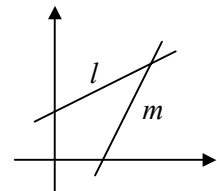


- 1 a $\text{grad } l = -2$
 $\therefore \text{grad } m = \frac{1}{2}$
 $y + 1 = \frac{1}{2}(x - 6)$
 $2y + 2 = x - 6$
 $x - 2y - 8 = 0$
 b $x - 2(1 - 2x) - 8 = 0$
 $5x - 10 = 0$
 $x = 2 \therefore (2, -3)$
- 2 a $\text{grad} = \frac{5+3}{7-1} = \frac{4}{3}$
 $\therefore y + 3 = \frac{4}{3}(x - 1) \quad [4x - 3y - 13 = 0]$
 b subtracting, $4y - 4 = 0$
 $y = 1 \therefore C(4, 1)$
 mid-point = $(\frac{1+7}{2}, \frac{-3+5}{2}) = (4, 1)$
 $\therefore C$ is the mid-point of AB
 c $\text{grad } m = -4$
 $\therefore \text{grad perp to } m = \frac{1}{4}$
 $y - 1 = \frac{1}{4}(x - 4)$
 $\therefore y = \frac{1}{4}x$ which passes through $(0, 0)$
- 3 a $M = (q, \frac{9}{2}) = (\frac{-2+4}{2}, \frac{7+p}{2})$
 $\therefore p = 2, q = 1$
 b $\text{grad } AB = \frac{2-7}{4+2} = -\frac{5}{6}$
 $\therefore \text{grad perp to } AB = \frac{6}{5}$
 $y - 7 = \frac{6}{5}(x + 2)$
 $5y - 35 = 6x + 12$
 $6x - 5y + 47 = 0$
- 4 a $PQ^2 = 4^2 + 8^2 = 80$
 $PQ = \sqrt{80} = 4\sqrt{5} \quad [k = 4]$
 b $M = (\frac{-5-1}{2}, \frac{-2+6}{2}) = (-3, 2)$
 c $\text{grad } MS = \frac{-1-2}{3+3} = -\frac{1}{2}$
 $\text{grad } PQ = \frac{6+2}{-1+5} = 2$
 $\text{grad } MS \times \text{grad } PQ = -\frac{1}{2} \times 2 = -1$
 $\therefore MS$ is perpendicular to PQ
 d $MS = \sqrt{6^2 + 3^2} = \sqrt{45} = 3\sqrt{5}$
 area = $PQ \times MS = 60$
- 5 a $\text{grad of } 2x - y + 4 = 0$ is 2
 $\therefore \text{grad of } l = 2$
 $y + 3 = 2(x + 1) \quad [y = 2x - 1]$
 b $\text{grad of } 6x + 5y - 2 = 0$ is $-\frac{6}{5}$
 $\therefore \text{grad of } m = \frac{5}{6}$
 $y - 4 = \frac{5}{6}(x - 4)$
 $6y - 24 = 5x - 20$
 $5x - 6y + 4 = 0$
 c $5x - 6(2x - 1) + 4 = 0$
 $10 - 7x = 0$
 $x = \frac{10}{7} \therefore (1\frac{3}{7}, 1\frac{6}{7})$
- 6 a $y - 4 = \frac{1}{2}(x - 2)$
 $2y - 8 = x - 2$
 $x - 2y + 6 = 0$
 b $x - 2(2x - 6) + 6 = 0$
 $18 - 3x = 0$
 $x = 6 \therefore (6, 6)$
 c l meets y -axis at $(0, 3)$
 m meets x -axis at $(3, 0)$



$(0, 0)$ and $(6, 6)$ on $y = x$
 $(0, 3)$ and $(3, 0)$ symmetrical about $y = x$
 \therefore quadrilateral is a kite

7 a at A , $y = 0 \therefore x = 20$
 at B , $x = 0 \therefore y = 10$
 $\therefore A(20, 0)$, $B(0, 10)$

b $l \Rightarrow y = 10 - \frac{1}{2}x$
 \therefore grad of $l = -\frac{1}{2}$
 \therefore grad of $m = 2$
 $m: y = 2x$
 at C , $10 - \frac{1}{2}x = 2x$
 $x = 4 \therefore C(4, 8)$
 \therefore area of $\triangle OAC$: area of $\triangle OBC$
 $= \frac{1}{2} \times 20 \times 8 : \frac{1}{2} \times 10 \times 4$
 $= 4 : 1$

9 a grad $PQ = \frac{2-c}{9-3} = \frac{2-c}{6}$
 grad $QR = \frac{11-2}{3c-9} = \frac{3}{c-3}$
 $\angle PQR = 90^\circ \therefore PQ$ perp to QR
 $\therefore \frac{2-c}{6} \times \frac{3}{c-3} = -1$
 $3(2-c) = -6(c-3)$
 $3c = 12$
 $c = 4$

b $PQ^2 = 6^2 + 2^2 = 40$
 $PQ = \sqrt{40} = 2\sqrt{10} \quad [k = 2]$

c $QR = \sqrt{3^2 + 9^2} = \sqrt{90} = 3\sqrt{10}$
 area $= \frac{1}{2} \times PQ \times QR = 30$

8 a grad $q = \text{grad } p = -\frac{3}{4}$
 $\therefore y = -\frac{3}{4}x + 7$

b grad $r = \frac{4}{3}$
 $\therefore y = \frac{4}{3}(x-1)$
 $3y = 4x - 4$
 $4x - 3y - 4 = 0$

c $\frac{4}{3}x - \frac{4}{3} = -\frac{3}{4}x + 7$
 $16x - 16 = -9x + 84$
 $25x = 100$
 $x = 4 \therefore (4, 4)$
 \therefore lies on $y = x$

10 a $PQ^2 = 12^2 + 9^2 = 225$
 $PQ = \sqrt{225} = 15$

b grad $= \frac{12-3}{13-1} = \frac{3}{4}$
 $\therefore y - 3 = \frac{3}{4}(x - 1)$
 $4y - 12 = 3x - 3$
 $3x - 4y + 9 = 0$

c grad $l_2 = -\frac{4}{3}$
 $y - 10 = -\frac{4}{3}(x - 2) \quad [4x + 3y - 38 = 0]$

d $l_1 \Rightarrow 9x - 12y + 27 = 0$
 $l_2 \Rightarrow 16x + 12y - 152 = 0$
 adding $25x - 125 = 0$
 $x = 5 \therefore (5, 6)$

e distance R to $(5, 6) = \sqrt{3^2 + 4^2} = 5$
 area $= \frac{1}{2} \times 15 \times 5 = 37\frac{1}{2}$

