Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

$$\bar{x}=\frac{(n+2)(6n+13)(6n+15)(6n+17)}{(n+3)(6n+20)(6n+22)(6n+24)}a=\frac{(n+2)(2n+5)(6n+13)(6n+17)}{(n+3)(2n+8)(6n+20)(6n+22)}a.$$

Let $m=8$, then $mn+2m+1=8n+17$, $mn+3m+2=8n+26$ and

$$\bar{x}=\frac{(n+2)(8n+17)(8n+19)(8n+21)(8n+23)}{(n+3)(8n+26)(8n+28)(8n+30)(8n+32)}a,$$ and so on for any value of m.

The centroid is on the axis of symmetry. $\therefore\ \bar{y}=0$.

If m be a positive fraction the centroid will be the origin and $\bar{x}=0$, $\bar{y}=0$.

This follows from the fact that there are as many loops, (equal) arranged about the centre as the denominator of the fraction represented by m has integers in it. Hence, if $m=\frac{q}{p}$, then there are p equal loops around the centre.

A general rule is as follows:

When m is a positive odd integer

$$\bar{x}=\frac{n+2}{n+3}\left[\frac{(mn+2m+1)(mn+2m+3)(mn+2m+5)\ldots\ldots}{(mn+3m+1)(mn+3m+3)(mn+3m+5)\ldots\ldots}\right]a,$$ to $\frac{m+1}{2}$ factors inside the brackets.

When m is a positive even integer

$$\bar{x}=\frac{n+2}{n+3}\left[\frac{(mn+2m+1)(mn+2m+3)(mn+2m+5)\ldots\ldots}{(mn+3m+2)(mn+3m+4)(mn+3m+6)\ldots\ldots}\right]a,$$ to $\frac{m}{2}$ factors inside the brackets. In either case $\bar{y}=0$,

ARITHMETIC.

Conducted by B. F. FINKEL, Kidder, Missouri. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

9. Proposed by O. S. KIBLER, Superintendent of Schools, West Middleburgh, Logan County, Ohio.

Four logs of uniform thickness whose diameters are each four feet, lie side by side and touch each other. In the crevices of these logs lie three logs 3 feet in diameter, and in the crevices of the three logs lie two logs whose diameters are 2 feet. What must be the diameter of a log to lie on the top of the pile and touch the two logs and the middle one of the three logs?

Solution by Professor G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia; I L. BEVERAGE, Monterey, Virginia; and the Proposer.

Let A, B, C, D, E, F, G, be centres of the logs as seen in the figure.

Now $CD=AB=ab=EG$.

$\therefore Ed=\frac{1}{2}EG=2$.

$EF^2-4=dF^2$, $ED^2-4=dD^2$,

$\sqrt{EF^2-4}+\sqrt{6\frac{1}{4}-4}=DF$.

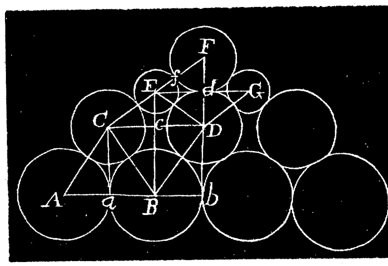
$EF=Ef+fF$, $DF=1\frac{1}{2}+fF$,

$\sqrt{fF^2+2fF-3}+\sqrt{2\frac{1}{4}}=1\frac{1}{2}+fF$,

$\sqrt{fF^2+2fF-3}=fF$,

$fF^2+2fF-3=fF^2$,

$fF=1\frac{1}{2}$.



$\therefore$ the diameter required=3 feet.

This problem was also solved by *A. L. FOOTE, JOHN T. FAIRCHILD, J. A. CALDERHEAD, H. C. WHITAKER, H. W. HOLYCROSS, P. S. BERG, CHARLES E. MYERS,* and *C. D. STILLSON.*

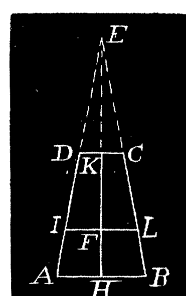
10. **Proposed by MISS LEOTA MILLER, B. L., Professor of Natural Science and Art, Kidder Institute, Kidder, Missouri.**

A carpenter is obliged to cut a board, that is in the form of a trapezoid, crosswise into two equivalent parts. The board is 12ft. long, 2 ft, wide at one end, and one foot wide at the other. How far from the narrow end must he cut?

Solution by B. F. FINKEL, Professor of Mathematics, Kidder Institute, Kidder, Missouri.

II.

1. Let $ABCD$ be the board.
2. $AB=2$ feet$=b$, the width of the large end,
3. $DC=1$ foot$=c$, the width of the small end, and
4. $HK=12$ feet$=a$, the length of the board.
5. Produce HK, AD, and BC till they meet in E. Then by similar triangles,
6. $ABE : EIL : EDC :: AB^2 : LI^2 : DC^2$. But
7. $EIL=EDC+\frac{1}{2}(ABCD)=\frac{1}{2}(2\,EDC+ABCD)=\frac{1}{2}(EDC+EDC+ABCD)=\frac{1}{2}(EDC+EAB)$.
8. $\therefore IL^2=\frac{1}{2}(AB^2+DC^2)=\frac{1}{2}(b^2+c^2)$.
9. $\therefore IL=\sqrt{\frac{1}{2}(b^2+c^2)}=\sqrt{\frac{1}{2}(2^2+1^2)}=\frac{1}{2}\sqrt{10}$ ft., the dividing line.
10. Area of $ABCD=\frac{1}{2}(AB+CD)\times KH=\frac{1}{2}(b+c)a=18$ sq. ft.
11. $\therefore$ Area of $ABIL=\frac{1}{2}ABCD=\frac{1}{4}(b+c)a=9$ sq. ft.
12. But area of $DCIL=\frac{1}{2}(DC+IL)\times KF$ $=\frac{1}{2}[c+\sqrt{\frac{1}{2}(b^2+c^2)}]\times KF=\frac{1}{2}(2+\sqrt{10})\times KF$.
13. $\therefore \frac{1}{2}(c+\sqrt{\frac{1}{2}(b^2+c^2)})\times KF=\frac{1}{4}(b+c)a$, whence
14. $KF=\dfrac{\frac{1}{2}(b+c)a}{[c+\sqrt{\frac{1}{2}(b^2+c^2)}]}=\dfrac{18}{\frac{1}{2}(2+\sqrt{10})}=\dfrac{36}{2+\sqrt{10}}$ 6.973666+feet.



III. $\therefore$ He must saw it in two at 6.973666+feet from the narrow end.

This problem was also solved by *G. B. M. Zerr, P. S. Berg, Charles E. Myers, J. A. Calderhead, A. L. Foote, H. C. Whitaker, H. W. Holycross, H. M. Cash* and *F. A. Swanger.*

11. **Proposed by L. B. HAYWARD, Superintendent of Schools, Bingham, Ohio.**

What length of rope will be required to draw water from a well, it being 38