

Exam Review

Extra Review Problems

- ① Let p = time spent on paved roads (in h)
 f = time spent off-road (in h)

$$\textcircled{1} p + f = 2 \quad \xrightarrow{\times 10} \quad 10p + 10f = 20$$

$$\textcircled{2} 25p + 10f = 41 \quad \rightarrow \quad 25p + 10f = 41$$

$$\underline{-15p = -21}$$

$$p = \frac{21}{15} = \frac{7}{5}$$

$$\frac{7}{5} + f = 2$$

$$f = 2 - \frac{7}{5}$$

$$f = 2 - 1\frac{2}{5}$$

$$f = \frac{3}{5}$$

∴ he spent $\frac{3}{5}$ hour (36 mins) off road and $1\frac{2}{5}$ hour (1 hour 24 mins) on paved roads.

he cycled $\frac{3}{5}$ hour $\times 10 \frac{\text{km}}{\text{hr}}$

$$= \boxed{6 \text{ km off road}}$$

OR

Let p = distance on paved roads (km)

f = distance off-road (km)

$$\textcircled{1} p + f = 41$$

$$t = \frac{d}{s}$$

$$\textcircled{2} \frac{p}{25} + \frac{f}{10} = 2$$

② Let d = distance from Ottawa (km)
 t = time since Rachelle leaves (hours)

Rachelle: ① $d = 110t$

Irwin: $d = 447 - 100(t - 0.5)$

② $d = 497 - 100t$

sub ① into ② $497 - 100t = 110t$

$$497 = 210t$$

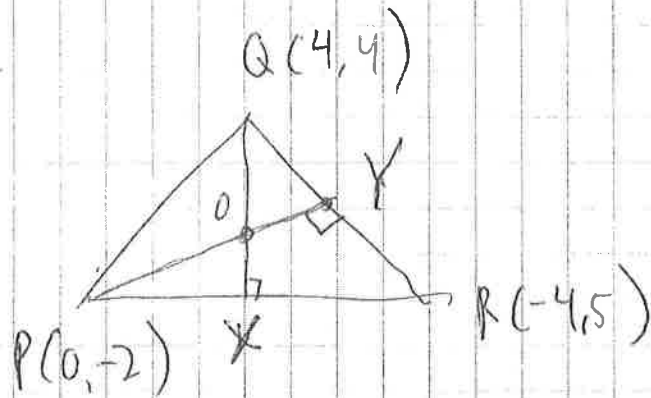
$$t = 2.37 \text{ hours}$$

$$d = 110(2.37)$$

$$d = 260.33$$

∴ 2.37 hours after Rachelle leaves they meet 260.3 km from Ottawa.

3.



$$m_{PR} = \frac{5 - (-2)}{-4 - 0}$$

$$m_{PR} = -\frac{7}{4}$$

$$\therefore m_{QX} = \frac{4}{7}$$

$$m_{QR} = \frac{5 - 4}{-4 - 4}$$

$$= -\frac{1}{8}$$

$$\therefore m_{PY} = 8$$

Equation for altitude QX :

$$\frac{4}{7} = \frac{y - 4}{x - 4}$$

$$7y - 28 = 4x - 16$$

$$4x - 7y = -12$$

Equation for altitude PY :

$$8 = \frac{y + 2}{x - 0}$$

$$8x = y + 2$$

$$8x - y = 2$$

The orthocentre is at the intersection of QX and PY:

$$\textcircled{1} 4x - 7y = -13 \xrightarrow{\times 2} 8x - 14y = -26$$

$$\textcircled{2} 8x - y = 2 \rightarrow 8x - y = 2$$

$$\underline{-13y = -26}$$

$$y = 2$$

$$8x - 2 = 2$$

$$8x = 4$$

$$x = \frac{1}{2}$$

\therefore orthocentre is at $(\frac{1}{2}, 2)$

4.



$$x^2 + y^2 = 15^2$$

$$\textcircled{1} x^2 + y^2 = 225$$

$$x + y + 15 = 36$$

$$\textcircled{2} y = 21 - x$$

Sub $\textcircled{2}$ into $\textcircled{1}$

$$x^2 + (21 - x)^2 = 225$$

$$x^2 + x^2 - 42x + 441 = 225$$

$$2x^2 - 42x + 216 = 0$$

$$x^2 - 21x + 108 = 0$$

$$x = \frac{21 \pm \sqrt{21^2 - 4(1)(108)}}{2}$$

$$x = \frac{21 \pm \sqrt{9}}{2}$$

$$x = \frac{21 \pm 3}{2}$$

$$x = 12 \text{ or } x = 9$$

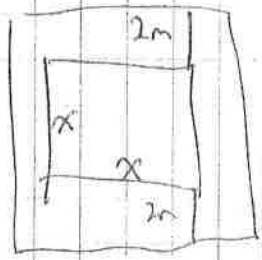
$$y = 21 - 12 \quad \text{or} \quad y = 21 - 9$$

$$y = 9$$

$$y = 12$$

∴ it is a 12m by 9m field.

5.



$$\text{Total Area} = (x+4)^2$$

$$\text{Area of lawn} = x^2$$

$$\begin{aligned} \text{Area of walkway} \\ = (x+4)^2 - x^2 \end{aligned}$$

$$\therefore (x+4)^2 - x^2 = x^2$$

$$x^2 + 8x + 16 - x^2 = x^2$$

$$x^2 - 8x - 16 = 0$$

$$x = \frac{8 \pm \sqrt{8^2 - 4(1)(-16)}}{2}$$

$$x = \frac{8 \pm \sqrt{128}}{2}$$

$$x \approx 9.66\text{m} \quad \text{or} \quad x = \cancel{1.66}$$

$$\therefore x \approx 9.66\text{m}$$

the lawn is about $9.7\text{m} \times 9.7\text{m}$.