

and one vol. of mercury at freezing point (+32°) occupying 1.0054 vols. at 87°.

$87^\circ - 62^\circ = 25^\circ$ ∴ every inch at 62° becomes 1.00025 inches at 87° ∴ correction for expansion of scale is 30×1.00025 . Again since vols. at 87° and 32° are as 1.0054 to 1 the true reading would be decreased in proportion to these numbers

$$\therefore 30 \times 1.00025 \times \frac{1}{1.0054} = 29.846 \text{ inches.}$$

Solutions to Numbers 176, 177, 178, 179, were given by Wilbur Grant, T. C. I.

PROBLEMS

For Entrance to High Schools and other Examinations, by W. S. ELLIS, B.A., Math. Master, Coll. Inst., Cobourg.

205. A customer bought a bar of iron $1\frac{1}{2}$ inches square and 8 feet long, which weighed 72 lbs. Finding that this did not suit his purpose, he took it back and exchanged it for another bar $1\frac{1}{2}$ inches square and 9 feet long; this time the dealer forgot to weigh the iron, with how many pounds should the customer be charged? *Ans.* $116\frac{1}{2}$ lbs.

206. A customer buys what he supposes is \$45 worth of tea, but a false weight having been used he only gets \$42 worth; how many ounces of tea are sold to him for a pound?

$$\text{Ans. } 14\frac{1}{3} \text{ oz.}$$

$$207. \frac{\frac{4}{9} + \frac{1}{25} - 1 - \frac{a}{b}}{\frac{2}{3} - \frac{1}{5} - 1} = \frac{22}{15}, \text{ find the missing}$$

term in the numerator for which $\frac{a}{b}$ stands.

$$\text{Ans. } \frac{4}{15}.$$

208. A river is running at the rate of 3 miles per hour, and a man spends one hour in rowing down stream, he then walks back by a semi-circular roadway to the starting point; if it be given that the course of the

river is straight, that the circumference of a circle is $\frac{2}{3}$ of its diameter, that the man can walk 4 miles while he can row 5, and that he is gone altogether 4½ hours; find his rate of rowing, his, rate of walking, and the whole distance travelled.

$$\text{Ans. } 5 \text{ mls., } 4 \text{ mls., and } 20\frac{1}{2} \text{ mls.}$$

209. *A* goes from *X* to *Y*, a distance of 25 miles; *B* goes from *X* to *Z*, and then from *Z* to *Y*; if the roads make a right angle at *Z*, if their lengths are as 3 to 4, if the rates at which *A* and *B* respectively travel are as 5 to 6, and if *A* is 5 hours on the road, find how long one of them will have reached *Y* before the other gets there.

$$\text{Ans. } A \text{ gets there } 50' \text{ before } B.$$

210. *A* lends \$25000 at 8 % per annum payable half-yearly, but afterwards makes an arrangement so as to get his interest in equal quarterly payments; what should be the amount of each payment so that neither party may suffer loss?

$$\text{Ans. } \$495.0495 +.$$

211. The Canadian Government issued a loan of \$2000000, interest 4 % per annum payable half-yearly. How much money will be required every six months to pay the interest on this loan, and also to form a fund, made up of equal half-yearly instalments bearing interest at 5 % per annum, so that the debt may be cancelled at the end of five years?

212. The length of a room is one and a-half times its breadth, and the breadth is to the height as 3 : 2, and it contains 5832 cubic feet; find the entire cost of covering the walls with paper 18 inches wide, costing $2\frac{1}{2}$ cents per yard, and of painting the ceiling at 7 cents per yard. *Ans.* \$9.78.

213. What is the length of an edge of a cube which is formed by beating together two solid spheres of gold, one two inches in diameter and the other weighing 8 times as much as this one?

$$\text{Ans. } \sqrt[3]{\frac{4}{3}\pi(1^3+2^3)}$$