

Problems 2017-3

There were nine tribute geometric problems on the occasion of the 150th anniversary of the death of Kōwa (or Takakazu) Seki [1], [2], which are presented below. Since they are easy and solved already, please send a manuscript saying something new or giving a generalization on these problems. There is no deadline of submission.

Remark and Notation: The information of the problem is mainly given by the figure. Congruent figures are denoted by the same letter. The radius of the circles with letter A is denoted by r_A .

Problem 1. Three pairs of congruent circles in a rectangle and two congruent arcs.

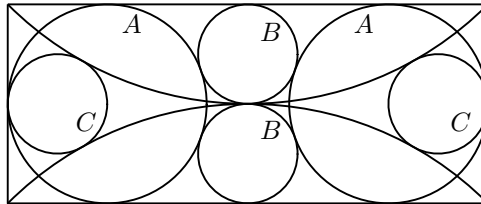


Figure 1. Find r_B in terms of r_C . Answer: $r_B = r_C$.

Problem 2. A right triangle ABC with perpendicular from A to BC and four congruent circles.

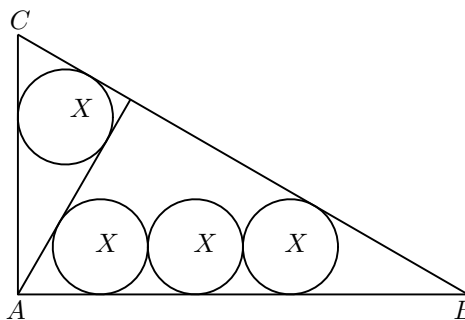


Figure 2. Find BC in terms of AC . Answer: $BC = 2AC$.

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Problem 3. A square of side a and three congruent squares of side b in an isosceles triangle.

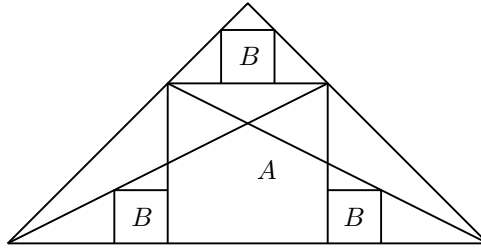


Figure 3. Find a in terms of b . Answer: $a = 3b$.

Problem 4. An isosceles triangle and two congruent squares in a rectangle $ABCD$.

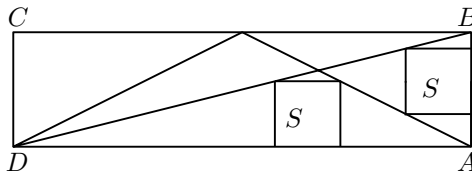


Figure 4. Find BC in terms of AB . Answer: $BC = 4AB$.

Problem 5. A rectangle and six congruent circles in a circle.

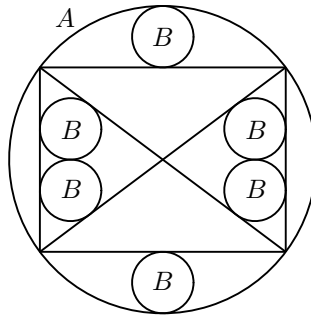


Figure 5. Find r_A in terms of r_B . Answer: $r_A = 5r_B$.

Problem 6. Two congruent circles and six congruent circles in a circle.

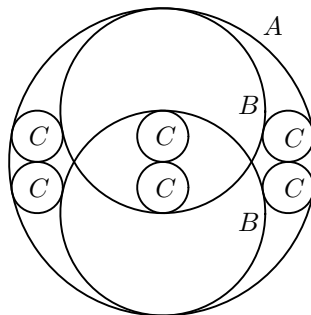


Figure 6. Find r_A in terms of r_C . Answer: $r_A = 6r_C$.

Problem 7. A circle and three congruent circles in a rhombus.

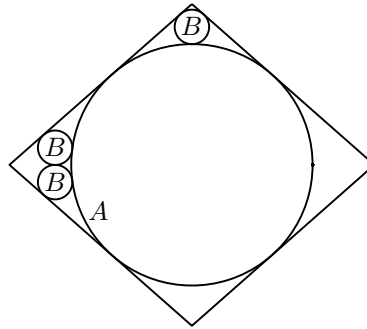


Figure 7. Find r_A in terms of r_B . Answer: $r_A = 7r_B$.

Problem 8. A rhombus and three congruent circles in a circle.

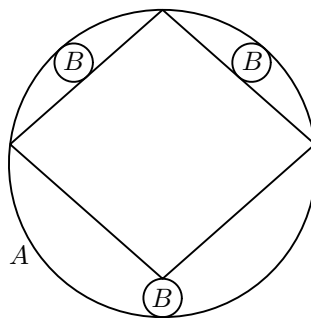


Figure 8. Find r_A in terms of r_B . Answer: $r_A = 8r_B$.

Problem 9. Four pairs of congruent circles and a circle.

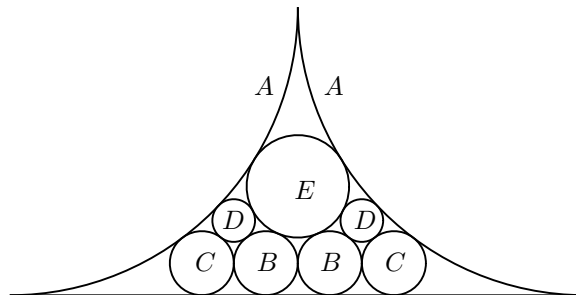


Figure 9. Find r_A in terms of r_B . Answer: $r_A = 9r_B$.

REFERENCES

- [1] Okayu (御粥安本) ed., Hōnōcho Sekisensei Sandai Kujō (奉納箸隻先生算題九条), 1855, Tohoku University Digital Collection, http://www.i-repository.net/il/meta_pub/G0000398wasan_4100003131
- [2] Okayu (御粥安本) ed., Ansei Yonen Seki Sensei Hyakugojikkaiki Tsuizen Sandai Kujō (安政四年関先生百五十回忌追善算題九条), Tohoku University Digital Collection, http://www.i-repository.net/il/meta_pub/G0000398wasan_4100003126