La Scoula d'Italia / Huson / IB Math: Sequences
10 October 2025

First & last name: Solutions
Grade:

1.7 Quiz: Sequences, Open book: notes and calculator allowed

1. A sequence is defined as follows: 3, 7, 11, 15, ...

   (a) Write down the first term u_1. [1]

   (b) Is the sequence arithmetic, geometric, or neither? [1]

   (c) Find the value of the next term in the sequence. [1]

   (d) Find a general expression for u_n, the n^{th} term. [3]

(a) 3

(b) arithmetic

(c) $15+4=19$

(d) $u_n = 3+(n-1)4$

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3. The fourth term of a geometric sequence $u_4 = 108$ and the fifth term $u_5 = 162$.

   (a) Find the common ratio r. [1]

   (b) Find the first term in the sequence. [3]

   (c) Hence, find a general expression for u_n, the n^{th} term. [2]

(a) $r = \frac{162}{108} = \frac{3}{2}$

(b) $u_4 = u_1 \cdot \left(\frac{3}{2}\right)^{4-1} = 108$

$u_1 = 32$

(c) $u_n = 32 \cdot \left(\frac{3}{2}\right)^{n-1}$

2. The first three terms of a geometric sequence are 27, 9, 3, ...

(a) Find the common ratio r. [2]

(b) Find the next two terms in the sequence. [2]

(c) Find a general expression for u_n, the n^{th} term. [2]

(a) $r = \frac{9}{27} = \frac{1}{3}$

(b) $u_4 = 3 \cdot \frac{1}{3} = 1$

$u_5 = 1 \cdot \frac{1}{3} = \frac{1}{3}$

(c) $u_n = 27 \cdot \left(\frac{1}{3}\right)^{n-1}$

4. In an arithmetic sequence $u_5 = 38$ and $u_{13} = 86$.

(a) Find the common difference. [2]

(b) Find u_1, the first term of the sequence. [2]

(c) Find the largest term in the sequence that is less than 200. [2]

(a) $u_5 = u_1 + (5-1)d = 38$

$u_{13} = u_1 + (13-1)d = 86$ ↓ subtract

$8d = 48$

$d = 6$

method 1

method 2 $d = \frac{86-38}{13-5} = \frac{48}{8} = 6$

(b) $u_5 = u_1 + (5-1)6 = 38$

$u_1 = 14$

(c) $u_n = 14 + (n-1)6 < 200$

$n-1 < \frac{200-14}{6} = 31$

$n < 32$

$n = 31$

$u_{31} = 14 + (31-1)6 = 194$

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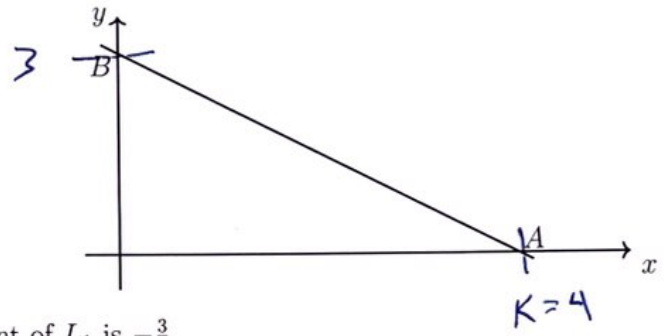
Challenge: Linear equations and quadratic functions

5. 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]

(a) $y = -\frac{3}{4}x + 3$

(b) $y = -\frac{3}{4}x + 3 = 0$

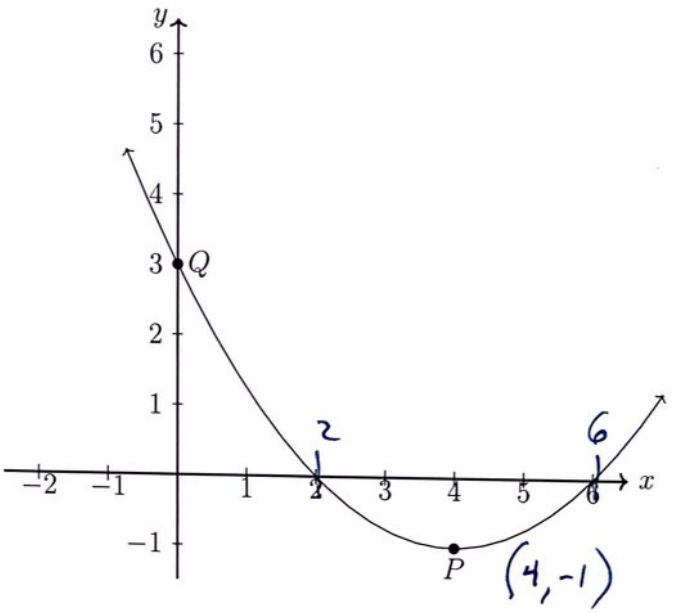
$x = 4$, $k = 4$

(c) i) $m_\perp = \frac{4}{3}$

ii) ~~$y - 3 = \frac{4}{3}(x - 4)$~~

$y - 1 = \frac{4}{3}(x - 2)$

6. Let f be a quadratic function. Part of the graph of f is shown below. The vertex is at $P(4, -1)$ and the y-intercept is at $Q(0, 3)$.



(a) The function f can be written in the form $f(x) = a(x - h)^2 + k$. Write down the value of h and of k.

(b) Find a.

(c) Find the zeros of the function f, such that $f(x) = 0$.

(a) $h = 4$, $k = -1$

(b) $f(0) = a(0-4)^2 - 1 = 3$

$16a = 4$

$a = \frac{1}{4}$

(c) $f(x) = \frac{1}{4}(x-4)^2 - 1$

$= \frac{1}{4}x^2 - 2x + 4 - 1$

$= \frac{1}{4}(x^2 - 8x + 12)$

$= \frac{1}{4}(x-2)(x-6)$ $\quad x = 2, 6$