Arithmetic.—For Class D. Time allowed: 3 hours.

[NOTE.—The full working of the questions, and not merely the results, must in all cases be given.]

1. A path 100 yards long and a yard wide is made round a building, with additional spaces 3 yards square at each of the three doors: find the cost of laying it down in gravel at 3 shillings a load (15 loads being required), and then asphalting it, at $3\frac{1}{2}$d. a yard.

2. Divide £20 2s. 6d. into two sums of money, one of which contains as many half-crowns as the other contains shillings.

3. Find the square root of $24{\cdot}2064 \times 3124{\cdot}81$

4. Simplify $\frac{\frac{1}{4} \text{ of } \frac{7}{15}}{\frac{5}{6} + \frac{2}{6+\frac{1}{2}}}$ of $8\frac{1}{11} - 9\frac{2}{7} \times 2\frac{1}{3} \div 47\frac{2}{3}$

5. If $\frac{3\frac{1}{2} - 2\frac{1}{3}}{3\frac{1}{2}}$ of a ship is worth £1,916 17s. 5d., how much is $\frac{3\frac{1}{2} + 2\frac{1}{3}}{3\frac{1}{2}}$ of the same ship worth?

6. Give a rule for the division of decimals, and divide the sum of 5·05 and 2·605 by their difference.

7. The illumination of a given point from a luminous object varies inversely as the square of the distance: if the quantity of light received from the Sun by Jupiter be represented by 100, what number will represent the quantity received by the Earth, if the respective distances are as 5 to 26?

8. The gallon contains 277·274 cubic inches, and a gallon of water weighs 10 lb.: find the weight of a cubic foot of water.

If mercury be 13·568 times as heavy as water, find in ounces the weight of a cubic inch of mercury. (Correct to *three* places of decimals.)

9. A man invests £5,187 10s. in the 3-per-cents. at 83, and when they have risen to 84 transfers $\frac{3}{5}$ of his capital to the 4-per-cents. at 96: find the alteration in his income.

10. The cost of polishing a cubical block of marble whose edge is $2\frac{1}{2}$ ft. is 5 guineas: what ought to be paid for polishing another cubical block, whose edge is $3\frac{3}{4}$ ft., when the price of labour has been reduced one-sixth? (The surfaces of cubes are proportional to the squares of their edges.)

11. The simple interest on a sum of money at the end of $6\frac{1}{4}$ years is three-eighths of the sum itself: what rate per cent. was charged?

12. In a boat race over a course of $2\frac{1}{4}$ miles, one crew (A) pulls 30 strokes to the minute, and the other (B) 35 strokes; but 5 strokes of A are equal to 6 strokes of B: compare the speeds of the boats. A does the course in 15 minutes: how long will B take, and what will be the distance between the boats at the finish?

Arithmetic.—For Class E, and for Civil Service Junior. Time allowed: 3 hours.

[All the work by which a result is obtained must be clearly shown, as no credit can be allowed for any result, however correct it may be, unless the method of obtaining it is given.]

1 gallon = 0·1605 cubic foot = 10 lb. of water at 62° F. 1 cubic foot of water weighs 62·3 lb.

1. A man bought 748 eggs at 2 a penny, and some others at 3 for twopence, and he paid altogether £2 19s. 10d: how many eggs did he buy at 3 for twopence?

2. Find the least number that can be divided by each of the numbers 7, 20, 28, 35, and 39, and leave 3 as remainder in each case.

3. (*a.*) Find the difference between $1 + \frac{1}{3} + \frac{1}{5} + \frac{1}{7}$ and $\frac{1}{2} - \frac{1}{4} + \frac{1}{6} - \frac{1}{8}$, and reduce the result to a decimal.

(*b.*) Find the value of $\frac{\frac{1}{2} + \frac{1}{3} + \frac{1}{4}}{\frac{1}{2\frac{1}{2}} + \frac{1}{3\frac{1}{3}} + \frac{1}{4\frac{1}{2}}}$ of £5.

4. Add together $0{\cdot}7\dot{3}\dot{2}$ of 12s. $4\frac{1}{2}$d. and $0{\cdot}\dot{0}2\dot{1}$ of £1 0s. $9\frac{3}{4}$d., and express the result as a decimal of £1. Give the rule you use for reducing a circulating decimal to the equivalent vulgar fraction.

5. One room is $23\frac{1}{2}$ ft. long, 15 ft. wide, and $12\frac{1}{2}$ ft. high; another room is $12\frac{1}{2}$ ft. long, 10 ft. wide, and 9 ft. high: compare their cubic contents. If the four walls of the larger room are painted at a cost of 1s. 3d. a square yard, and the four walls and ceiling of the smaller room at a cost of 1s. $4\frac{1}{2}$d. a square yard, compare the expense of painting the rooms.

6. A hall is 68·82 ft. long and 55·5 ft. wide, and it is to be paved with equal square slabs: what is the size of the largest slabs that will exactly fit, and how many of them will be required?

7. If the annual rainfall at Dunedin is 40 inches, how many 400-gallon tanks are required to hold half the rain falling during the year on a roof covering a floor 30 ft. × 40 ft.?

8. Find the amount of £802 9s. at the end of 5 years at $4\frac{1}{2}$ per cent. compound interest. Explain the shortest way you know of obtaining the amount at the end of 10 and 15 years respectively.

9. From the following table ascertain the increase per cent. of the population of each colony during the nine years 1890–1899, giving the percentage correct to the first decimal place:—

Colony.	Population. 1890.	1899.
New South Wales	1,121,860	1,356,650
Victoria	1,133,266	1,163,400
Queensland	392,965	482,400
South Australia	319,414	370,700
Western Australia	46,290	171,030
Tasmania	145,290	182,300
New Zealand	625,508	756,500