La Scoula d'Italia / Huson / IB Math: Sequences First & last name:
7 October 2025 Grade:

1.5 Homework: Geometric sequences & algebra review, due Thursday 9 October

1. The second term of an arithmetic sequence is 9 and the fifth term is 31.

   (a) Find the value of the common difference. [2]

   (b) Find an expression for u_n, the n^{th} term. [3]

2. [Maximum mark: 6]

   The number of apartments in a housing development has been increasing by a constant amount every year. At the end of the first year the number of apartments was 150, and at the end of the sixth year the number of apartments was 600.

   The number of apartments, y, can be determined by the equation $y = mt + n$, where t is the time, in years.

   (a) Find the value of m. [2]

   (b) State what m represents **in this context**. [1]

   (c) Find the value of n. [2]

   (d) State what n represents **in this context**. [1]

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3. [Maximum mark: 6]

An iron bar is heated. Its length, L, in millimetres can be modelled by a linear function, $L = mT + c$, where T is the temperature measured in degrees Celsius (°C).

At 150°C the length of the iron bar is 180 mm.

(a) Write down an equation that shows this information. [1]

(b) At 210°C the length of the iron bar is 181.5 mm.

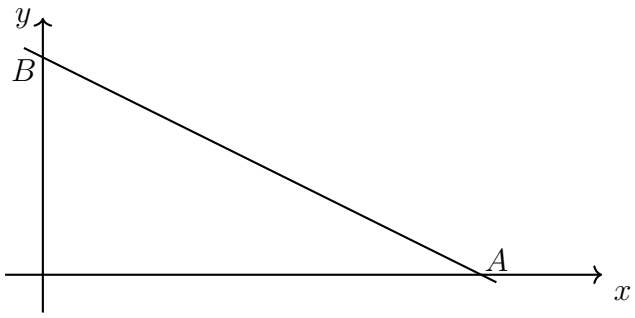
Write down an equation that shows this second piece of information. [1]

(c) Hence, find the length of the iron bar at 40°C. [4]

4. [Maximum mark: 5]

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

diagram is not to scale



The equation of L_1 is $y = -\frac{2}{5}x + 3$.

(a) Find the value of [2]

i. j

ii. k

(b) The line L_2 is perpendicular to L_1 and passes through $(4, 3)$.

i. Write down the gradient for 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]

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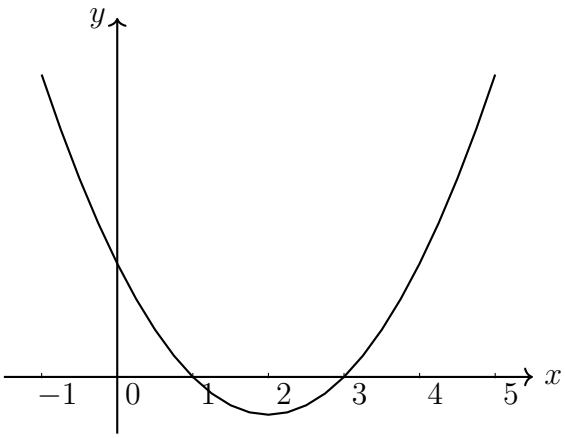
5. [Maximum mark: 6]

The diagram shows part of the graph of the quadratic function f.



The vertex is at $(2, -1)$ and the x-intercepts are at 1 and 3.

The function f can be written in the form $f(x) = (x - h)^2 + k$.

(a) Write down the value of h and k. [2]

The function can also be written in the form $f(x) = (x - a)(x - b)$.

(b) Write down the value of a and b. [2]

(c) Find the y-intercept. [2]