

[Express the result in pounds, shillings, and pence; and assume 25 francs to be equal to £1, and a metre to be 39 $\frac{3}{8}$ inches.]

Number of yards purchased = 6666 $\frac{3}{8}$.

Number of metres = 12 $\frac{3}{8}$ 0 0.

Original cost = £1000 0 0

Carriage, packing, etc..... = 83 6 2

Duty = 256000 centimes.... = 102 8 0

Total cost..... = £1185 14 2

Sales

$$= \frac{128000}{21} \times \frac{8+6}{2} \times \frac{1}{25} \text{ £} \dots = 1706 \text{ } 13 \text{ } 4$$

Profit..... = £520 19 2

6. Simplify

$$\left(\frac{x}{x-1} - \frac{1}{x+1} \right) \cdot \frac{x^2-1}{x^2+1} \cdot \frac{(x-1)^2(x+1)^2+x^2}{x^2+x^2+1}$$

$$= \frac{x^2+1}{(x-1)(x+1)} \cdot \frac{(x-1)(x^2+x+1)}{(x^2+1)(x^2-x^2+1)}$$

$$\cdot \frac{x^2-x^2+1}{(x^2+x+1)(x^2-x+1)}$$

$$= \frac{1}{(x+1)(x^2-x+1)} = \frac{1}{x^3+1}.$$

7. (a) Find the sum of five numbers in arithmetical progression, the second being 4 and the fifth 8 $\frac{1}{2}$.

(b) Also find the sum of five numbers in geometrical progression, the third being 3 and the fifth 27.

(a) Let x be the common difference. The terms are $(4-x)$, 4, $(4+x)$, $(4+2x)$, $(4+3x)$ = 8 $\frac{1}{2}$, $\therefore x = 1\frac{1}{2}$.

$$\text{Sum} = 2\frac{1}{2} + 4 + 5\frac{1}{2} = 7 + 8\frac{1}{2} = 27\frac{1}{2}.$$

$$(b) 3r^2 = 27, r = 9,$$

$$\text{Sum} = \frac{1}{3} \div 1 + 3 + 9 + 27 = 40\frac{1}{3}.$$

8. Divide £5 between a man, a woman, two boys, and a girl, so that the man has as much as the two boys and the girl together, the woman and girl together as much as the two boys together, and the man and girl together half the whole amount.

Let x = what man gets,

$\frac{1}{2} - x$ = what girl gets,

$2x - \frac{1}{2}$ = what 2 boys get,

$3x - 5$ = what woman gets.

$$\text{Adding } 5x - 5 = 5, x = \text{£}2.$$

Man gets £2; woman £1; two boys, £1 10s.; girl, 10s.

9. Find the greatest common measure of

$$x^4 + 14x^3 + 67x^2 + 126x + 72,$$

$$x^4 + 3x^3 - 31x^2 - 123x - 90,$$

$$x^4 + 13x^3 + 49x^2 + 27x - 90.$$

$$= x + 3.$$

10. A man pays £150 a year for rent, water-rate, and poor-rate, the rates being charged on the rent he actually pays. If the rent were reduced 10 per cent., the rate per £ of the poor-rate 25 per cent., and of the water-rate 5 per cent., he would pay in all £130 1s.; whereas if poor-rates were doubled and water-rate reduced 5 per cent., the rent being as at first, he would pay £169 10s. What did he pay for rent, poor-rate, and water-rate respectively?

Let x = rent he pays; y = rate in £ poor-rate; z = rate in £ water-rate.

$$x + xy + xz = 150,$$

$$100x + \frac{1}{2}y \cdot 100x + \frac{1}{2}xz \cdot 100x = 13000,$$

$$x + 2xy + \frac{1}{2}xz \cdot x = 169\frac{1}{2},$$

which give $x = \text{£}120$, $y = \text{£}\frac{1}{3} = 3s. 4d.$, $z = \text{£}\frac{1}{12} = 1s. 8d.$

PROBLEMS IN ARITHMETIC,

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I. May one concrete number be divided by another? Apply your answer to the following: How often is £7 6s. 9d. contained in £51 7s. 3d.?

II. Can this problem be solved? Why? Multiply £8 7s. 6d. by £3.

III. "The number of square feet in a floor is found by multiplying the number of feet in the length by the number of feet in the breadth?" Is this statement correct? Why?

IV. For every 4 $\frac{3}{8}$ yards in the diameter of a circle, there are 7 $\frac{1}{2}$ yards in the circumference—from this find how much it will cost, at 12 cts. per yard, to fence a circle whose circumference exceeds its diameter by 57 $\frac{1}{2}$ feet. *Ans.* \$6.28 $\frac{1}{2}$.

V. What must be added to 98, so that if the sum be multiplied by 35 the product may be less than 17641 by 13616?

Ans. 17.

VI. One number is 3 times as great as another, and if half this sum be multiplied