Shrewsbury School.

ARITHMETIC PRIZE.

March, 1915.

[The use of Algebraical symbols is allowed, but preference will be given to work which does not contain unnecessary Algebraical methods. *All working must be shown.*]

1. From the following table find, to the nearest shilling, the value per cwt. of coffee in 1912, 1913, and in 1914. Find also the percentage falling off in 1914 in quantity and in total value as compared with 1913, each percentage being taken to the nearest integer:

Year.	Quantity imported in cwts.	Value in £.
1912	1,143,526	3,134,924
1913	1,055,866	3,329,598
1914	956,226	2,707,169

2. Multiply 173829 by 481928, only using *three* lines of multiplication.

3. Find, without unnecessary working, the value to 4 places of decimals of:

$$1+\tfrac{1}{2}+\frac{1}{2\cdot2}+\frac{1}{2\cdot2\cdot3}+\frac{1}{2\cdot2\cdot3\cdot3}+\frac{1}{2\cdot2\cdot3\cdot3\cdot4}+\ \ldots\ldots\ldots\ldots$$

4. Pure spirit can be bought at 14/- per gallon. A wine merchant reduces this spirit with water until he can gain 25% by selling his mixture at 12/6 per gallon. In what ratio does he mix the spirit and water?

5. Gold is sold to the Mint at £3 17s. 9d. per oz. and is mixed with an alloy worth 5/2 per oz. in the ratio of 11 : 1. If sovereigns be coined out of this mixture each weighing 5 dwts. 3·247 grs. what profit is made by the Mint on 100 sovereigns?

6. Two men walk with uniform speed along a railway in the same direction. A train travelling uniformly overtakes one of them, who walks at 4 miles per hour, and the whole train, which is 132 yards long, passes him in $7\frac{1}{2}$ secs. Then $6\frac{3}{4}$ secs. after it began to pass this man the train begins to pass the other and occupies $7\frac{1}{8}$ secs. in doing so. How long will it take one man to overtake the other, reckoning from the time when the train began to pass the first man?

7. A solid sphere of radius $8\frac{3}{4}$ inches is immersed in water in a square tank of depth 6 feet, thus causing the water to rise $\frac{7}{8}$ of an inch. Find to 2 places of decimals the length of one side of the tank.

8. Two travellers had between them 330 lbs. of luggage. They were charged for excess weight 2/5 and 3/- respectively. If it had all belonged to one man he would have been charged 9/7. How much is allowed free, and what is the rate of charge for excess?

9. If in France the railway fare for the distance of 384 Kilometres is 25·28 francs, how does this rate of charge compare with the English rate of 1d. per mile, taking the metre of 1yd. $3\frac{1}{2}$ins. and £1 = 25·2 fr.?

10. A basket contains a number of apples. A boy takes $\frac{1}{3}$ of them and one more: a second takes $\frac{1}{3}$ of the remainder and one more: a third takes $\frac{1}{3}$ of what are left and one more. There are then 5 left. How many were there at first?

11. If money invested in a 3 per cent. stock yields interest at the rate of 3 per cent. per annum after paying 5d. in the £ income tax, what is the price of the stock?

12. Find the square root of 3249, and explain as clearly as possible why your method gives the repuired result.