SHREWSBURY SCHOOL.

ARITHMETIC PRIZE.

March, 1922.

[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. Express a rainfall of 3·5 mm. in tons of water per acre to the nearest ton, given that 39·37 inches = 1 m., and that a cubic foot of water weighs 62·5 lbs.

2. Below is shown part of a multiplication sum, the dots representing figures left out. Fill in all these figures.

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      1 . 7 . .
          . . 2
  ---------------
        . . . 7 .
    . . . . 8 8
  . . 8 . 0 2
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  . . . . . 6 . .
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3. 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 ?

4. A man invests $\frac{2}{3}$ of his money in a 7% stock at $102\frac{1}{2}$, and the remainder in a 3% stock at $87\frac{1}{2}$, and obtains £53 more per annum than he would have if he had invested it all in $3\frac{1}{2}$% stock at $71\frac{3}{4}$. How much money had he ?

5. A tug, A, towing three barges, B, C, and D, collided with a ship E. In the ensuing litigation the owners of E claimed £2320 damages being £4 per ton on the combined tonnage of A, B C and D. The defendants denied that B and C were in collision and agreed to pay £920 in respect of A and D. If the tonnages of A, B and C are in the ratio of 1 : 3 : 4 find D's tonnage

6. A, B and C enter into partnership on Jan. 1st with capitals of £2500, £3500 and £4000 respectively. In three months' time A subscribes £1500 more to the business. If the profit for the year is £667 10s., how much should each receive ?

7. The average temperature for Monday, Tuesday and Wednesday was 53°. The average for Tuesday Wednesday and Thursday was 56°, the temp. for Thursday being 60°. What was the temp. on Monday ?

8. A mine consists of a hemisphere and cone placed base to base, the diameter of the common base being 3ft. 6″ and the height of the cone being 4ft. This is connected by 8ft. 6″ of wire whose circumference is 3″ to a sinker, which is a cylinder of diameter 1ft. 6″ and height 9″, and which lies at the bottom. If the apparatus is immersed in water contained in a tank whose length and breadth are 8ft. and 6ft., how much will the water level rise ?

9. I set out from A to C and walk the first mile at 4 m. p.h. I then drive for 40 mins at 9 m.p.h. and walk the rest of the way at 3 m.p.h. A car starts from A 2 hours after I leave and arrives at C at the same time as I do, after travelling at an average speed of 28 m.p.h. Find the distance from A to C.

10. A man owes £5000 which he arranges to pay in 4 equal instalments at the end of one, two, three and four years respectively. If interest be reckoned at 4% what will each instalment be ? (to the nearest penny).

11 A pours 1 gall. 3 qts. of water into a tank at 8 o'clock and goes away, repeating the operation every 10 mins. B comes at 8.8 and takes out $\frac{3}{4}$ gall. repeating the operation every 7 mins. Now when the tank contains $1\frac{1}{2}$ galls. or more, it leaks at the rate of $1\frac{1}{2}$ galls. per hour, and when it contains less it leaks at the rate of $\frac{1}{2}$ gall. an hour. How much water will A and B find when they arrive together?

12 Find the highest power of 3 which is contained in the product $1\times2\times3\times4\times$ . . . . . $\times120$.