

Shrewsbury School.

ARITHMETIC PRIZE, 1933.

(All working must be shewn. Take $\pi = \frac{22}{7}$.)

1. Three tramps meet together for a meal. The first has 5 loaves, the second has 3, and the third, who has his share of the bread, pays the others 4d. How ought they to divide the money?

2. A number consists of certain digits, the left-hand digit being 2. When the number is multiplied by 3 the result is a number consisting of the same digits in the same order, except that the 2 has now become the right-hand digit. Find the number, explaining your reasoning.

3. I have 6 lbs. of tea at $1/8$ per lb. and 10 lbs. at $1/6$ per lb. How much tea at $2/-$ per lb. must I mix with these so that the value of the whole mixture may be $1/9$ per lb.?

4. The marks of a form range from 539 to 217 and they have to be "scaled" so that the top boy gets 700 and the bottom boy 100. Describe a convenient method by which this can be done, and use your method to find the final mark of a boy who originally gets 412.

5. A marquee with semicircular ends is 62 feet wide and 214 feet long. Its sides are vertical to a height of 8 feet; its canvas roof is carried up to a ridge 25 feet above the ground, equal in length to the straight portions of the sides. Two per cent. must be deducted from the volume calculated from the above figures to allow for the sag of the canvas. How many people will the marquee hold if each is allowed 90 cubic feet of space?

6. Two solid lead spheres, of radii 2" and 4", are melted down and recast as a solid right circular cylinder of height 6". Show that the surface exposed is unaltered.

7. ABCD represents a square field whose diagonal is 280 yards long. Right in the middle of the field is a circular pond 140 yards in diameter. At the edge of the pond nearest to C is a man: at D is a pig: at A is an open gate. The man and the pig start running for the gate simultaneously, each taking the shortest possible route, the man at 12 m.p.h. and the pig at 9 m.p.h. Which gets to the gate first, and how long before the other?

8. A man sells some 5% stock at 88 and some 4% stock at 99, realising the same sum from each sale. He invests the proceeds in a $3\frac{3}{4}$ % stock. What must be the price of this if his income is to be the same as before?

9. A tradesman's expenses are 12% of his receipts, and he allows his customers 5% for cash: how much per cent. above cost price must he mark his goods to make a profit of 10% on his capital?

10. A sum of money is put out at Compound Interest. The first year's interest was £65 2s. 1d. and the fourth year's interest £73 4s. 8d. Find the sum and the rate per cent.