

Hence $P \left\{ (1.04)^2 + 1.04 + 1 \right\} = 5000(1.04)^3$
and $P = \$1,081.74...$

6. What must be the market value of 6% stock, so that after paying an income tax of 16 mills on the dollar, it may yield 5% on the investment?

If P be the value of \$100 stock, after paying income tax, there is a yearly income of $\frac{P}{20}$ from every \$100 stock.

But every \$100 stock yields \$6 per annum of which, after income tax, there remains $6 - \frac{16}{100} \times 6$ or $\$5.90\frac{4}{10}$

$$\text{Hence } \frac{P}{20} = 5.90\frac{4}{10} \\ \text{and } P = \$118.08$$

7. State the relation between the pound Troy and the pound Avoirdupois. What is the gain per cent. when the selling price per oz. Avoirdupois is the same as the cost per oz. Troy?

Since 1 lb. Troy contains 5,760 grains Troy, and 1 lb. Avoirdupois contains 7,000 grains Troy, therefore

$$1 \text{ lb. Troy is equal to } \frac{5760}{7000} \text{ or } \frac{144}{175} \text{ lb. Avoirdupois.}$$

A lb. Avoird. contains 16 oz., and therefore 1 oz. Avoird. contains $437\frac{1}{2}$ grains. Similarly an oz. Troy contains $5760 \div 12$ or 480 grains.

$\therefore$ The gain on an expenditure represented by $437\frac{1}{2}$ is $480 - 437\frac{1}{2}$ or $42\frac{1}{2}$

$$\therefore \text{The gain per cent.} = \frac{42\frac{1}{2}}{437\frac{1}{2}} \times 100 = 9\frac{5}{7}$$

8. The diameter of a circular plate of lead is 13 inches. From this is cut out a circular plate of radius 6 inches, and the remainder of the lead is moulded into the form of a circular plate, with one-fourth of the former thickness. Find the diameter of this plate.

The surface of the plate of lead is $\pi \left(\frac{13}{2}\right)^2$ sq. in. The surface of the plate cut out is $\pi \times 6^2$ sq. in. Hence the

remaining surface is $\left(\frac{169}{4} - 36\right) \pi$ or $\frac{25}{4} \pi$ sq. in. The surface of a plate moulded from this, and $\frac{1}{4}$ as thick will be $\frac{25}{4} \pi \times 4$ or 25π sq. in.

If d be the diameter of this plate
 $\pi \cdot \frac{d^2}{4} = 25 \pi$
whence $d = 10$ inches.

9. A rectangular field whose length is $\frac{4}{3}$ of its width, contains 2 ac. 112 sq. rds. Find the length of a diagonal.

Since the angle is right, and one side is $\frac{4}{3}$ of the other, the sides and diagonal are as the numbers 3, 4, 5.

Hence the sides and diagonal may be represented by 3s, 4s, and 5s.

$$\therefore 12s^2 = 2 \text{ ac. } 112 \text{ sq. rds.} = 13068 \text{ sq. yd.}$$

whence $s = \sqrt{1089} \text{ yds} = 33 \text{ yds.}$; and the diagonal is 165 yds.

10. The length of one diagonal of a rhombus is double that of the other: the area is 16 sq. in.: find the length of each side.

The diagonals of a rhombus bisect each other at right angles, and form four congruent right-angled triangles.

If d , $2d$, and s be the lengths of the diagonals and side respectively, in inches.

$$\text{The area} = 2 \times \frac{1}{2} d \times d = d^2 = 16 \text{ sq. ins}$$

$$\text{whence } d = 4 \text{ inches; and } s = \sqrt{2^2 + 4^2} = 2\sqrt{5} \text{ in.}$$

EAST MIDDLESEX, PROMOTION AND REVIEW EXAMINATION, NOVEMBER, 1895.

SPELLING—2ND TO 3RD CLASS.

LIMIT OF WORK—Words, phrases and sentences in the different textbooks used by the class, names of familiar objects, days of the week and months.

VALUE, 50 marks; for every error in spelling deduct 3 marks; in capitals