Innovate to Keep Problem Solving Alive!

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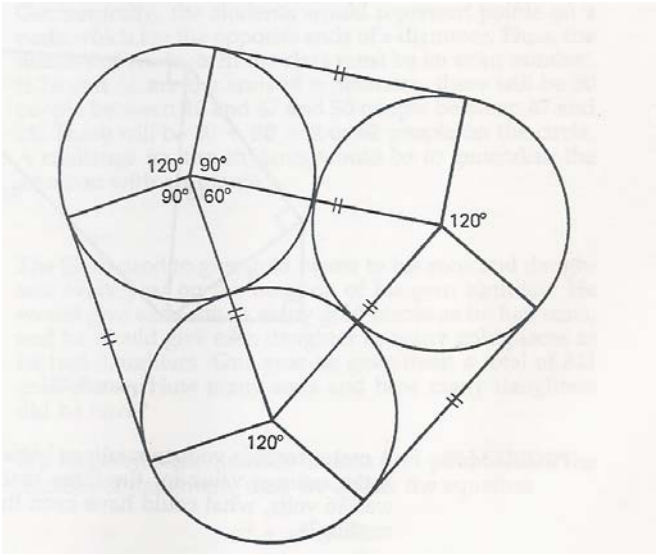
Answers to Sample Problems and Given Problems at the Workshop

Sample Problems

Problem 1. A merchant buys his goods at 25% off the list price. He then marks the goods so that he can give his customers a discount of 20% on the marked price but still make a profit of 25% on the selling price. What is the ratio of marked price to list price? (Krulik & Rudnick, 1989, p. 149)

Answer: $\frac{MP}{LP} = \frac{5}{4}$

Problem 2. Three cylindrical oil drums of 2-foot diameter are to be securely fastened in the form of a "triangle" by a steel band. What length of band will be required? (Krulik & Rudnick, 1989, p. 153)



From: Krulik & Rudnick, 1989, p. 153

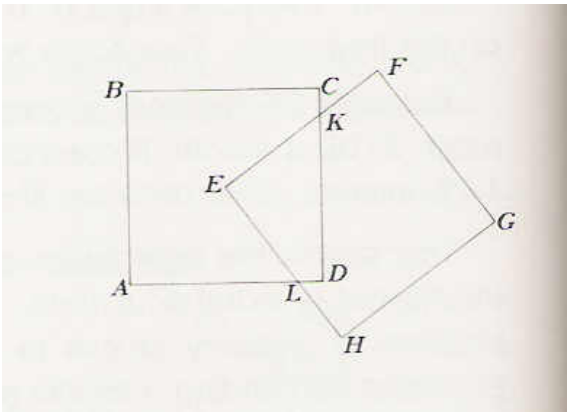
Answer: $6 + 2\pi \approx 12.28$ ft.

Problems for the Workshop

1. How many different triangles with integer sides can be drawn having the longest side (or sides) of length 6? How many of the triangles are isosceles? (Butts, 1980, p. 25)

Answer: 12. 1 equilateral and 7 isosceles

2. What values are possible for the area of quadrilateral *EKDL* if *ABCD* and *EFGH* are squares of side 12 and E is the center of square *ABCD*? (Butts, 1980, p. 30)



Butts, 1980, p. 30

Answer: 36

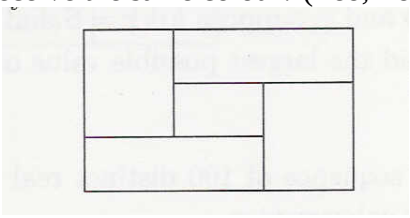
3. A 6-foot tall man looks at the top of a flagpole making an angle of 40º with the horizontal. The man stands 50 feet from the base of the flagpole. How high is the flagpole to the nearest foot? (Krulik & Rudnick, 1989, p. 161)

Answer: 48 ft.

4. A piece of "string art" is made by connecting nails that are evenly spaced on the vertical axis to nails that are evenly spaced on the horizontal axis, using colored strings. The same number of nails must be on each axis. Connect the nail farthest from the origin on one axis to the nail closest to the origin on the other axis. Continue in this manner until all nails are connected. How many intersections are there if you use 8 nails on each axis? (Krulik & Rudnick, 1980, p. 164)

Answer: 28

5. A figure is divided into five regions as shown in the diagram below. Given 4 distinct colors, how many different ways are there to colour the figure so that no two regions with a common boundary receive the same colour? (Teo, To, & Wong, 2000, p. 21)



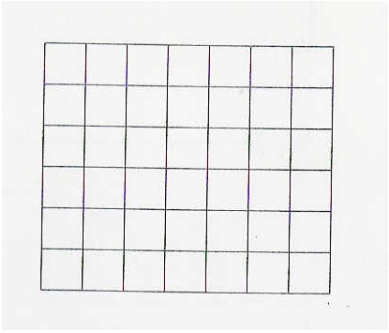
Teo, To, & Wong, 2000, p. 21

Answer: 72

6. Eight points on a circle are grouped into disjoint pairs. Each pair is joined by a chord. Find the number of ways of joining pairs such that no two of the chords intersect. (Teo, To, & Wong, 2000, p. 20)

Answer: 14

7. A 6 x 7 rectangle is divided into 6 x 7 unit squares as shown. What is the total number of squares of all sizes in the rectangle? (Wong, __, p. 37)



Wong, __, p. 37

Answer: 112

8. 1n 1991, a family spent 19% of their income on rent, 26% on food, 30% on other items and saved the rest. In 1992, their income increased by 10%. If the cost of food increased by 10%, savings decreased by 4% and rent remained the same, by what percentage did the expenditure on other items increase? (Wong, __, p. 211)

Answer: 28%

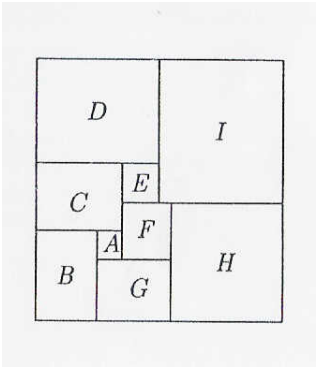
9. When a mother was 3 times as old as her son was, she was as old as he is now. When the son is as old as his mother is now, she will be 70 years old. How old is the mother now? (Wong, __, p. 360)

Answer: 50 years old

10. Two swimmers at opposite ends of a 90-foot pool, start to swim the length of the pool, one at the rate of 3 feet per second, the other at 2 feet per second. They swim back and forth for 12 minutes. Allowing no loss of time at the turns, find the number of times they pass each other. (Garces, 2008)

Answer: 20

11. Nine squares are arranged as shown. If square *A* has area 1 cm^2 and square *B* has area 81 cm^2 then what is the area of square *I* in square centimeters? (Australian Mathematics Competition, 1991)



Answer: 324

Australian Mathematics Competition, 1991

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