

## Prize Competition.

## ARITHMETICAL PROBLEMS.

FOR CANADA SCHOOL JOURNAL COMPETITION PRIZES—FOURTH CLASS.

BY X+Y.

1. Divide 10 acres into 9 equal parts as far as inches, and prove by multiplication.

$$\begin{array}{r} 9 \overline{) 10} \\ 10 \ 17 \ 23 \ 4 \ 108 \times 9 \\ \underline{9} \\ 100 \ 0 \ 00 \ 0 \\ 40 \overline{) 160 \ 30\frac{1}{2} \ 211\frac{1}{2} \ 9 \ 42\frac{1}{2} \ 144 \ 972} \\ \underline{4} \quad \quad \underline{7} \quad \quad \underline{4\frac{1}{2}} \quad \quad \underline{6\frac{1}{2}} \end{array}$$

2. How many pounds, etc., Apothecaries weight are in 10 lbs., 10 dwts. Troy?

$$\begin{array}{r} 10 \cdot \quad 0 \cdot \quad 10 \cdot \\ 12 \\ \hline 120 \\ 20 \\ \hline 2410 \\ 24 \\ \hline 9640 \\ 4820 \\ \hline 57840 \end{array} \quad \begin{array}{r} 20 \overline{) 57840} \\ 3 \overline{) 2892} \\ 8 \overline{) 964} \\ 12 \overline{) 1204} \end{array}$$

Ans. lbs. 10 0 4

3. Bought 36 lbs. (avoirdupois) tea for \$45.00. At what weight per lb. Troy must I sell it, so as to gain 10 per cent.?

$$1 \text{ lb. avoird.} = \$1.25 + 10 \text{ per cent.} = \$1.37\frac{1}{2}$$

$$7000 \text{ gr. avoird.} ; 5760 \text{ gr. Troy.} : \$1.37\frac{1}{2} = \$1.13\frac{1}{2}$$

4. Find value of 1 lb. silver, gold being worth £3 18s. 9d. per oz., ratio 15½ to 1 15½; 12:£3 18s. 9d. = Ans. £3 0s. 0d.

Find difference between the cost of six dozen eggs at 20 cents per dozen, and half a dozen at 40 cents per dozen,

$$\begin{array}{r} 6 \times 12 = 72 = 20 = \$14.40 \\ 6 \times 40 = 2.40 \\ \hline \text{Ans.} \quad \$12.00 \end{array}$$

6. A tradesman failed in \$14,000, his effects are \$8,750. What will a creditor lose whose debt is \$3,581.

$$14 (000) \begin{array}{r} 8750 \times 100 \\ 875 (000) \end{array} \begin{array}{r} 62\frac{1}{2} \\ 37\frac{1}{2} \end{array} \times 3581 = 1342.87\frac{1}{2} \text{ Ans.}$$

7. Four farmers bought a thrashing machine, A paying ½, B ⅓, C ¼, and D \$93; find cost of machine.

$$\text{Add } \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, 7\frac{1}{12} = 10\frac{1}{4} = 20\frac{1}{2} \times 93 = 335 \text{ Ans.}$$

8. In an orchard ½ of the trees bear apples, ⅓ plums, ¼ cherries, ⅕ peaches, and 33 pears; how many trees are there in the orchard?

$$\text{Add } \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + 33 = 42\frac{1}{2} + 33 = 75\frac{1}{2} = \text{Ans. } 120.$$

9. A, B and C rented a pasture field for \$26.00. A put in 4 cows for 8 months, B put in 6 cows for 6 months, when he took 4 out; C kept 2 cows in the whole year. What ought each to pay?

$$\begin{array}{r} 4 \times 8 = 32 \div 8 = 4 \times 2. \text{ A's share} = 8 \\ 6 \times 6 + 2 \times 6 = 48 + 12 = 60 \div 6 = 10. \text{ B's share} = 12 \\ 2 \times 12 = 24 \div 2 = 12. \text{ C's share} = 6 \end{array} \quad \text{Ans.}$$

10. January 1st A and B go into partnership, A with \$600, B with \$750. April 1st C joins them with \$1,000, when A withdraws \$150; while B puts in \$250. Dec. 31st the net profits are \$900. What is each man's share?

$$\begin{array}{r} A \ 600 \times 3 \times 450 \times 9 = 5850 \div 15 = 117 \\ B \ 750 \times 8 \times 1000 \times 9 = 11250 \div 15 = 225 \\ C \ 1000 \times 9 \quad 9000 \div 15 = 180 \\ A \ 522 : 117 :: 900 = \$201.72 \\ B \ 522 : 225 :: 900 = \$387.93 \\ C \ 522 : 180 :: 900 = \$810.34 \end{array}$$

11. A Brahma hen eats 1½ bushels wheat at \$1.20 per bushel, lays 180 eggs which weigh 7 to the pound. A Leghorn hen eats 1½ bushels at \$1.20 per bushel, lays 200 eggs which weigh 8 to the pound. Which is the most profitable? eggs being sold by weight.

$$\text{Cost of Brahma } 1\frac{1}{2} \text{ bush. @ } 1.20 = \$1.80$$

$$\text{Cost of Leghorn } 1\frac{1}{2} \text{ bush. @ } 1.20 = 1.50$$

$$\text{Weight of Brahma } 180 \text{ at } 7 \text{ to the lb.} = 25\frac{1}{2} \text{ lb. or } 7\text{c. per lb.}$$

$$\text{Weight of Leghorn } 200 \text{ at } 8 \text{ to the lb.} = 25 \text{ lb. or } 6\text{c. per lb.}$$

12. A farm is let for \$500, and a certain quantity of wheat at \$1.05 per bushel; wheat rose to \$1.28½ per bushel, thereby rising the whole rent 10 per cent; how many bushels wheat were there?

$$10 \text{ per cent. of } \$500 = \$50$$

$$10 \text{ per cent. of } \$1.05 = 10\frac{1}{2} + 1.05 = 1.15\frac{1}{2}$$

$$\text{Wheat rose to } 1.28\frac{1}{2} - 1.15\frac{1}{2} = 8$$

$$\therefore \$50 \div 8 = \text{Ans. } 625 \text{ bushels wheat.}$$

13. If 5 Fowls, 3 Geese and 2 Turkeys cost \$16.50

$$\begin{array}{r} 7 \quad 5 \quad 3 \\ 9 \quad 6 \quad 1 \end{array} \quad \begin{array}{r} 23.75 \\ 23.00 \end{array}$$

Find the cost of one of each separately.

Equalize the fowls by × first line by 4 and second by 5,

$$\begin{array}{r} 20 \quad 12 \quad 8 \\ 20 \quad 25 \quad 25 \\ \hline \text{Therefore} \quad 13 \quad 7 \quad \hline 52.75 \end{array}$$

Equalize 2nd and 3rd lines

$$\begin{array}{r} 36 \quad 45 \quad 27 \\ 36 \quad 24 \quad 4 \\ \hline \text{Equalize} \quad \left\{ \begin{array}{l} 21 \\ 13 \end{array} \right. \quad \left\{ \begin{array}{l} 23 \\ 7 \end{array} \right. \quad \hline 52.75 \end{array}$$

Fowls. Geese. Turkeys.

$$\begin{array}{r} \text{Cut out} \quad \left\{ \begin{array}{l} 21 \\ 13 \end{array} \right. \quad \left\{ \begin{array}{l} 23 \\ 7 \end{array} \right. \quad \hline \$121.75 \quad 52.75 \end{array}$$

$$\begin{array}{r} 147 \quad 161 \\ 299 \quad 161 \\ \hline 152 \quad \hline \text{cost } \$361.00 \end{array}$$

$$\$361.00 \div 152 \text{ cost of Goose} = \$2.37\frac{1}{2}$$

$$1 \text{ Goose} = 2.37\frac{1}{2} \times 13 \text{ will} = 30.87\frac{1}{2} \div 7 \text{ Turkey} = 21.87\frac{1}{2}$$

$$\therefore 1 \text{ Turkey} = \$3.12\frac{1}{2}$$

Hence 2 Turkeys 6.25 + 3 Geese 7.12½ = 13.37½ but 5 Fowls, 3 Geese, 2 Turkeys = 16.50 ∴ 5 fowls = the difference or 16.50 - 13.37½ = 3.12½. Therefore 1 Fowl 62½, 1 Goose 2.37½, 1 Turkey 3.12½.

14. A Privateer took a prize of £2779 17s. 1½d. which was divided as follows, viz.: 110 sailors, 1 Carpenter to have half as much again as a sailor, 1 Boatswain as much as 2½ sailors, 1 Surgeon as much as 3 sailors. The Mate as much as the Carpenter, the Boatswain and the Surgeon together. The Captain as much as the Mate, Surgeon, Boatswain, Carpenter and one Sailor beside. Find each man's share.

$$\begin{array}{r} \text{Sailors } 110 \text{ shares each} = £ \ 19 \ 19\text{s. } 11\frac{1}{2}\text{d.} \\ \text{Captain } 15 \quad \quad \quad 299 \ 19\text{s. } 8\frac{1}{2}\text{d.} \\ \text{Mate } 7 \quad \quad \quad 139 \ 19\text{s. } 10\frac{1}{2}\text{d.} \\ \text{Surgeon } 3 \quad \quad \quad 59 \ 19\text{s. } 11\frac{1}{2}\text{d.} \\ \text{Carpenter } 1\frac{1}{2} \quad \quad \quad 29 \ 19\text{s. } 11\frac{1}{2}\text{d.} \\ \text{Boatswain } 2\frac{1}{2} \quad \quad \quad 49 \ 19\text{s. } 11\frac{1}{2}\text{d.} \end{array}$$

$$239) £2779 \ 17\text{s. } 1\frac{1}{2}\text{d.} (£19 \ 19\text{s. } 11\frac{1}{2}\text{d.})$$

15. At what time are the hands of a clock first at right angles, second, directly over each other, third, again at right angles, and fourth, pointing in directly opposite directions between four and five o'clock?

The minute hand moves 11 times faster than the hour hand, ∴ the 60 ÷ 11 = 5⅕, therefore, at 5⅕ past 4 the hands are first at right angles, 5⅕ × 3 = 16⅕ + 5⅕ = 21⅕,

$$\text{again, } 21\frac{1}{5} + 16\frac{1}{5} = 38\frac{1}{5},$$

$$\text{again, } 38\frac{1}{5} + 16\frac{1}{5} = 54\frac{1}{5},$$

$$(1.) \ 5\frac{1}{5}, \quad (2.) \ 21\frac{1}{5}, \quad (3.) \ 38\frac{1}{5}, \quad (4.) \ 54\frac{1}{5}.$$

16. How many bricks in a wall 42 feet long, 24 feet high, and 16½ inches thick? Size of brick 8 inches long, 4 inches broad, and 2 inches thick, allowing ¼ inch for mortar between the bricks.

$$\text{brick and mortar } 8\frac{1}{4} \times 4\frac{1}{4} \times 2\frac{1}{4} = 84\frac{1}{8}$$

$$\text{wall } 24 \text{ ft. } 0\frac{1}{2} \times 42 \times 1.4\frac{1}{2} = 1512\frac{1}{2}$$

$$1512\frac{1}{2} \div 84\frac{1}{8} = \text{Ans. } 50,860\frac{1}{2}$$

17. How many crowns, half crowns, shillings, sixpences and pence are there in £36 15s. 9d., and of each an equal number?

$$\begin{array}{r} £5 = 60 \text{ pence} \quad £36 \ 15\text{s. } 9\text{d.} \\ 2-6 = 30 \quad \quad \quad 20 \end{array}$$

$$\begin{array}{r} 1 = 12 \quad \quad \quad 735 \\ \quad \quad \quad 12 \end{array}$$

$$6 = 6 \quad \quad \quad 8829 \text{ (81 Ans.)}$$

$$1 \text{ rds} \quad \quad \quad 872$$

$$\begin{array}{r} 109 \\ 109 \end{array}$$