

SEVENOAKS SCHOOL



SIXTH FORM ENTRANCE TEST
for entry into Lower Sixth (Year 12) in September 2022

MATHEMATICS

Higher Level

NAME (IN CAPITALS):

Candidate number:

School:

Curriculum:
(eg (I)GCSE, MYP, your national curriculum or Not Studied)

Time allowed: 30 minutes

Equipment needed: Pen, pencil, eraser

Information for candidates:

Calculators are NOT allowed.

Write your name, school and the curriculum you follow on this page.

There are FIVE questions. Each question is worth 5 marks. You are advised to concentrate on **two/three** questions giving FULL written solutions to each problem but you can attempt more if you have time.

The following formula may be useful:

nth term of an arithmetic progression

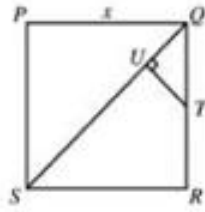
$$u_n = u_1 + (n - 1)d$$

where u_1 is the first term and d is the common difference

1. The ratio of the fifth term to the twelfth term of an arithmetic sequence is $\frac{6}{13}$. If each term of this sequence is positive, and the product of the first term and the third term is 32, find the sum of the first 100 terms of this sequence. [5 marks]

2. The positive numbers x and y satisfy the equations $x^4 - y^4 = 2009$ and $x^2 + y^2 = 49$. Find the value of $\frac{x}{y}$, giving your answer in the form $a\sqrt{b}$ where a and b are rational numbers. [5 marks]

3. A square $PQRS$ has sides of length x . T is the midpoint of QR and U is the foot of the perpendicular from T to QS . Find, in terms of x , the area of the quadrilateral $SUTR$. [5 marks]



4. For the sequence 7, 13, 19, 25, ..., prove algebraically that the difference between the squares of any two consecutive terms is always a multiple of 24. [5 marks]

5. A semicircle of radius r is drawn with centre V and diameter UW . The line UW is then extended to the point X , such that UW and WX are of equal length. An arc of the circle with centre X and radius $4r$ is then drawn such that the line XY is a tangent to the semicircle at Z , as shown in the diagram below. Find, in terms of r , the area of triangle YVW . [5 marks]

