

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. The daily issue of a newspaper is 60,000 copies. Three days of the week the paper consists of three sheets, and the other three days of four sheets. If a sheet be 3 ft. long and 2 ft. broad, find the number of acres which the weekly issue would cover.

2. Simplify $\frac{1}{2} - \frac{1}{3} - \frac{1}{11} + \frac{1}{13}$, and multiply the result by the sum of $\frac{1}{3}$ and $\frac{2}{5}$.

3. The assets of a bankrupt amount to £5,000. It is estimated that the creditors will receive 5s. in the pound; but it is discovered that one debt has been overlooked, and this reduces the dividend to 4s. 6d.: what is the amount of the debt that was overlooked?

4. A corn merchant bought 121 quarters of wheat, and sold it so as to gain 17½% on 26 quarters and 13% on the rest, having previously tried to sell the whole at a uniform gain of 15%, which would have brought him £4 5s. more than he actually received: what did the wheat cost him a quarter?

5. Give rules for the division of decimals, and for reducing a mixed circulator to a vulgar fraction. Divide 0.1001 by 0.390625.

6. If an ounce of gold be worth £4.0099, what is the value of a bar of gold weighing 1.683 lb.?

7. If the true discount on £226 2s. 8d. due at the end of a year and a half be £12 16s., what is the rate of interest?

8. A man, being two minutes late for his train, determined after half a minute's consideration to take a special train, which was got ready in twenty minutes. If the ordinary train travelled thirty-two miles an hour, and the special forty-eight miles, how far would the ordinary train have gone before it was overtaken by the special?

9. When the 3-per-cents are at 80, how much stock must be sold out to pay a bill of £690 3s. 9d. due nine months hence, at 3% per annum, simple interest?

10. A man bought, at 57s. a quarter, a crop of standing wheat estimated to yield 100 quarters. The yield proved deficient; but he sold the wheat at 72s. a quarter, and thereby cleared 2% on his outlay: how many quarters did the crop yield?

11. Of a debt of £1,000, £190 is due now, £250 in one month, £370 in five months, £120 in eight months and a half, and the balance in nine months: when would be the proper time of payment if the whole debt were paid together?

12. What will it cost to line with lead, at 10s. 1½d. a square yard, a closed cistern, of which the internal measurements are—length, 7 ft. 10 in.; width, 5 ft. 4 in.; and depth, 3 ft. 6 in.?

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

NOTE 1.—One gallon = 0.1605 cubic feet. The length of the circumference of a circle = 3.1416 × diameter of the circle. The area of a circle = 3.1416 × square of its radius.

NOTE 2.—The whole of the working of each question to be shown.

1. Find, correct to five places of decimals, the sum of the following, converting each term into a decimal before performing the addition:—

$$\frac{2}{2 \times 3} + \frac{4}{2 \times 3 \times 4 \times 5} + \frac{6}{2 \times 3 \times 4 \times 5 \times 6 \times 7} + \frac{8}{2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9} + \frac{10}{2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \times 11}$$

2. A train moving uniformly travels 88 yards in three seconds: find its velocity in miles an hour.

In what time will it travel 600 miles, with a stoppage of five minutes after every hundred miles?

3. The minute-hand of a clock is 7 in. long: find the velocity of its extremity in feet a second.

4. What length of carpet 30 in. wide will be required for a room 17 ft. 4 in. long and 13 ft. 9 in. wide? Draw a diagram to show how you would arrange the carpet to fit into the room. If the cost of the carpet is £10 18s. 4d., what is the price of it a yard? No regard need be paid to the pattern of the carpet.

5. Give a rule for the decimalization of sterling money, and find the cost, correct to a penny, of 1086.42 acres at £11 18s. 9½d. an acre.

6. A box made of white pine $\frac{3}{4}$ in. thick is 4 ft. long, 3 ft. wide, and 3 ft. deep externally. Find the weight in pounds of the box, including the lid, if a cubic foot of white pine weighs 25 lb.

7. A cylindrical tank is 8 ft. in diameter and 4 ft. high. Find (1) the area of the iron required to make it, including the top and bottom, and find (2) the number of gallons of water the tank will hold.

8. What sum at compound interest will amount to £1,300 at the end of the first year and £1,352 at the end of the second year?

9. If the rate of insurance is 3½ per cent., what premium must I pay on a ship worth £21,418 in order that, in case of loss, I may recover both the value of the ship and the premium paid?

10. What are present value, true discount, commercial discount? Find the difference between the commercial discount and the true discount on £8,550 for eight months at 5 per cent.

11. A person derives an income from £6,720 invested in the 4 per cents at 96. He sells out at 94, and invests one half of the proceeds in railway stock at 82½, which pays a 3 per cent. dividend, and the other half in bank stock at 164½, which pays an 8½ per cent. dividend. What difference will he find in his income?

12. An empty cistern has three pipes A, B, and C opening into it. A can fill it in three hours, B can fill it in four hours, and C can empty it in one hour. A is opened at 1 p.m., B is opened at 2 p.m., and C is opened at 3 p.m. At what time will the cistern be empty?