Trisekce úhlu s využitím origammi geometrie

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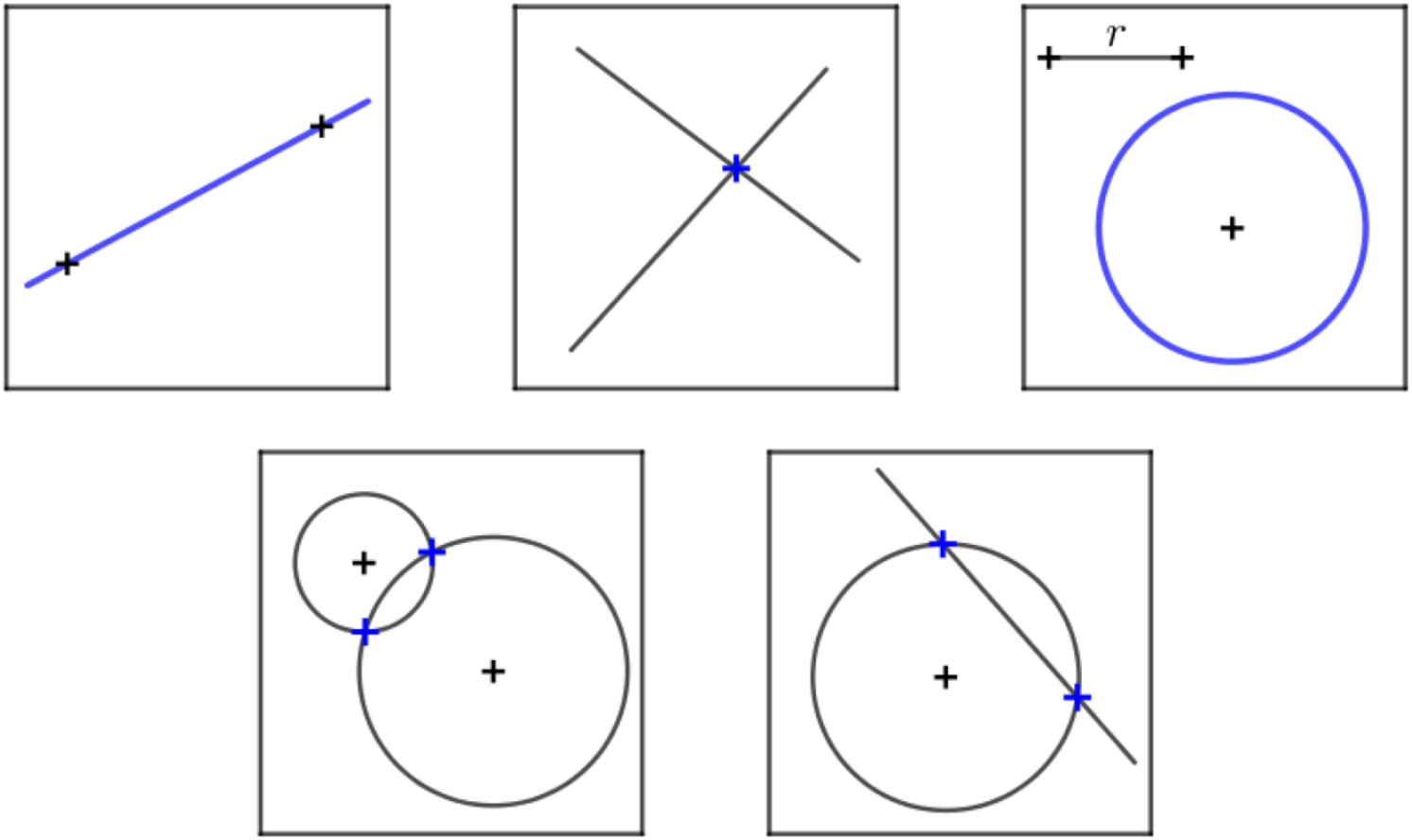
Eukleidovská geometrie

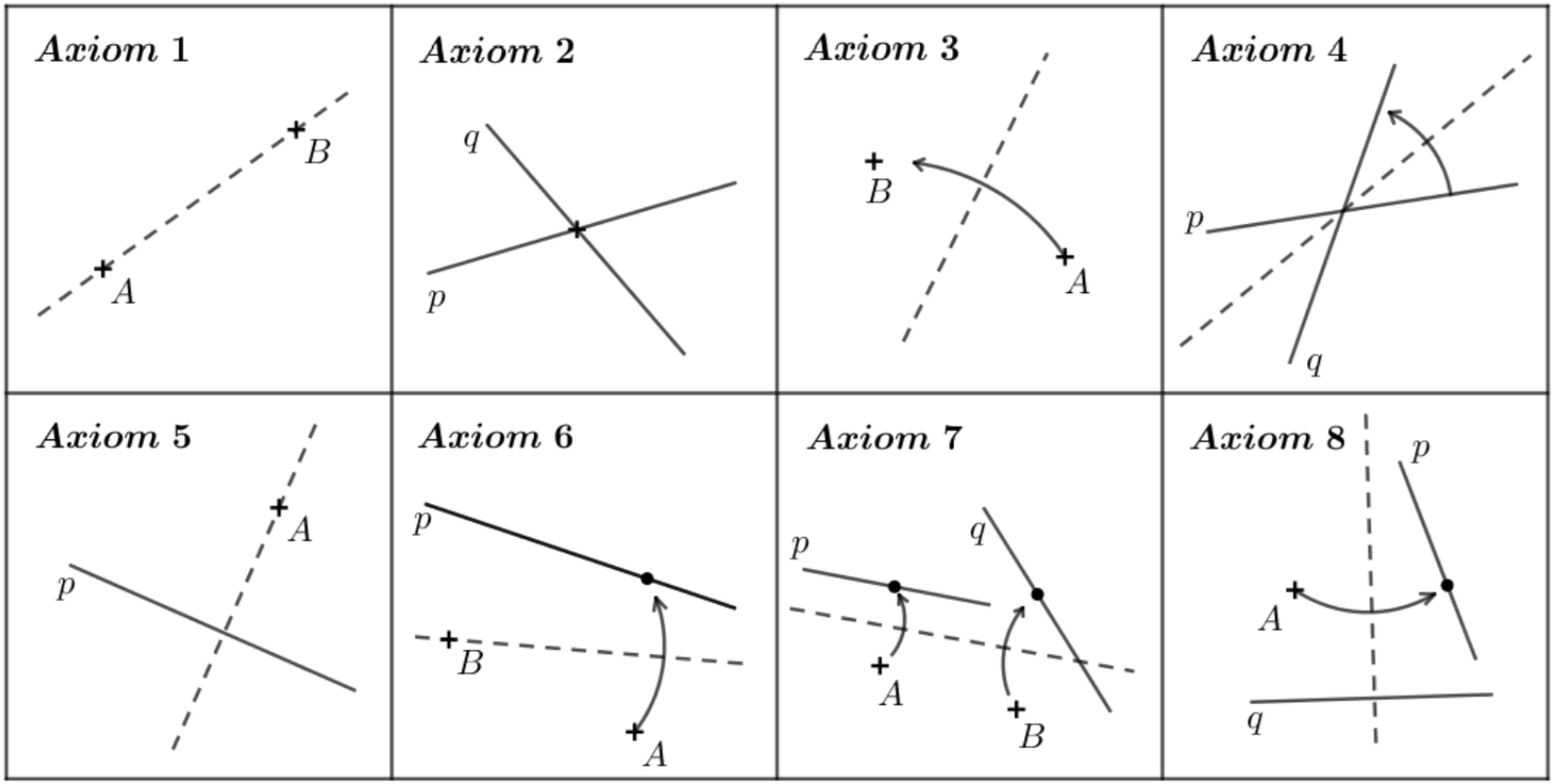
- základní eukleidovské konstrukce



- vedou k řešení soustavy lineárních rovnic, popř. lineární a kvadratické rovnice, popř. soustavy kvadratických rovnic

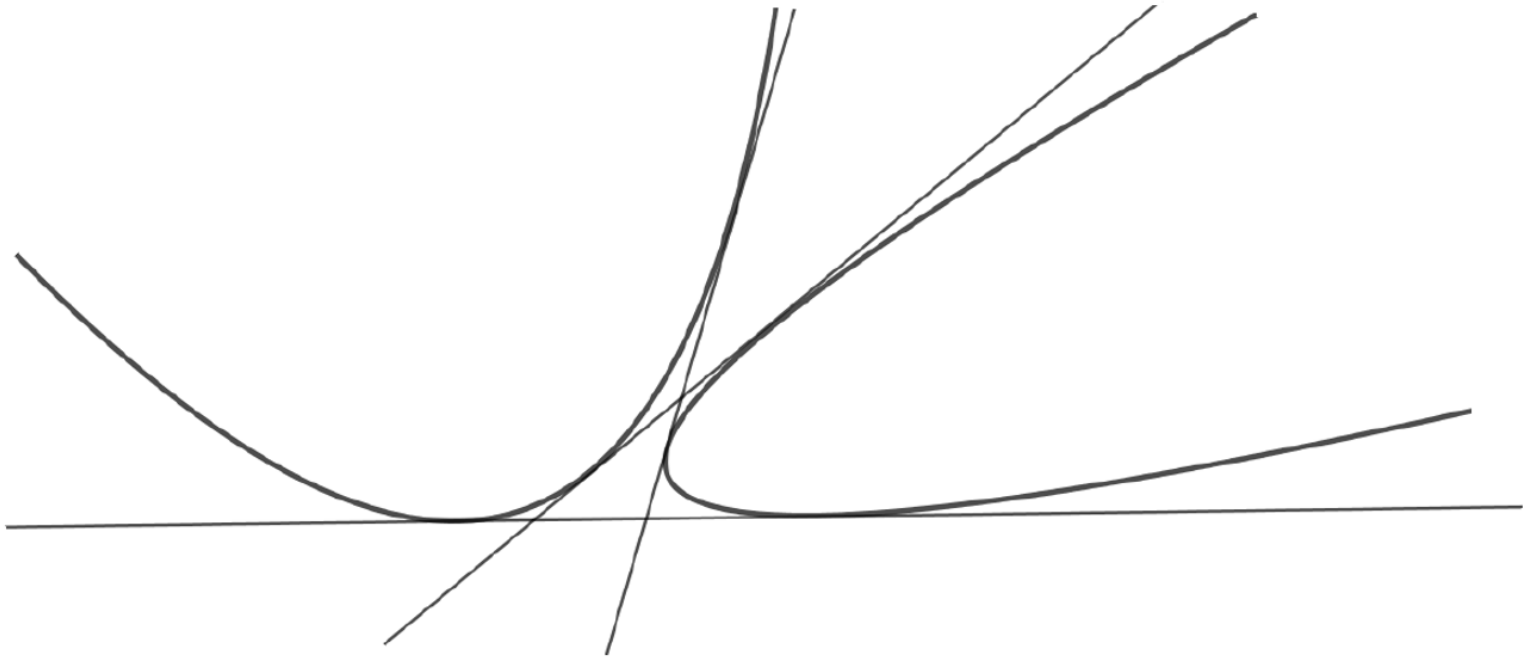
Origami geometrie

- Huzita-Hatori axiomy origammi geometrie



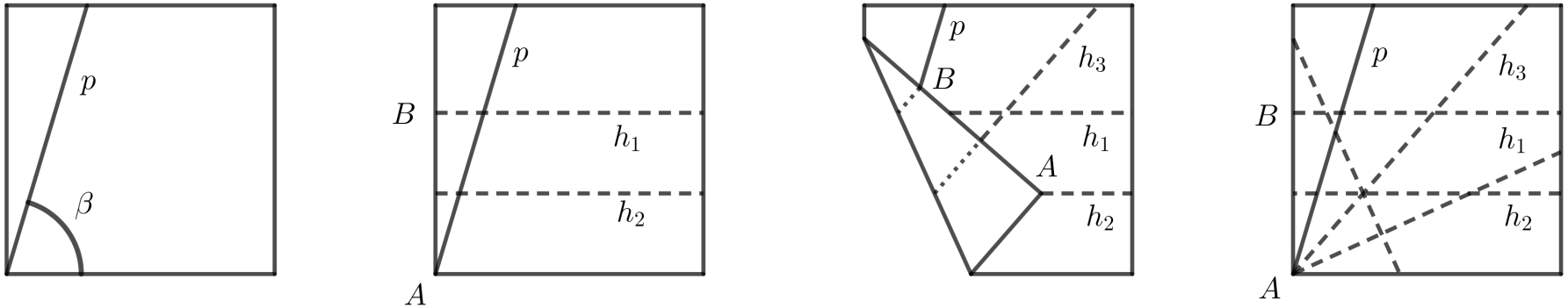
Origami geometrie

- 7. axiom



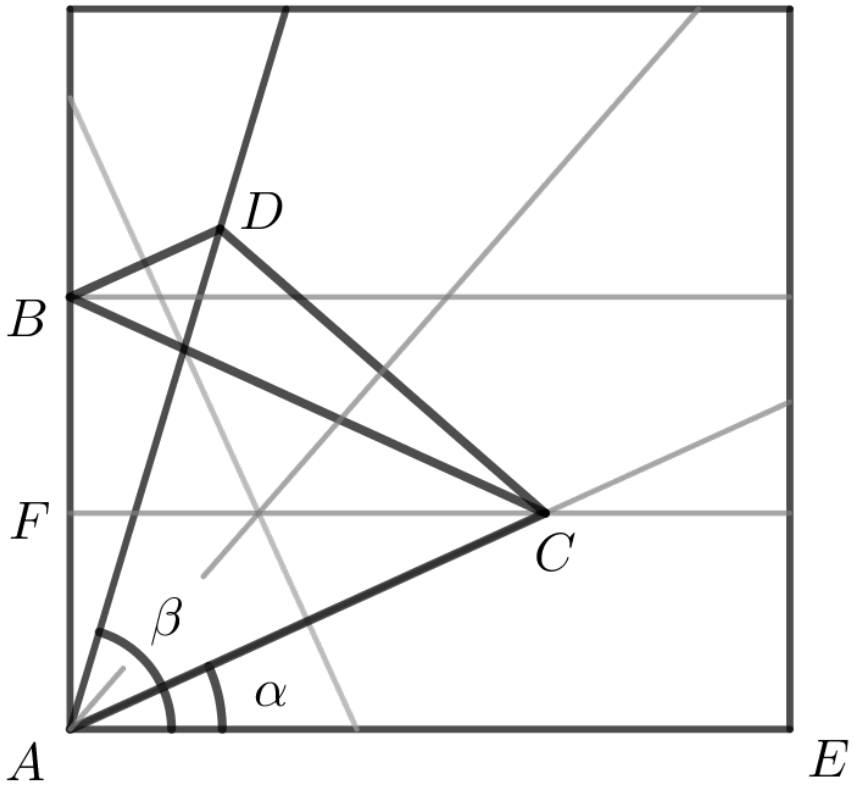
Trisekce úhlu

- eukleidovsky neřešitelné
- algebraické řešení vede k hledání kořenů kubické rovnice
- Hisashi Abe – japonský matematik, konstrukci odvodil 1970



Trisekce úhlu

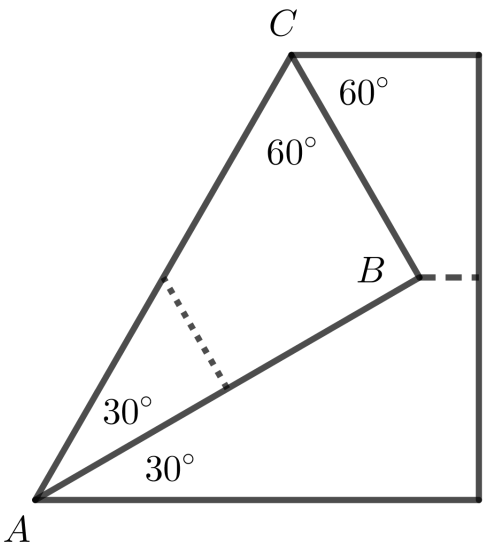
důkaz

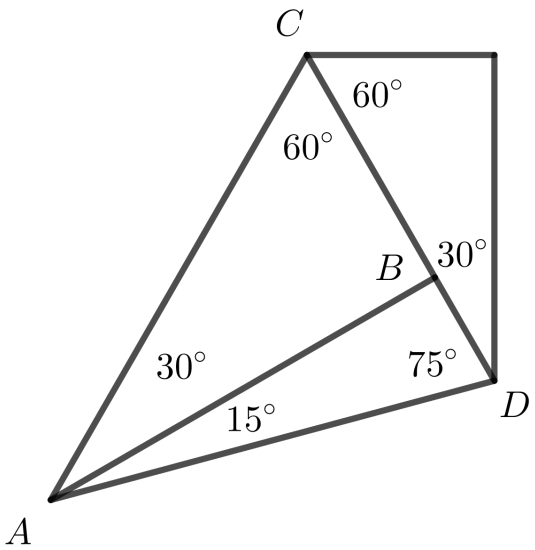


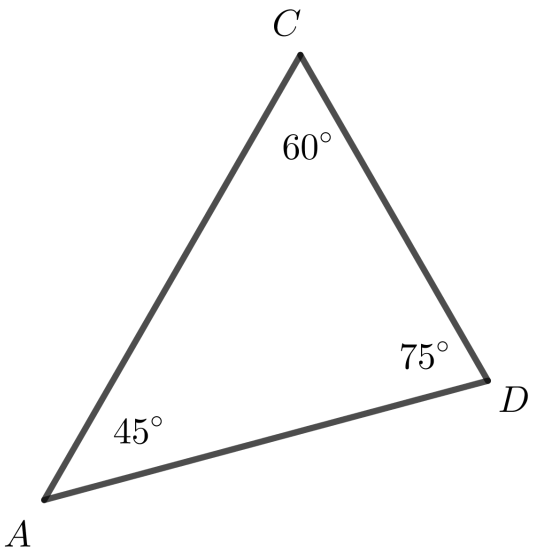
Úhly v trojúhelníku

papírový úhloměr

Na čtvercovém papíru pomocí několika překladů vytvoříme úhly o velikostech 15°, 30°, 45°, 60°, 75°, 90°, 105°, 120° a 150°.

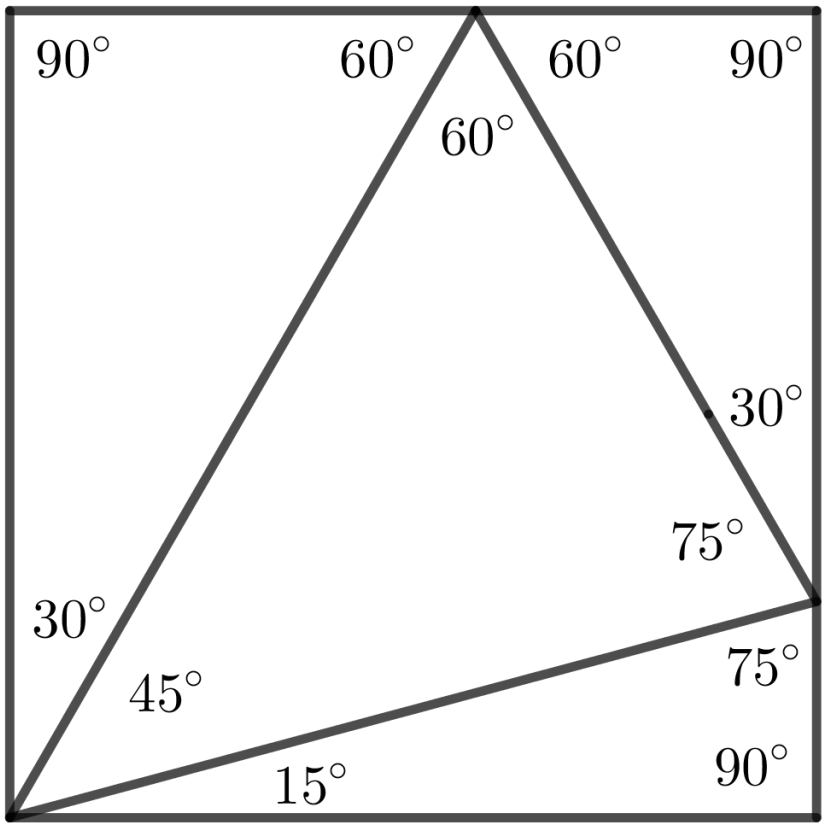






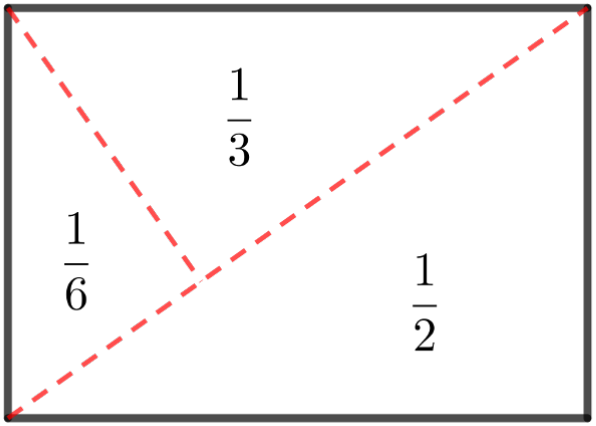
Úhly v trojúhelníku

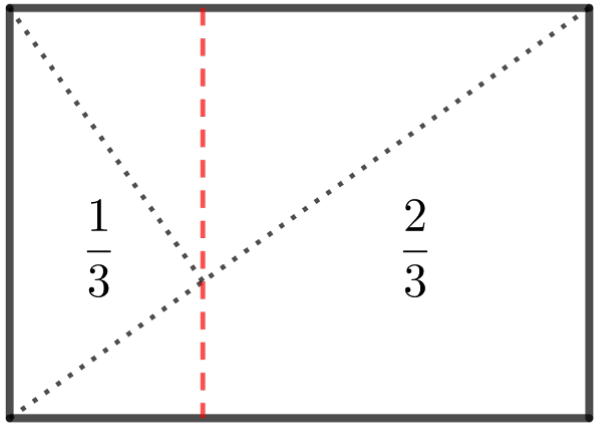
papírový úhloměr

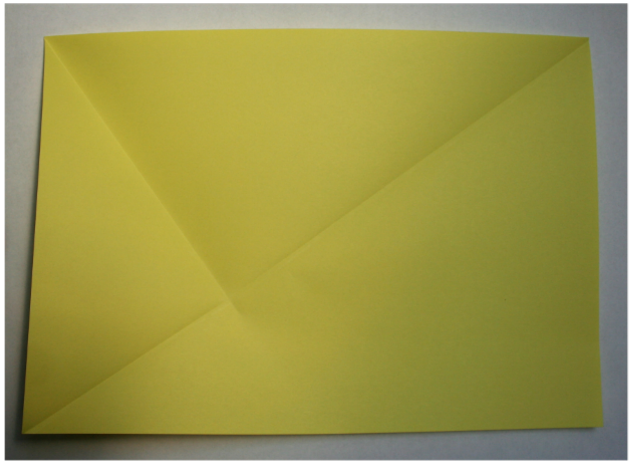


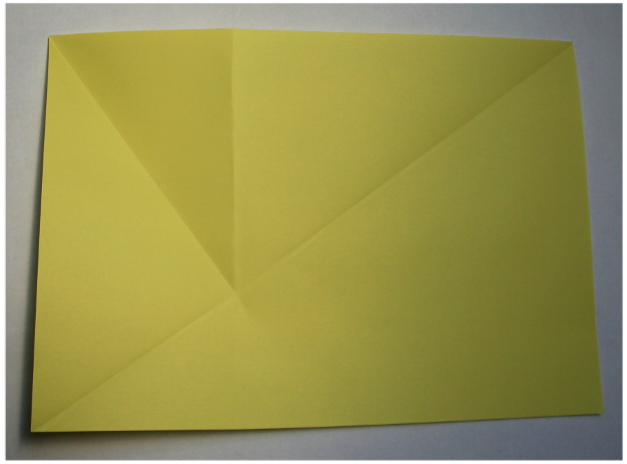
Práce s kancelářským papírem

Formáty papíru řady A - poměr kratší ku delší straně je vždy $1 : \sqrt{2}$







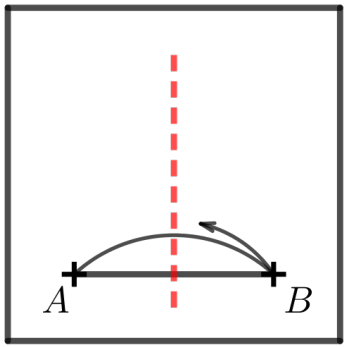


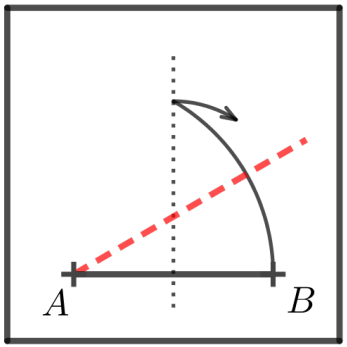
Pravidelné mnohoúhelníky

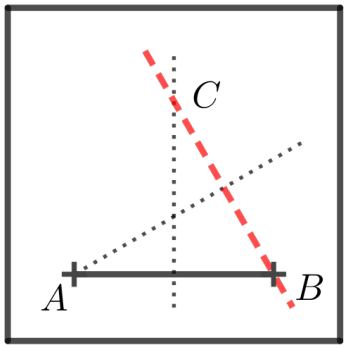
rovnostranný trojúhelník

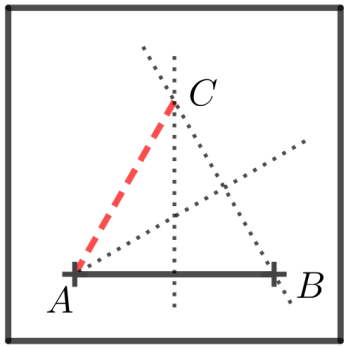
Na internetu lze dohledat řadu návodů konstrukce pravidelných n-úhelníků.

Některé konstrukce by žáci mohli objevit sami - rovnostranný trojúhelník, čtverec.





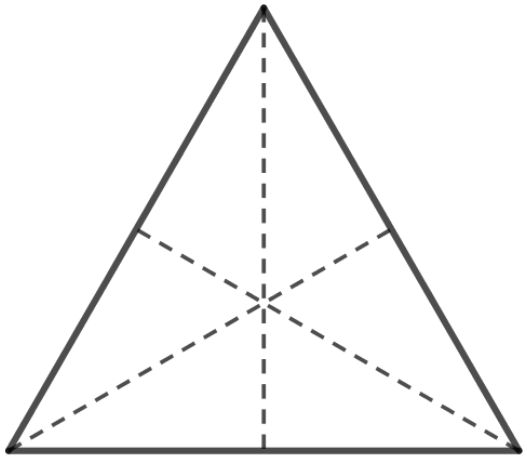


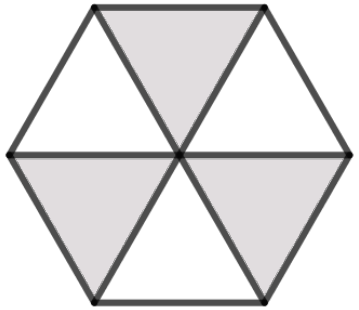


Pravidelné mnohoúhelníky

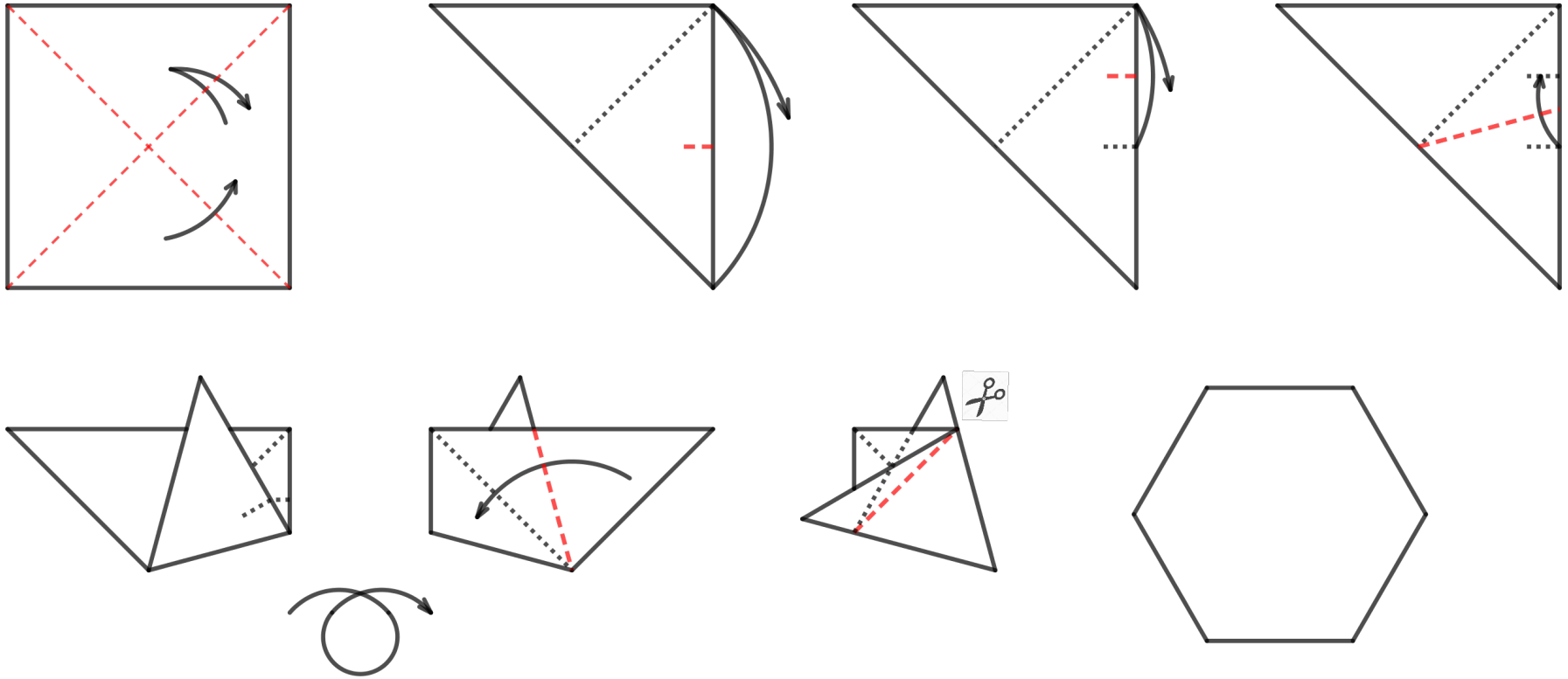
šestiúhelník

Šestiúhelník sestrojený z rovnostranného trojúhelníku

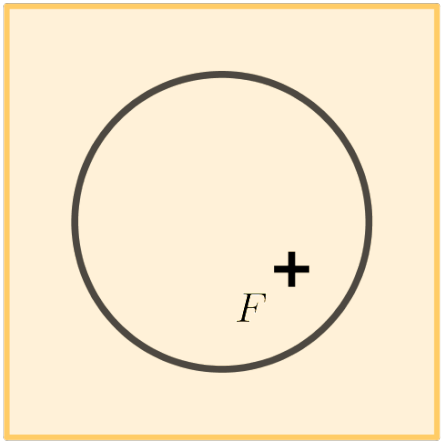


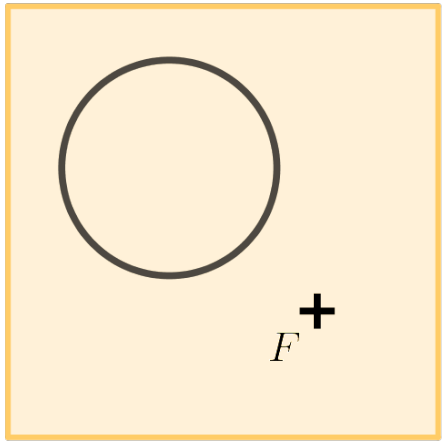


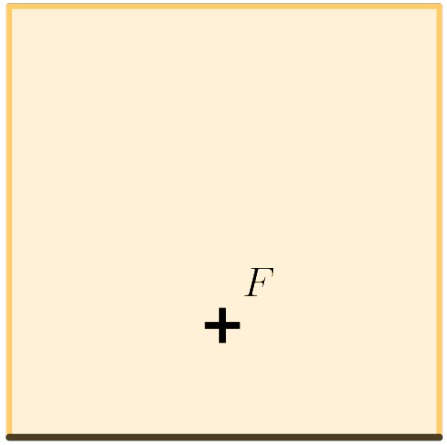
Šestiúhelník sestrojený z čtvercového papíru



Kuželosečky







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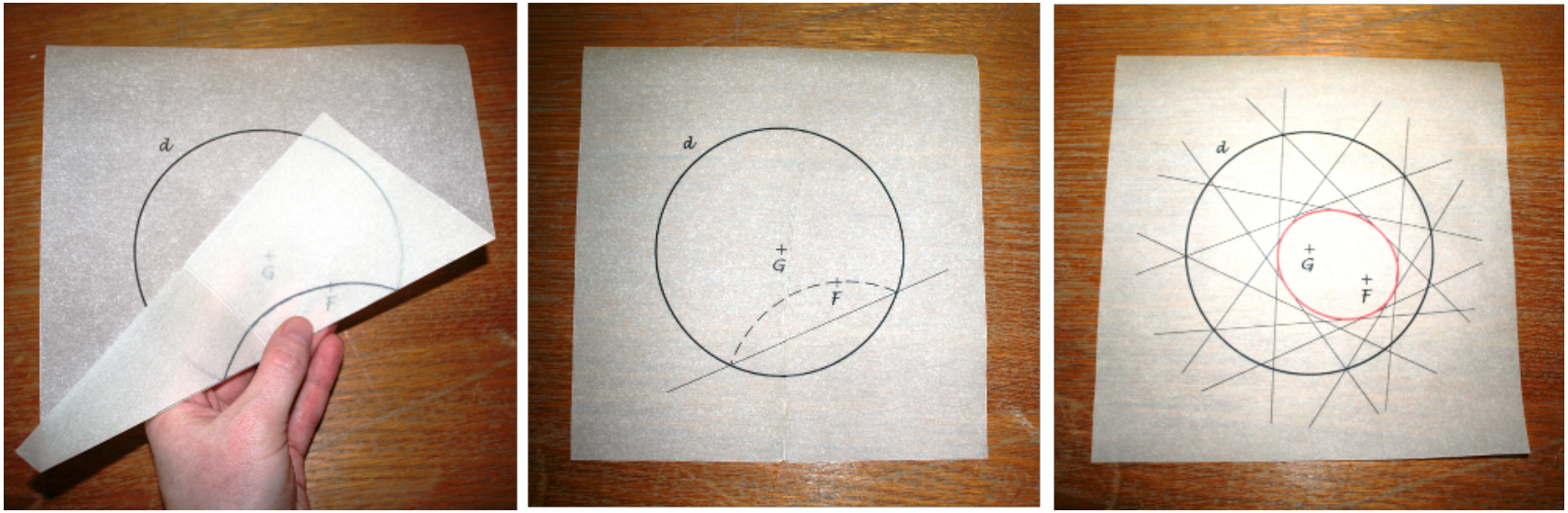
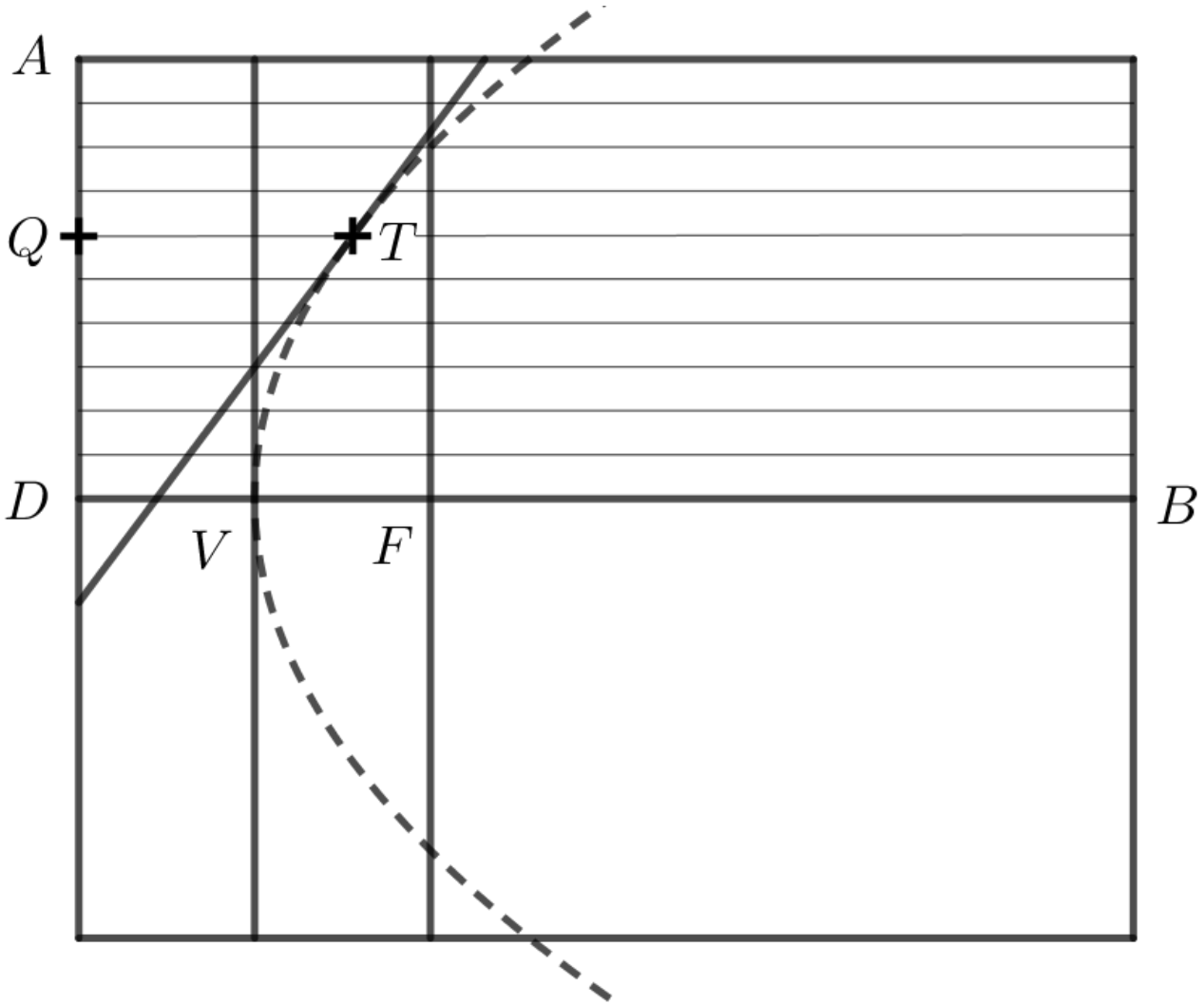


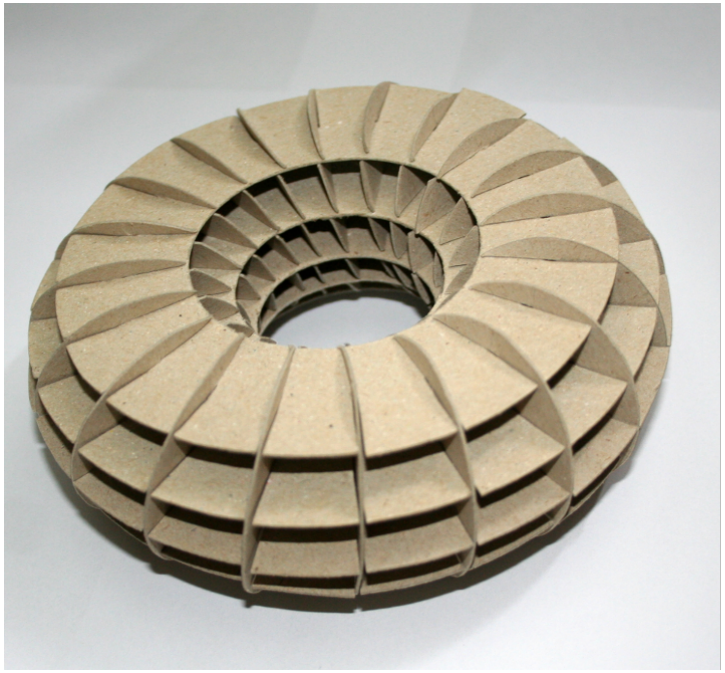
Konstrukce vychází z ohniskových vlastností kuželoseček

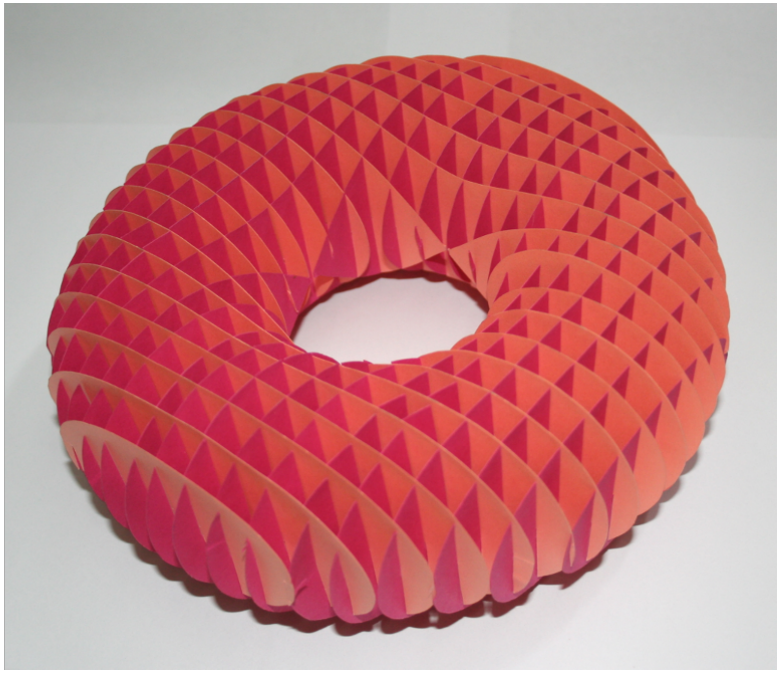
Řídicí kružnice, resp. přímka (u paraboly) je množinou všech bodů souměrně sdružených s ohniskem kuželosečky podle jejích tečen.

Kuželosečky



Modely sestavené z rovinných řezů těles

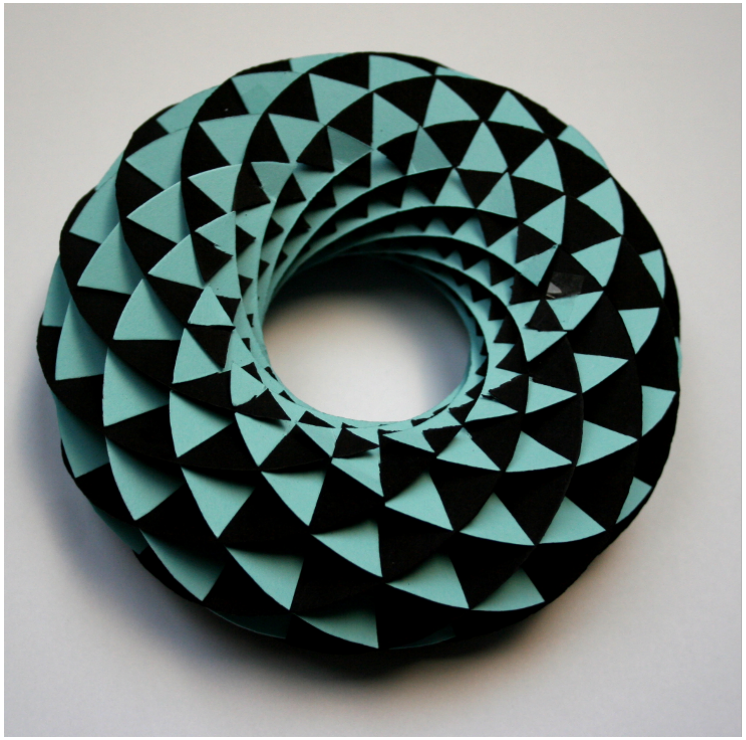


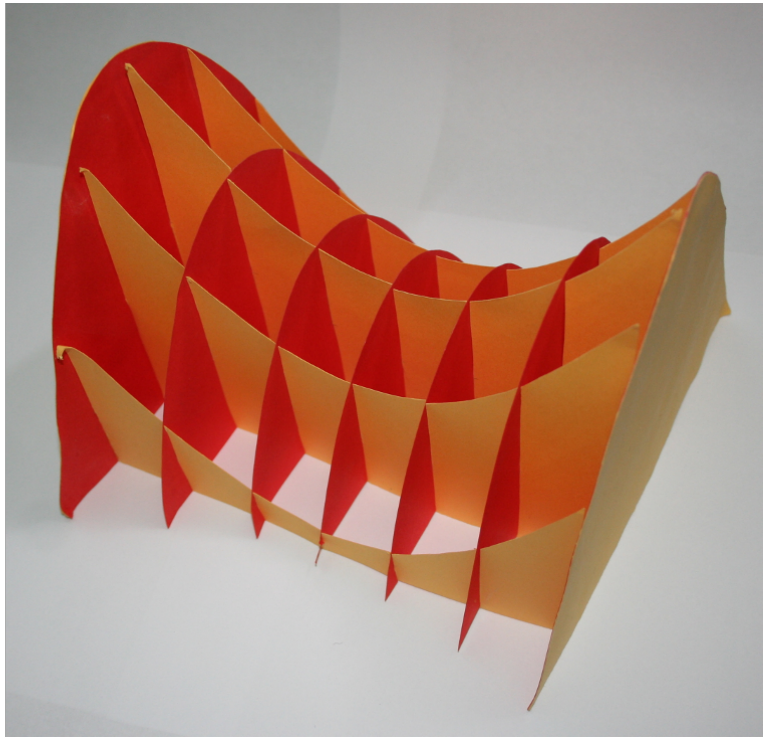


rovnoběžkové a meridiánové kružnice na anulouidu

Perseovy křivky - řezy rovinami rovnoběžnými s osou anuloidu

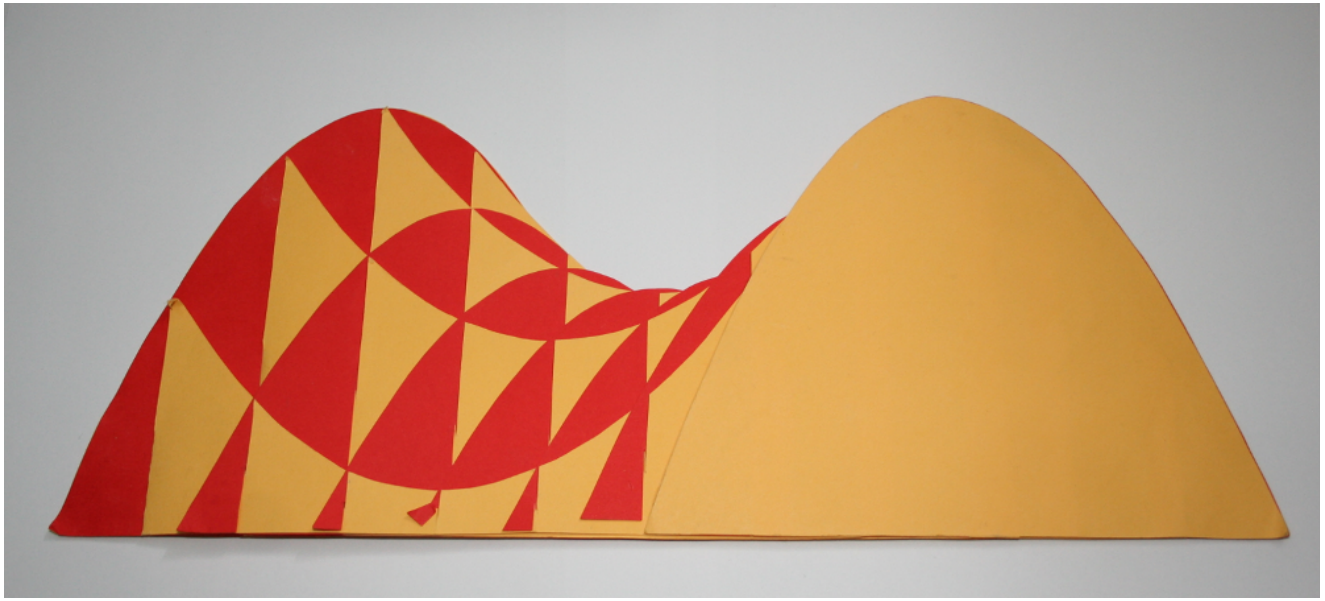
Modely sestavené z rovinných řezů těles





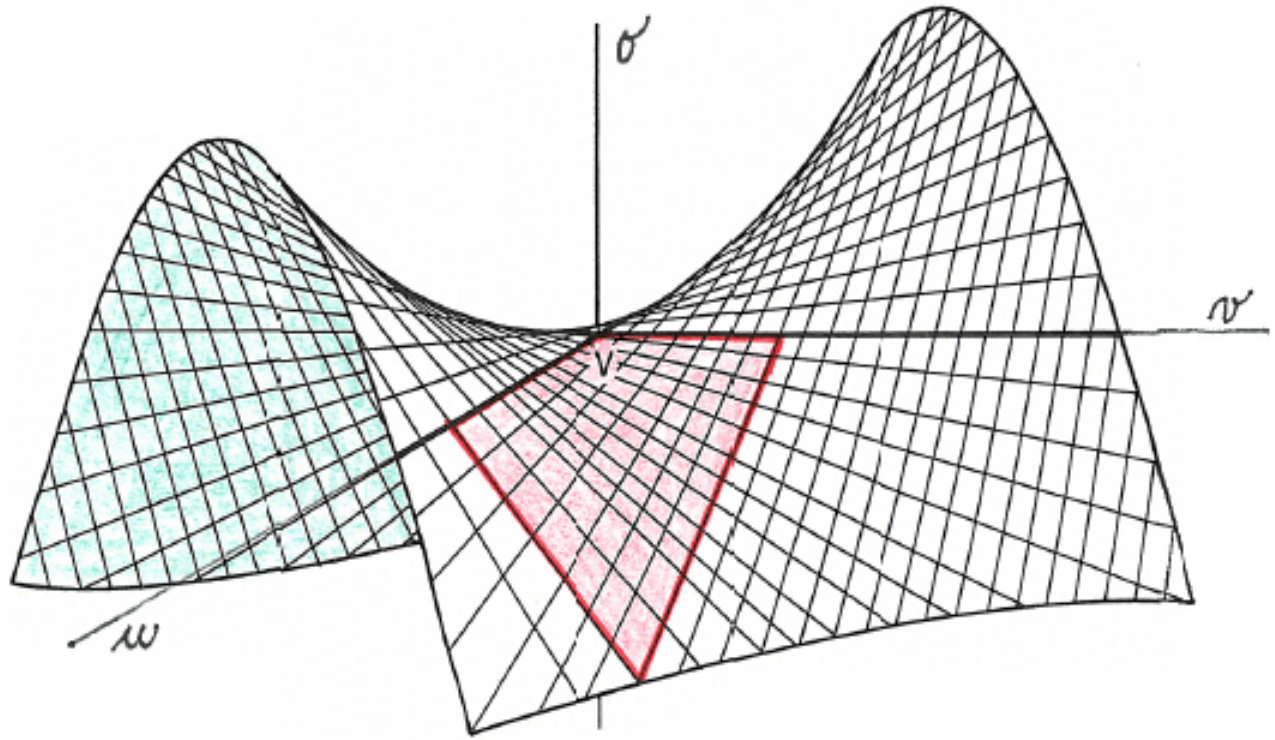
Villarceauovy kružnice - řezy anuloidu bitangenciální rovinou
parabolické řezy hyperbolického paraboloidu

Modely sestavené z rovinných řezů těles

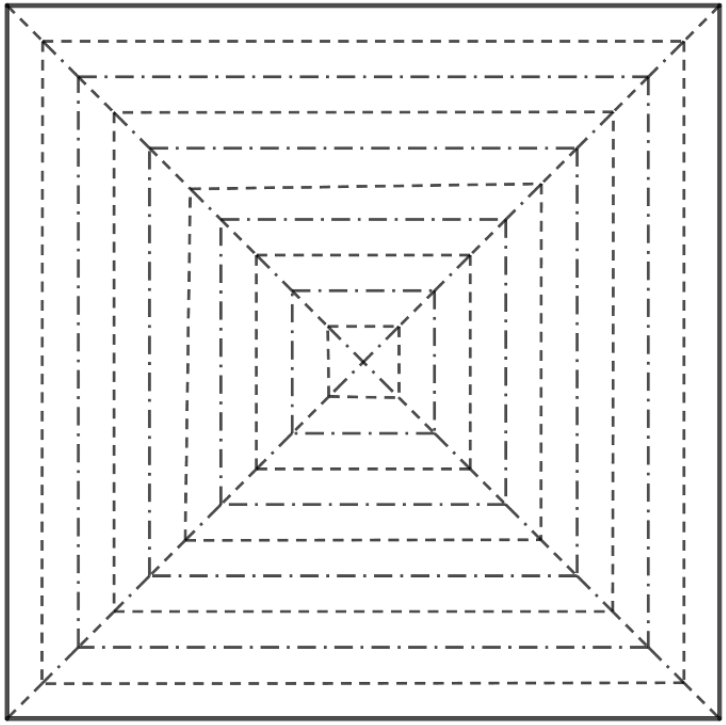


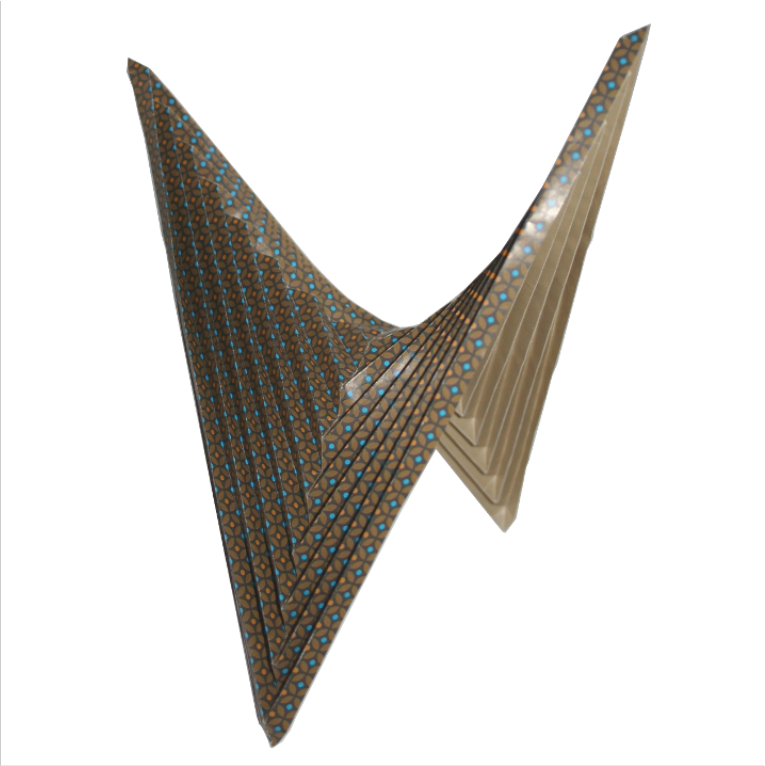
model hyperbolického paraboloidu sklopený do roviny

Hyperbolický paraboloid



Hyperbolický paraboloid





Děkuji za pozornost