

SOLUTIONS OF PROBLEMS FOR 1855.

PROBLEM 1.—The spike describes 798 cycloids, each of which is 20 ft. The first or last $\frac{1}{2}$ is = 5 feet. $\therefore 798 \times 20 = 15960$, and $+5 = 15965$ feet. *Answer.*

PROB. 2.—This is worked on the same principle as compound interest, by logarithms. The answer is 2.8113 per cent.

PROB. 3.—The curve described is the involute of a circle. $100 \times 100 + (1 + 16.5) = 165000$ rods, or 515 $\frac{1}{2}$ miles. *Ans.*

PROB. 4.— $\frac{1}{2}(2 - \sqrt{3}) \times 12 = 1.6072952$ inches thick. *Ans.*

PROB. 5.—Area of a transverse section of the ring = 0.012526953. Distance of the centre of gravity of that section from the centre of the ring = .39106. $2 \times .39106 \times 3.1416 \times .012526953 =$ solid area, or .03084 inches. *Ans.*

PROB. 6.— $\sqrt[4]{3d}$ root of $48 \times 48 + 3d$ root of 16×16 cubed = 86.436 inches, or 7.203 feet.

PROB. 7.— $218169 \times$ by the length of the side (=1) = 218169 solid feet. *Ans.*

Surface = $\frac{1}{2} \times 20 \times \sqrt[4]{3} = 5 \sqrt[4]{3} = 8.66025$ square feet. *Ans.*

PROB. 8.—Sides 52.915 rods, or $20\sqrt[4]{7}$. Area = $700\sqrt[4]{3}$ rods = 7.57772225 acres.

PROB. 9.— $4\frac{1}{2} : \frac{1}{2} :: 2 : 2.9$. 2 feet added make 2 2-9 feet. *Ans.*

PROB. 10.—This belongs to the Calculus. If the ball be discharged at foot of the mountain, it must move 17 times faster than the earth revolves. At 5 miles, it must move 167746 times faster, or 483908 miles per second. *Ans.*

PROB. 11.—1 lb. and 2 lbs. = 3 lbs. $3 \times 3 = 9$ lbs. $9 \times 3 = 27$ lbs. $27 \times 3 = 81$ lbs. $\therefore$ The weights are 1, 2, 9, 27 and 81 lbs. *Ans.*

PROB. 12.—This is too lengthy for insertion. *Ans.*—53534.42 square miles.

PROB. 13.—Log. amt. = log. principal + $10 \times .07 \times .4342944819 = 3.60503608$, or \$4027.50 *Ans.*

PROB. 14.—The cheese will consist of a cylinder, two segments of a sphere, and a body around it like a hoop or finger-ring. 1770.43569 solid inches. *Ans.*

PROB. 15.—The required body lacks the equal segments of a sphere, of being a globe. Solid area = 17802.4 inches. Superficial = 4084.08 sq. inches.

PROB. 16.—By spherical Trig. the arc or line required = $9^\circ 57' 42'' .648 = 637.8528$ miles *Ans.*

PROB. 17.—The required body will lack four equal segments of a sphere of being a globe. Solid area = 402.0087 feet. Superficial = 287.209 ft.

PROB. 18.—Let $x =$ that part of the globe's diameter above water, then $6x$ squared = x cubed = $32 + 3$. $\therefore x = 1.5478526$, and this from 4 leaves 2.4521474 ft. *Ans.*

PROB. 19.—The horse is to feed outside of the wall, of course. The rope is to reach half-way around, instead of all the way, (a typographical error.) Let $x =$ radius of garden, then x cubed $\times 3.1416$ cubed $+ 6x = 2 \times 160$. $\therefore x = 7.8691$, and diameter = 15.7382 rods. Rope = $7.8691 \times 3.1416 = 24.722$ rods. *Ans.*

PROB. 20.—5-2 tang. $45^\circ = 2\frac{1}{2}$ tons = pressure upon the tree. Pressure upon the stump (or the thrust) = $\frac{1}{2} \times 5 \times \sqrt[4]{5} = 5.59017$ tons. *Ans.*

PROB. 21.—Radius of largest inscribed globe will = $3\frac{1}{2}$; the area of this is to that of the required globe, as the area of the cone is to that of the required globe, plus a fourth of the cone. Diameter = 5.26974 inches. *Ans.*

PROB. 22.—Work this by Algebra, or by Alligation. *Ans.*, 7, 21 and 72.

PROB. 23.—Velocity = $643\frac{1}{2}$ feet per second; height = 1608 $\frac{1}{2}$ feet; range = 11142.86 feet.

PROB. 24.—This is worked by Arithmetic, but is too long for this place. A. can do it in 13 $\frac{1}{2}$ days; B. in 14, 14-29 days; C. in 11, 1-19 days, and D. in 70 days. All working together, will do it in 4 days. *Ans.*

PROB. 25.—The present values of \$1 for 13, 11 and 9 years, are 41.4964 cts., 47.5092 cts., and 54.39, 33 cts. The \$16,000 is to be divided in those ratios. $\therefore$ \$46 30-04; \$5300.93, and \$6069.03 are the Answers.

PROB. 26.—Add 4 to both sides, and extract the square root when we have x squared = $3x + 2 = +or-3$. $\therefore x = \frac{1}{2}(3 + or - \sqrt{13})$, or $\frac{1}{2}(3 + or - \sqrt{-11})$.

QUESTION 1.—Work by cancelling. $(2\frac{1}{2} \times 45 \times 34 \times 6 \times 12 \times 3 \times 39 \times 12 \times 3 \times 6 \times 92) + (22\frac{1}{2} \times 17 \times 3 \times 10\frac{1}{2} \times 2 \times 6 \times 23 \times 8 \times 2 \times 25 \times 8) = \32.40 . *Ans.* Put mixed fractions into improper ones.

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NOTE.—For want of room the Solutions are very much shortened, and some are entirely omitted. We invite correspondents to send us solutions always before May 1st. Correspondents are also invited to send us original or well-selected problems, "with their solutions," which, if liked, we will insert next year.

DUNDAS, N. Y., May 11, 1855.

S. H. WRIGHT.

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