THE LIVERPOOL INSTITUTE

Margaret Bryce Smith Scholarships, 1953

ARITHMETIC

Section B

Time allowed—1¼ Hours

Put your name and initials and your number on each sheet of paper which you use.

Remember to turn over.

1. Electricity is charged at $4\frac{1}{2}d$. a unit for the first 60 units, then at $\frac{3}{4}d$. a unit for the remaining units used. If my bill is £1. 12s. 9d., how many units of electricity have I used ?

2. Tom has 7s. 10d. and Jack has 3s. 5d. How much must Tom give to Jack so that Jack may have four times as much as Tom ?

3. A bus conductor collects fourpenny, fivepenny, and sixpenny fares, the total amount being £1. 0s. 9d. If the number of fourpenny fares is the same as the number of fivepenny fares, but there are nine more sixpenny fares than there are fourpenny fares, how many passengers are there on the bus ?

4. The working day at a factory is raised from 7 hours to 8 hours ; as a result, each man now produces 9 articles an hour instead of 10 an hour, but, as before, he is paid according to the number of articles which he produces. If one man's weekly wage used to be £7, what is it now ? Another man finds that he earns 7s. a week more than he did. What does he earn now ?

5. A grain merchant packs his grain in boxes of the same size. 47 lb. of barley would fill a box, 38 lb. of oats would fill a box, and 60 lb. of wheat would fill a box. A mixed amount of grain weighs 1,800 lb., the barley occupying twice as much space as the oats and two and a half times as much space as the wheat. How many boxes would the mixed grain fill ?

1 H 2   **Turn over.**

6. Mary and Jane arrange to walk from their homes to the town hall where they meet at 4 p.m. Both walk there at 4 miles an hour. Mary lives half a mile farther from the town hall than Jane. If Jane sets out at 3.30 p.m., at what time should Mary start? How far from the town hall does Jane live? At what time will Mary reach home if she starts back at 5.20 p.m. and walks at 3 miles an hour?

7. The following statements show a method of multiplying 2 by 2, 3 by 3, and 4 by 4:

$$2 \times 2 = 1 \times 3 + 1 = 4.$$
$$3 \times 3 = 2 \times 4 + 1 = 9.$$
$$4 \times 4 = 3 \times 5 + 1 = 16.$$

Using this method, and showing the steps as above, multiply 999999 by 999999.

8. (i) What fraction is the area of the inner square *PQRS* of the area of the outer square?

(ii) The area of a circle may be taken to be eleven-fourteenths that of the square into which it just fits. If the area of *ABCD* is 196 sq. in., what is the area of the shaded part marked X?

(iii) What is the area of the shaded part marked Y?