

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

1. What is meant by greatest common measure? In the centigrade, Fahrenheit, and Réaumur thermometers the melting-point of ice is marked 0° , 32° , and 0° respectively, and the boiling-point of water 100° , 212° , and 80° : state generally what temperatures can be expressed in integral numbers of degrees on all three scales at once.

2. What do you understand by least common multiple?

Find the least common multiple of a pound troy and a pound avoirdupois. Give the answer in both denominations.

3. What length of Brussels carpet $\frac{3}{4}$ yard wide is required for a room 33ft. 10in. long and 25ft. 10in. wide, without any transverse seam, the length of the pattern being 1ft. 6in.?

What will it cost, at 5s. 3d. a yard?

4. What principal does it take to yield £1 of yearly interest when invested in each of the following stocks: 5-per-cents, at 140; 6-per-cents, at $168\frac{1}{2}$; and 8-per-cents, at $223\frac{1}{2}$?

Express the answers in decimals of £1.

5. If a cubic foot of water weighed exactly 62·50lb., a half-pint would contain 17·28in., but it actually contains almost 17·33in.: find a more correct value for the weight of a foot of water, to two places of decimals.

6. Half of a field is planted with early potatoes, 2ft. 9in. from row to row, and 2 links from set to set in the rows. The other half is planted with a later kind, 5 links from row to row, and 1ft. 6in. from set to set. If there are 4,000 more sets of the early kind than of the late, what is the area of the whole field?

7. What is the difference between theoretical and practical discount?

A bill for £840, due in three months, is discounted for £829 10s., the bank rate being 5 per cent.: what profit does the broker make on the transaction?

8. Coffee loses weight in roasting, so that a 60lb. bag of green coffee yields only 48lb. to 50lb. of roast: find the greatest and least values of 1lb. of raw coffee if the roast is sold for 2s. a pound, neglecting the cost of roasting.

9. Simplify—

$$5\frac{1}{3} \text{ of } \frac{1}{\frac{1}{2\frac{1}{4}} + 1\frac{1}{3}}$$

$$(4\frac{1}{5} + 5\frac{1}{4}) \div (4\frac{1}{4} + 3\frac{3}{8})$$

10. When the dollar is worth 4s. 3d., and the pound sterling is worth 25 francs 33 centimes, what sum of French money is equivalent to \$1,600?

11. Calculate the square root of 6877·219041.

12. If a grocer mixes nine chests of one-and-tenpenny tea with one chest of three-shilling tea, and sells the mixture at a profit of 25 per cent., what is his retail price?

Arithmetic.—For Senior Civil Service. Time allowed: 3 hours.

1. Show why it is that if a number is an exact divisor of two other numbers it also divides exactly their sum or difference. Find the greatest common multiple and the least common multiple of 8001, 13335, and 18669.

2. Simplify $\frac{13(\frac{9}{13} - \frac{2\frac{5}{8}}{7\frac{5}{8}}) - 21(\frac{1}{3} - \frac{1}{4})}{13(\frac{1}{3} + \frac{1}{7}) + 5(\frac{1}{2} + \frac{1}{3} + \frac{1}{8} + \frac{1}{7})}$; and find the value of $\frac{2\frac{2}{5} \text{ of } 1\frac{5}{7}}{2\frac{2}{5} - 1\frac{5}{7}}$ of $\cdot 3571428$ of a ton + $\frac{1\cdot 16}{1\cdot 16}$ of $\frac{1}{16}$ of 1 ton 13cwt.

3. A litre contains 1,000 cubic centimetres, and a gallon contains 277·274 cubic inches: if 1ft. = 30·48 centimetres, express a pint as the decimal of a litre.

4. The hands of a watch are observed to come together at intervals of $65\frac{1}{2}$ minutes true time: find how much the watch gains or loses per day.

5. Find the value of 86 tons 17cwt. $24\frac{1}{2}$ lb. of sugar at £1 6s. 8d. per hundredweight.

6. A cubical cistern contains 244 cubic feet 243 cubic inches: find the expense of lining its bottom and sides with lead, at 1s. 4d. per square foot.

7. A can do a piece of work in 5 days and B twice as much in 11 days: they begin to do it together, but after they have worked for 1 day B's place is taken by C, and the work is finished in $2\frac{1}{5}$ days more: in what time could C alone do the work?

8. If 40 lb. of gold be coined into 1,869 sovereigns, and a sovereign be worth 25·17 francs, find the weight of gold in a 20-franc piece.

9. Extract the cube root of $6 + 2\sqrt{5}$ to three decimal places.

10. What sum of money must be invested at 4 per cent. to amount in three years, at compound interest, to £7,030 8s.?

11. A dealer sold a horse at a price which would have brought him a profit of 25 per cent., but he was obliged to accept from the purchaser a composition of 13s. 4d. in the pound: how much per cent. did he lose?

12. A and B became partners in a business for a term of four years, contributing the capital in the proportion of 1 to 3 respectively, and it was agreed that A should receive 15 per cent. of the gross profits for his services as manager. At the end of two years B sold to A one-third of his share in the partnership, and at the end of three years he sold to A one-half of his remaining share. How should a gross profit of £3,560 be divided between the partners at the termination of the period of partnership?