2.1

- $\left(\dfrac{2+8}{2}, \dfrac{7+(-1)}{2}\right) = (\mathbf{5}, \mathbf{3})$

2.2

- $d = \sqrt{(5-(-1))^2 + (11-3)^2} = \sqrt{36+64} = \sqrt{100} = \mathbf{10}$

2.3

- $m = \dfrac{13-4}{4-1} = \dfrac{9}{3} = \mathbf{3}$

2.4

- parallel, so $m = 2$: $y - 5 = 2(x - 3)$
- $\boldsymbol{y = 2x - 1}$

2.5

- $m_2 = -\dfrac{1}{3}$, so the gradient is $-\dfrac{\mathbf{1}}{\mathbf{3}}$

3.1

- he divided the change in x by the change in y; gradient is change in y over change in x
- $m = \dfrac{7-1}{4-2} = \dfrac{6}{2} = \mathbf{3}$

3.2

- $\dfrac{1+x}{2} = 4$ and $\dfrac{-3+y}{2} = 1$
- $B = (\mathbf{7}, \mathbf{5})$

3.3

- $PQ = \sqrt{3^2+4^2} = 5$ and $QR = \sqrt{4^2+(-3)^2} = 5$, so $PQ = QR$: isosceles
- $PR^2 = 7^2 + 1^2 = 50 = 5^2 + 5^2 = PQ^2 + QR^2$, so by the converse of Pythagoras the angle at Q is $90°$

3.4

- $2y = x + 4$ gives $y = \frac{1}{2}x + 2$, gradient $\frac{1}{2}$; perpendicular gradient $= -2$
- through $(0, 3)$: $\boldsymbol{y = -2x + 3}$
- $y = 0$: $2x = 3$, crossing at $(\mathbf{1.5}, \mathbf{0})$

3.5

- midpoint $= \left(\dfrac{2+6}{2}, \dfrac{1+9}{2}\right) = (4, 5)$
- gradient $AB = \dfrac{9-1}{6-2} = 2$, so the perpendicular gradient is $-\frac{1}{2}$