

2. Reduce to the simplest form as a mixed number :—

$$(a.) \frac{2\frac{1}{2} - \frac{3}{4} \text{ of } 1\frac{5}{8}}{\frac{1}{2} \text{ of } 3\frac{1}{2} + \frac{1}{4}} \div \frac{2\frac{1}{2} - \frac{1}{2} \div \frac{1}{4}}{1\frac{1}{2} \text{ of } 8\frac{1}{2}} + \frac{1}{1 + \frac{5}{16}}$$

$$(b.) \frac{0.17 + 0.65\bar{3}}{0.247 \div 2.21} \text{ of } 7.68$$

3. Gold is 19.3 times and copper 8.62 times as heavy as water. How many times as heavy as water is a mixture of 11 parts of gold and 1 part of copper?

4. Find the length, in links, of the side of a square field whose area is 1 acre 2 roods 7 poles.

5. In a race of a hundred yards, A can beat B by 4 yards and A can beat C by 10 yards. By how many yards will B beat C in a hundred yards?

6. Find how many hundredweights of lead will be required to cover an area 25 feet long and 18 feet 8 inches wide with a sheet of lead one-fifth of an inch thick.

7. Seventy-five per cent. of the area of a farm is arable, eighty-five per cent. of the remainder is pasture, and the rest is waste land. If the area of the waste land is 9 acres, what is the area of the farm?

8. Find, as the decimal of a ton, the weight of a cubic metre of water.

9. The diameter of the fore wheel of a wagon is 3 feet 6 inches, and that of the hind wheel is 6 feet 5 inches. If two nails, one on the outside of each wheel, touch the ground together, in how many seconds (correct to two places of decimals) will they do so again if the wagon travels at the rate of 3 miles an hour?

10. On the New Zealand railways each passenger is allowed to take a certain weight of luggage free of charge. Two passengers travelling from Wellington to Napier have between them 6 cwt. of luggage, and are charged £1 5s. and 15s. respectively for the excess above the weight allowed free. If one passenger had travelled with the same weight of luggage he would have been charged £2 10s. How much luggage is allowed to each passenger free of charge?

Arithmetic.—For Class D. Time allowed : Three hours.

[NOTE.—The full working of the questions must in all cases be given.]

1. To what uniform depth must a piece of ground 414 yards long and 37 yards wide be excavated that the earth taken out may form an embankment containing 25,530 cubic yards, supposing the earth to be increased one-ninth in volume by the removal?

2. Subtract $\frac{1}{4}$ of $\frac{3\bar{3}}{4 \text{ of } 33\bar{3}} + \frac{1}{2}$ of $\frac{\frac{2}{3}}{1 + \frac{2}{3}} + \frac{\frac{3}{4} \times \frac{1}{1\frac{1}{2}}}{\frac{5}{6} \text{ of } 7\bar{5}}$ from 101 times the sum of $\frac{3}{10}$ and $\frac{1}{2}$ of $\frac{7}{15}$ of $\frac{7}{20}$

3. A, B, and C are partners, and share the profits in proportion to the amount of capital each has invested; A receives one-fifth of the total profits, and his income is diminished £40 by a fall of $\frac{1}{2}$ per cent. in the rate of profit; B receives twice as much as C: find the capital of C.

4. Define a decimal. What are the advantages to be gained by the substitution of a decimal system for the present Imperial system of weights and measures?

5. Having given that 1 metre = 1.09363 yards, express 1 yard 0 feet 3.1393 inches as the decimal of a metre, correct to five places.

6. Reduce to a single decimal $\frac{0.04275}{3.05} \times \frac{4.216}{0.342} \times \frac{2.7}{1.5318}$

7. The sum of £327 is borrowed at the beginning of the year at a certain rate of interest, and after nine months £400 more is borrowed at double the rate: if at the end of the year the interest on both sums amounts to £13 3s. 6d., find the rate at which the first sum was borrowed.

8. A field is 300 yards long and 200 yards broad: find the distance from corner to corner. Also, if a belt of trees 30 yards wide be planted round the field, find in acres, &c., the area of the interior space.

9. When the 3-per-cents are at 91 $\frac{1}{2}$, and the 3 $\frac{1}{2}$ -per-cents at 96 $\frac{1}{2}$, a man has a sum of money to invest which will give him £1,930 of the former stock: what would be his income if he were to invest the same sum in the latter stock?

10. If the coalfields of Great Britain, containing 8,139 square miles, be represented by a square inch, find, correct to two places of decimals, the length of the side of a square which shall represent on the same scale the coalfields of the United States, estimated to contain 133,132 square miles.

11. If a person's salary be paid at the beginning instead of at the end of the month, by how much ought the month's salary to be reduced, reckoning interest at 4 $\frac{1}{2}$ per cent. per annum?

12. Incomes below £150 a year being subject to an income-tax of 5d. in the pound, and incomes above £150 to a tax of 7d. in the pound, find what income above £150 a man must have that, after paying income-tax, he may be 7 $\frac{1}{2}$ d. poorer than a man whose gross income is £149 10s.

Arithmetic and Algebra.—For Civil Service Senior. Time allowed : Three hours.

1. Divide 23.41 by 798.63 correctly to 6 places of decimals by the shortest method you know. Reduce $\frac{3\frac{5}{8}}{1\frac{1}{2}}$ to a decimal.

Find the value of 0.175 of a ton + 0.16 of a hundredweight + 0.24 of a quarter.

2. Find the square root of 29506624, the cube root of 1.027243729, and the value of $3\sqrt{2+2\sqrt{3}}$ to 3 places of decimals.