

3. Find x , y and z in each of the following examples of simultaneous equations:

$$(\alpha) \quad \frac{1}{x} + \frac{1}{y} - \frac{1}{z} = a,$$

$$\frac{1}{x} - \frac{1}{y} + \frac{1}{z} = b,$$

$$\frac{1}{y} + \frac{1}{z} - \frac{1}{x} = c.$$

$$(\beta) \quad \frac{2x-y}{3} = \frac{3y+2z}{4} = \frac{x-y-z}{5} = 4.$$

4. A man rows down a stream 20 miles and back again in 10 hours. He finds he can row 2 miles against the stream in the same time he can row 3 miles with it. Find the time of his rowing down and of his rowing up the stream, and also the rate of the stream.

5. Given $\begin{cases} x^2 + y^2 = 7 + xy, \\ x^3 + y^3 = 6xy - 1, \end{cases}$ find x and y .

6. The fore wheel of a carriage turns in a mile 132 times more than the hind wheel; but if the circumferences were each increased by 2 feet it would turn only 88 times more. Find the circumference of each.

7. A sum of money was lent at 25 per cent. per annum. Six years' interest was paid and the capital was lost. As a question of simple interest how much did it pay?

8. The population of a country in 1870 was 2,943,578; in 1880, 3,408,766. What will it likely be in 1900?

9. A man bought a 4 per cent. stock at 75, and afterwards sold at 95. He found he had made $7\frac{1}{2}$ per cent. per annum. How long did he hold the stock?

10. ABC is an equilateral triangle, and AD is perpendicular to BC . Show that the square on AD is equal to three times the square on BD .

11. A triangle whose base is one of the non-parallel sides of a trapezium and vertex, the middle point of the opposite side is equal to half the trapezium.

12. If a straight line touch a circle, and from the point of contact a straight line be drawn cutting the circle, the angles which this line makes with the line touching the circle shall be equal to the angles which are in the alternate segments of the circle.