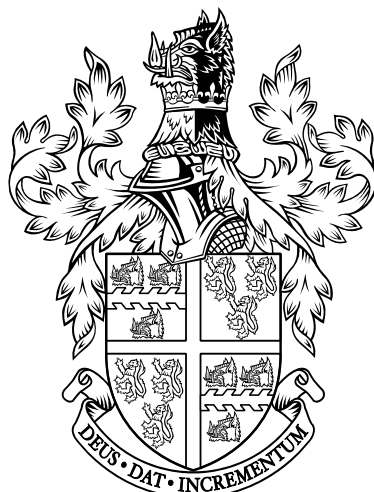




TONBRIDGE SCHOOL

Paper for Entrance into Year 12

Sample Paper Maths

Name:

School:

Answer **ALL** questions.

Do all your workings in the spaces provided.

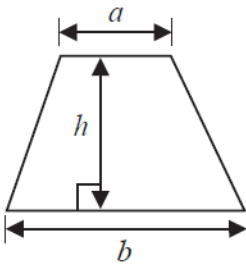
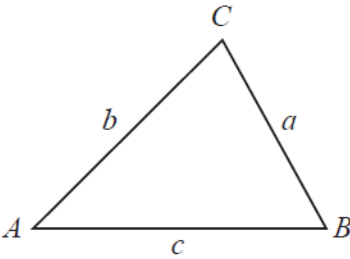
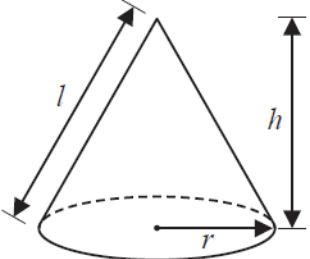
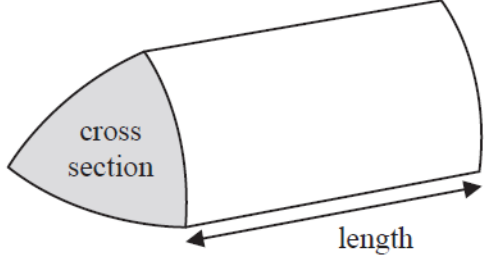
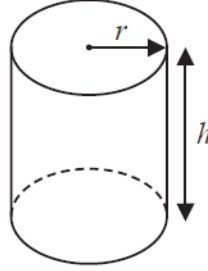
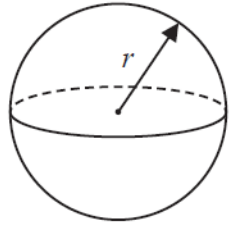
Total marks: 60

Time: 60 minutes.

You are allowed to use a calculator in this exam.

A list of useful formulae will be found on page 2.

Formulae sheet – Higher Tier

Arithmetic series Sum to n terms, $S_n = \frac{n}{2} [2a + (n - 1)d]$	Area of trapezium $= \frac{1}{2}(a + b)h$ 
The quadratic equation The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	In any triangle ABC Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$ Area of triangle $= \frac{1}{2}ab \sin C$ 
Volume of cone $= \frac{1}{3} \pi r^2 h$ Curved surface area of cone $= \pi r l$ 	Volume of prism $= \text{area of cross section} \times \text{length}$ 
Volume of cylinder $= \pi r^2 h$ Curved surface area of cylinder $= 2\pi r h$ 	Volume of sphere $= \frac{4}{3} \pi r^3$ Surface area of sphere $= 4\pi r^2$ 

SECTION A (60 marks)

Q1)

Expand and simplify:

$$(2x + 1)^2 - (x + 1)(x - 2)$$

_____ [3]

Q2)

Write as a single fraction in its simplest form:

$$\frac{4}{3x} + \frac{5}{2x}$$

_____ [2]

Q3)

Solve:

$$\frac{3}{x + 7} = \frac{5}{x - 1}$$

_____ [3]

Q4) Factorise fully:

a) $2x - 4x^2$

_____ [1]

b) $3x^2 - x - 2$

_____ [2]

c) $50p^4 - 18q^2$

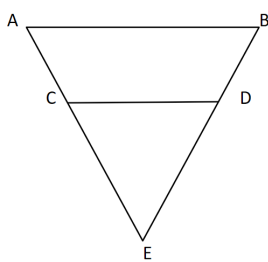
_____ [2]

Q5)

In the diagram below, AB and CD are parallel. The ratio of the area of ABCD to the area of CDE is 9:16.

The length of ED is 6 cm. Calculate the length of DB.

Note the diagram is not to scale.



_____ [4]

Q6)

Find the equation of the line perpendicular to $2y + 3x = 5$ that passes through $(6,1)$. Give your answer in the form $ax + by + c = 0$, where a, b and c are integers.

_____ [5]

Q7) a) Write the expression below in the form $\sqrt{k}$. You must show full working.

$$\frac{27}{\sqrt{3}} - \sqrt{75}$$

_____ [4]

b) Solve $x^2 + 2x \geq 3$

_____ [3]

Q8)

A die is biased so that the probability of getting a six is $\frac{1}{5}$. I roll the die three times. Calculate the probability I get at least two sixes.

_____ [4]

Q9)

Find the coordinates of the points of intersection of $y + 2x = 5$ and $x^2 - 3y^2 = 6$.

You must show full algebraic working!

_____ [6]

Q10)

Find the coordinates of the point(s) on the curve $y = \frac{6}{x}$ where the gradient is $-\frac{3}{4}$.

_____ [4]

Q11)

The values of P and Q are given below correct to one decimal place. The value of R is correct to one significant figure. Find the greatest possible value of S . Give your answer to three decimal places.

$$P = 1.5, Q = 2.7, R = 20$$

$$S = \frac{2P}{R - Q}$$

_____ [3]

Q12) I walk 300m on a bearing of 070 degrees. I then walk 500m on a bearing of 120 degrees. On what bearing must I walk to get back to where I started?

_____ [6]

Q13)

Solve

$$\frac{3 \times 3^x}{9^{2x}} = \frac{1}{\sqrt{3}}$$

_____ [4]

Q14)

The seventh term of an arithmetic sequence is 43. The 13th term of the sequences is 25.

Find the greatest possible value of S_N

_____ [4]