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UNIVERSITIES OF MANCHESTER LIVERPOOL
LEEDS SHEFFIELD AND BIRMINGHAM

JOINT MATRICULATION BOARD

GENERAL CERTIFICATE OF EDUCATION

MATHEMATICS, SYLLABUS I (ARITHMETIC)

ORDINARY

Thursday 17 June 1954 2—4

(Mathematical tables provided)

Answer ALL questions in Section A and any THREE questions from Section B.

In Questions 1, 2 and 3 a candidate need not write down more of his working than he finds necessary; in all other questions full explanations and all necessary details of working are required.

Section A.

Mathematical tables must NOT be used in this section.

A 1. (*a*) Find the exact value of $3650{\cdot}4 \div 7{\cdot}2$.

(*b*) Simplify $3\frac{1}{12} - (1\frac{1}{3} \times 1\frac{5}{8})$.

(*c*) Express 1s. $10\frac{1}{2}$d. as a fraction of 3s. $1\frac{1}{2}$d. Give your answer in its lowest terms.

(*d*) Calculate the exact cost of 3 tons 16 cwt. of goods at £1. 17s. 6d. per ton.

A 2. (*a*) Calculate the length of the circumference of a circular pond 21 ft. in diameter. [Take π as $\frac{22}{7}$]

(*b*) A man takes 1,000 equal paces in walking half a mile. How long is each pace, in inches, correct to the nearest inch?

(*c*) Calculate the amount of £500 after 2 years at 4 per cent. per annum compound interest.

(*d*) A man made 17 per cent. profit on his cost price when he sold an article for £526. 10s. 0d. What had it cost him?

A 3. (*a*) A greengrocer bought a sack containing 1 cwt. of potatoes for 10s. 0d. He sold the potatoes at $1\frac{1}{2}$d. per lb. How much profit did he make?

(*b*) A bottle of salad dressing bears a label describing the weight of the contents as 6 oz. and also as 170 gm. From this information calculate the number of grams which are equivalent to 1 lb.

(*c*) A rectangular field is 200 yd. long and 121 yd. wide. Calculate its area in acres.

(*d*) Three children, aged respectively 15 years, 11 years and 3 years, received a legacy of £899 divided between them in proportion to their ages. How much did the youngest child receive?

A 4. A man made a journey of 80 miles. He walked at 4 m.p.h. for $1\frac{1}{2}$ hours, cycled the next 25 miles at 12 m.p.h. and completed the journey by car. His average speed for the whole journey was 15 m.p.h. Calculate the average speed of the car.

A 5. An English tourist in France had to pay 1,435 francs for a taxi journey of 35 km. The rate of exchange was 984 francs to the £. Taking 8 km. as equivalent to 5 miles, calculate the cost of the journey in pence per mile.

Section B.

Answer any THREE questions from Section B.

Mathematical tables must NOT be used in Questions 6 and 7.

B 6. A housewife bought for jam-making 8 lb. of raspberries at 2s. 2d. per lb. She also used 2 lb. of apples costing 5d. per lb. and 10 lb. of sugar costing $6\frac{1}{2}$d. per lb. She added some water weighing 1 lb. and after boiling she had 16 lb. of jam. She estimated that twopennyworth of gas had been used. Calculate (i) how much she saved by making her own jam instead of buying 16 lb. of jam at 1s. 9d. per lb., (ii) the percentage reduction in weight due to boiling, giving your answer correct to the nearest whole number.

B 7. A bookseller purchasing from a publisher is allowed $33\frac{1}{3}$ per cent. discount on the list price of books. He sells to the general public at the list price, but to schools he allows a discount of 10 per cent. on the list price. Calculate his percentage profit on his cost price in dealing with schools.

A certain book is listed at 7s. 6d. The bookseller buys 6 gross. Of these he sells 4 gross to schools, 200 to the general public and the rest later as " shop soiled " at 2s. 6d. each. Calculate his total gain in this transaction.

[Turn over

B 8. *In this question take* π *as* 3·142.

(*a*) The surface area of a ball is 40·0 sq. cm. Calculate the radius of the ball correct to the nearest millimetre.

[The surface area of a sphere is given by the formula $A=4\pi r^2$.]

(*b*) A metal water pipe 10 ft. long is of circular cross-section. Its external diameter is 8 in., and the thickness of the metal is $\frac{3}{8}$ in. The density of the metal is 460 lb. per cu. ft. Calculate the weight of the pipe, correct to the nearest lb.

B 9. A quadrilateral *PQRS* has $PS=SR$, the diagonal $PR=8$ cm., $\angle PSR=\angle PQR=90°$, $\angle QRP=71°$. The line *QN* drawn perpendicular to *PS* meets *PS* at *N*. Calculate (i) *QR*, (ii) *RS*, (iii) *QN*, giving each answer correct to three significant figures.

B 10. A ship moving in still water travels 5·3 miles due north and then 7·2 miles on a bearing N 62° E. It then returns in a straight line to its starting point. Calculate the bearing and length of the return route, as accurately as the tables allow.

B 11. The foot *A* of a vertical tower *AB* is on one bank of a straight stretch of a river 68 ft. wide. The point *C* is on the other bank of the river immediately opposite *A*. The point *D* is on the same bank as *C* and $\angle CDA=53°$. The angle of elevation of *B* from *C* is 34°. Calculate (i) *AB*, (ii) *AD*, (iii) the elevation of *B* from *D*, as accurately as the tables allow.