If $\frac{19}{15} = 361$ galls.

$\therefore \frac{20}{15} = 380$ "

$\frac{1}{4}$ of $380 = 95$ " pass through A in 1 min.

$4\frac{1}{2} \times 95 = 427\frac{1}{2}$ " " " A " $4\frac{1}{2}$ " Ans.

$\frac{1}{5}$ of $380 = 76$ " " " B " 1 "

$2\frac{1}{2} \times 76 = 190$ " " " B " $2\frac{1}{2}$ "

20. The population of a city increases $\frac{1}{16}$ each year ; its present population is 34,560. Find the difference between what its population was two years ago, and what it will be a year hence.

Solution. $\frac{16}{17} \times \frac{16}{17} \times 34560 = 30375$ population 2 years ago.

$\frac{17}{16} \times 34560 = 36864$ " 1 year hence.

$36864 - 30375 = 6489$ Ans.

21. Bought 4 hdds. of sugar, each containing 1825 lbs., at $6\frac{1}{4}$c per lb., and paid $31.975 for freight, storage and cartage. Allowing $\frac{1}{20}$ for leakage and waste, for how much per lb. must I sell the remainder to gain $\frac{1}{4}$ of outlay?

Solution. $1825 \times 4 \times 6\frac{1}{4} = \$456.25$ cost price.

$\frac{5}{4}(456.25 + 31.975) = 610.28\frac{1}{8}$ selling price.

$\frac{19}{20}$ of $7300 = 6935$ lbs. to sell.

$\$610.28\frac{1}{8} \div 6935 = 8\frac{14835}{55480}$ or $8\frac{1}{2}$ nearly. Ans.

22. A room 20 feet long can be carpeted for $48, with carpet worth a certain price per square yard ; or for $72, with carpet $\frac{5}{6}$ of a yard wide, worth 30 cents per yard more. Find the width of the room. 18 feet. Ans.

Solution. $\frac{5}{6}$ of $72 = \$60$ cost, if second carpet were one yard wide.

$\$60 - \$48 = \$12$ difference in cost.

$\$12 \div 30 = 40$ square yards in room.

40 sq. yds. $\div 20$ feet $= 18$ feet. Ans.

23. Six men can do a piece of work in $7\frac{3}{4}$ days. How soon after beginning must they be joined by 2 men more, so as to complete it in $5\frac{2}{3}$ days? Ans. $\frac{12}{15}$ days.

Solution. If 6 men would require $\frac{93}{2}$ days.

$\therefore$ 1 man " $46\frac{1}{2}$ "

$\therefore$ 8 men " $5\frac{3}{4}$ "

$\frac{5\frac{2}{3}}{5\frac{3}{4}} = \frac{188}{207}$ part done by the 8 men.

$\therefore \frac{207}{207} - \frac{11\frac{1}{2}}{207} = \frac{19}{207}$ " 6 " before the 2 men came.

Again if 6 men would do the whole work in $\frac{93}{2}$ days.

$\therefore$ 6 " " $\frac{19}{207}$ of " $1\frac{12}{15}$ " Ans.

24. By selling a lot of land for $600 gaining $\frac{1}{6}$ of cost ; a second for $600, losing $\frac{1}{5}$ of cost ; and a third at a gain of $\frac{1}{5}$ of cost, I find I have made $75 on the whole transaction. Find cost of each lot.

Solution. $\frac{5}{6}$ of $600 = \$500$ cost of first.

$\frac{5}{4}$ of $600 = \$750$ " second.

$1250 - 1200 = \$50$ loss.

By problem—$75 total gain $\therefore 75 \times 50 = \$125$ to gain.

If $1 = gain on $5.

$\therefore \$125 = $ " $625 cost of third.

25. Seven men engaged to do a piece of work in a given time, but 3 of them failing to come, the work was prolonged $7\frac{1}{2}$ days. In what time would the 7 men have done it ? 10 days. Ans.

Solution. By problem—

$\frac{4}{7}$ of work is done by 4 men in $7\frac{1}{2}$ days.

$\therefore \frac{1}{7}$ " " 1 man " $\frac{15 \times 4}{2}$ "

$\therefore \frac{7}{7}$ " " 7 men " $\frac{15 \times 4 \times 7}{2 \times 4 \times 7} = 10$ days. Ans.

26. A garden is $10\frac{3}{4}$ rods long and $8\frac{3}{4}$ rods wide, and surrounded by a fence $7\frac{3}{4}$ feet high ; a walk is laid out around it within the fence $7\frac{1}{2}$ feet wide at the sides, and $5\frac{1}{2}$ feet wide at the ends. How much remains for cultivation ? 21,296 sq. ft. Ans.

Solution. $\frac{43}{4} \times \frac{11}{2} \times 3 = \frac{1419}{8}$ length in feet.

$\frac{35}{4} \times \frac{11}{2} \times 3 = 143$ breadth.

$\frac{1419}{8} \times 143 = 25364\frac{5}{8}$ area in sq. ft.

$\frac{1419}{8} \times 15 \times \frac{5}{4} = 2660\frac{5}{8}$ " " " of two sides.

$(143 - 15) \times \frac{11}{2} \times \frac{7}{4} = 1408$ " " " ends.

$\therefore 25364\frac{5}{8} - (2660\frac{5}{8} + 1408) = 21296$ sq. ft. Ans.

27. A grocer mixes 17 lbs. of tea with 13 lbs. of superior quality, and gains $\frac{1}{4}$ of cost by selling at $65\frac{1}{2}$ cents per lb. If one kind cost 10 cents per lb. more than the other, find the price of each per lb. Ans. 50 and 60 cents.

Solution. By problem $\frac{5}{4}$ of price $= 65\frac{1}{2}$ cents per lb.

$\frac{1}{4}$ " " $= 10\frac{3}{4}$ " "

$\frac{5}{4}$ " " $= 54\frac{1}{2}$ " "

$\therefore$ 30 lbs. $\times 54\frac{1}{2} = \$16.30$

and 17 " $\times 10 = 1.70$

And $16.30 + 1.70 = 18.00 \div 30 = 60$c. price of better tea.

And $60 - 10 = 50$c. " cheaper "

28. A certain principal, at simple interest amounts to $1033.20 in $4\frac{1}{4}$ years ; and to $1041.40 in $4\frac{1}{2}$ years. Find the principal and rate per cent. Ans. $820 and 6.

Solution. $4\frac{1}{2} - 4\frac{1}{4} = \frac{1}{4}$ year, and $1041.40 - 1033.20 = \$8.20$ int. for $\frac{1}{4}$ year.

If int. for $\frac{1}{4}$ year $= \$8.20$

$\therefore$ " " " $\frac{4}{4}$ " $= 49.20$.

$\therefore$ " " " $4\frac{1}{4}$ " $= 213.20$.

$\therefore 1033.20 - 213.20 = \$820$ principal Ans.

If int. on $820 for one year $= \$49.20$.

" " " $100 " " " $= \$6.00$. Ans.

29. A speculator gained $\frac{1}{16}$ on $\frac{3}{5}$ of his investment and lost $\frac{1}{20}$ on the remainder, and his net profits were $720.00. What would have been his profits had he gained $\frac{1}{16}$ on $\frac{4}{5}$, and lost $\frac{1}{20}$ on the remainder ? $405 Ans.

Solution. $\frac{16}{16} \times \frac{3}{5} = \frac{39}{80}$

$\frac{20}{20} \times \frac{2}{5} = \frac{19}{50}$ and $\frac{39}{80} + \frac{19}{50} = \frac{5\frac{2}{5}}{5}$

Again if $8.00 are gained on $50

$\therefore 1.00$ is " " $\frac{2}{16}$

$\therefore \$720.00$ are gained on $4500 amount invested.

$\frac{4}{5}(4500) \times \frac{13}{80} = \$2340$

$\frac{1}{5}(4500) \times \frac{19}{50} = 2565$

$\therefore 2340 + 2565 - 4500 = \$405$ Ans.

30. A farmer has a bin of wheat 16 feet long 7 feet 6 inches wide and 4 feet 4 inches deep, for which he is offered 85 cents per bushel by measure, or 84 cents per bushel by weight. If every bushel by measure weighs 62 lbs. ; and a gallons contains $277\frac{1}{4}$ cub. inches, find which is the better offer, and the gain by accepting it.

Solution. $16 \times 7\frac{1}{2} \times 4\frac{1}{3} = 520$ cub. ft. in bin $= 898560$ cub. in.

$277\frac{1}{4} \times 8 = 2218\frac{2}{3}$ cub. in a bushel,

If $2218\frac{2}{3}$ cub. in. $= 1$ bush.

$\therefore$ $\frac{1}{1}$ " " $= \frac{1}{2218\frac{2}{3}}$

$\therefore$ " " $= \frac{1}{2218\frac{2}{3}}$

$\therefore 898560$ " " $= 405$

$\therefore 405 \times 85 = \$344.25$ first offer.

Again if 1 bush. weighs 62 lbs.

$\therefore$ 405 bush. weigh 25110 lbs.

If 60 lbs are worth 84 cents.

$\therefore 25110$ lbs. are worth $351.54 second offer,

$351.64 - 344.25 = \$7.29$ gain by latter offer.

31. If a gallon of water weighs 145.83 ozs., Troy, and 1 pint of water contains 34 56 cub. inches, find the weight of cub. foot of water in ozs. avoir.

Solution. If 34.56 cub. in. $= 1$ pint,

$\therefore 1728$ " " $= 50$ "

Again if 1 gallon of water weighs 145.83 oz. Troy,

$\therefore$ 50 pts. or $6\frac{1}{4}$ " " " $911\frac{11}{16}$ " "

Again 1 oz. Troy $= 480$ grs.

$\therefore 911\frac{11}{16}$ " " $= 437500$ grs.

If $\frac{7000}{16}$ grs. $= 1$ oz. avoir.

$\therefore 437500$ grs. $= 1000$ ozs. avoir. Ans.

32. The interval between the firing of two guns on a wharf is 10 minutes, and a passenger on board on approaching steam-boat hears the second report 9 minutes and 45 seconds after the first, the boat moving at a uniform rate, and sound travelling 1125 feet per sec. If the steamer's whistle is heard at the wharf, when she is 5 miles off, how soon after that will she arrives there ?

Solution. 10 min.—9 min. 45 sec. $= 15$ sec.

If in 1 sec. sounds travels 1125 ft.

$\therefore$ " 15 " " " 16875 ft.

Again by problem steamer travels 16875 ft. in 9 min. 45 sec.

$\therefore$ " " " 5 miles in 15 min. $15\frac{1}{2}$ sec. Ans.

CRISDAN.

Holiday Reading

AN HISTORICAL LIBEL SUIT.

On the twelfth of May, Earl Grey mentioned in the House of Lords that a Mr. Hone was proceeded against for publishing some blasphemous parody ; but he had read one of the same nature, written, printed, and published some years ago by other people, without any notice having been taken officially of it. The parody to which Earl Grey alluded, and a portion of which he recited was