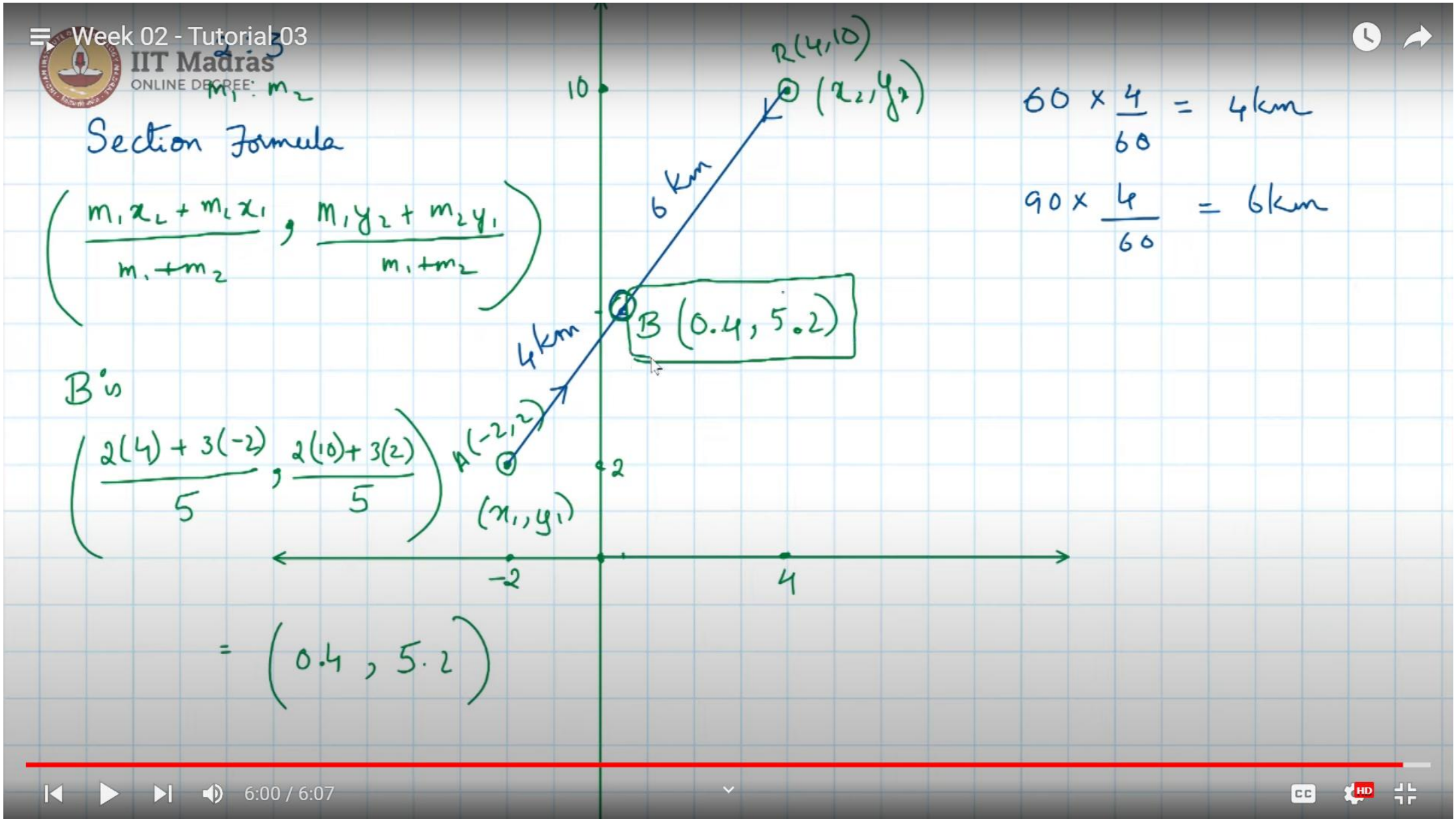


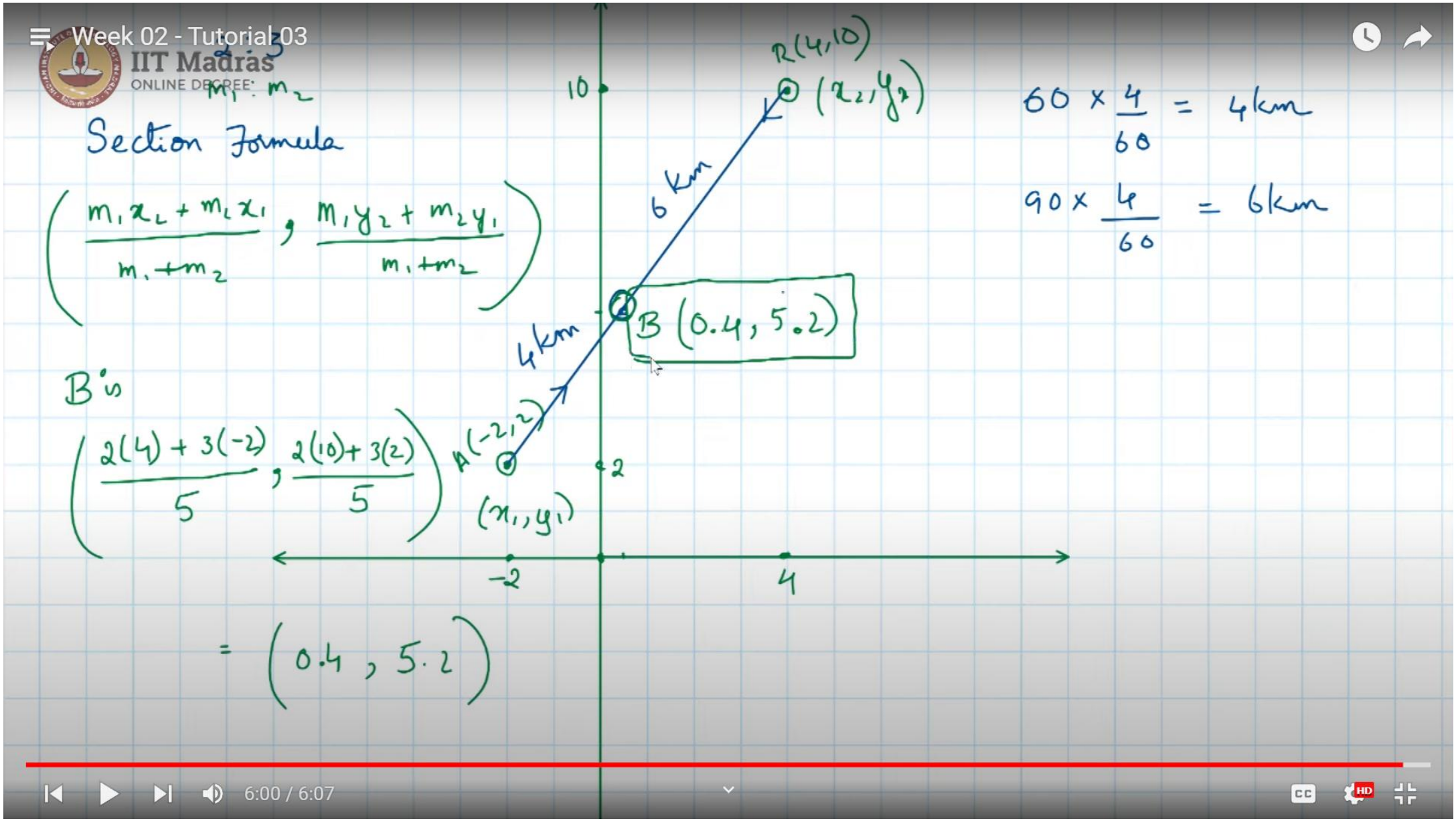
3. Two friends Abdul and Ram started from positions (-2,2) and (4,10) respectively towards each other to meet at position P. If their speeds are 60 km/hr and 90 km/hr respectively and meet in 4 minutes at point P. Find the position of P, given that one unit distance is equal to 1 km.

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 his bill amount when he 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 $KR : RM = 4 : 2$.


Week 02 - Tutorial 03
IIT Madras
ONLINE DEGREE
$m_1 : m_2$
Section Formula
$\left(\frac{m_1x_2 + m_2x_1}{m_1+m_2}, \frac{m_1y_2 + m_2y_1}{m_1+m_2}\right)$
B is
$\left(\frac{2(4)+3(-2)}{5}, \frac{2(10)+3(2)}{5}\right)$
$= (0.4, 5.2)$
R(4,10)
(x_2, y_2)
A(-2,2)
(x_1, y_1)
B (0.4, 5.2)
6 km
4km
10
2
-2
4
$60 \times \frac{4}{60} = 4km$
$90 \times \frac{4}{60} = 6km$
6:00 / 6:07

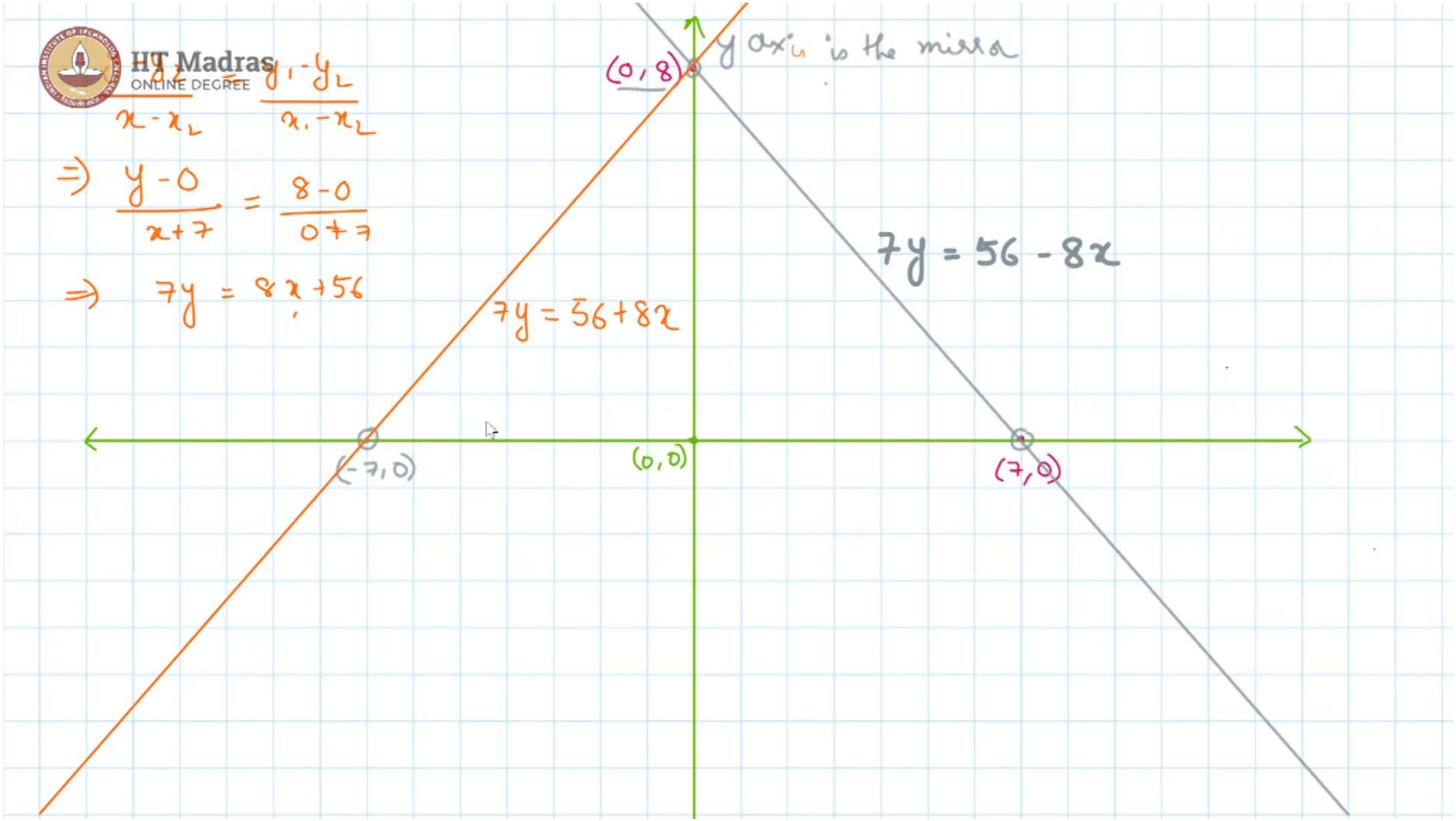

Week 02 - Tutorial 03
IIT Madras
ONLINE DEGREE
$m_1 : m_2$
Section Formula
$\left(\frac{m_1x_2 + m_2x_1}{m_1+m_2}, \frac{m_1y_2 + m_2y_1}{m_1+m_2}\right)$
B is
$\left(\frac{2(4)+3(-2)}{5}, \frac{2(10)+3(2)}{5}\right)$
$= (0.4, 5.2)$
R(4,10)
(x_2, y_2)
A(-2,2)
(x_1, y_1)
B (0.4, 5.2)
6 km
4km
10
2
-2
4
$60 \times \frac{4}{60} = 4km$
$90 \times \frac{4}{60} = 6km$
6:00 / 6:07

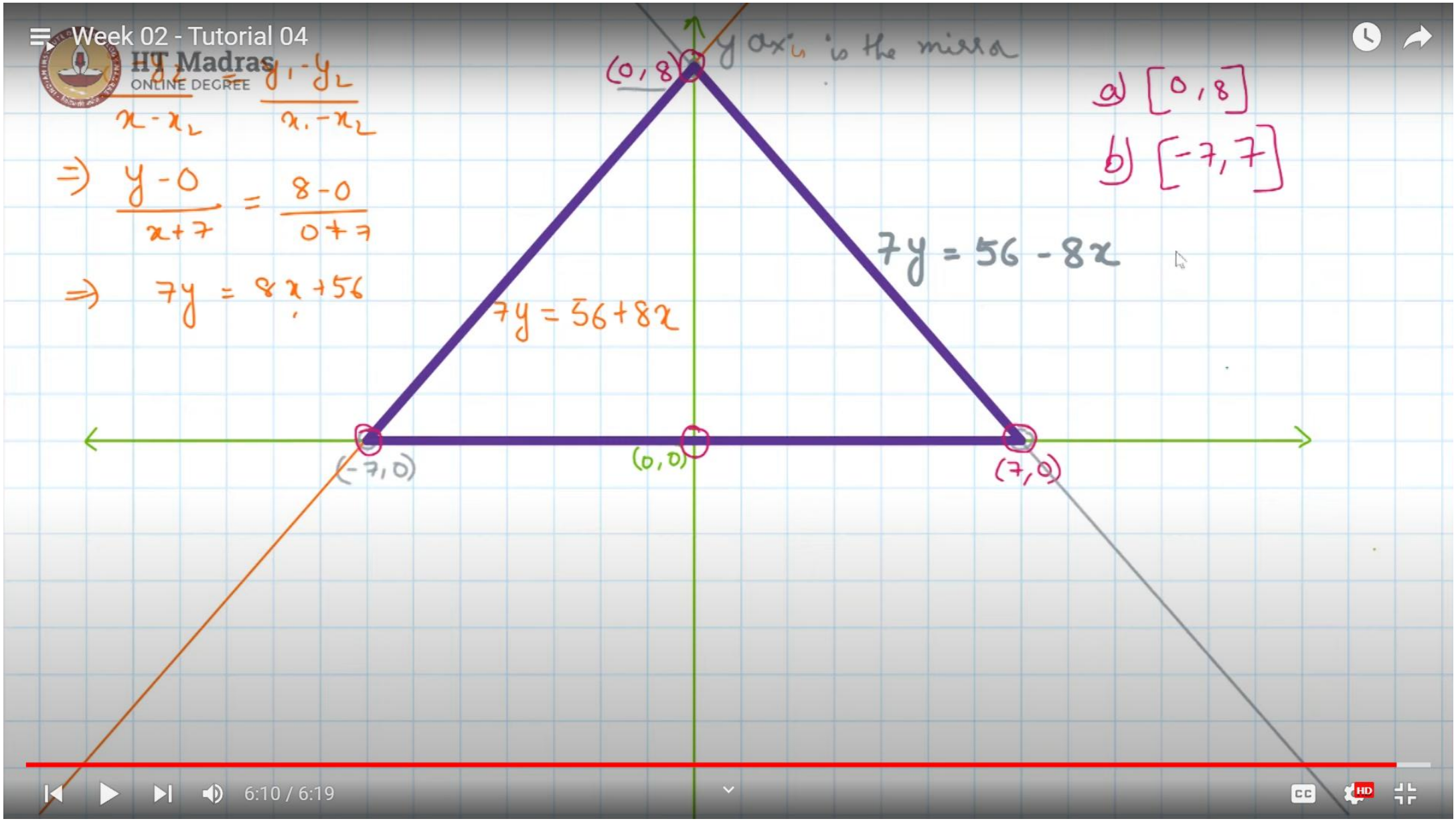
3. Two friends Abdul and Ram started from positions (-2,2) and (4,10) respectively towards each other to meet at position P. If their speeds are 60 km/hr and 90 km/hr respectively and meet in 4 minutes at point P. Find the position of P, given that one unit distance is equal to 1 km.

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 his bill amount when he 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.
   - ◯ $\angle LRP + \angle PRM = 90°$


HT Madras
ONLINE DEGREE
$\frac{y_2}{x-x_2} = \frac{y_1-y_2}{x_1-x_2}$
$\Rightarrow \frac{y-0}{x+7} = \frac{8-0}{0+7}$
$\Rightarrow 7y = 8x+56$
y axis is the mirror
(0,8)
$7y = 56+8x$
$7y = 56-8x$
(-7,0)
(0,0)
(7,0)


Week 02 - Tutorial 04
HT Madras
ONLINE DEGREE
$\frac{y_2 - y_1}{x - x_1} = \frac{y_1 - y_2}{x_1 - x_2}$
$\Rightarrow \frac{y-0}{x+7} = \frac{8-0}{0+7}$
$\Rightarrow 7y = 8x + 56$
y axis is the mirror
(0,8)
a) [0,8]
b) [-7,7]
$7y = 56 - 8x$
$7y = 56 + 8x$
(-7,0)
(0,0)
(7,0)
6:10 / 6:19

400 free minutes

₹ 50 per month

₹ 0.2 per minute (over 400 minutes)

$x \rightarrow$ no. of minutes

$y \rightarrow$ Bill amount.

Fixed | Additional minute charge

$$y = 50 + 0.2(x - 400)$$

$$y = 50 + \frac{x}{5} - 80 = \frac{x}{5} - 30$$

$$\Rightarrow 5y = x - 150$$

$$\Rightarrow x - 5y - 150 = 0$$

$$700 - 5y - 150 = 0 \Rightarrow 5y = 550 \Rightarrow y = ₹\ 110$$

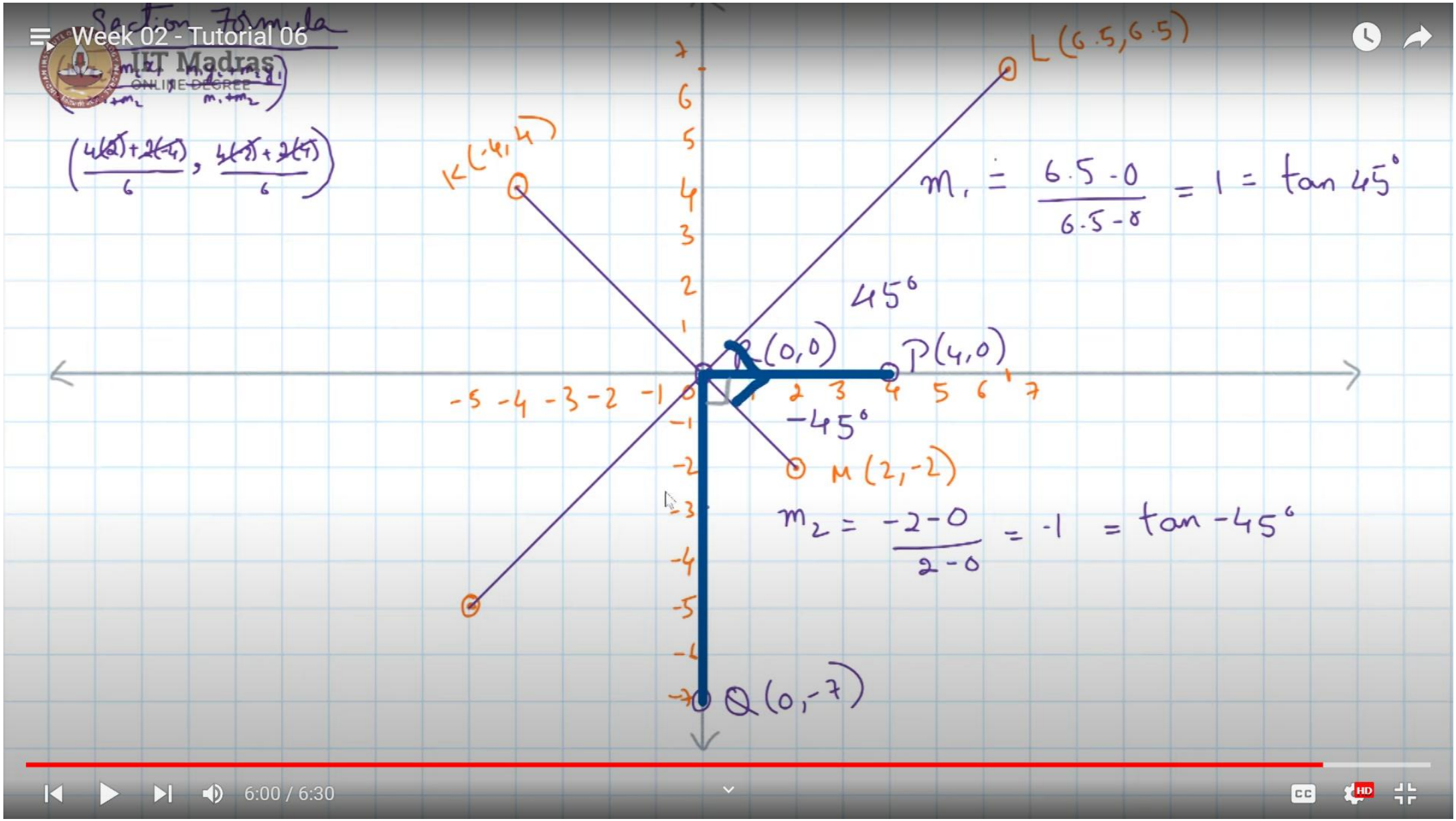
(a) What is the set of $y-$*coordinates* of the points in set A?

(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 the point of intersection of KM and LN, and is known to cut the line segment KM in the ratio $KR : RM = 4 : 2$. 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.
   - ◯ $\angle LRP + \angle PRM = 90^o$
   - ◯ $\angle LRP + \angle PRM = 180^o$
   - ◯ Adequate information for finding the relation between $\angle LRP$ and $\angle PRM$.
   - ◯ None of the above.


Week 02 - Tutorial 06
Section Formula
IIT Madras
ONLINE DEGREE
L(6.5, 6.5)
K(-4, 4)
$m_1 = \frac{6.5-0}{6.5-0} = 1 = \tan 45^\circ$
45°
O(0,0)
P(4,0)
-45°
M(2,-2)
$m_2 = \frac{-2-0}{2-0} = -1 = \tan -45^\circ$
Q(0,-7)
6:00 / 6:30

(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?

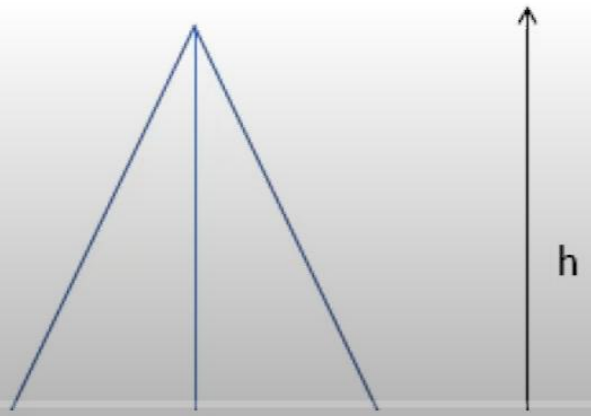
5. Mary subscribed to a cell phone plan with 400 free minutes, a Rs. 50 monthly fee, and 20 paise for each additional minute. What is her bill amount when she uses 700 minutes per month?

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 the point of intersection of KM and LN, and is known to cut the line segment KM in the ratio $KR : RM = 4 : 2$. Let two points P and Q has coordinates as $(4, 0)$ and $(0, -7)$ respectively. Then choose the correct options.

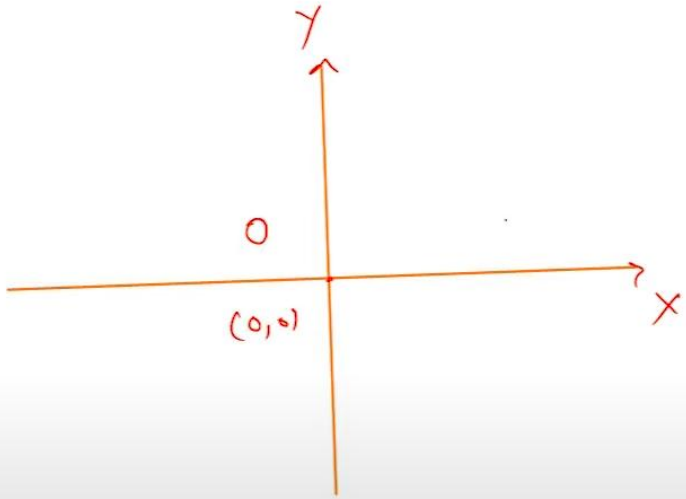
- ○ RP and RQ are parallel.
- ○ RP and RQ are perpendicular.
- ○ Adequate information for finding the relation between RP and RQ.
- ○ $\angle LRP + \angle PRM = 90^o$
- ○ $\angle LRP + \angle PRM = 180^o$
- ○ Adequate information for finding the relation between $\angle LRP$ and $\angle PRM$.
- ○ None of the above.

origin P

7. Two points O and P have their coordinates $(0, 0)$ and $(7, 3)$ respectively. Line segment OP is rotated by 360 degrees around the $X - axis$. A cone is shown below in figure. If the volume of the cone is given as $V = \frac{1}{3} \times \pi \times R^2 \times h$, then answer the followings. (for calculation use the value of π to be $\frac{22}{7}$)



(a) What will be the volume of cone generated by the rotation of line segment OP?



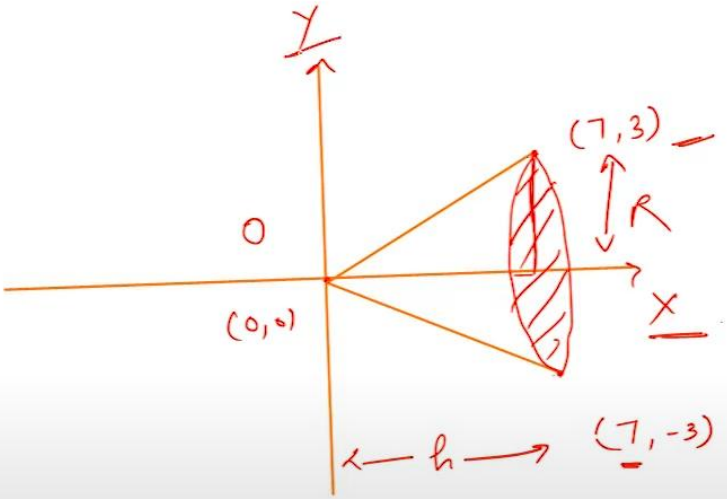
(a) What will be the volume of cone generated by the rotation of line segment OP?

Volume of cone

$V = \frac{1}{3} \pi R^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times 3 \times 3 \times 7$

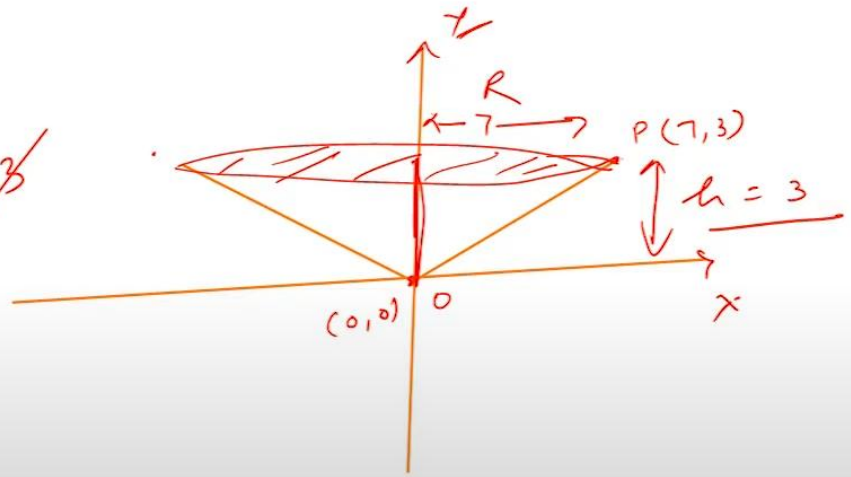
$= 66$ cubic unit



$R = 3$

$h = 7$

(b) If rotation is done around $Y - axis$ rather than $X - axis$ then what will be the volume of cone?



Volume

$V = \frac{1}{3}\pi r^2 h$

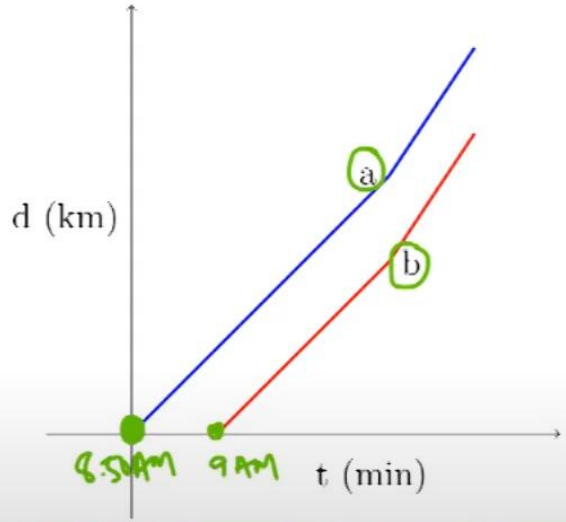
$= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 3$

$= 154$

$R = 7$

9. Suresh and Ramesh are colleagues. Their office starts at 9.30 AM. Suresh starts to office at 08:50 AM, and Ramesh starts at 09:00 AM. They both travel at 60kmph. At 09:20 they found that they need to increase their speeds to reach office on time. They increased their speed by 30 kmph each and they reach office on time. If the timer begins at 8:50 AM then answer the following.

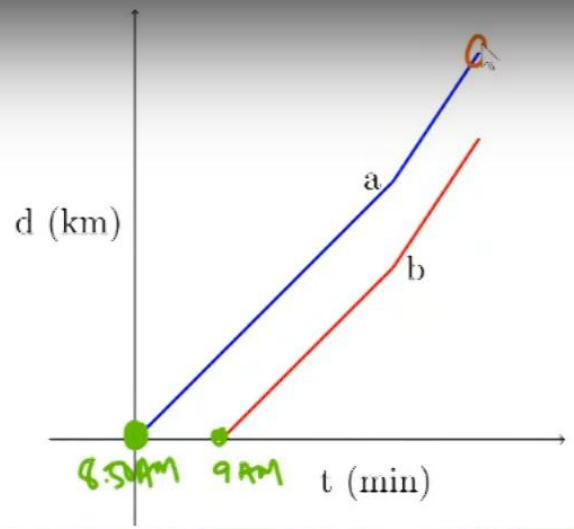
(a) Observing the following graph of their distance travelled vs time, choose the correct option.



- ○ Path a belongs to Suresh and path b belongs to Ramesh.
- ○ Both the paths belong to Suresh.
- ○ Path a belongs to Ramesh and path b belongs to Suresh.
- ○ Both the paths belong to Ramesh.
- ○ Neither path a nor path b belongs to Ramesh.
- ○ Neither path a nor path b belongs to Suresh.

Week 02 - Tutorial 09

IIT Madras
ONLINE DEGREE



- ◯ Path a belongs to Suresh and path b belongs to Ramesh.
- ✗ ◯ Both the paths belong to Suresh.
- ✗ ◯ Path a belongs to Ramesh and path b belongs to Suresh.
- ✗ ◯ Both the paths belong to Ramesh.
- ✗ ◯ Neither path a nor path b belongs to Ramesh.
- ✗ ◯ Neither path a nor path b belongs to Suresh.

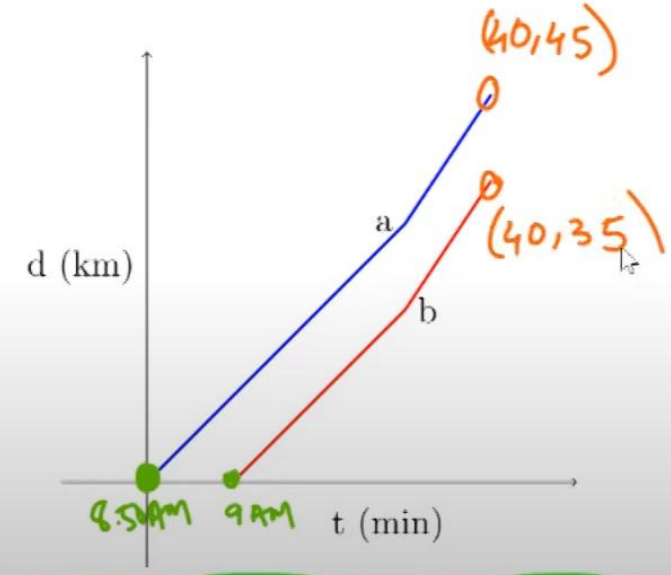
(b) Choose the correct option regarding the final position (t, d) of Ramesh and Suresh respectively.

- ◯ (4,4.5) and (3,3.5).
- ◯ (40,45) and (30,35).
- ◯ (40,35) and (40,45).
- ◯ (30,45) and (40,35).
- ◯ (4,45) and (30,35)

2:51 / 4:59

9. Suresh and Ramesh are colleagues. Their office starts at 9.30 AM. Suresh starts to office at 08:50 AM, and Ramesh starts at 09:00 AM. They both travel at 60kmph. At 09:20 they found that they need to increase their speeds to reach office on time. They increased their speed by 30 kmph each and they reach office on time. If the timer begins at 8:50 AM then answer the following.

(a) Observing the following graph of their distance travelled vs time, choose the correct option.



$\frac{1}{6} \times 90 = 15$ km

$\frac{1}{3} \times 60 = 20$ km

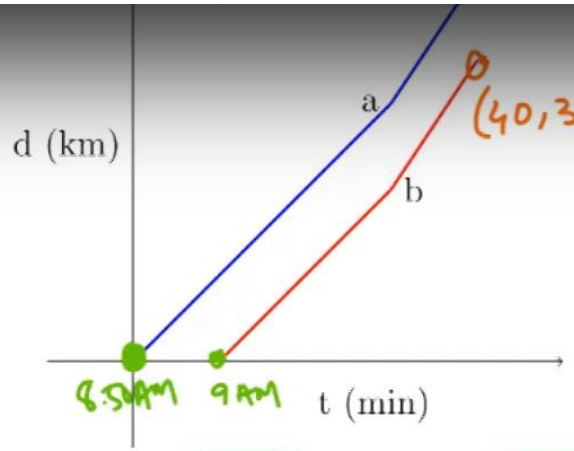
30 km + 15 km = 45 km

20 km + 15 km = 35 km

- ○ Path a belongs to Suresh and path b belongs to Ramesh.
- ✗ ○ Both the paths belong to Suresh.
- ✗ ○ Path a belongs to Ramesh and path b belongs to Suresh.

Week 02 - Tutorial 09

IIT Madras ONLINE DEGREE



- ○ Path a belongs to Suresh and path b belongs to Ramesh.
- ○ Both the paths belong to Suresh.
- ○ Path a belongs to Ramesh and path b belongs to Suresh.
- ○ Both the paths belong to Ramesh.
- ○ Neither path a nor path b belongs to Ramesh.
- ○ Neither path a nor path b belongs to Suresh.

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- ○ (4,4.5) and (3,3.5).
- ○ (40,45) and (30,35).
- ○ (40,35) and (40,45).
- ○ (30,45) and (40,35).
- ○ (4,45) and (30,35).
- ○ None of the above.

4:48 / 4:59