

# Nekonveksni pravilni mnogokuti

**Natalija Radotović-Maksić, univ. spec., učiteljica savjetnica**

Osnovna škola „Vladimir Nazor“ Križevci,

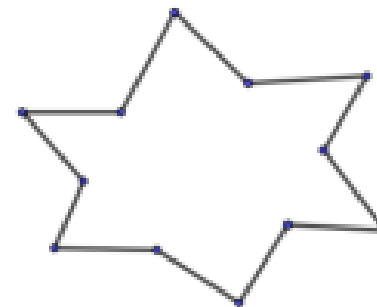
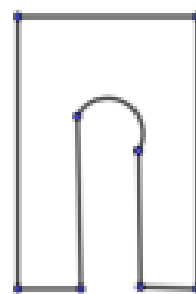
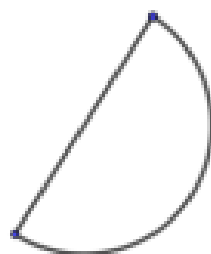
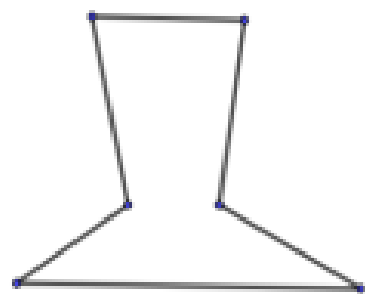
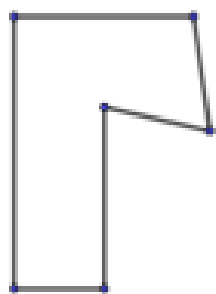
**Gordana Jandžel, dipl. uč., učiteljica savjetnica**

Osnovna škola Matije Gupca Gornja Stubica

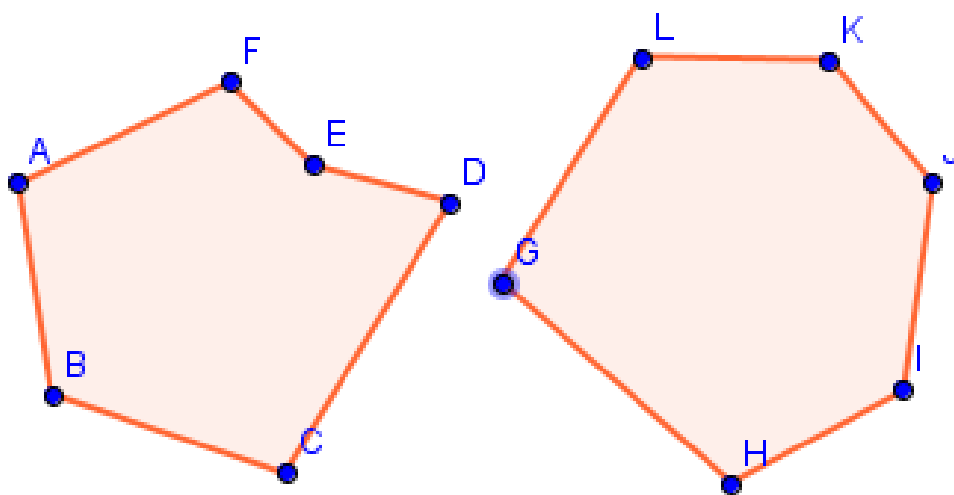
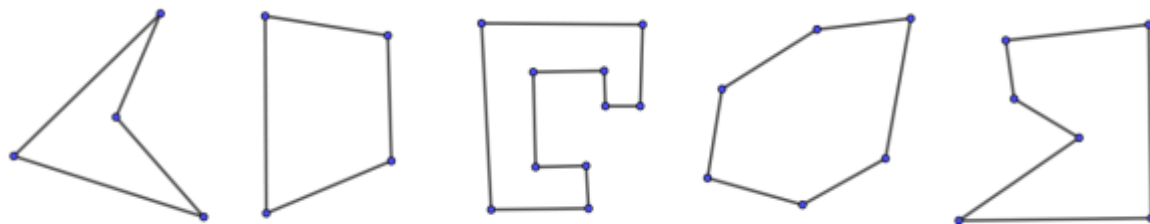
# Kurikulum nastavnog predmeta matematika za 7. razred, Domena C- Oblik i prostor

- *MAT OŠ C.7.1. propisuje: Crta i konstruira mnogokute i koristi se njima pri stvaranju složenijih geometrijskih motiva.*
- *Razrada ishoda uključuje: Prepoznaje mnogokute u prostoru. Opisuje mnogokut. Razlikuje pravilne i nepravilne mnogokute, konveksne i nekonveksne. Konstruira pravilne mnogokute. Skicira, crta ili konstruira nepravilni mnogokut. Korelacija s Tehničkom kulturom/Likovnom kulturom.*

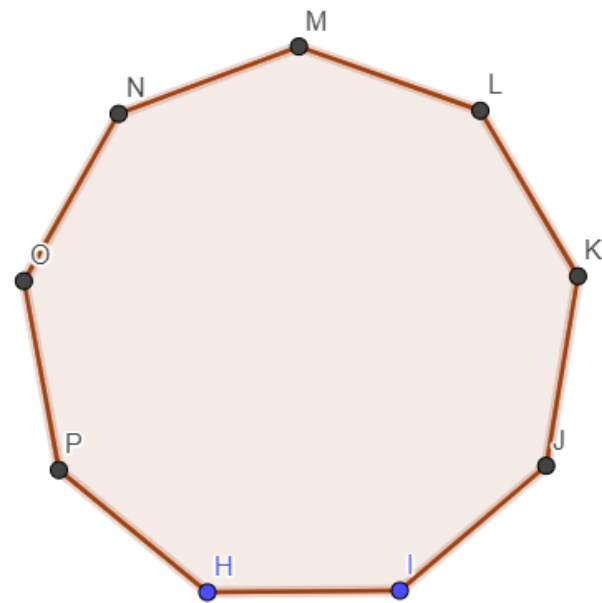
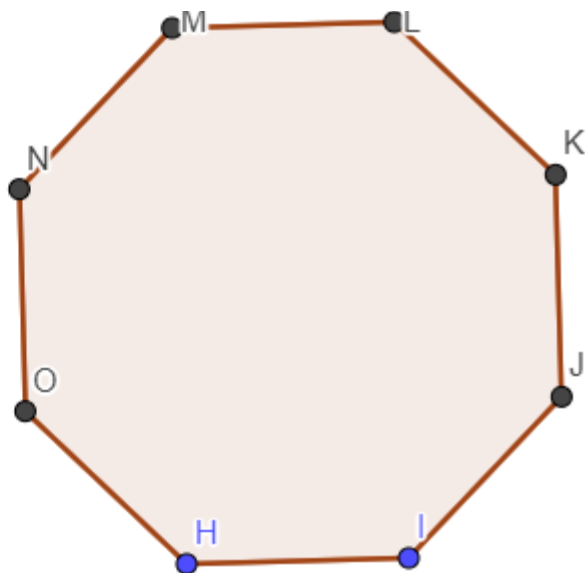
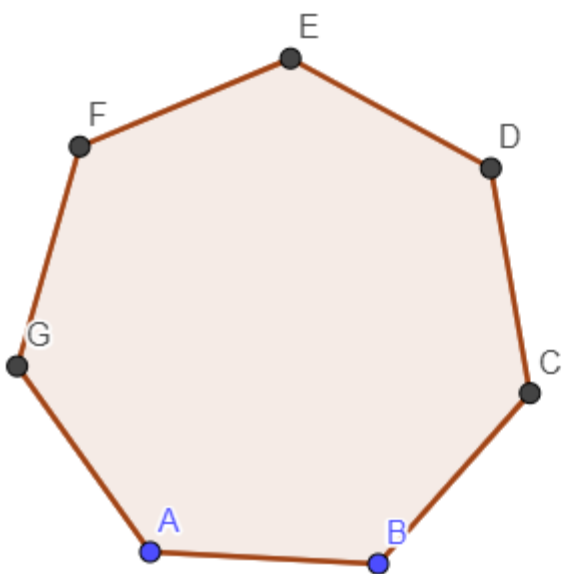
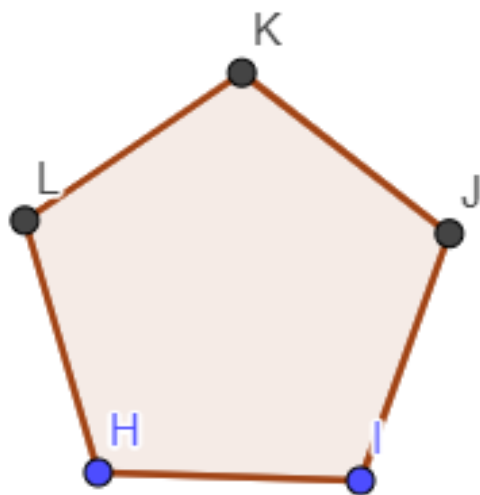
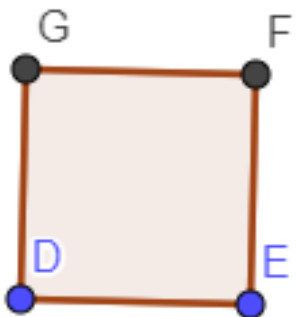
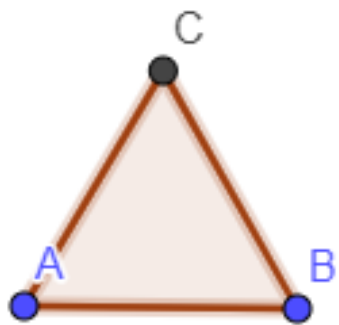
# Mnogokuti



# Konveksni i nekonveksni mnogokuti



# Pravilni mnogokuti

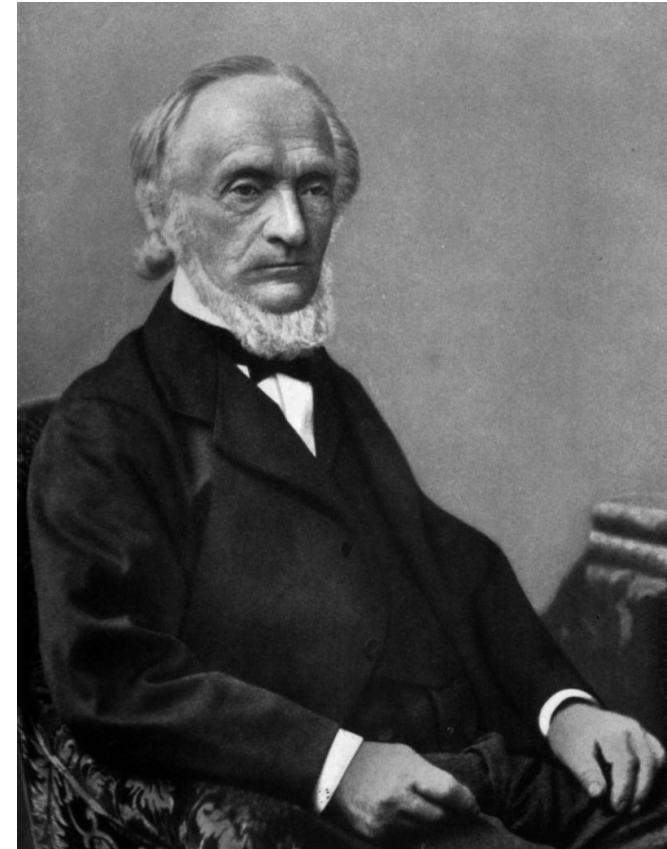


# Nekonveksni pravilni mnogokuti

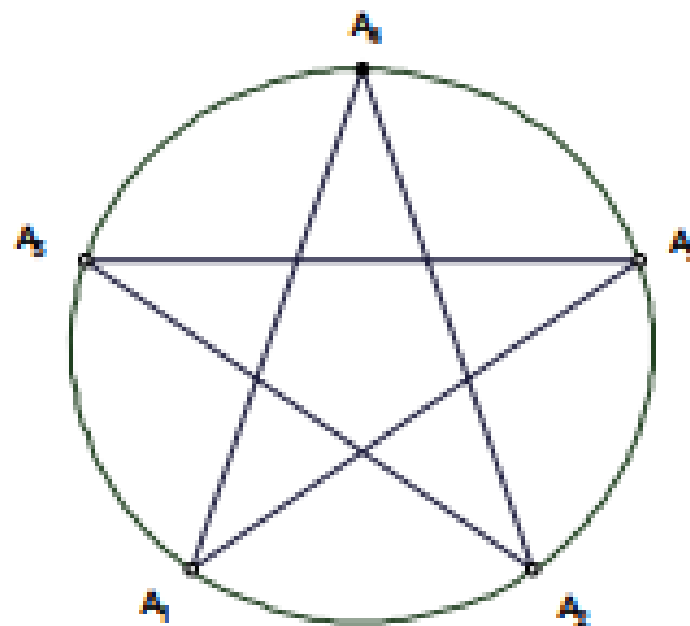
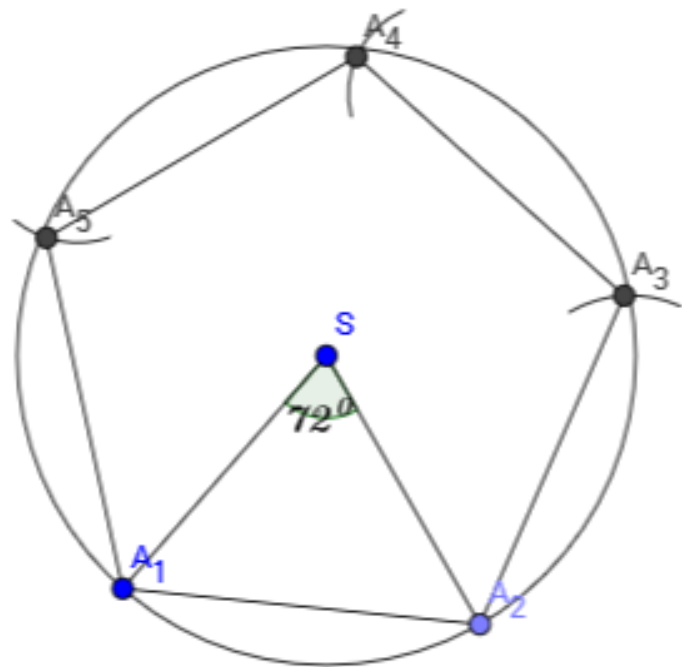
Nekonveksni pravilni mnogokut je geometrijska figura koja nastaje uzastopnim spajanjem točaka (najčešće nesusjednih) koje su pravilno raspoređene na kružnici pri čemu se postupak spajanja ponavlja sve dok se ne vratimo u polaznu točku. Takve mnogokute nazivamo još i zvjezdastim mnogokutima.

Neka su  $n$  i  $p$  nenegativni cijeli brojevi, te neka je na kružnici  $k$  na međusobno jednakim udaljenostima raspoređeno  $n$  točaka. Povezivanjem svake  $p$ -te točke dobiva se konkavna figura koju zovemo pravilni  $\{ n/p \}$  zvjezdasti mnogokut.

$\{ n/p \}$  Schläflijev simbol.

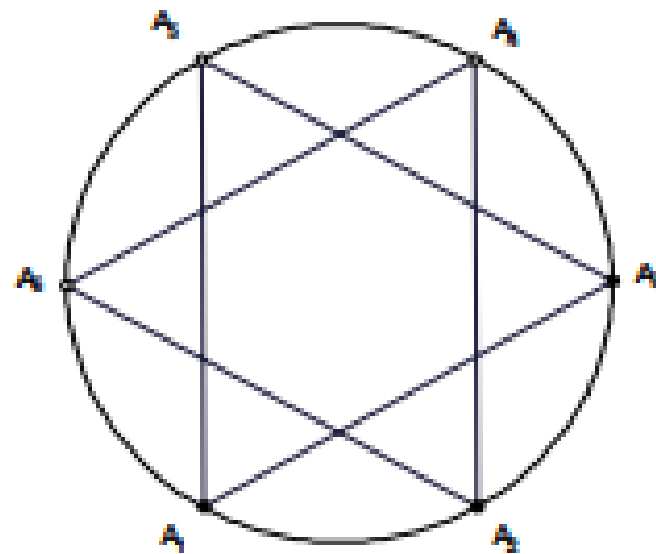
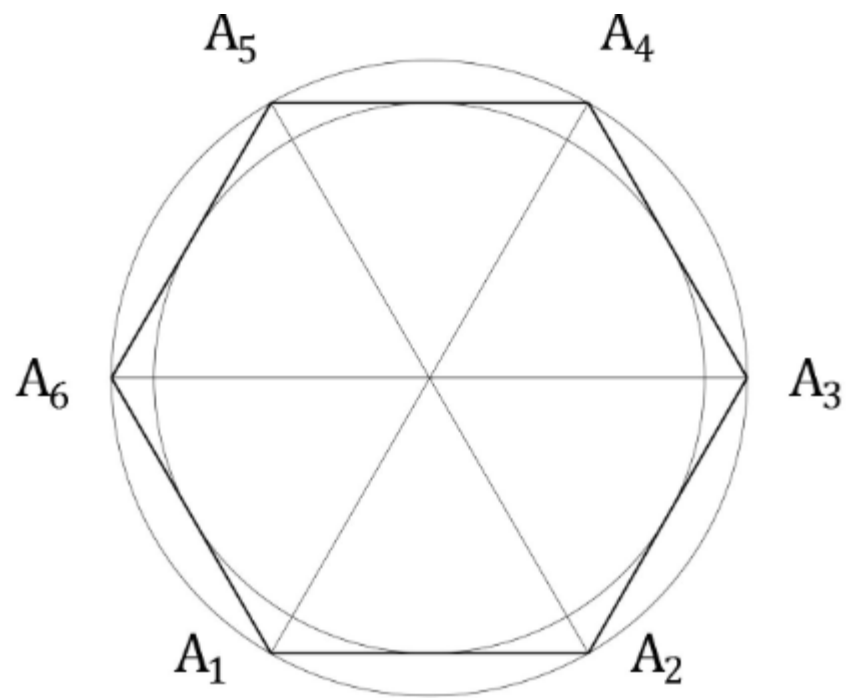


Ludwig Schläfli (1814.–1895.), švicarski matematičar, bavio se geometrijom i kompleksnom analizom.



Pentagram – iz antičkog doba simbol planeta:  
Merkur, Venera, Mars, Jupiter, Saturn = simbol vječnosti (5/2)



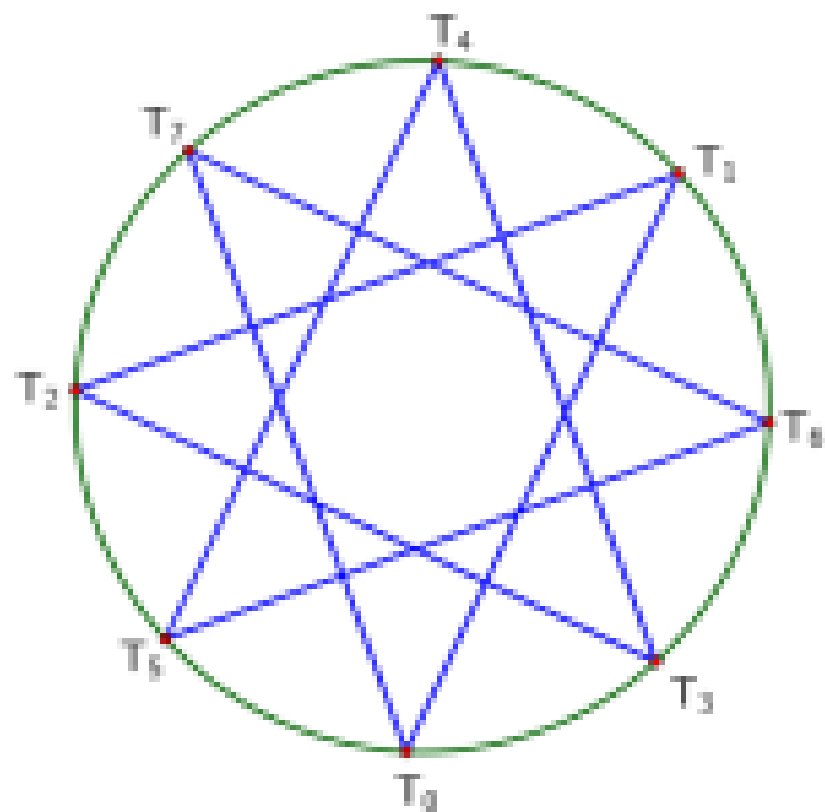


Davidova zvijezda – judaizam: 6 dana stvaranja svijeta  
(6/2)

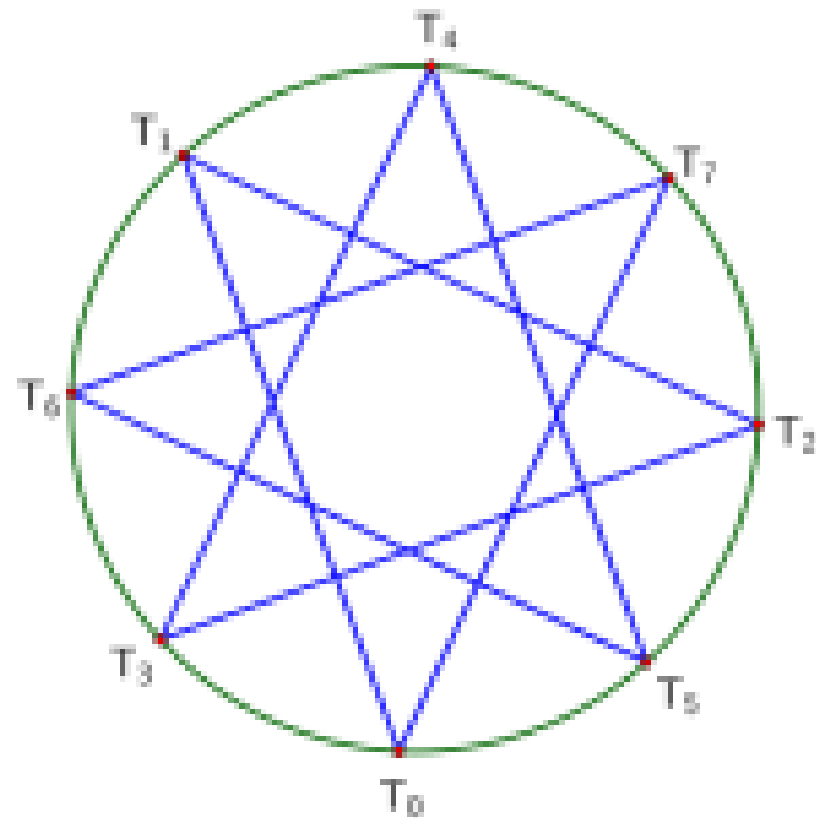
Ako kružnicu podijelimo na  $n$  jednakih lukova, tada je broj svih nekonveksnih pravilnih mnogokuta koji se mogu u nju upisati jednak najvećem cijelom broju manjem od  $\left(\frac{n}{2} - 1\right)$ .

Broj vrhova	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Broj mnogokuta	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8

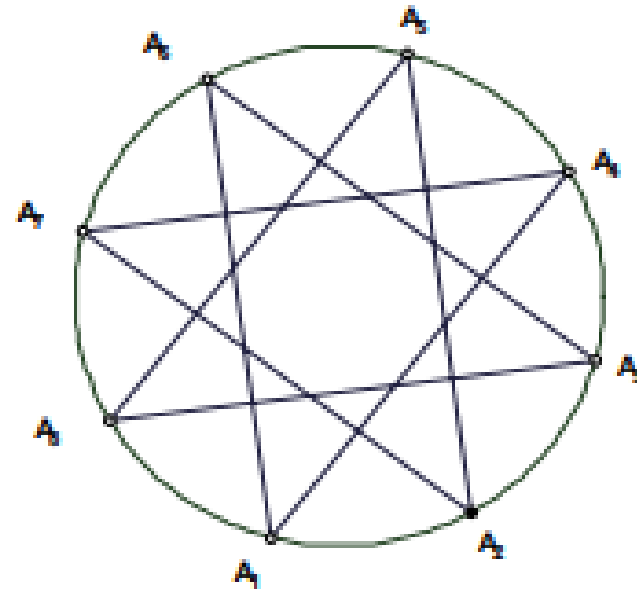
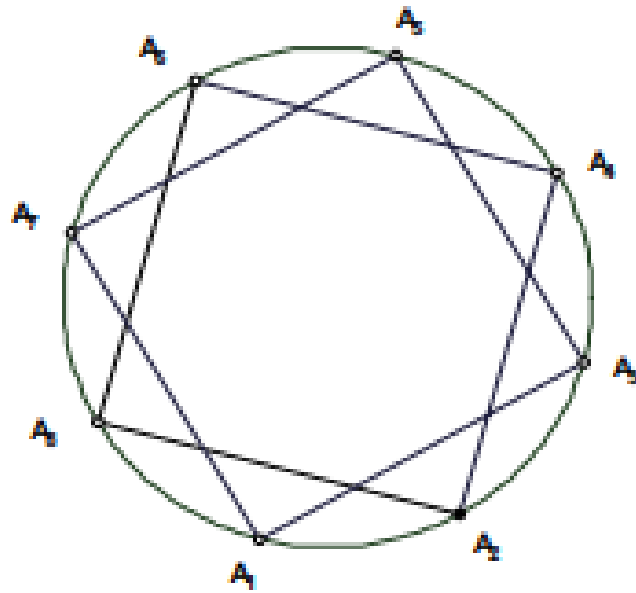
# Sukladni pravilni zvjezdasti mnogokuti



(a) pravilni  $\left\{\frac{8}{3}\right\}$  zvjezdasti mnogokut

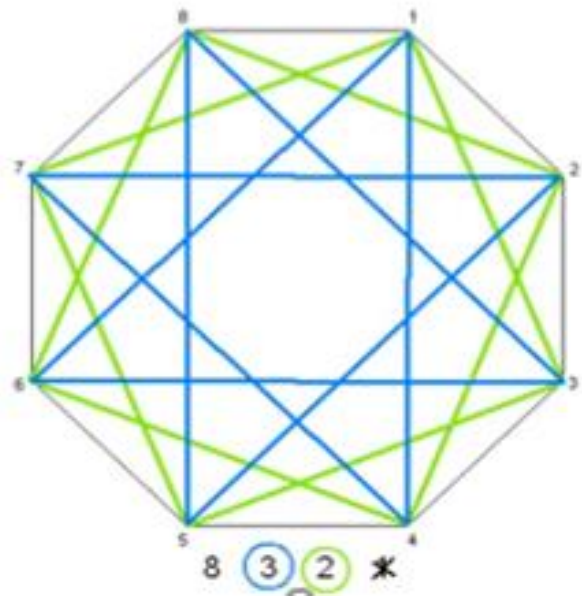
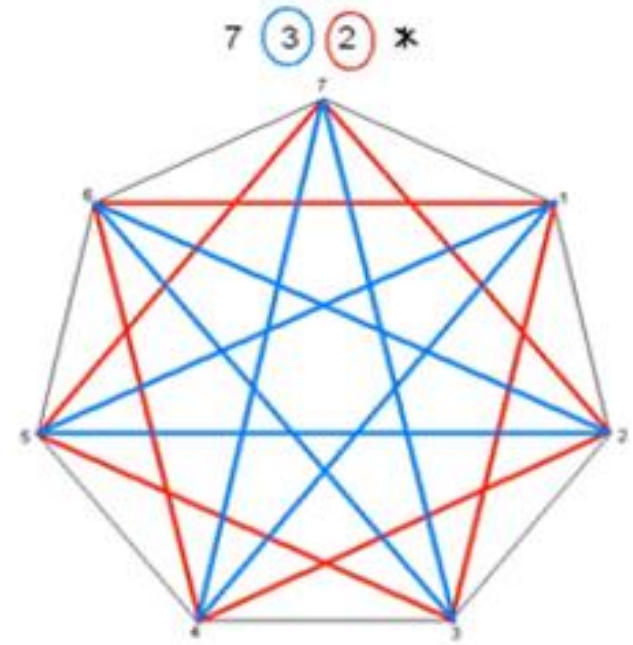
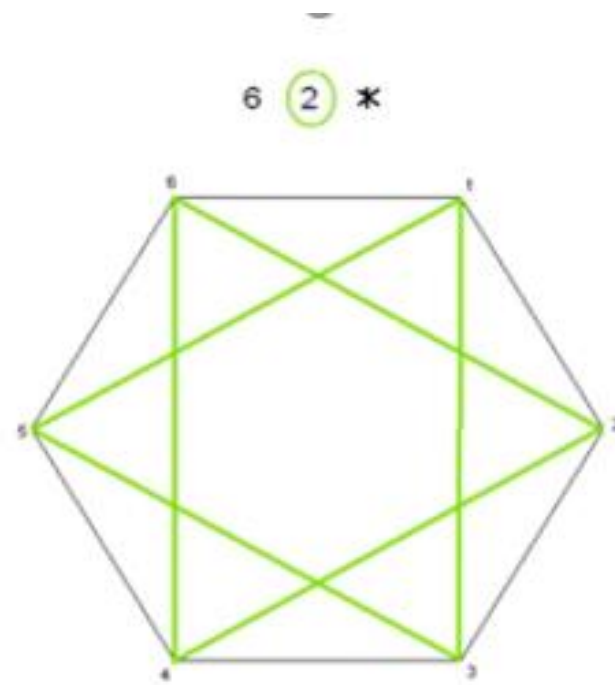
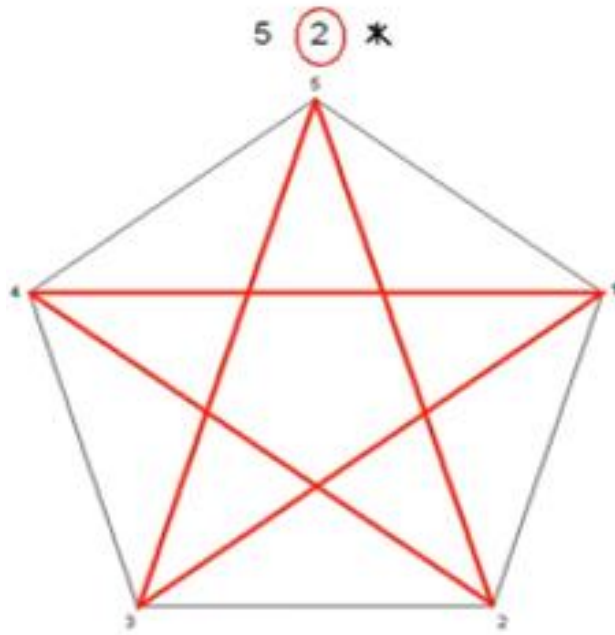


(b) pravilni  $\left\{\frac{8}{5}\right\}$  zvjezdasti mnogokut



Pravilni zvjezdasti osmerokuti:

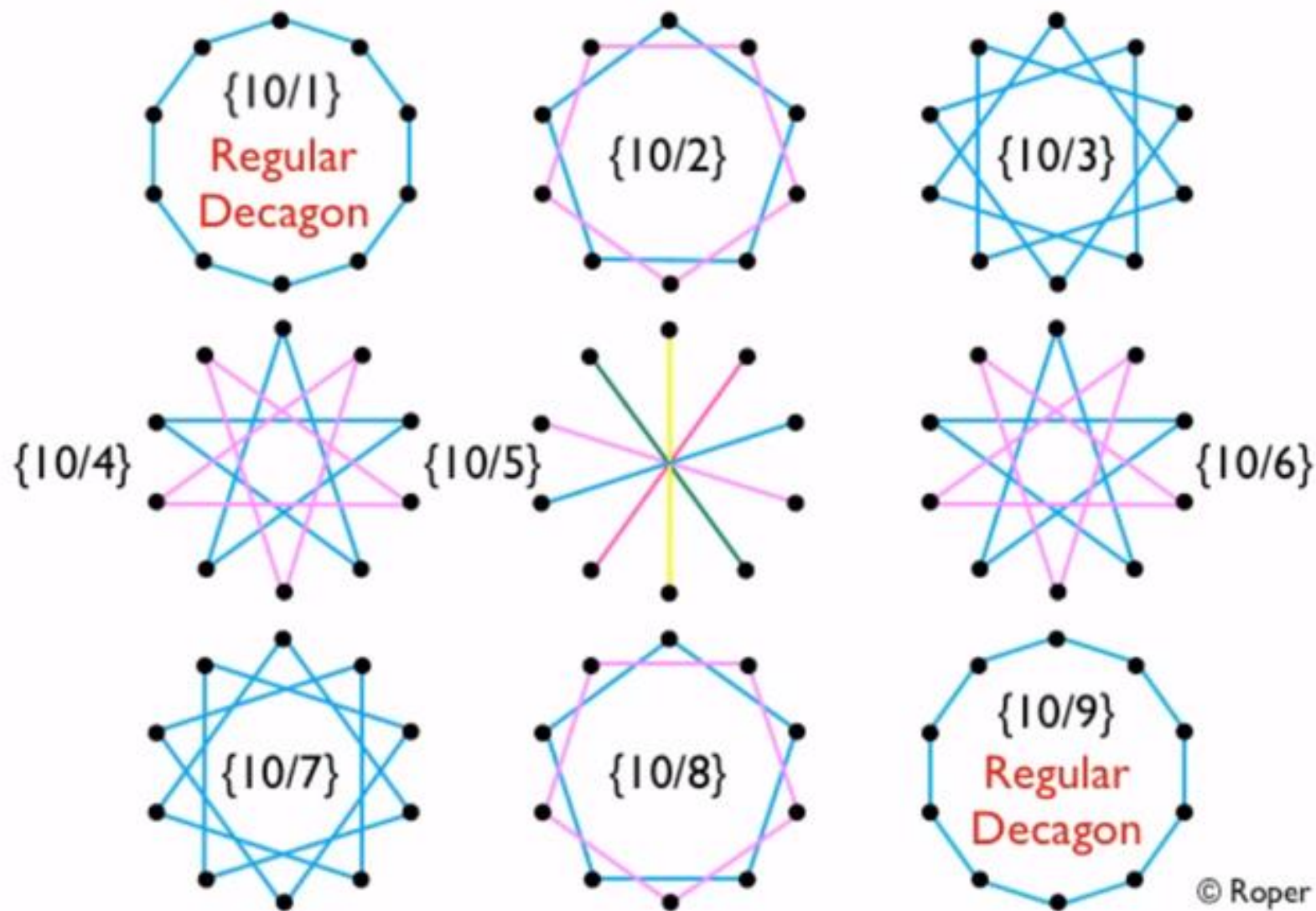
- s dvije zatvorene izlomljene linije:  $A_1A_3A_5A_7A_1$  i  $A_2A_4A_6A_8A_2$   
( $8/2$  – zajednički djeljitelj)
- s jednom zatvorenom izlomljenom linijom:  $A_1A_4A_7A_2A_5A_8A_3A_6A_1$ .  
( $8/3$  – relativno prosti) – jednostavni pravilni zvjezdasti mnogokut

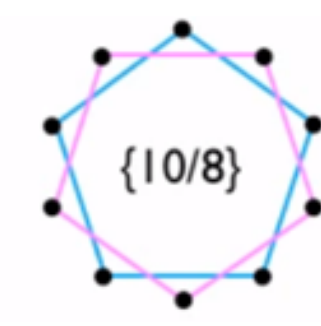
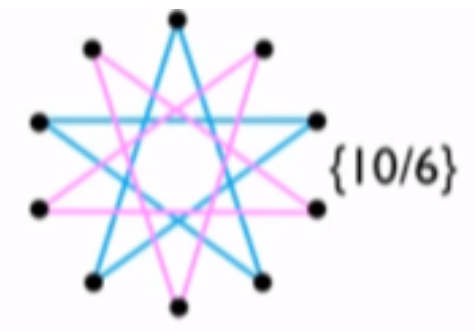
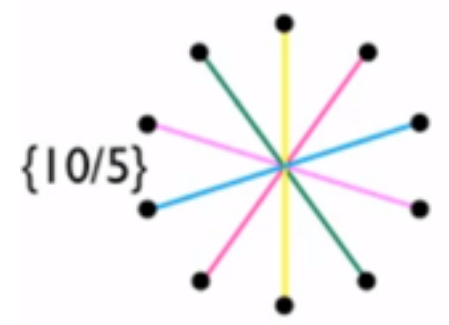
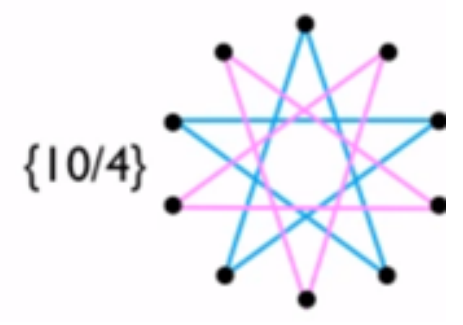
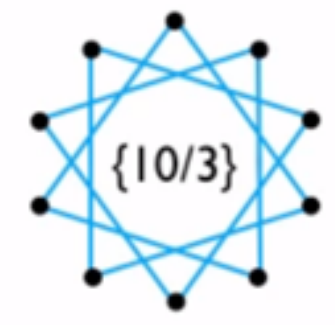
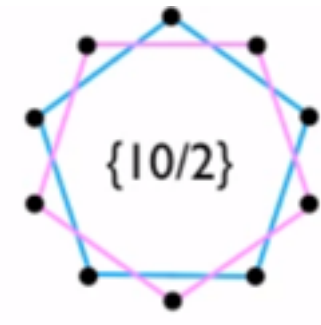
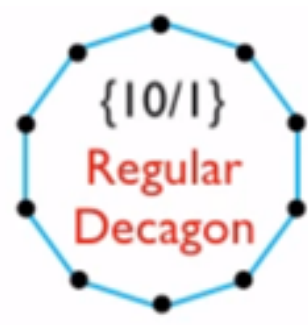


- Convex polygons
- Order 2 star polygons
- Order 2 degenerate star polygons
- Order 3 star polygons



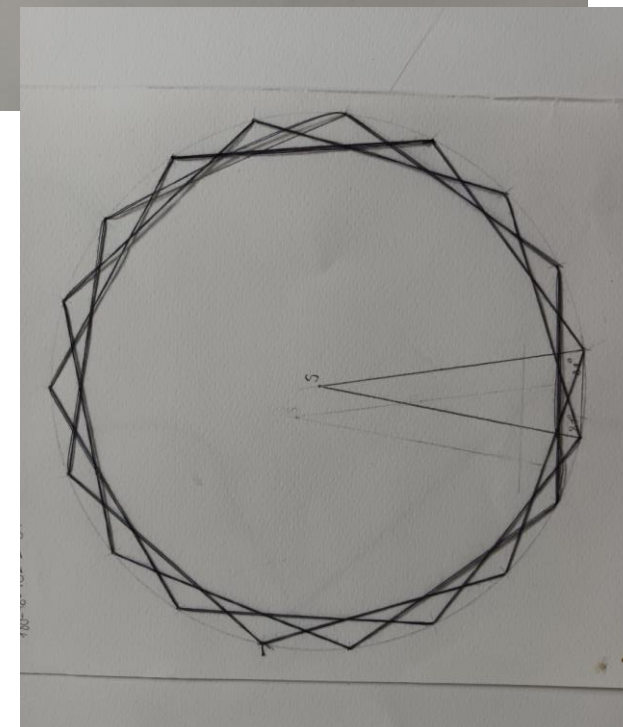
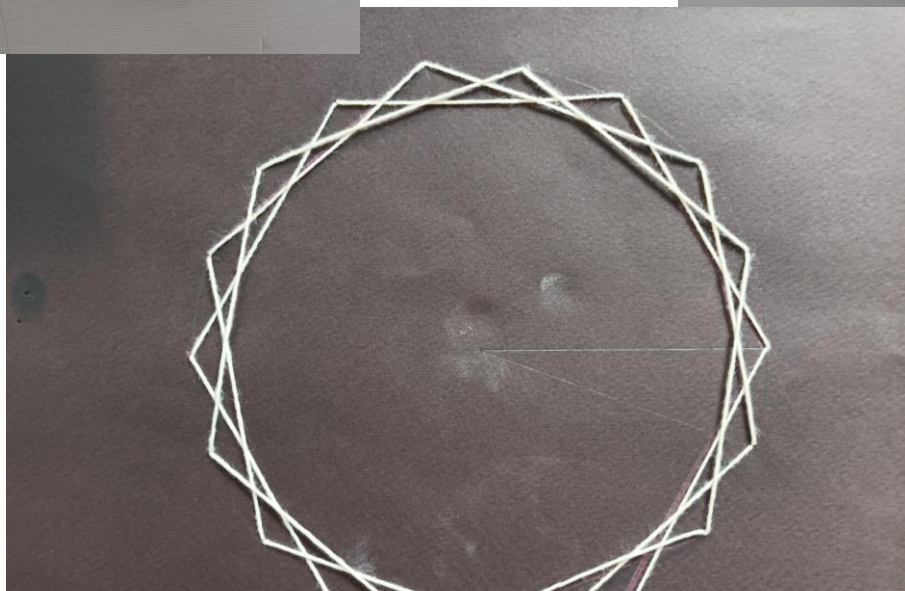
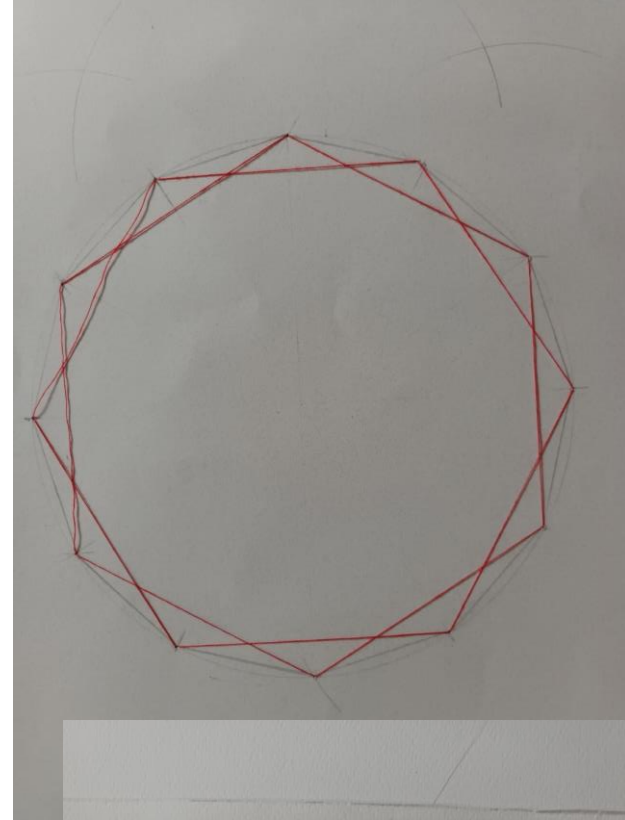
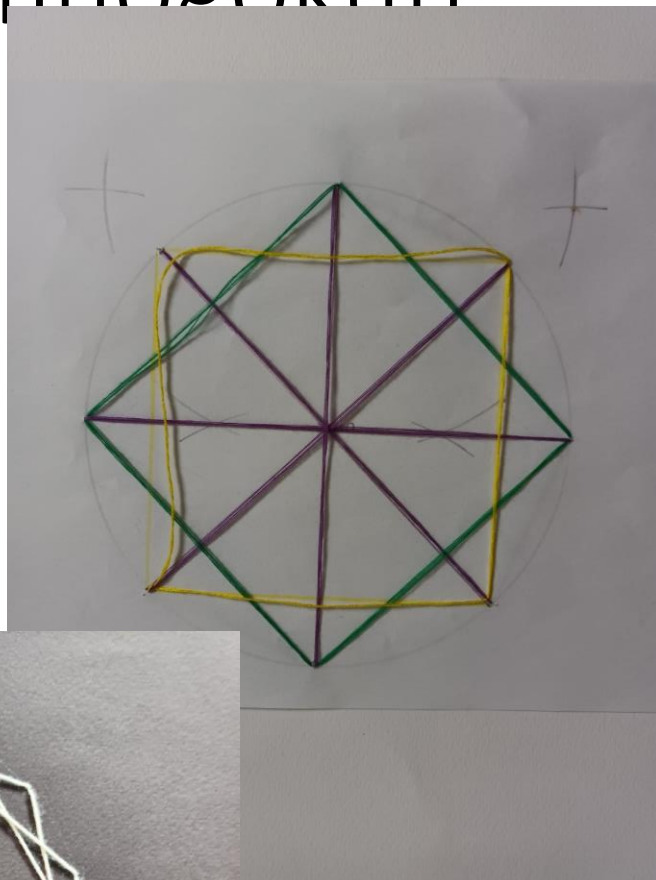
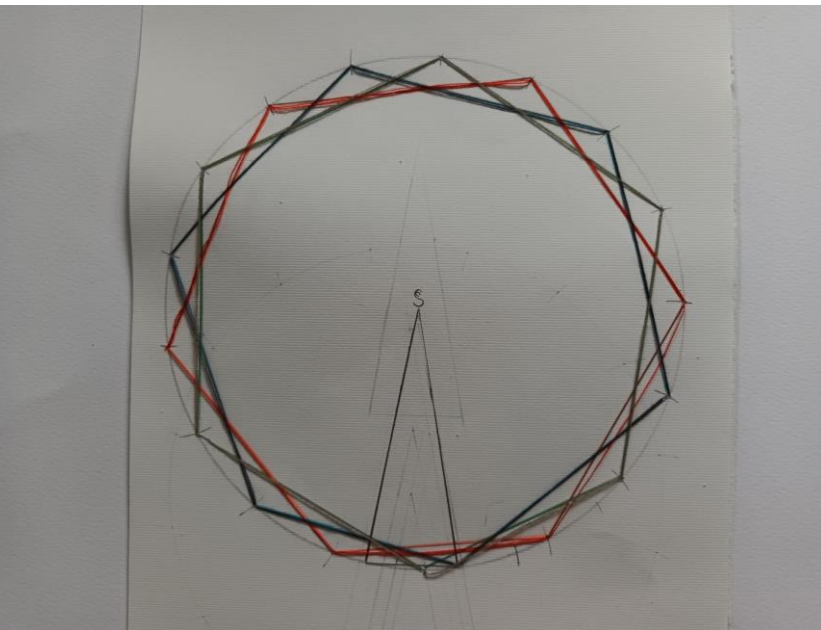
Koliko ima pravih zvjezdastih deseterokuta?



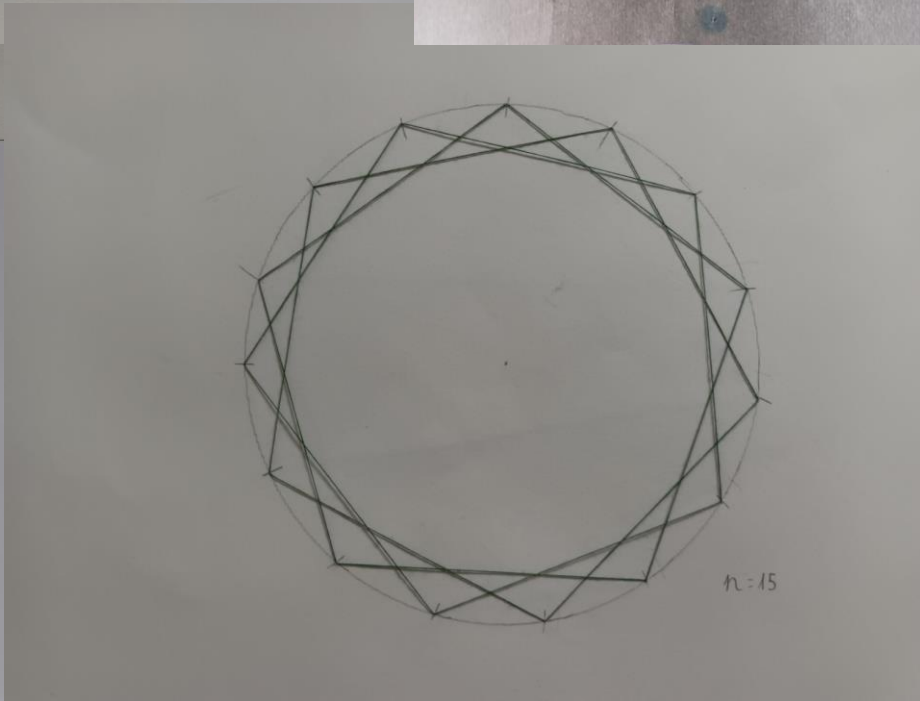
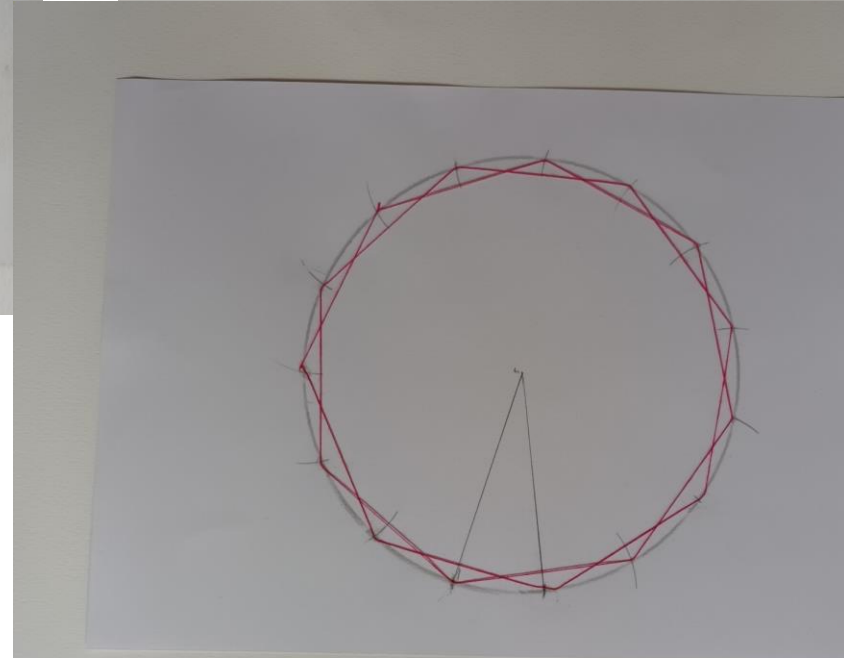
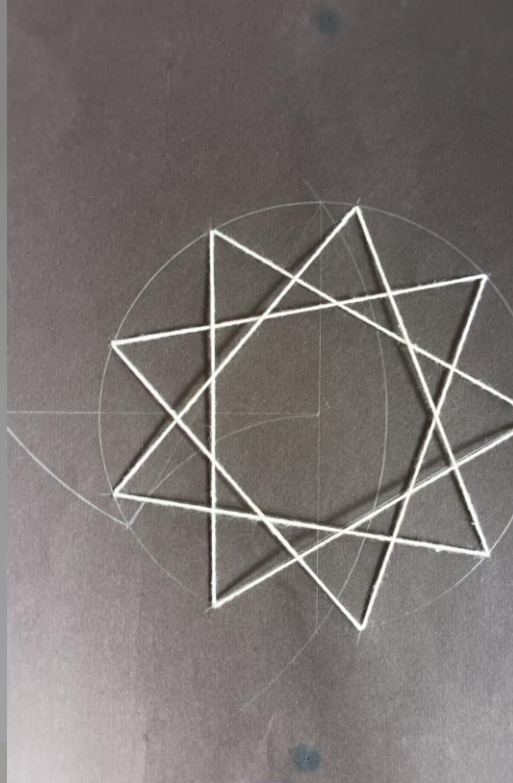
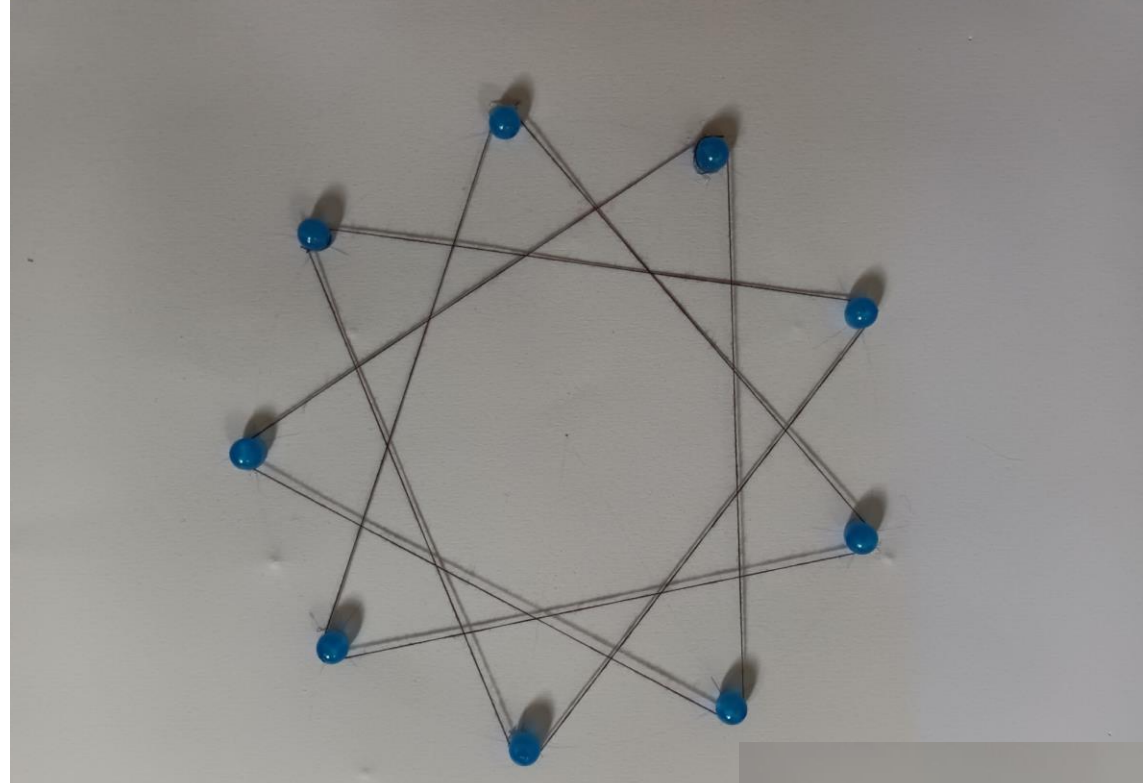
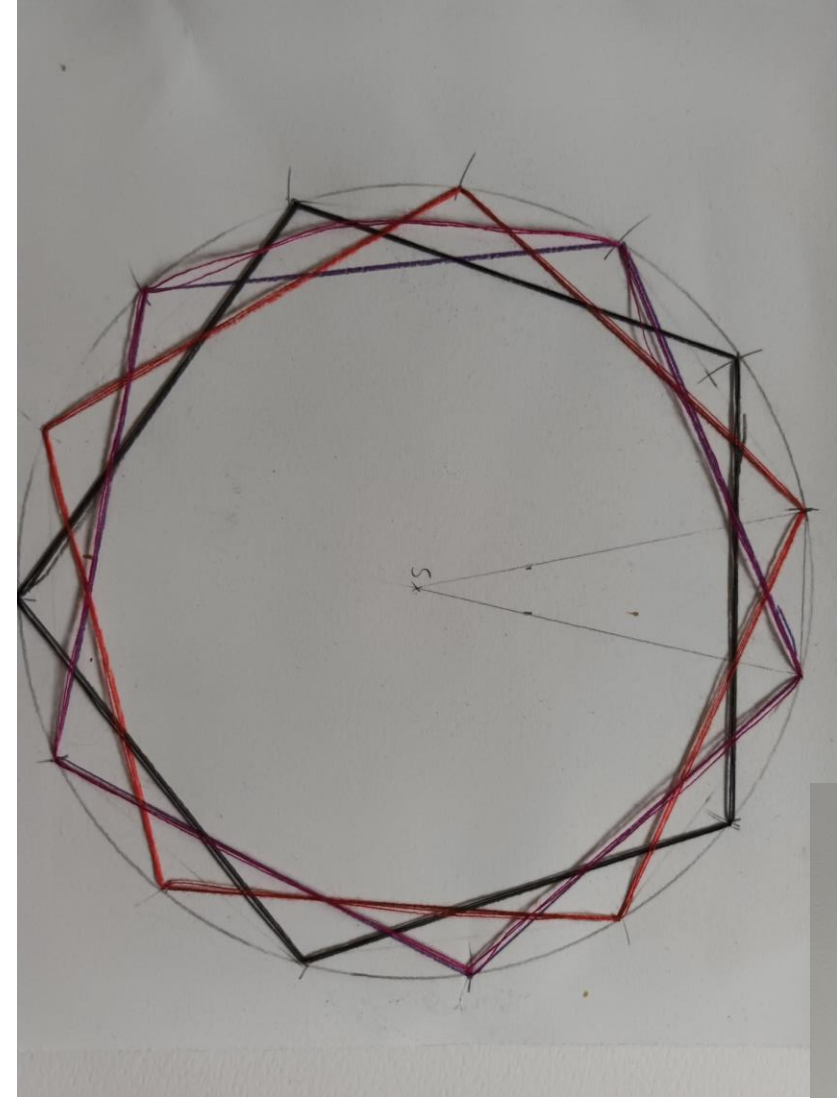




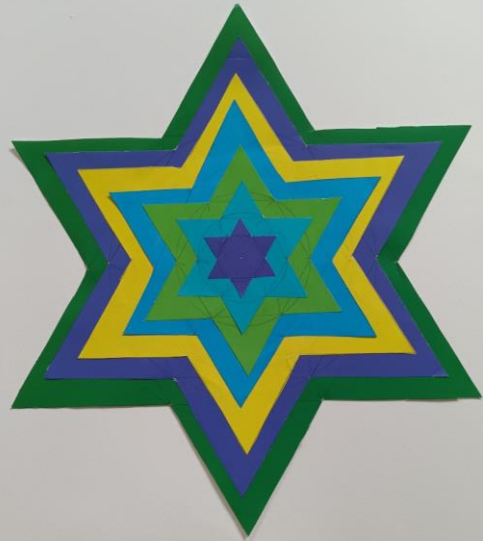
# Učenički zvjezdasti mnogokuti







# 3D Davidove zvijezde



# Zvezdasti mnogokuti na zastavama



simbolizira ideal jedinstva,  
solidarnosti i sklada među  
narodima Europe.



Australija 7/3



Jordan 7/3



Azerbajdžan 8/3



Pravilni zvjezdasti mnogokuti 6/2

# Literatura

Halapa, M.: Zvezdasti mnogokuti, Matka 12 (2003. /2004.) br. 47, str. 164-165.

Corn A., Primorac Gajčić, LJ.: Pravilni zvezdasti mnogokuti, Osječki matematički list 17 (2017), 161-170  
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[https://narodne-novine.nn.hr/clanci/sluzbeni/2019\\_01\\_7\\_146.html](https://narodne-novine.nn.hr/clanci/sluzbeni/2019_01_7_146.html) 22.1.2019.

<https://edutorij-admin-api.carnet.hr/>

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- <https://forms.office.com/e/PhT9WEzLVh>

Evaluacijski upitnik

