

**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]

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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  $n^{\text{th}}$  term. [2]

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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  $n^{\text{th}}$  term. [2]

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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]

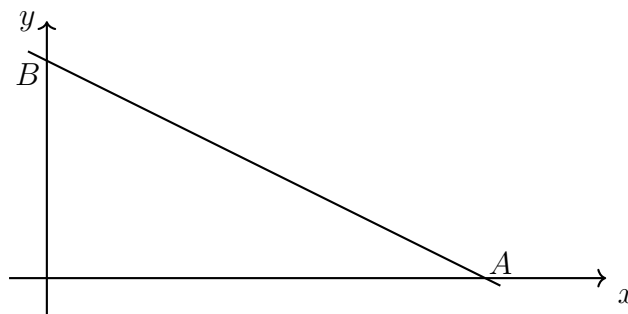
(c) Find the largest term in the sequence that is less than 200. [2]

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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]

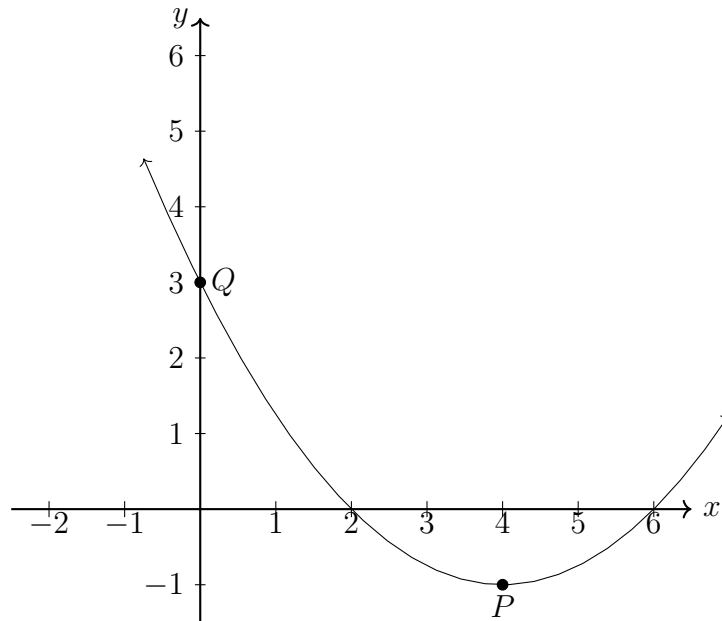
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6. Let  $f$  be a quadratic function. Part of the graph of  $f$  is shown below. The vertex is at  $P(4, -1)$  and the  $y$ -intercept is at  $Q(0, 3)$ .



- (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  $f(x) = 0$ .

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