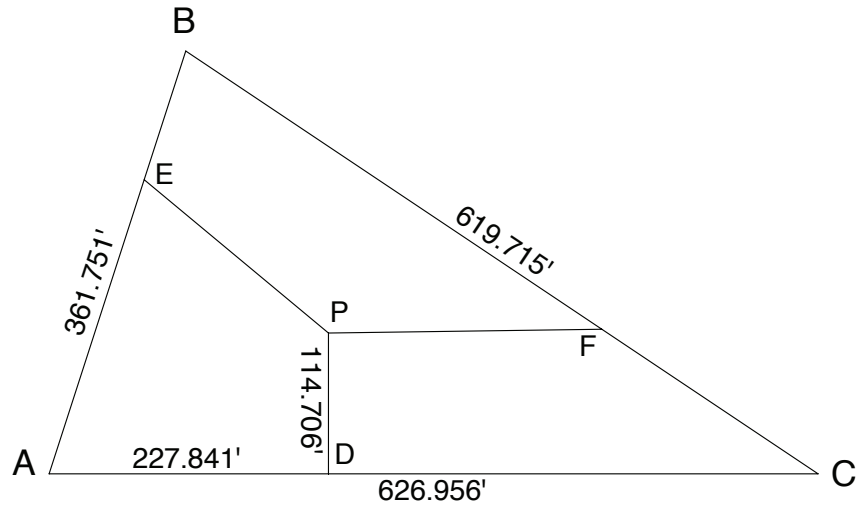


Problem  
**166**

by Dave Lindell, L.S.



Triangle ABC is to be divided into three equal parts by lines PD, PE and PF. Point D is 227.841' due east of point A and point P is 114.706' due north of point D. What are the bearings and distances of all the lines?

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Problem  
**167**

by Benjamin Bloch, Ph.D.

SDQ OF EXPONENTIALS															
n	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
x															
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	2	4	8											
3	1	3	9												
4	1	4													
5	1	5													
6	1	6													
7	1	7													
8	1	8													
9	1	9													
10	1	1													
11	1	2													
12	1	3													
13	1	4													
14	1	5													
15	1	6													
16	1	7													
17	1	8													
18	1	9													
19	1	1													
20	1	2													
21	1	3													
22	1	4													

We now apply SDQ to exponentials,  $x^n$ , with base  $x$  and exponential  $n$ , where  $3^4$  with base  $x=3$  and exponent  $n=4$ , means  $3 \times 3 \times 3 \times 3 = 81$ . Recall that SDQ, (Single Digit Quality) reduces any number to a single digit by adding its digits until a single digit remains. Thus,  $SDQ(3^4) = 3 \times 3 \times 3 \times 3 = 81 \Rightarrow 9$ .

In the table the lefthand column lists base values  $x$  and the row across the top lists exponent values  $n$ .

- Fill in the SDQ values for the blank cells in this table.
- Why was this table designed with blank columns between 1 and 2, 7 and 8, and 13 and 14? Does this pattern repeat and if so what is the pattern?
- Same question as b) but pertaining to the blank rows between 9 and 10 and 18 and 19.
- What is the minimum table size required to find the SDQ for any exponent with any base?

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