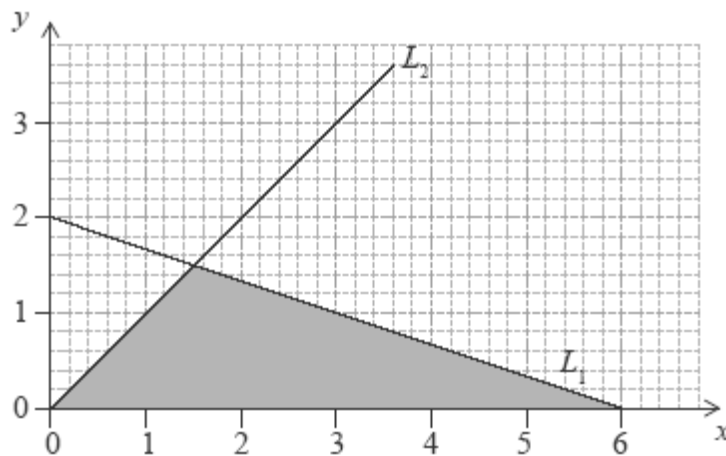


Simultaneous Equations

60 min
64 marks

1. The diagram shows the straight lines L_1 and L_2 . The equation of L_2 is $y = x$.



(a) Find

- (i) the gradient of L_1 ;
- (ii) the equation of L_1 .

(3)

(b) Find the area of the shaded triangle.

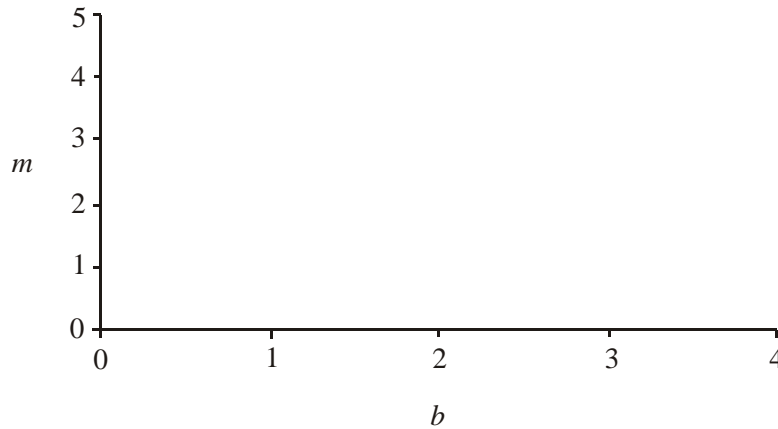
(3)

(Total 6 marks)

2. A store sells bread and milk. On Tuesday, 8 loaves of bread and 5 litres of milk were sold for \$21.40. On Thursday, 6 loaves of bread and 9 litres of milk were sold for \$23.40.

If b = the price of a loaf of bread and m = the price of one litre of milk, Tuesday's sales can be written as $8b + 5m = 21.40$.

- (a) Using simplest terms, write an equation in b and m for Thursday's sales.
(b) Find b and m .
(c) Draw a sketch, in the space provided, to show how the prices can be found graphically.



(Total 6 marks)

3. The equation of the line R_1 is $2x + y - 8 = 0$. The line R_2 is perpendicular to R_1 .

- (a) Calculate the gradient of R_2 .

(2)

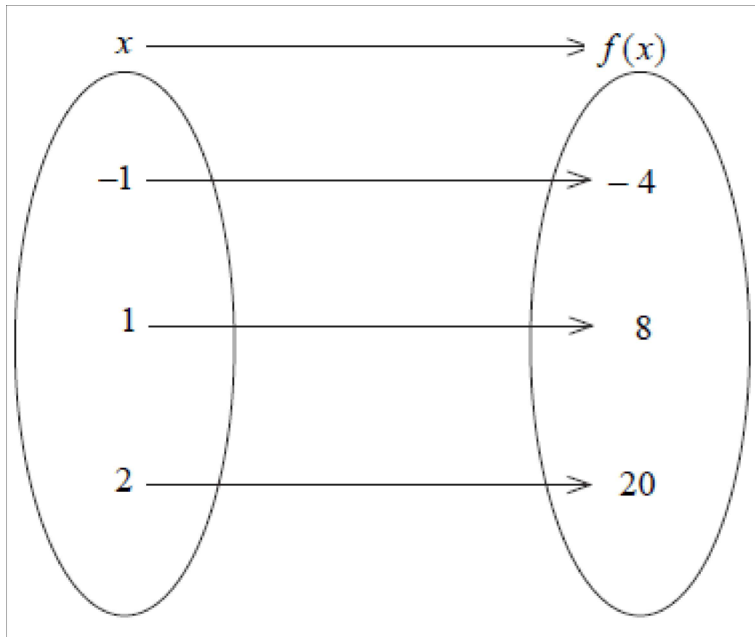
The point of intersection of R_1 and R_2 is $(4, k)$.

- (b) Find
(i) the value of k ;
(ii) the equation of R_2 .

(4)

(Total 6 marks)

4. A quadratic function, $f(x) = ax^2 + bx$, is represented by the mapping diagram below.



- (a) Use the mapping diagram to write down **two** equations in terms of a and b .

(2)

- (b) Find the value of

(i) a ;

(ii) b .

(2)

- (c) Calculate the x -coordinate of the vertex of the graph of $f(x)$.

(2)

(Total 6 marks)

5. The number of cells, C , in a culture is given by the equation $C = p \times 2^{0.5t} + q$, where t is the time in hours measured from 12:00 on Monday and p and q are constants.

The number of cells in the culture at 12:00 on Monday is 47.

The number of cells in the culture at 16:00 on Monday is 53.

Use the above information to

- (a) write down two equations in p and q ; (2)
- (b) calculate the value of p and of q ; (2)
- (c) find the number of cells in the culture at 22:00 on Monday. (2)

(Total 6 marks)

6. Jacques can buy six CDs and three video cassettes for \$163.17 or he can buy nine CDs and two video cassettes for \$200.53.

- (a) Express the above information using two equations relating the price of CDs and the price of video cassettes.
- (b) Find the price of one video cassette.
- (c) If Jacques has \$180 to spend, find the exact amount of change he will receive if he buys nine CDs.

(Total 6 marks)

7. Mal is shopping for a school trip. He buys 50 tins of beans and 20 packets of cereal. The total cost is 260 Australian dollars (AUD).

- (a) Write down an equation showing this information, taking b to be the cost of one tin of beans and c to be the cost of one packet of cereal in AUD. (1)

Stephen thinks that Mal has not bought enough so he buys 12 more tins of beans and 6 more packets of cereal. He pays 66 AUD.

(b) Write down another equation to represent this information. (1)

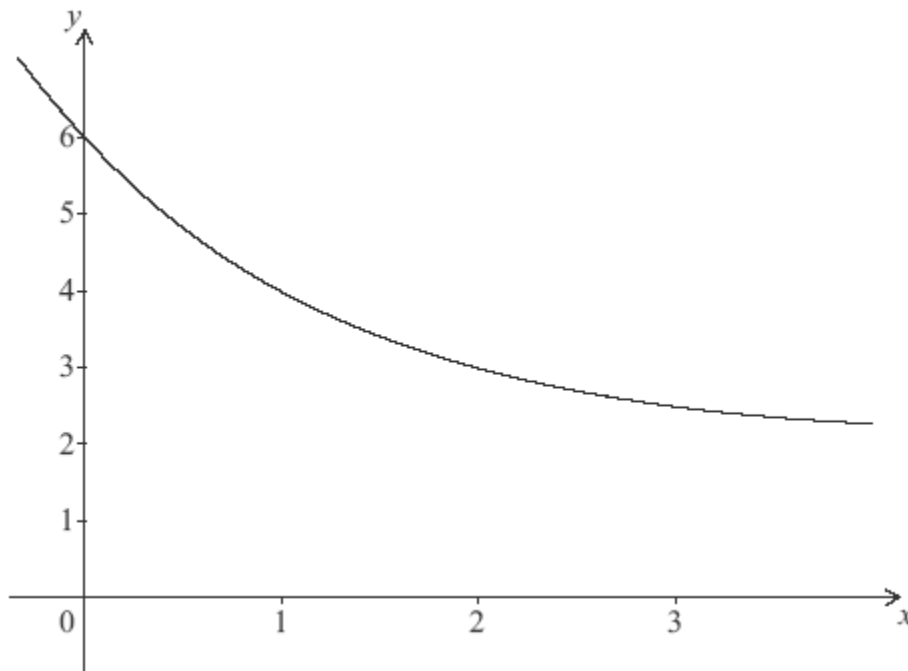
(c) Find the cost of one tin of beans. (2)

(d) (i) Sketch the graphs of these two equations.

(ii) Write down the coordinates of the point of intersection of the two graphs. (4)

(Total 8 marks)

8. Consider the function $f(x) = p(0.5)^x + q$ where p and q are constants. The graph of $f(x)$ passes through the points $(0, 6)$ and $(1, 4)$ and is shown below.



- (a) Write down two equations relating p and q . (2)
- (b) Find the value of p and of q . (2)
- (c) Write down the equation of the horizontal asymptote to the graph of $f(x)$. (2)
- (Total 6 marks)**

9. The cost c , in Australian dollars (AUD), of renting a bungalow for n weeks is given by the linear relationship $c = nr + s$, where s is the security deposit and r is the amount of rent per week.

Ana rented the bungalow for 12 weeks and paid a total of 2925 AUD.

Raquel rented the same bungalow for 20 weeks and paid a total of 4525 AUD.

Find the value of

- (a) r , the rent per week;
- (b) s , the security deposit.

(Total 8 marks)

10. 10 000 people attended a sports match. Let x be the number of adults attending the sports match and y be the number of children attending the sports match.

- (a) Write down an equation in x and y .

(1)

The cost of an adult ticket was 12 AUD. The cost of a child ticket was 5 AUD.

- (b) Find the total cost for a family of 2 adults and 3 children.

(2)

The total cost of tickets sold for the sports match was 108 800 AUD.

- (c) Write down a second equation in x and y .

(1)

- (d) Write down the value of x and the value of y .

(2)

(Total 6 marks)