Q1 $(-1,7)$ $(4,-3)$ $m_1 : m_2 = 2:3$

$$x = \frac{m_1x_2 + m_2x_1}{m_1+m_2} = \frac{2\times4 + 3\times-1}{2+3} = \frac{5}{5} = 1$$

$$y = \frac{m_1y_2 + m_2y_1}{m_1+m_2} = \frac{2\times-3 + 3\times7}{2+3} = \frac{-6+21}{5} = \frac{15}{5} = 3$$

∴ coordinate is $(1,3)$.

Q. $(4,-1)$ $(-2,-3)$ $m_1 : m_2 = 1:2$

$m_1 : m_2 = 2:1$

P $$x = \frac{m_1x_2 + m_2x_1}{m_1+m_2} = \frac{1\times-2 + 2\times4}{1+2} = \frac{-2+8}{3} = \frac{6}{3} = 2$$

P. $$y = \frac{m_1y_2 + m_2y_1}{m_1+m_2} = \frac{1\times-3 + 2\times-1}{1+2} = \frac{-3-2}{3} = \frac{-5}{3}$$

coordinate of $P\left(2, -\frac{5}{3}\right)$

Q $$x = \frac{m_1x_2 + m_2x_1}{m_1+m_2} = \frac{2\times-2 + 1\times4}{2+1} = \frac{-4+4}{3} = 0$$

Q $$y = \frac{m_1y_2 + m_2y_1}{m_1+m_2} = \frac{2\times-3 + 1\times-1}{2+1} = \frac{-6-1}{3} = \frac{-7}{3}$$

coordinates of $Q\left(0, -\frac{7}{3}\right)$

3. Green flag $= \frac{1}{4}$

No. of flower pot $= 100$

$\frac{1}{4} \times 100 = 25$ m

coordinate of green flag $= (2, 25)$

$\frac{1}{5} \times 100 = 20$ m

coordinate of red flag $= (8, 20)$

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(8-2)^2 + (20-25)^2}$$
$$= \sqrt{36 + 25} = \sqrt{61}\ m$$

midpoint of distance between two flags

$$x = \frac{x_1 + x_2}{2} = \frac{8+2}{2} = 5$$

$$y = \frac{y_1 + y_2}{2} = \frac{20+25}{2} = 22.5$$

coordinate of blue flag is $(5, 22.5)$

4. $(-3, 10)$, $(6, -8)$, $(-1, 6)$

Let the ratio be $K:1$

$$x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}$$

$$\Rightarrow -1 = \frac{K \times 6 + 1 \times (-3)}{K+1}$$

$$\Rightarrow -K - 1 = 6K - 3$$

$$\Rightarrow -K - 6K = -3 + 1$$

$$\Rightarrow -7K = -2$$

$$K = \frac{2}{7}$$

$$K:1 = 2:7$$

5. Let the ratio be $= K:1$

$$(x, 0) = \frac{K-4+1}{K+1}, \frac{K+5 \times 5}{K+1}$$

$$0 = \frac{K \times 5 + 1 \times 5}{K+1}$$

$$5K - 5 = 0$$

$$K = 1$$

Ratio $= 1:1$

$$x = \frac{1-4}{2} = -\frac{3}{2}$$

Hence, $\left(-\frac{3}{2}, 0\right)$ is the required point

8. $AP = \frac{3}{7} AB$

$PB = AB - AP$

$= 1 - \frac{3}{7} = \frac{7-3}{7} = \frac{4}{7} AB$

$AP : BP = \frac{3}{7} AB : \frac{4}{7} AB$

$= \frac{\frac{3}{7}}{\frac{4}{7}} = 3:4$

$x = \frac{3(2) + 4(-2)}{3+4} = \frac{6-8}{7} = \frac{-2}{7}$

$y = \frac{3(-4) + 4(-2)}{3+4} = \frac{-12-8}{7} = \frac{-20}{7}$

$\therefore$ AB coordinate is $\left(\frac{-2}{7}, \frac{-20}{7}\right)$

7. $\frac{x+1}{2} = 2$ $\quad$ $\frac{y+4}{2} = -3$

$x+1 = 4$ $\quad$ $y+4 = -6$

$x = 3$ $\quad$ $y = -10$

coordinate of $A(3, -10)$

9. $\left(\frac{x_1+x_2}{2}\right)\left(\frac{y_1+y_2}{2}\right)$

$\left(\frac{-2+2}{2}\right)\left(\frac{2+8}{2}\right) = (0, 5) E$

$\left(\frac{-2+0}{2}\right)\left(\frac{2+5}{2}\right) = D\left(-1, \frac{7}{2}\right)$

$\left(\frac{0+2}{2}\right)\left(\frac{5+8}{2}\right) = F\left(1, \frac{13}{2}\right)$

6 (1,2) (4,y) (x,6) (3,5)

midpoint of AC = midpoint of BD

$$\frac{x+1}{2}, \frac{6+2}{2} = \frac{4+3}{2}, \frac{y+5}{2}$$

$$\frac{x+1}{2} = \frac{7}{2} \qquad \frac{y+5}{2} = \frac{8}{2}$$

$$2x+2 = 14 \qquad 2y+10 = 16$$

$$2x = 12 \qquad 2y = 6$$

$$x = 6 \qquad y = 3$$

10. (3,0) (4,5) (-1,4) (-2,-1)

$$AC = \sqrt{(-3)^2+(4-0)^2} = \sqrt{(2)^2+(4)^2} = \sqrt{16+16} = \sqrt{32} = 4\sqrt{2}$$

$$BD = \sqrt{(4+2)^2+(5+1)^2} = \sqrt{(6)^2+(6)^2} = \sqrt{36+36} = 6\sqrt{2}$$

$$\text{Area of rhombus} = \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2}$$

$$= \frac{1}{2} \times 24 \times 2$$

$$= 24 \text{ unit. sqm}$$