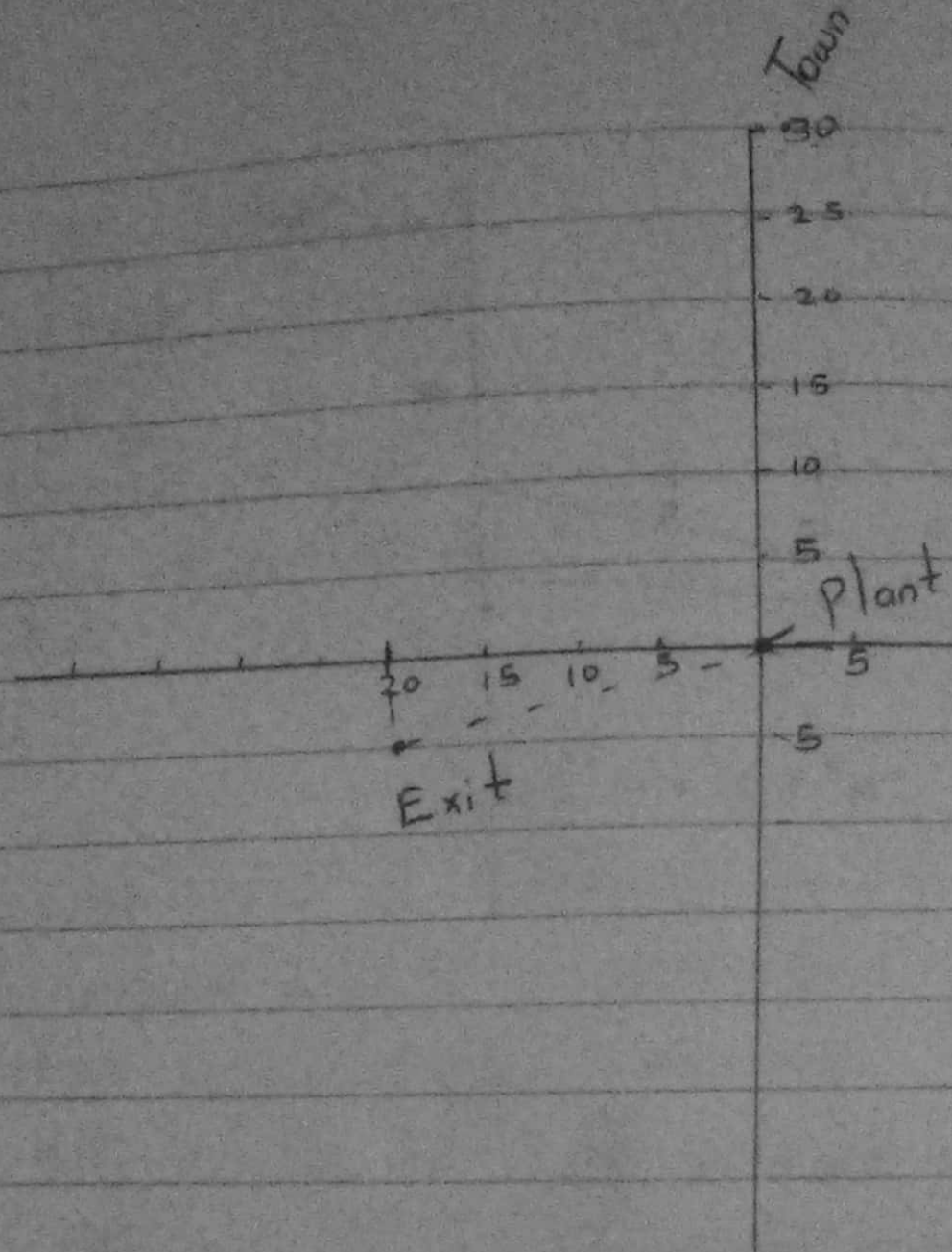




$$ii) R = k/r$$

$$R = 1400 \text{ m/s}$$

$$r = 10 \text{ m}$$

$$k = 1400 \text{ m/s} \times 10 \text{ m}$$

$$k = 14000 \text{ m}^2/\text{s}$$

$$10) R = r/t$$

$$R = k/r$$

Replace R with r/t

$$r/t = k/r$$

$$r^2/t = k$$

$$r^2 = kt$$

$$r = \sqrt{kt}$$

$$t = k/r^2$$

To the exit

The distance to the exit is given by

(20, 5)

$$= \sqrt{20^2 + 5^2}$$

$$= \sqrt{425}$$

$$= 20.6155$$

$$r^2 = kt$$

$$t = r^2/k$$

$$t = \frac{425}{14000/60}$$

$$= 1.8214 \text{ minutes}$$

To the town

The distance is $\sqrt{30^2 + 2^2} = 30.0666 \text{ m}$

$$t = r^2/k$$

$$= \frac{904}{14000/60}$$

$$= 3.8743 \text{ minutes}$$

Town and Exit line equation

Town (2, 30) Exit (20, 5)

$$y = mx + c$$

$$m = \frac{\Delta y}{\Delta x} = \frac{30 - 5}{2 - 20} = \frac{25}{-18}$$

$$30 = \frac{25}{-18} \times 2 + c$$

$$30 + \frac{50}{18} = c$$

$$32.7778 = c$$

$$y = -\frac{25}{18}x + 32.78$$

$$y = 32.78 -$$

line perpendicular

$$m_1 \times m_2 = -1$$

$$-\frac{25}{18} \times m_2 = -1$$

$$m_2 = \frac{18}{25}$$

Using point (0,0)

$$y = mx + c$$

$$0 = \frac{18}{25} \times 0 + c$$

$$0 = c$$

$$y = \frac{18}{25}x$$

Intersection point

$$y = \frac{18}{25}x$$

$$y = -\frac{25}{18}x + 32.78$$

$$y = 0.72x$$

$$y = -1.389x + 32.78$$

$$0.72x = -1.389x + 32.78$$

$$2.109x = 32.78$$

$$x = 15.54$$

$$y = 0.72x$$

$$y = 0.72 \times 15.54$$

$$y = 11.19$$

$$\text{Point} = (15.54, 11.19)$$

Distance from the center of the circle to the road

$$y = \frac{18}{25}x = y = 0.72x$$

$$\text{Gradient} = \frac{\Delta y}{\Delta x} = \frac{18}{25}$$

Point (0,0) center

$$\frac{18 - 0}{25 - 0} = \frac{18}{25}$$

$$d = \sqrt{18^2 + 25^2}$$

$$= 30.8058 \text{ miles}$$

$$\text{time} = r^2/k$$

$$= \frac{949}{14000|60}$$

$$= 4.067 \text{ minutes}$$