5.0 Calculator practice: Linear regression, systems of equations, cosine rule, frequency table statistics

1. Apply the law of cosines, $c^2 = a^2 + b^2 - 2ab\cos\theta$.

Working:

$a = 14.5$, $b = 4.7$, $\theta = 52°$. Find the third side length, c.

2. Perform a linear regression on the data in the table, finding $y = ax + b$.

Diploma score (x)	28	30	27	31	32	25	27
University entrance mark (y)	73.9	78.1	70.2	82.2	85.5	62.7	69.4

(a) Write down the value of a, b, and r. [3]

(b) Characterize the correlation coefficient. [1]

(c) Use your regression line to estimate y for $x = 29$. [2]

Working:

Answers:

(a) .....

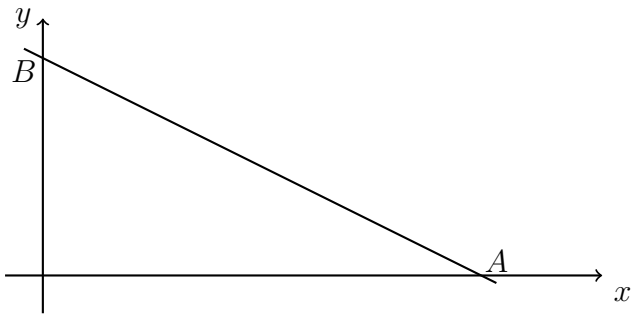
(b) .....

(c) .....

3. [Maximum mark: 6]

The diagram shows the straight line L_1, which intersects the x-axis at $A(k, 0)$ and the y-axis at $B(0, 3)$.

diagram is not to scale



The gradient of L_1 is $-\frac{3}{4}$.

(a) Write down the equation of the line L_1. [1]

(b) Find the value of k. [2]

(c) The line L_2 is perpendicular to L_1 and passes through $(2, 1)$.

i. Write down the gradient of the line L_2. [1]

ii. Hence, write down the equation of L_2. Leave your answer in the form $y - a = m(x - b)$. [2]

4. [Maximum mark: 7]

Let $f(x) = 2x + 8$ and $g(x) = \sqrt{x} - 1$, for $x \geq 0$.

(a) Write down $g(9)$. [1]

(b) Find $(f - g)(x)$. [1]

(c) Find $(g \circ f)(4)$. [1]

(d) Write down $g^{-1}(4)$. [2]

(e) Find $f^{-1}(x)$. [2]

Working:

Answers:

(a) .....

(b) .....

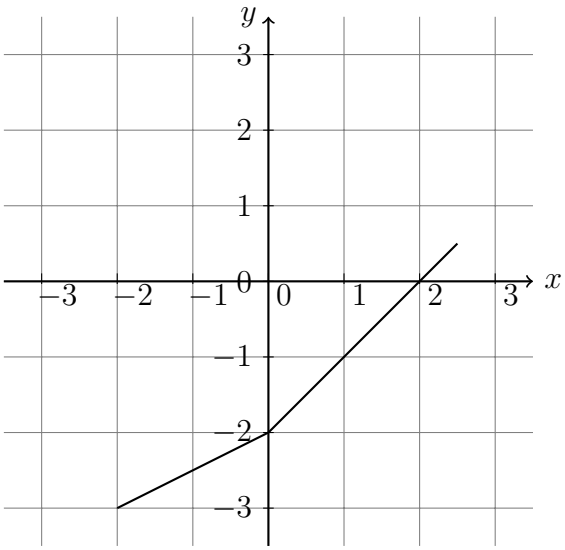
(c) .....

(d) .....

(e) .....

5. [Maximum mark: 6]

Early finishers: The diagram below shows the graph of a function f for $-2 \leq x \leq 2.5$.



(a) Write down the value of $f(2)$. [1]

(b) Write down the value of $f^{-1}(-1)$. [2]

(c) Sketch the graph of f^{-1} on the grid. [3]

Working:

Answers:

(a) .....

(b) .....