Name: ..........................  School: ..........................

TONBRIDGE SCHOOL

Test for Entrance into Year 9 in September 2015

MATHEMATICS

Time allowed: 1 hour

Total Marks: 100

THIS IS A NON-CALCULATOR PAPER

Instructions:

1. Complete Name and School at the top of the cover page.

2. All questions should be attempted and answers given in the space provided.

3. A completely correct answer may receive no marks unless all workings are shown.
1. (a) Write 45\% as a fraction in lowest terms.

Answer: ……………………………….   (2)

(b) Write $\frac{5}{8}$ as a decimal.

Answer: ……………………………….   (2)

(c) Calculate 30\% of $12.50$.

Answer: $……………………………….   (2)$

(d) Calculate $\frac{7}{15}$ of 4.5 metres.

Answer: ……………………………….   (2)
2. (a) By **first writing each number correct to 1 significant figure**, estimate the answer to

\[
\begin{array}{c}
11.4 \\ 194 \\ \hline \\
93.1
\end{array}
\]

Answer: ……………………………….   (3)

(b) Calculate \(2^3 \times 3\sqrt{27}\).

Answer: ……………………………….   (2)

(c) Write 300 as a product of prime factors, **using indices**.

Answer: ……………………………….   (3)

(d) What is the smallest integer by which 300 has to be multiplied by to produce a perfect square ?

Answer: ……………………………….   (2)
3. (a) It takes 2 hour 27 minutes to travel from York to London by train. Christopher catches the 11.35 a.m. train from York.

At what time should Christopher arrive in London?

Answer: ……………………… p.m. (2)

(b) A race horse averages 2 miles every 5 minutes. How long will it take the horse to run 26 miles at this rate?

Answer: ……… h ………… min (2)

(c) How far does a car travel in 35 minutes at 30km/h?

Answer: ……………………… km (2)

(d) Write 40km/h as a speed in metres per second.

Answer: ……………………… m/s (2)
4. Calculate

(a) the sum of 73.5 and 9.74

Answer: ……………………… (1)

(b) the difference between 84 and 7.7

Answer: ……………………… (1)

(c) the product of 4.3 and 7

Answer: ……………………… (1)

(d) $24 \div 0.4$

Answer: ……………………… (2)
5. (a) **Fully** simplify the following:

(i) \(2m + 3m\)

Answer: ………………………. (1)

(ii) \(3y^3 \times 3y^3\)

Answer: ………………………. (2)

(iii) \(\frac{9y^6}{3y^2}\)

Answer: ………………………. (2)

(b) Multiply out the brackets **and fully simplify**

\[2(3p + 4q) - 6(p - 2q)\]

Answer: ………………………. (3)

(c) Factorise **completely**

\[9a^2 + 27a\]

Answer: ………………………. (2)
6. (a) Solve the following:

(i) $5a - 3 = 21 - a$

Answer: $a = \ldots \ldot
(b) Solve these inequalities:

(i) \( n + 2n > 9 \)

Answer: ……………………… (2)

(ii) \( 2(n - 3) \leq 6 \)

Answer: ……………………… (2)

7 (a) 60 sweets are to be divided between two people in the ratio of 5:7. How many sweets do each of the two people receive?

Answers: …………… and ……….. (2)

(b) When £143 is divided in the ratio 2:4:5, what is the difference between the largest share and the smallest share?

Answer: ……………………… (3)
8. Below is a picture of a regular octagon.

Calculate the size of the angles $x$, $y$ and $z$

Answers: $x = \text{.........} \quad (2)$

$y = \text{......} \quad (2)$

$z = \text{......} \quad (2)$
9. Given that \( a = \frac{2}{5} \) and \( b = \frac{3}{4} \) and \( c = \frac{1}{3} \), find the value of

(a) \( a + b \)

Answer: ……………………….   (2)

(b) \( \frac{12}{c} \)

Answer: ……………………….   (1)

(c) \( \frac{b}{c} \)

Answer: ……………………….   (2)

(d) \( abc \)

Answer: ……………………….   (2)
10. In the desert, every soldier drinks \( \frac{3}{5} \) of a litre of water each day.

An army patrol drinks 18 litres in a day

How many soldiers are there in the patrol?

Answer: ......................... (2)

11. A fair, six-sided dice has faces numbered 1, 2, 3, 4, 5 and 6. When the dice is thrown, the number facing up is the score.

The dice is thrown once.

(a) What is the probability that the score is 1 or 2

Answer: ......................... (1)

(b) If the dice was thrown 300 times, how many times would a score of 5 be expected?

Answer: ......................... (1)
12. **By first drawing a set of axes**, draw the line defined by the equation

\[ y = 2x + 5 \]

showing the coordinates where the line intercepts the axes.
13. The following graph is to be drawn

\[ y = 2x^2 - 3x \]

a) Complete the table

<table>
<thead>
<tr>
<th></th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x^2 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 2x^2 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 3x )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( y )</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

b) By first drawing a set of axes, then plotting appropriate points based on the information in the above table, draw the graph for the values \(-2 \leq x \leq 3\)
14. The wage bill for five builders and six carpenters is £1,340, while the bill for eight builders and three carpenters is £1,220. What wage is paid to each builder?

Answer: ................................. (4)
15. A sequence begins:

5 8 11 14 …… ……

(a) Write down a formula for the $n$th term

Answer: ………………………… (2)

(b) Calculate the 25$^{th}$ term

Answer: ………………………… (1)

(c) Find the value of $n$ when the $n$th term equals 146

Answer: ………………………… (2)

(d) Determine the value of the first term which is greater than 1000

Answer: ………………………… (2)
16. A unit fraction is one like $\frac{1}{4}$ with numerator 1.

(a) Write 1 as the sum of three different unit fractions

Answer: …………………………. (2)

(b) By multiplying your answer to (a) by a suitable unit fraction, write $\frac{1}{6}$ as the sum of three different unit fractions

Answer: …………………………. (2)

(c) Use your answers to (a) and (b) to write 1 as the sum of five different unit fractions

Answer: …………………………. (3)

END OF PAPER