

# SHREWSBURY SCHOOL.

## ARITHMETIC PRIZE, 1923.

1.  $\pi = 3.14159265 -$   
 $e = 2.7182812$

Find correct to 4 significant figures :—

(1)  $\pi \times e.$       (2)  $\frac{e}{25\pi}$

2. At an election there are 25 electors, each of whom voted for 2 out of 3 candidates A, B and C. A received 18, B 17, and C 15 votes. How many electors voted for each pair of candidates ?

3. From April 1, 1908, to March 31, 1909, the numbers of letters, etc., delivered by the Post Office were estimated as follows—

England and Wales	...	2,482 $\frac{6}{10}$	millions
Scotland	...	256 $\frac{9}{10}$	"
Ireland	...	167 $\frac{9}{10}$	"

and the average numbers of letters, etc., delivered per head of the population as :—

England and Wales	...	70.
Scotland	...	53.
Ireland	...	38.

From these data estimate the number of letters delivered per head of the whole population of Great Britain and Ireland combined.

4. Three bells begin tolling at rates 50, 55, and 65 times per min. respectively. How soon will they next toll together ?

5. A man invested £250 in German Marks  $2\frac{1}{2}$  years ago withdrawing his money from an investment yielding 5%. The exchange then stood at 250 Marks to the £. What is his total loss if he has to sell out now when exchange is at 100,000 Marks to the £ ?

6. A shop-keeper pays £2,000 for stock, and fixes selling price of each article so as to make 25% profit on it. His receipts for the year are £1,600 and he has £20 interest from the bank where he deposits these receipts. At the end of the year to clear stock he allows 25% discount on goods and his receipts are £400. How much of his original stock is left and what is his profit per cent on total goods sold ?

7. A hot water cistern holding 50 gallons can be filled by its inlet pipe in an hour. The inlet pipe runs whenever the cistern is not full. 20 gallons is run into a bath in 5 minutes. How long afterwards will it be before the cistern is again full ?

8. A man wants to pay £1,150 for a house and he wants to get the money by selling  $2\frac{1}{2}$ % consols at 58. How much stock must he sell, and what would be his quarterly income derived from it ? (Answer to nearest penny).

9. The average daily rainfall for a week was 0.025 inches, and for the first three days of the next week 0.531 inches. What was the average daily rainfall for the next 4 days if for the whole fortnight it was 0.184 inches ?

10. The law of cooling of a body may be stated as follows :— During each second the decrease in temperature is proportional to the excess of temperature of the body over its surroundings at the beginning of the second. A body decreases in temperature from  $80^\circ$  to  $70^\circ$  in 5 minutes. What will be the temperature after  $\frac{1}{4}$  of an hour, and when will the temperature be  $40^\circ$ , if the surrounding temperature is always  $20^\circ$ . (Logarithms may be used).

11. A cube will just fit into a sphere of radius one foot. What is the length of a side of the cube ?