How to find suitable problems for mathematically gifted students within enrichment courses

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In this talk we want to give some ideas how to develop *Low Threshold High Ceiling* tasks and open problem fields for gifted students. In the first part of the talk we reflect on general goals of the work in open problem fields and possible guidelines for students and teachers.

In the second part we shall give an overview of a possible open problem field, namely the construction of tilings of the plane. Starting from basic platonic tilings and continuing with Archimedian ones, we introduce the notion of 'periodicity' and even get to so-called Penrose tilings. We shall see how quickly we get from a high school problem to open mathematical research, which mostly can be tackled by elementary means.

The talk is based on work [1] used for enrichment programs for mathematically gifted children and on observations from working mathematicians. This mathematical problem field can be enriched by artistic, crafting, historical and cultural discourses. Possibilities for this include the art of Escher or Islamic architecture.

References

[1] W. Bedenknecht, K. Heuer and D. Sarikaya. Parkettierungen der Ebene mit Anschlussproblemen: Förderung mathematisch begabter Jugendlicher innerhalb des Klassenverbandes am Beispiel einer Projektwoche. (In German). Preprint: `http://logic.las.tu-berlin.de/Members/Heuer/publications/Parkett_WBKHDS.pdf`