

# MATHEMATICS.

## ARITHMETIC.

### Ib.

[Time allowed—1 hour 40 minutes.]

Six questions may be answered, and the marks will be awarded on the first six answers left uncanceled. The paper is divided into three sections, A, B, and C, the questions in Section A carrying least, and those in Section C most marks.

Tables of Measures, Constants, and Formulae will be supplied, and Tables of Logarithms may be obtained from the Superintendent.

#### SECTION A.

1. Indicate two different methods which may be used to determine the greatest and the least of the fractions :

$$\frac{37}{89}, \frac{67}{157}, \frac{47}{113}$$

Arrange the three fractions in order of magnitude.

2. Calculate to four places of decimals the value of each of the following :—

$$(a) \quad 1 + \frac{1}{1} + \frac{1}{1 \times 2} + \frac{1}{1 \times 2 \times 3} + \frac{1}{1 \times 2 \times 3 \times 4} + \dots \text{ etc.}$$

$$(b) \quad 1 - \frac{1}{1} + \frac{1}{1 \times 2} - \frac{1}{1 \times 2 \times 3} + \frac{1}{1 \times 2 \times 3 \times 4} - \dots \text{ etc.}$$

State the number of terms you find it necessary to take to attain the required degree of accuracy in each case.

#### SECTION B.

3. A French Company charges 150 francs to carry 10,000 kilograms a distance of 277 kilometres, and an English Company charges £37 to carry 100 tons 245 miles. By how much per cent. is the French rate higher or lower than the English ?

[£1 = 88.5 francs.]

4. Write down six Multiples of 24. Find how many Common Multiples of 24 and 33 lie between 5,000 and 20,000, and write down the two smallest and the two largest of those Multiples.

Examine whether any complete square between 5,000 and 20,000 is divisible by both 24 and 33.

[Turn over.]

5. Make a rough estimate of the value of each of the following:—

(i) By what percentage is 36,298,374 less than 40,364,281?

(ii) 
$$\frac{\sqrt{39 \cdot 62891} + \sqrt[3]{70 \cdot 81}}{37 \cdot 2846 \times 0 \cdot 248}$$

(iii) Find the price of 3 cwt. 3 qrs. 17 lbs. of sugar at  $5\frac{3}{4}$  pence per lb.

Indicate clearly how you arrived at the result in each case.

6. During a certain period of the year a clock loses time at an average rate of  $48 \cdot 4$  seconds per day between the hours of 10 a.m. and 7 p.m., and gains at the average rate of  $x$  seconds per day during the remainder of the day. If the clock shows the correct time at 12 noon each day, what is the value of  $x$ ?

#### SECTION C.

7. Two long uniform linear scales,  $A$  and  $B$ , are placed edge to edge. Readings of  $67 \cdot 4$  and  $84 \cdot 1$  on  $A$  coincide respectively with readings of  $32 \cdot 7$  and  $56 \cdot 3$  on  $B$ : find

(i) what reading on  $B$  coincides with 100 on  $A$ ,

(ii) what reading on  $A$  coincides with 0 on  $B$ ,

(iii) what reading is the same on both scales.

8. At a section of a river near its mouth the breadth is 173 feet, and the average depth is 7·6 feet. The current flows at an average rate of 2·5 miles per hour. What weight of water, in tons, is discharged annually by the river?

What area of country is drained by the river if the annual rainfall is 22 inches and 34 per cent. of the rainfall fails to reach the sea owing to evaporation?

9. A property,  $P$ , worth £26,387 on January 1st, 1925, is decreasing in value at the rate of  $3\frac{1}{2}$  per cent. per annum. Another property,  $Q$ , worth £18,495 on the same date, is increasing in value at the rate of  $8 \cdot 4$  per cent. per annum. Find (i) the values of  $P$  and  $Q$   $3\frac{1}{4}$  years later, and (ii) when will  $P$  and  $Q$  be equal in value.