

## Exercise 1C

1f.  $m = \frac{7}{4}$ ,  $m_{\perp} = -\frac{4}{7}$

h.  $m_{\perp} = -\frac{1}{m}$

l.  $m = \frac{a}{b-c}$ ,  $m_{\perp} = -\frac{b+c}{a} = \underline{\underline{\frac{c-b}{a}}}$

2d.  $(7, -4) \perp y = \frac{5}{2}$

$$x = 7$$

h.  $(0, 3) \perp y = 2x - 1$

$$m_{\perp} = -\frac{1}{2}$$

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

$$2y - 6 = -x$$

$$x + 2y - 6 = 0$$

l.  $(-1, -2) \perp ax + by = c$

$$m = -\frac{a}{b}, m_{\perp} = \frac{b}{a}$$

$$y + 2 = \frac{b}{a}(x + 1)$$

$$ay + 2a = bx + b$$

$$bx - ay - 2a + b = 0$$

4.  $(1, 1) \perp 2x - 3y = 12$   
 $m = \frac{2}{3}$

$$m_{\perp} = -\frac{3}{2}$$

$$y - 1 = -\frac{3}{2}(x - 1)$$

$$2y - 2 = -3x + 3$$

$$3x + 2y - 5 = 0$$

$$3x + 2y = 5 \quad (\times 2) \quad 6x + 4y = 10$$

$$2x - 3y = 12 \quad (\times 3) \quad 6x - 9y = 36 \quad -$$

$$13y = -26$$

$$y = -2$$

$$3x + 2(-2) = 5$$

$$3x = 5 + 4$$

$$x = 3 \quad \underline{\underline{(3, -2)}}$$

5.  $A(2, 3)$   $B(1, -7)$   $C(4, -1)$

$$m_{BC} = \frac{6}{3} = 2$$

$$m_{\perp} = -\frac{1}{2}$$

$$y - 3 = -\frac{1}{2}(x - 2)$$

$$2y - 6 = -x + 2$$

$$x + 2y - 8 = 0$$

6. i.  $m_{PQ} = 0$

$$m_{\perp} = \text{undefined}$$

$$x = 8$$

$$m_{PR} = \frac{-12}{6} = -2$$

$$m_{\perp} = \frac{1}{2}$$

$$y - 5 = \frac{1}{2}(x - 12)$$

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

b.  $y = \frac{1}{2}(8) - 1 = 3$   
 $\underline{\underline{(8, 3)}}$

c.  $m_{QR} = \frac{12}{4} = 3$

$$m_{\perp} = -\frac{1}{3}$$

The altitude through P:

$$y - 5 = -\frac{1}{3}(x - 2)$$

$$3y - 15 = -x + 2$$

$$x + 3y = 17$$

$$(8, 3) \rightarrow x + 3y = 17$$

$$8 + 3(3) = 17 \rightarrow \text{correct}$$

$\therefore$  The altitude through P also passes through point  $(8, 3)$