

ARHITEKTONSKE KONSTRUKCIJE 1.r.

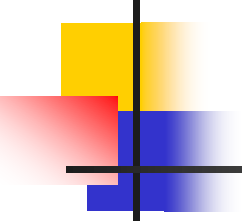


Nastavna cjelina:

ARHITEKTONSKI NACRTI I PROJEKTI

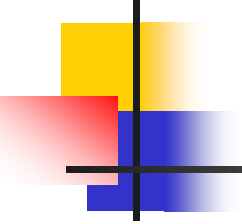
Nastavna jedinica:

ORTOGONALNA PROJEKCIJA I AKSONOMETRIJA



PROJEKCIJE

- Ako želimo neko tijelo ili građevinu grafički prikazati na papiru, poslužit ćemo se **projekcijama**.
- Da bi se precizno tehnički prikazali svi potrebni detalji nekog objekta koristimo **ortogonalnu projekciju**.



PROJEKCIJE

- Za prostorno predočavanje tijela koriste se različiti tipovi **aksonometrijskih** prikaza.
- **Izometrija** je najjednostavniji, dok je **perspektiva** najkompliciraniji i najzorniji prikaz.



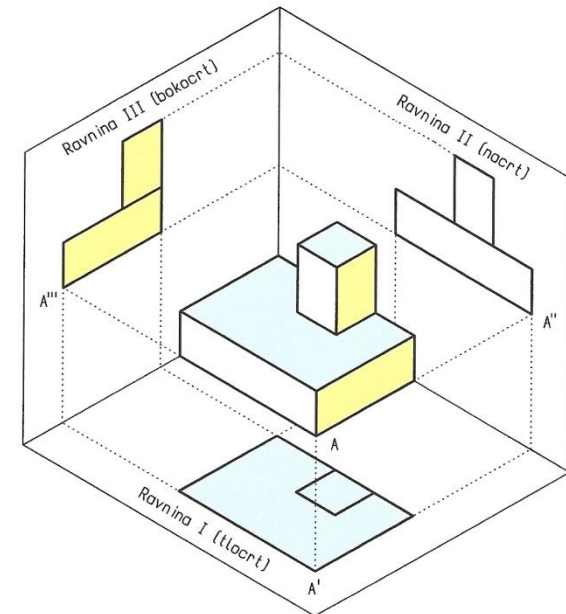
ORTOGONALNA PROJEKCIJA

- Cilj crtanja u ortogonalnoj projekciji je u tehničkom crtanju jednostavno odrediti sve dimenzije predmeta.
- Zadatak: prikazati trodimenzionalne objekte u dvodimenzionalnom prostoru crtaćeg papira

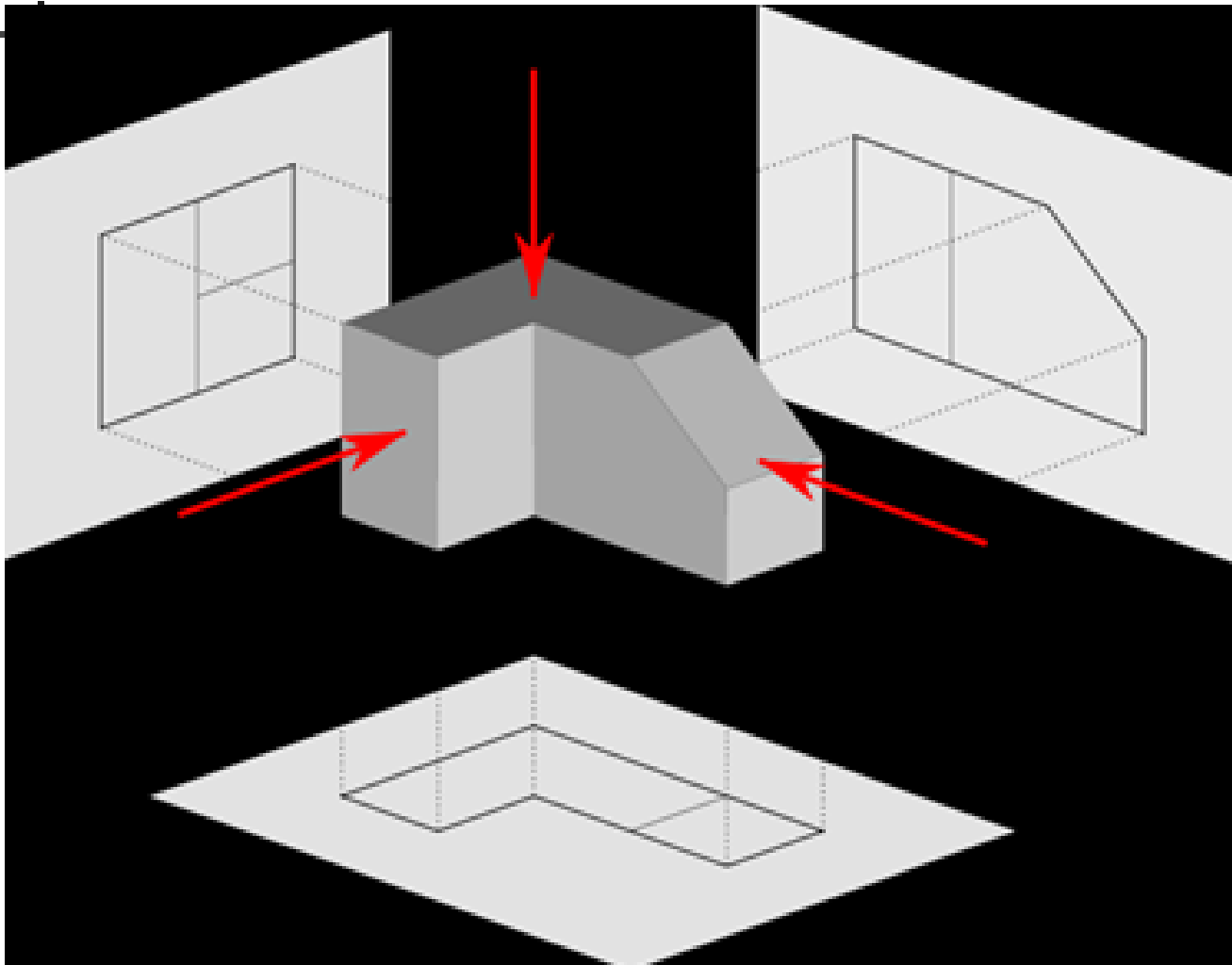
ORTOGONALNA PROJEKCIJA

■ Pravila ortogonalne projekcije su:

- zrake projiciranja su okomite na ravninu crtanja (po kutom od 90°),
- predmet se nalazi između ravnine crtanja (projiciranja) i crtača,
- u projekciji se crta onaj dio predmeta koji se vidi u smjeru gledanja.

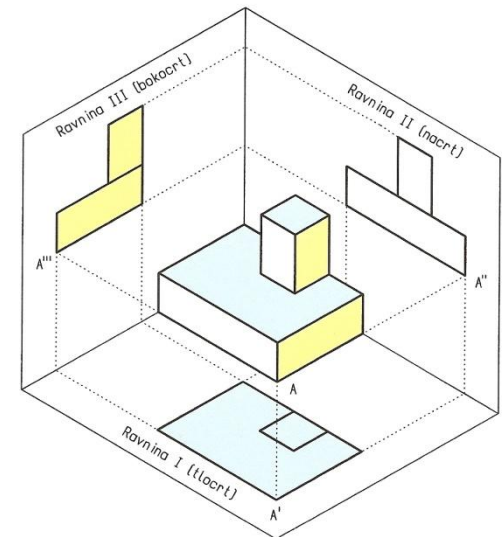


ORTOGONALNA PROJEKCIJA

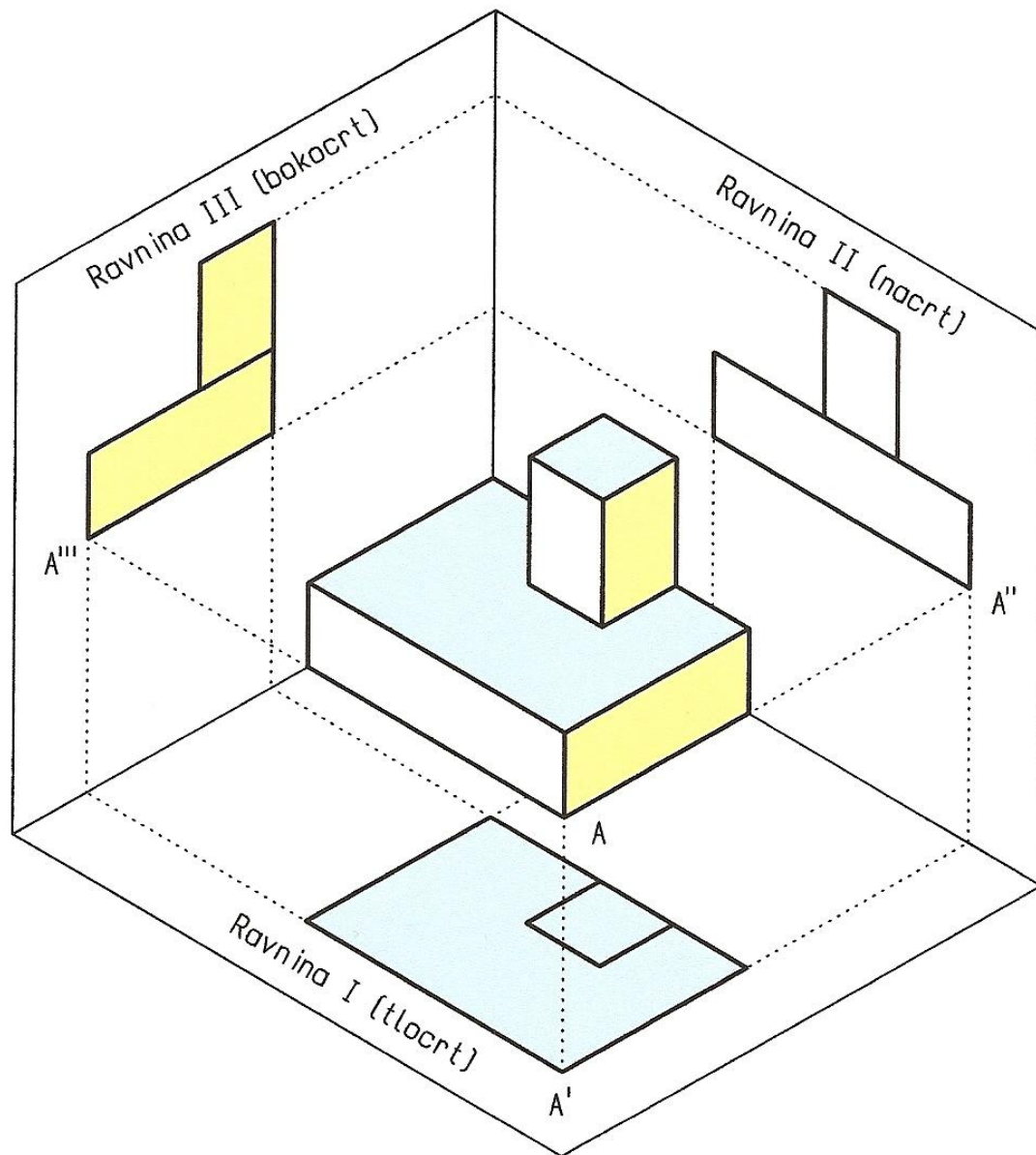
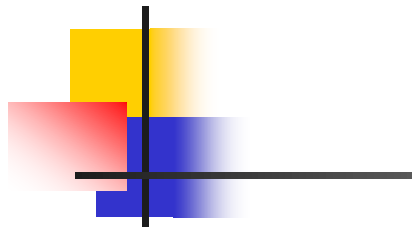


ORTOGONALNA PROJEKCIJA

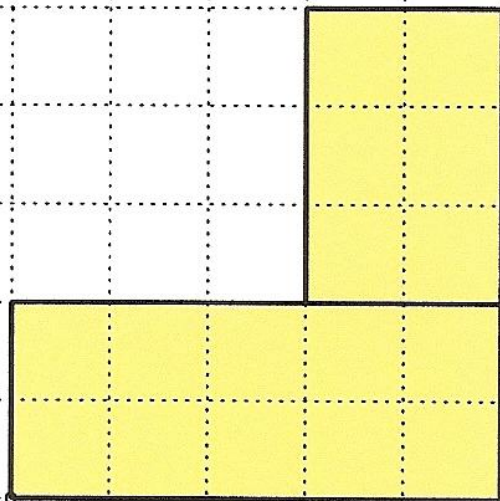
- Osnovna svojstva ortogonalne projekcije su:
 - bridovi koji su paralelni i jednaki u prostoru zadržavaju ta svojstva i u projekciji,
 - kutovi koji su jednaki u prostoru zadržavaju isti odnos i u projekciji .



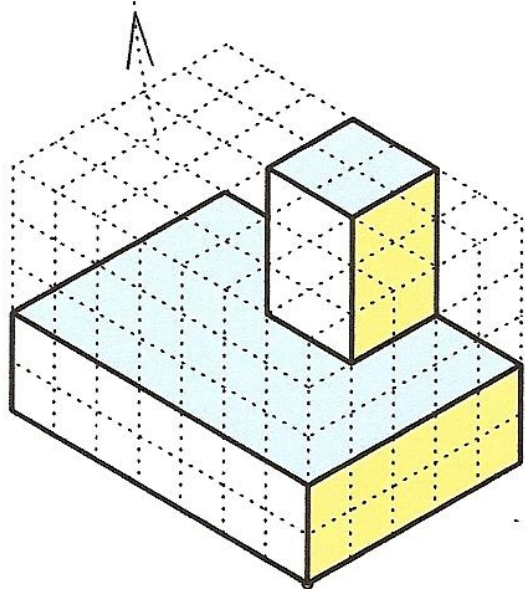
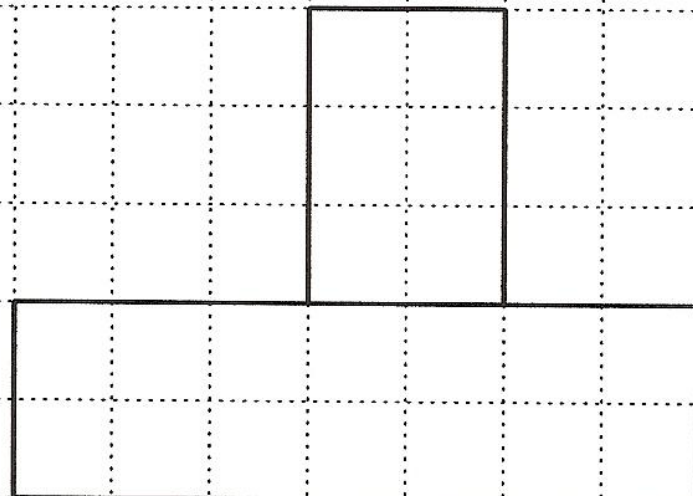
ORTOGONALNA PROJEKCIJA



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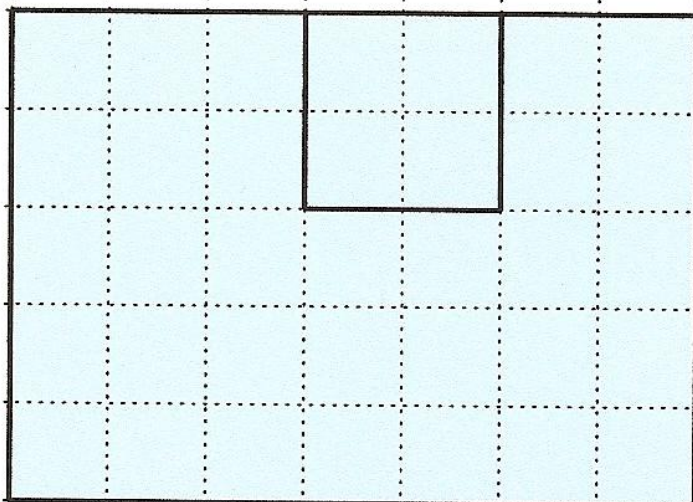


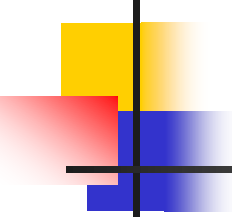
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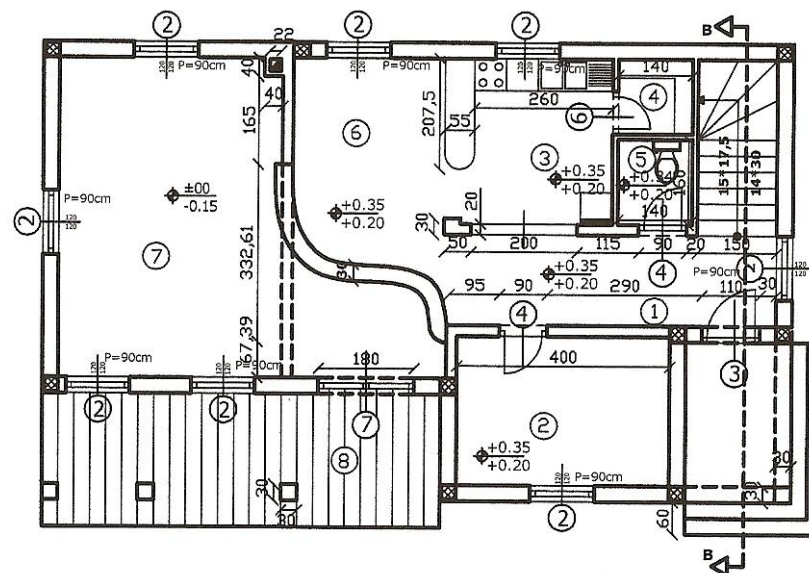
ORTOGONALNA PROJEKCIJA

- Pri izradi projekata koristimo **ortogonalnu projekciju** da bi precizno prikazali sve potrebne detalje a **aksonometrijski prikaz** objekta da bi ga što zornije predočili.
- Pomoću tlocrta i presjeka prikazujemo konstrukciju i unutrašnjost objekta, dok se vanjski izgled građevine prikazuje pročeljima i tlocrtom krova.

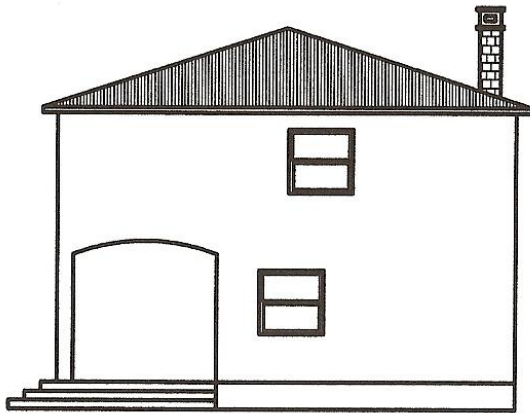
[illegible]

kanalica za kanalicu
ondulina za kanalicu
daščana oplata 2,5 cm
ekspandirani polistiren 5 cm
MAP konstrukcija

parket 1 cm
estrih 4 cm
hidroizolacija
tercni 5 cm
bet. ploča 16 cm



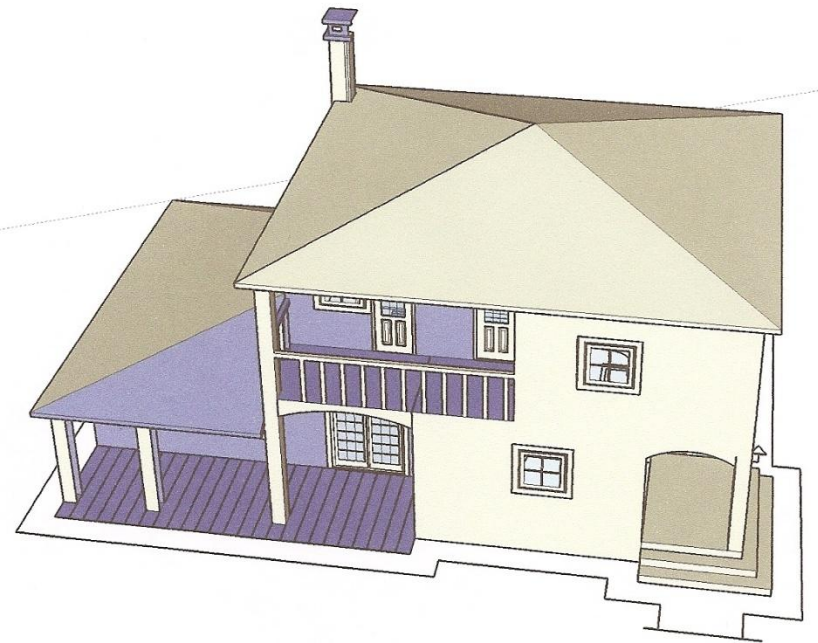
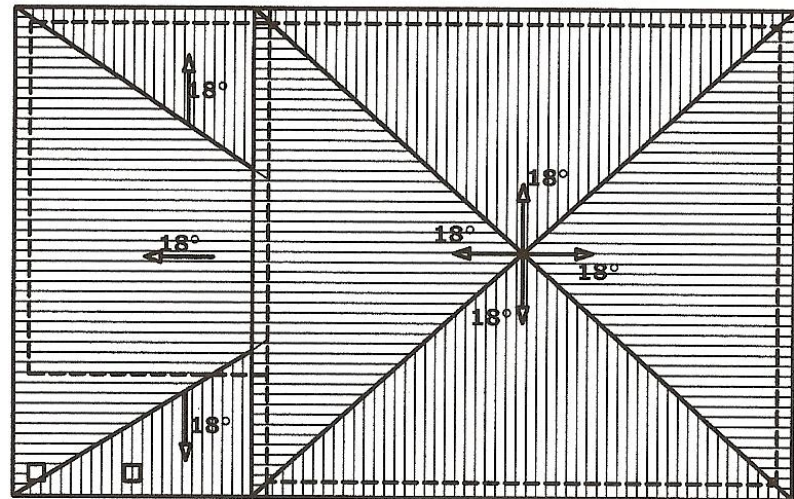
Istocno pročelje



južno pročelje



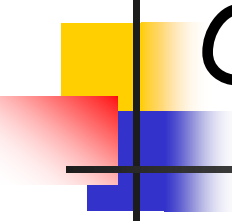
Tlocrt krova





ORTOGONALNA PROJEKCIJA

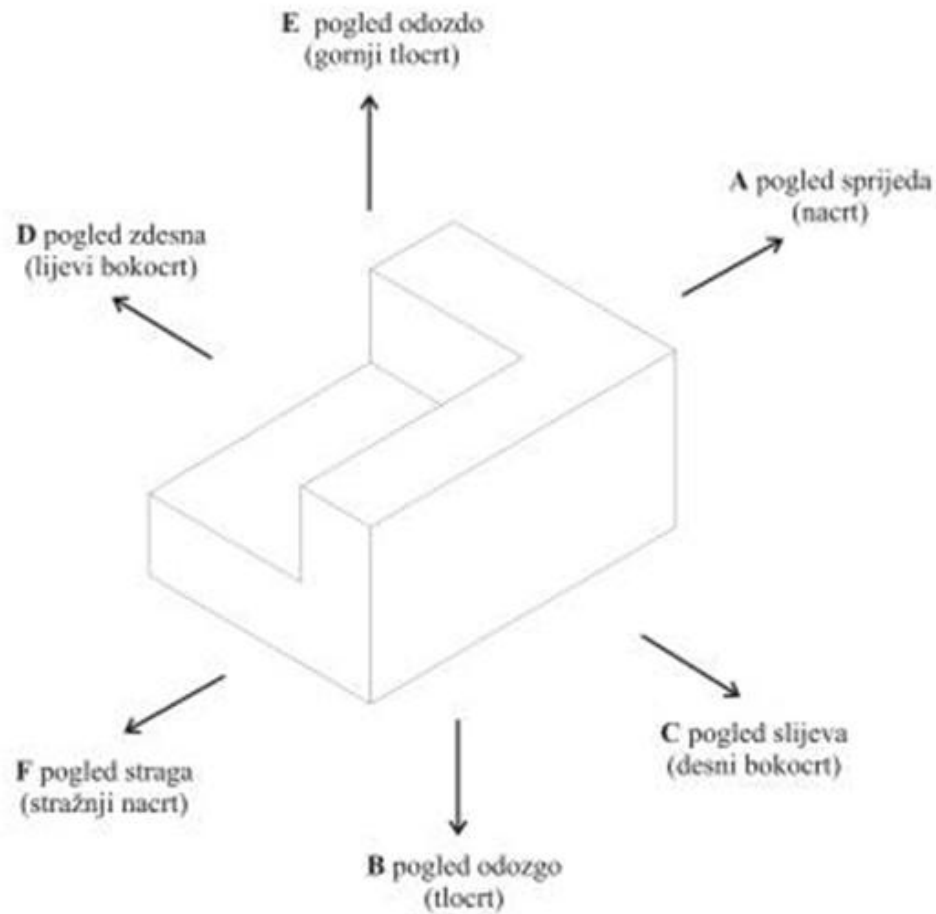
- Na osnovu prostornog prikaza određuju se ravnine projekcije (I, II i III ravnina, koje se nazivaju još i **ravnina tlocrta, ravnina nacрта i ravnina bokocrta**).
- Prilikom crtanja te se ravnine mogu okrenuti na dva načina, tako da se treća ravnina projekcije ili bokocrt postavi s lijeve ili desne strane.



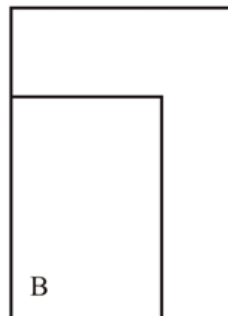
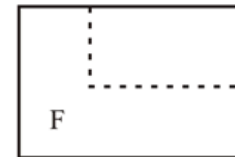
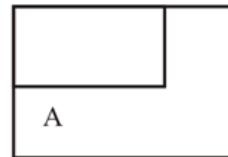
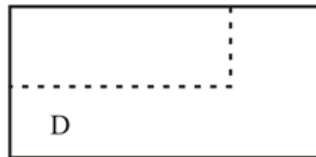
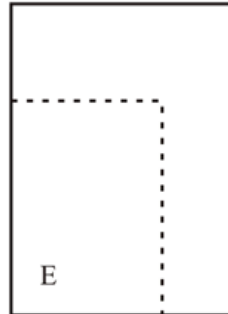
ORTOGONALNA PROJEKCIJA

- Ortogonalna projekcija omogućava ukupno 6 različitih pogleda:
 - A - nacrt (pogled sprijeda),
 - B - tlocrt (pogled odozgo),
 - C - desni bokocrt (pogled s lijeve strane),
 - D - lijevi bokocrt (pogled s desne strane),
 - E - gornji tlocrt (pogled odozdo),
 - F - stražnji nacrt (pogled straga).

ORTOGONALNA PROJEKCIJA



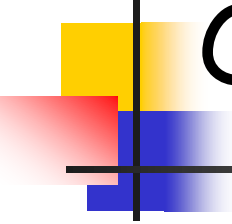
ORTOGONALNA PROJEKCIJA





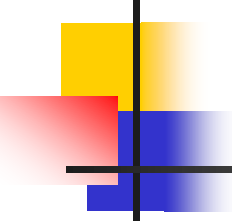
ORTOGONALNA PROJEKCIJA

- Na jednom crtežu koristi se onoliki broj pogleda koji je dovoljan za prijenos svih važnih informacija o dimenzijama i obliku objekta.
 - tri projekcije (nacrt, tlocrt i bokocrt),
 - dvije projekcije (nacrt i tlocrt)
 - ponekad i samo jedna.
 - a ponekad i više od tri



ORTOGONALNA PROJEKCIJA

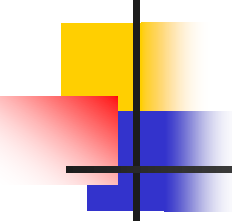
- Treba odabrati one poglede koji na najzorniji način prikazuju predmet.



ORTOGONALNA PROJEKCIJA

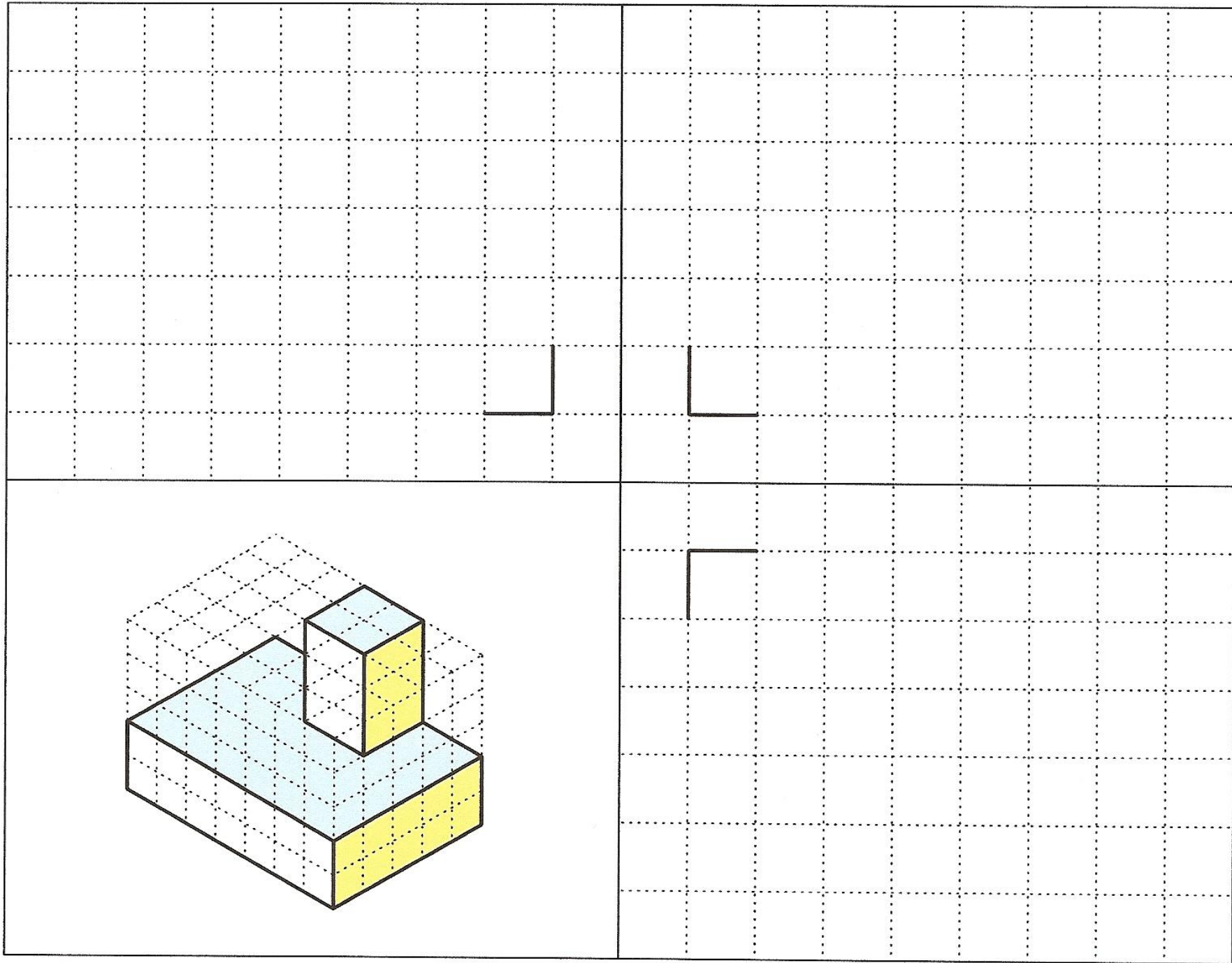
RAZMISLI!

Koja geometrijska tijela možeš prikazati u dvije projekcije; tri projekcije; smo jednoj?

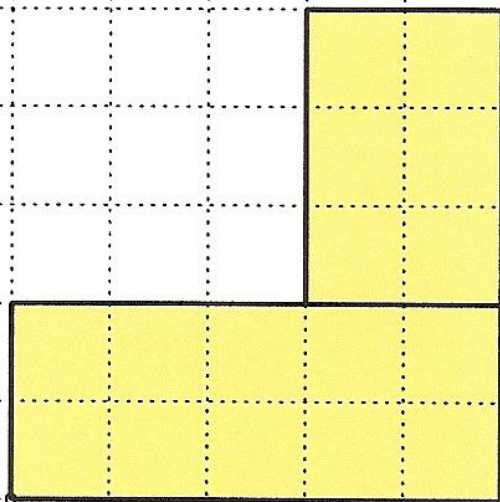


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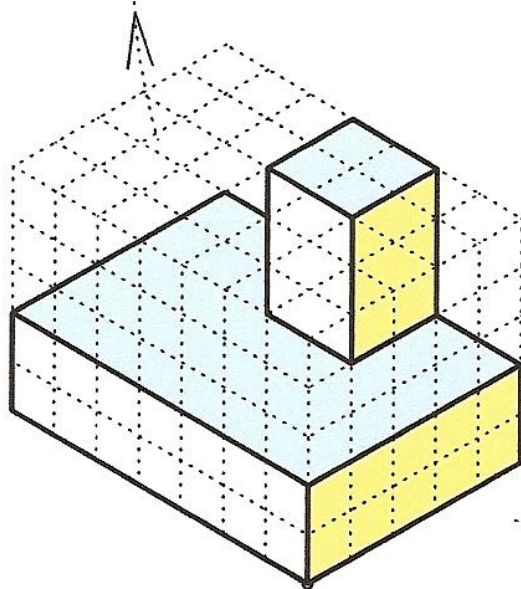
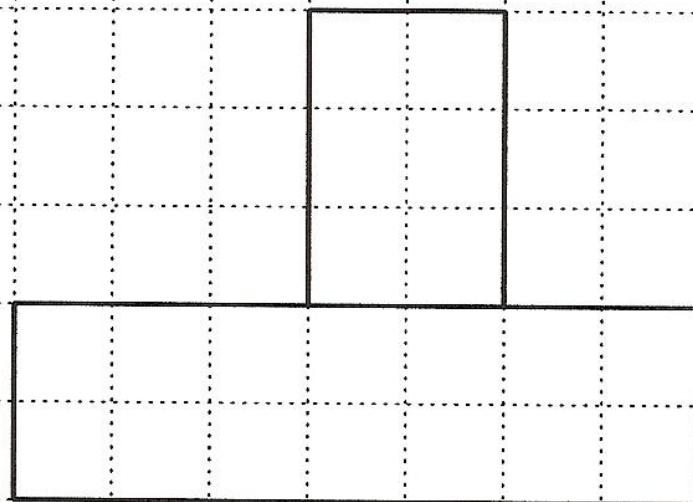
NA SLJEDEĆEM PRIMJERU PROBAJ
NACRTATI ORTOGONALNU
PROJEKCIJU ZADANOG TIJELA!



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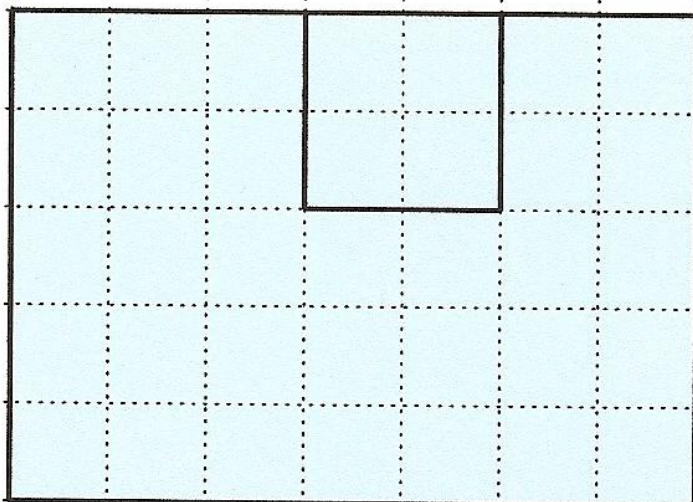


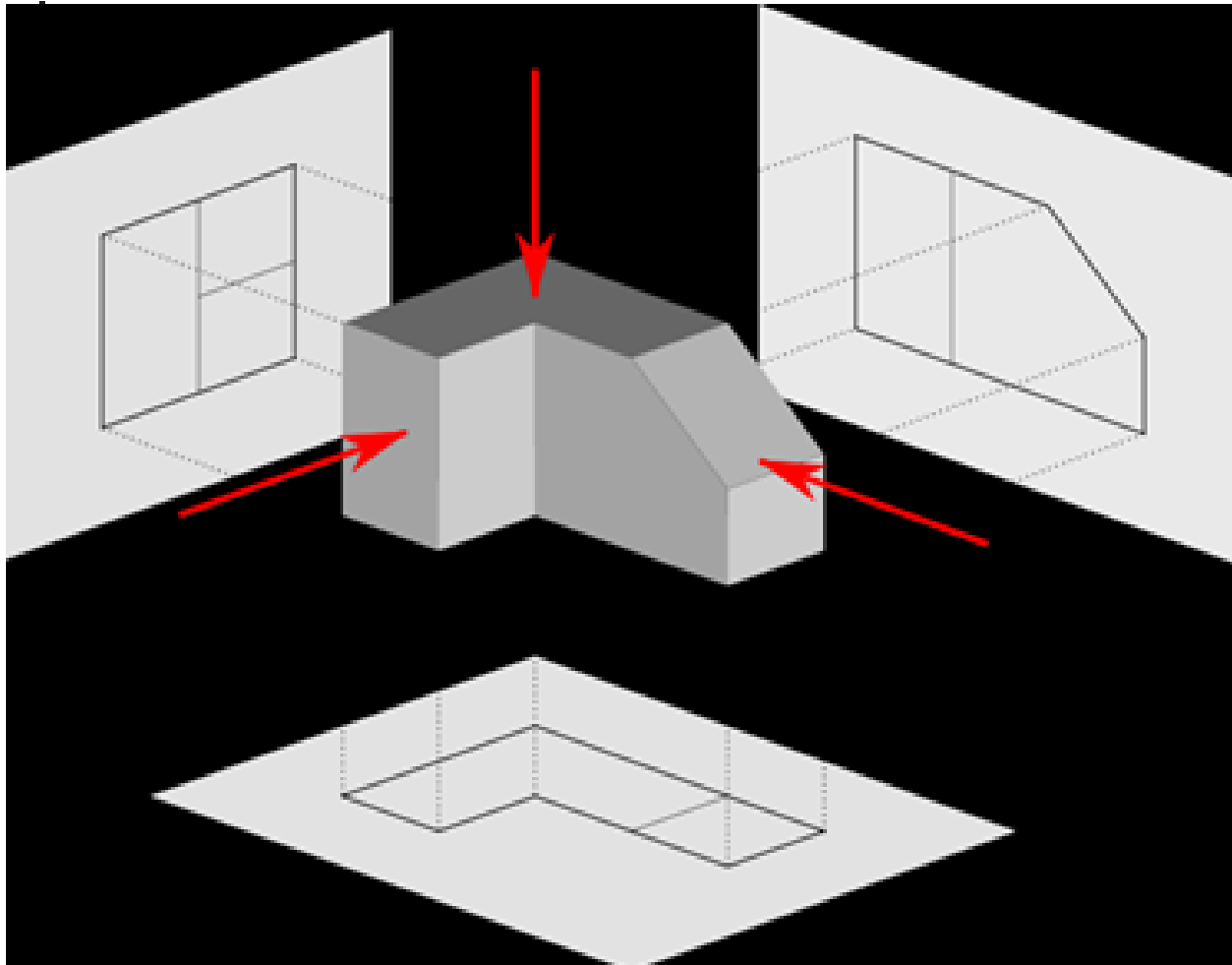
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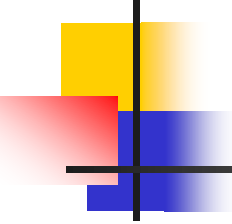


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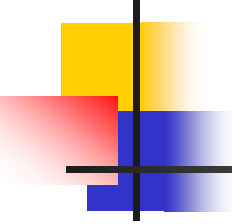






AKSONOMETRIJA

- Za uočavanje složenih detalja primjenjujemo prostorni prikaz koji prikazuje trodimenzionalni predmet jednom projekcijom u ravnini
- Zato je nužno da bar jednu prostornu dimenziju prikažemo pod nekim kutom

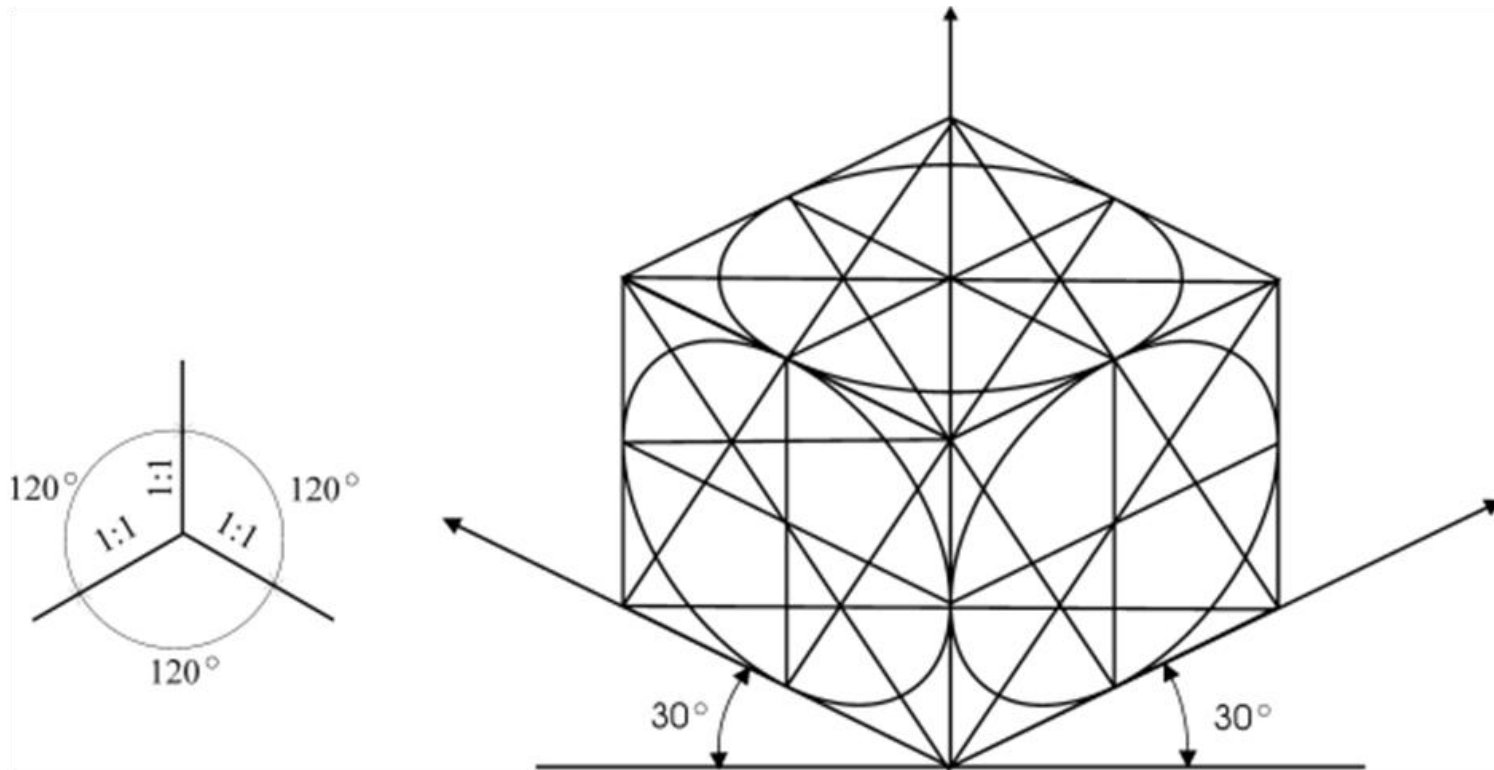


AKSONOMETRIJA

- Po smještaju glavnih osi i prikрати u smjeru pojedinih osi razlikuju se sljedeće vrste aksonometrijskih projekcija:
 - Izometrija
 - Dimetrija
 - Trimetrija - svaka os ima drugačiji nagib i prikратu,
 - Kosa projekcija - dvije osi su pod kutom od 90° i bez prikrate, a treća je pod kutom od 30° , 45° ili 60° s proizvoljnom prikратom

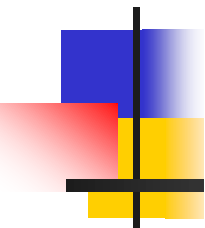
AKSONOMETRIJA

Izometrija - osi su ravnomjerno razmještene pod kutovima od 120° , nema prikrate u smjeru osi

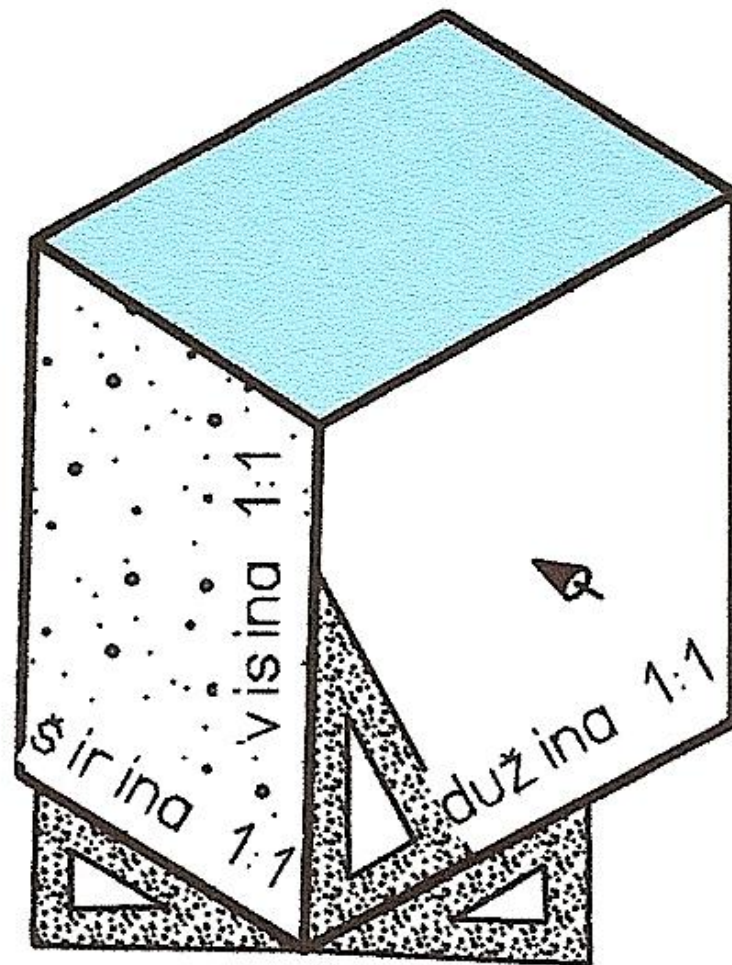


IZOMETRIJA

Osi x i y su pod kutom od 30° u odnosu na horizontalu.

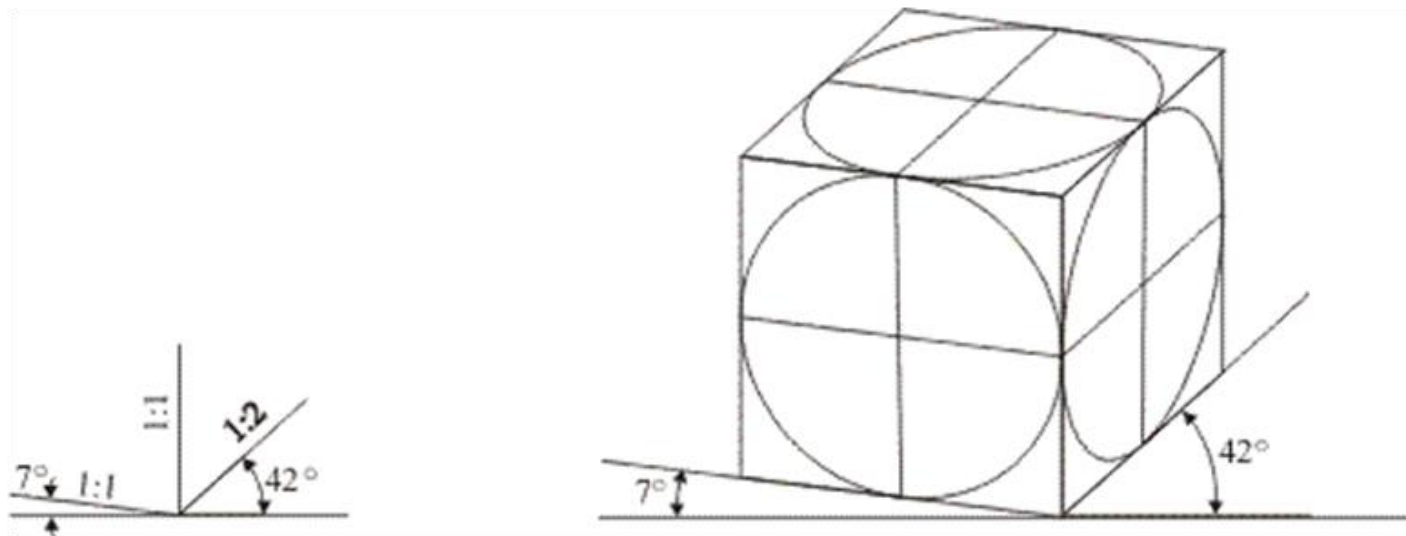


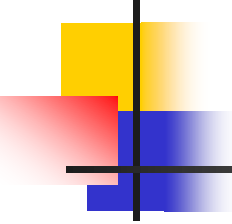
Sve vrijednosti su u pravoj veličini.
(nema prikrata)



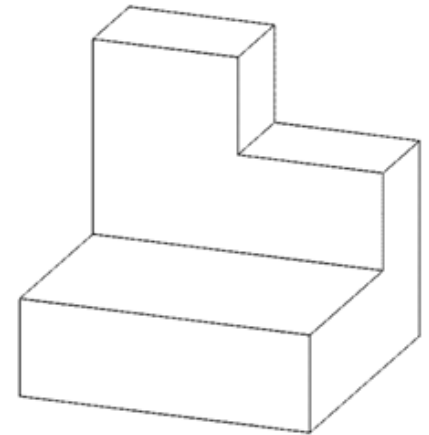
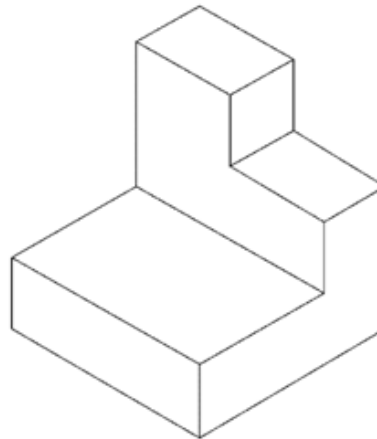
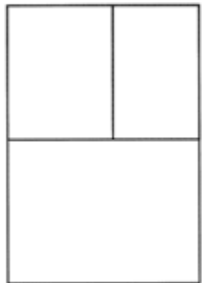
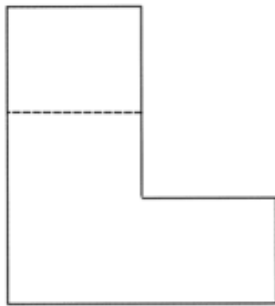
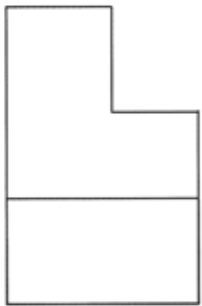
AKSONOMETRIJA

Dimetrija - dvije osi su pod kutovima od 7° i 90° bez prikrate, a jedna pod kutom od 42° s prikratom 1:2,





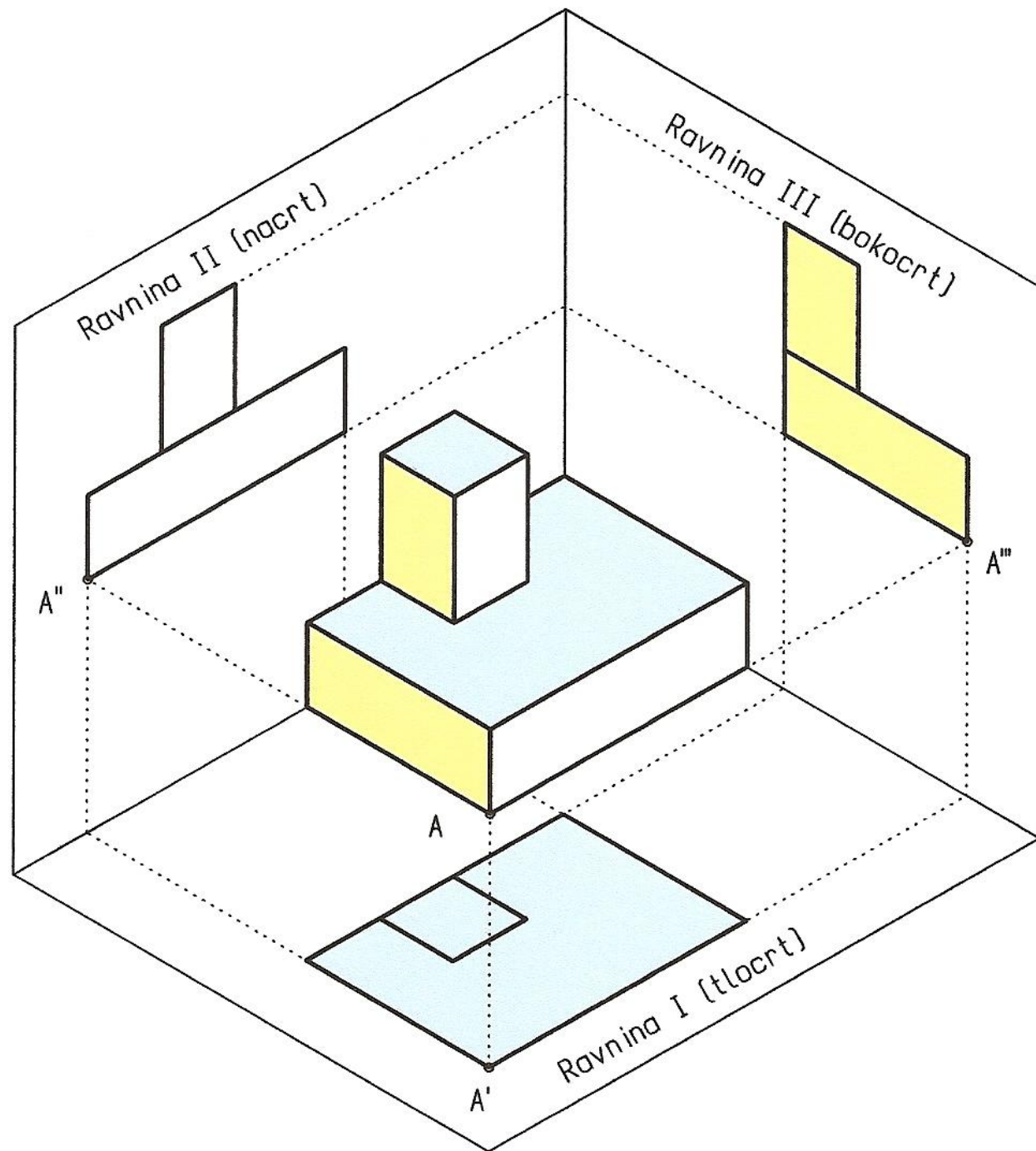
AKSONOMETRIJA



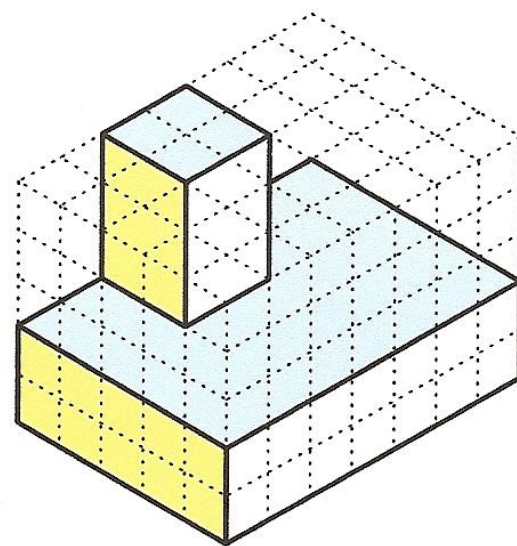
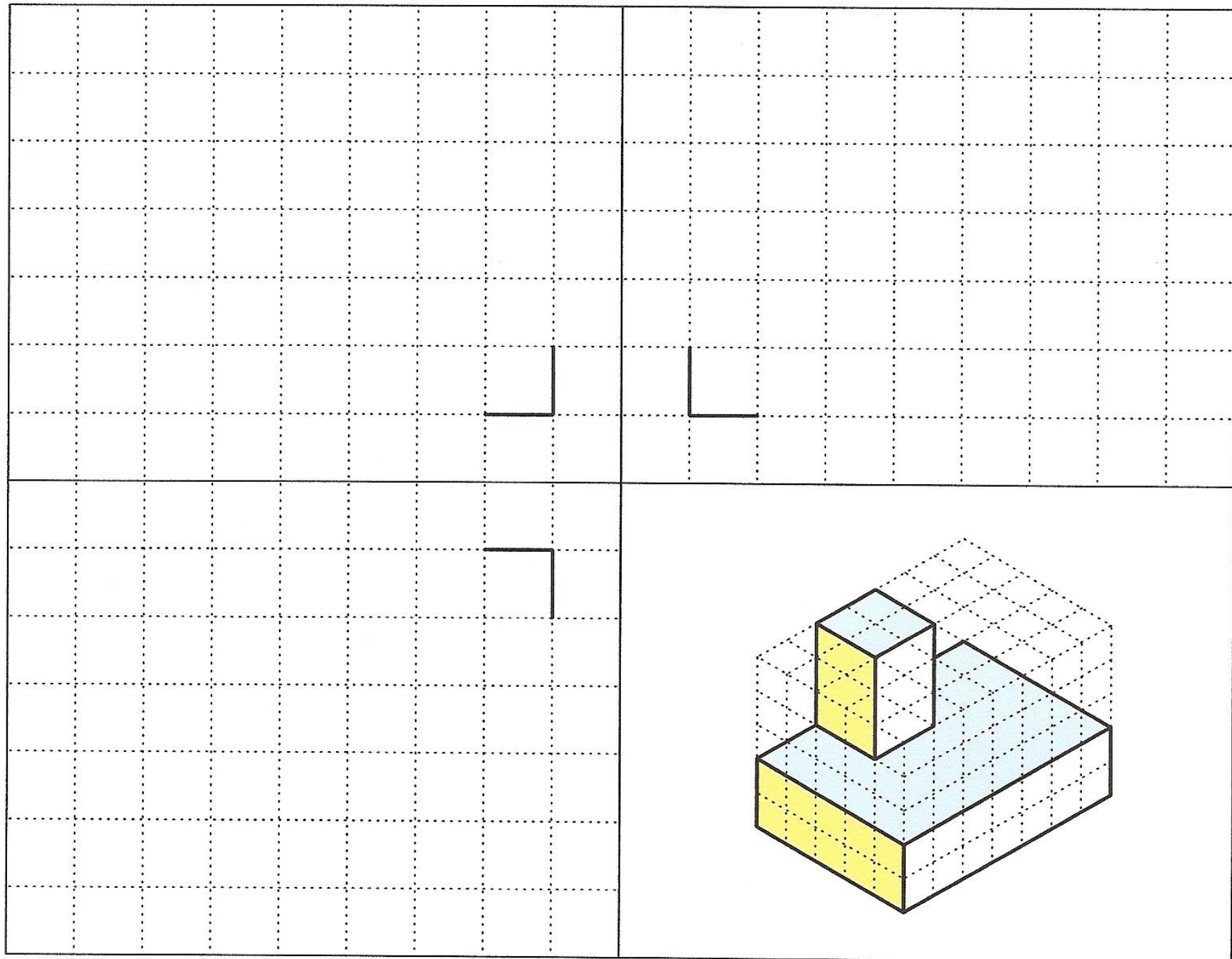
a) ortogonalna projekcija

b) izometrijska projekcija

c) dimetrijska projekcija.



Aksonometrijski prikaz tijela s prikazom projekcija na tri međusobno okomite ravnine (bokocrt je na desnoj strani).



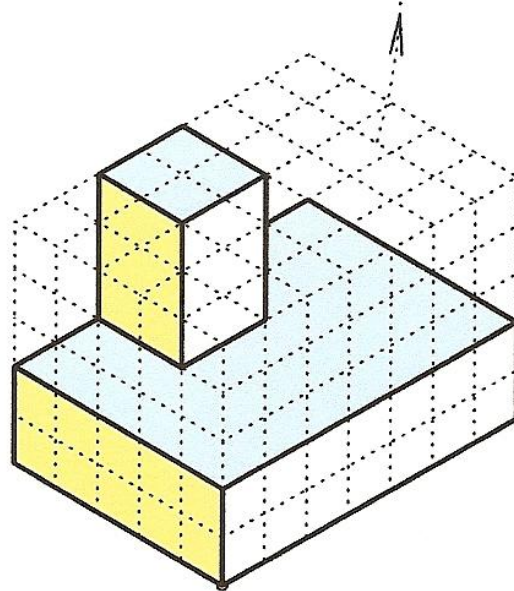


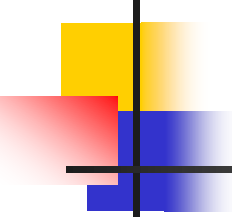
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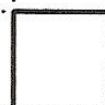
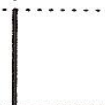
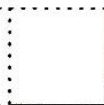
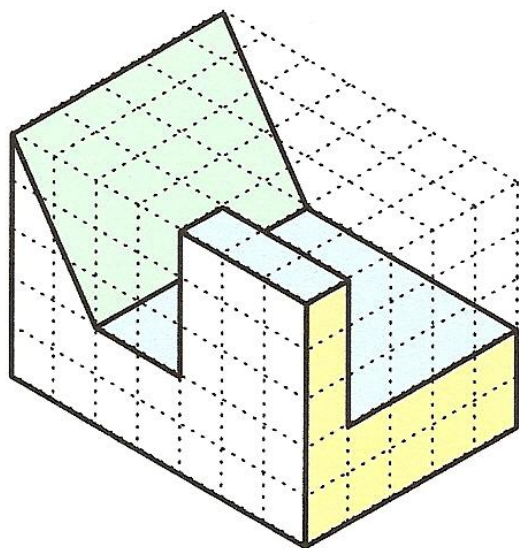
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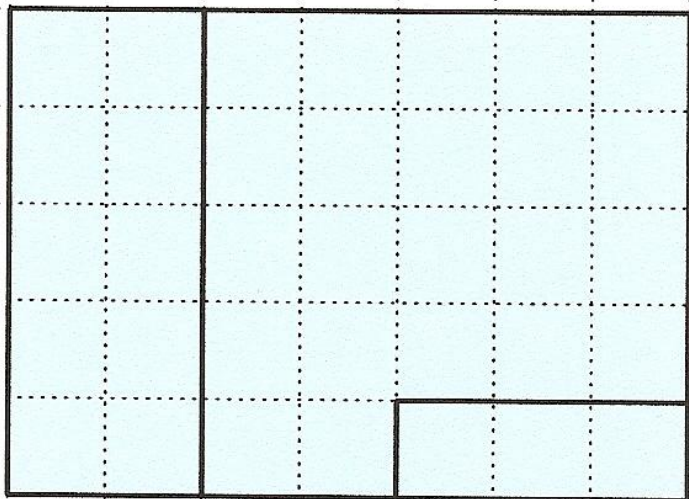
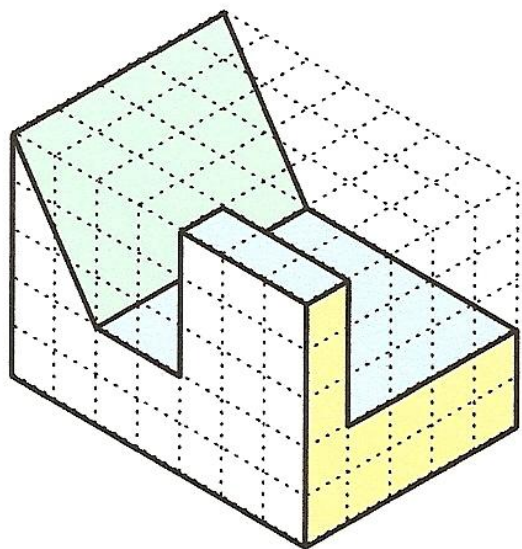
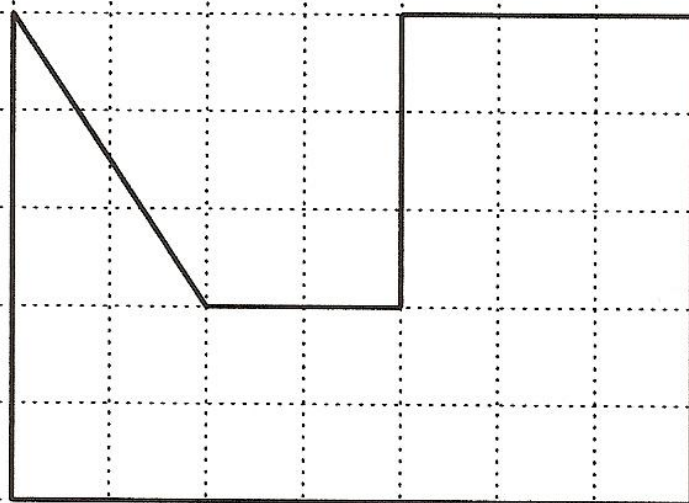
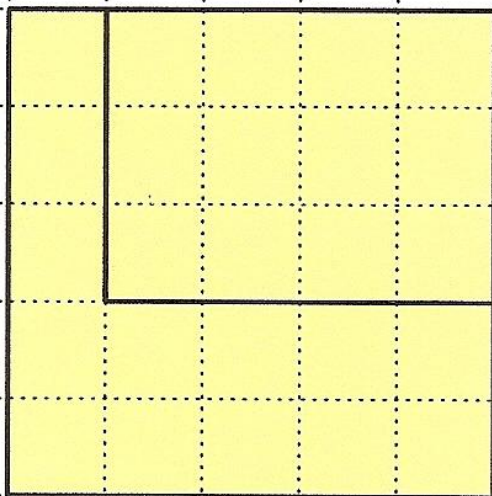


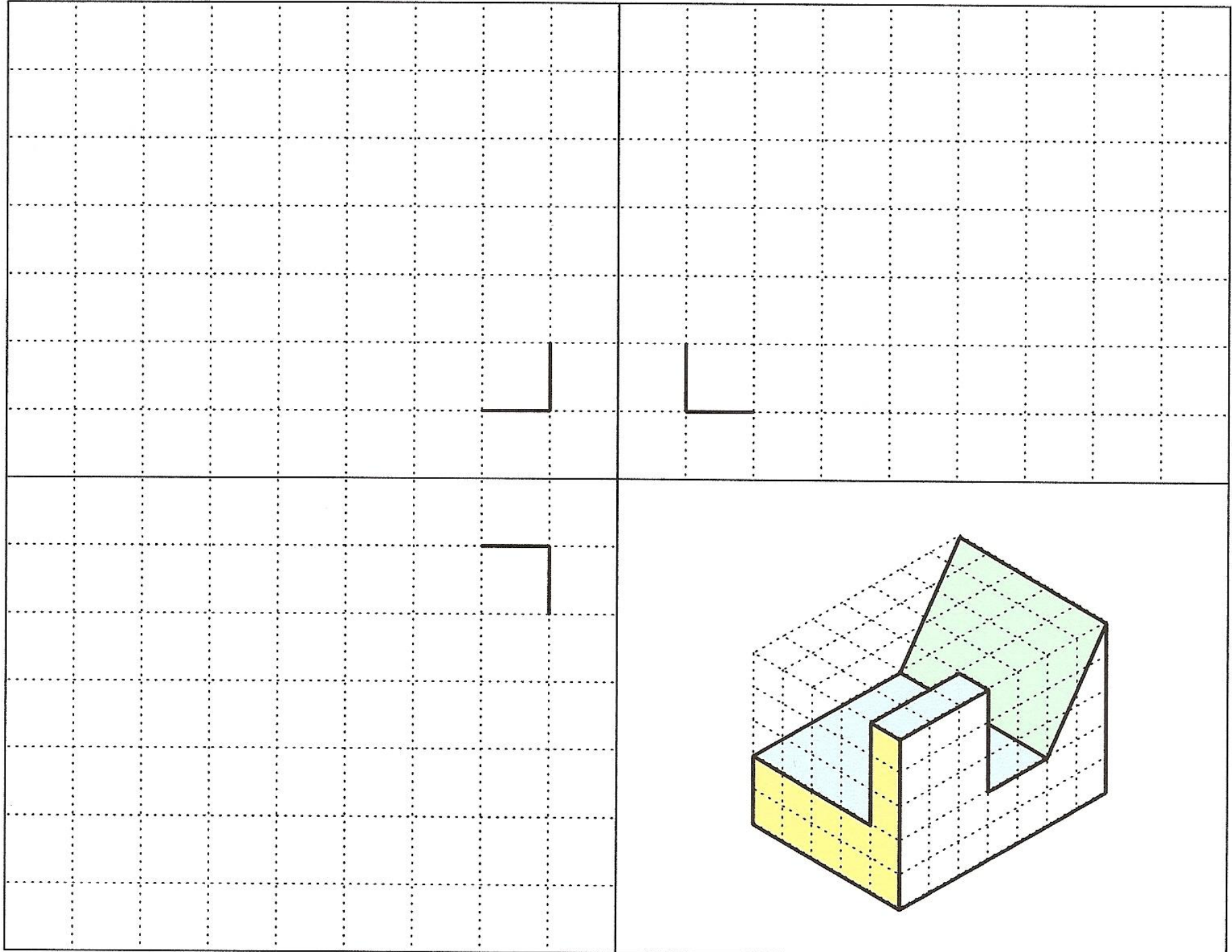


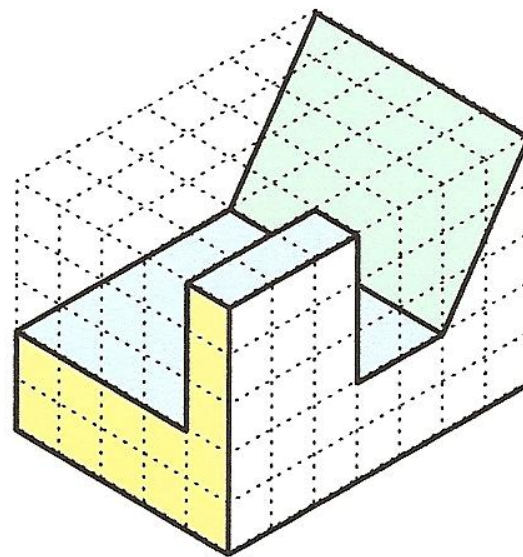
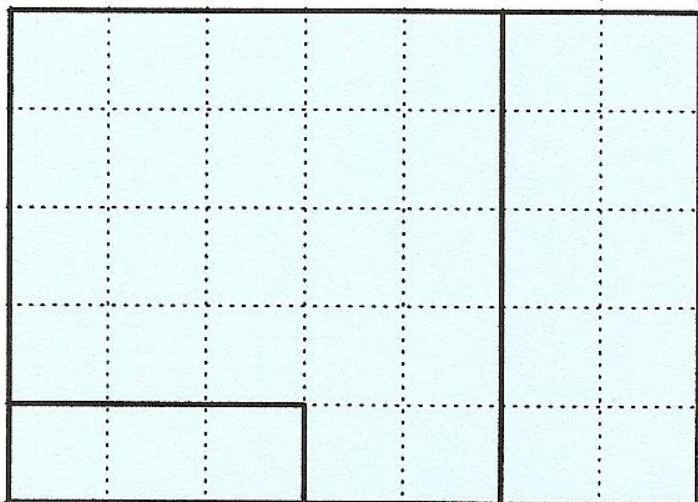
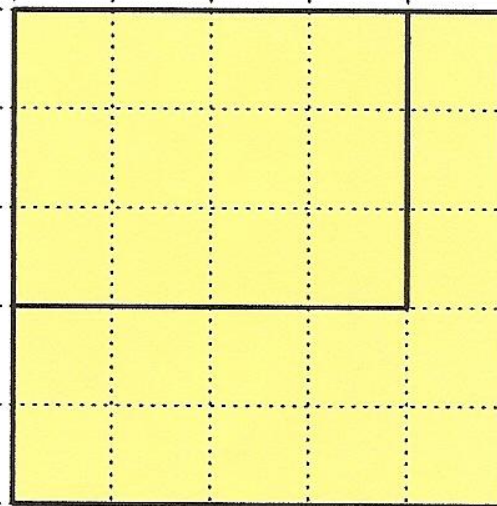
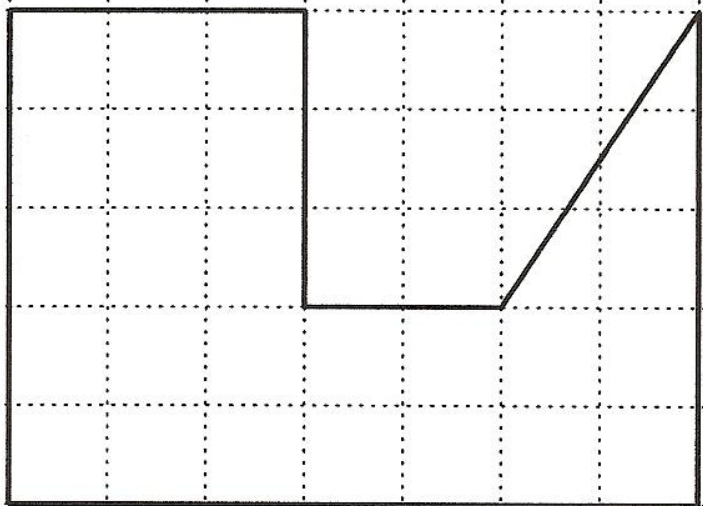
Zadaci za vježbu

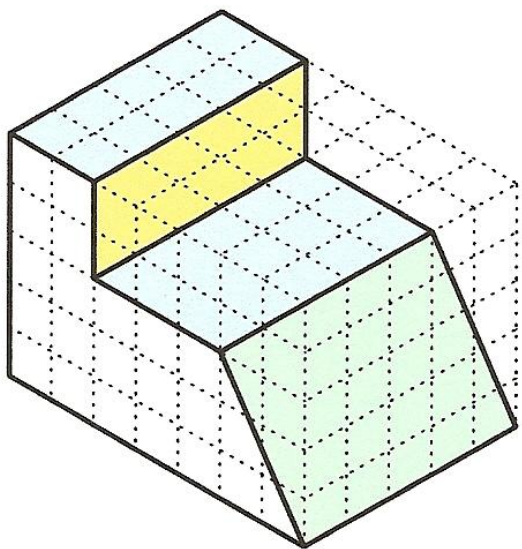
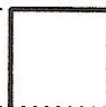
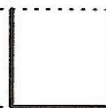
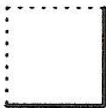
- Na nekoliko sljedećih primjera predočeno je crtanje ortogonalne projekcije!
- Prikazana je ortogonalna projekcija kod koje je bokocrt s desne ili s lijeve strane!

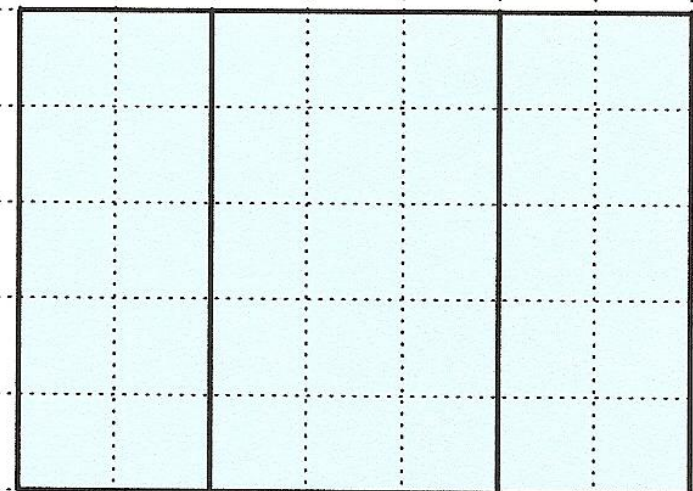
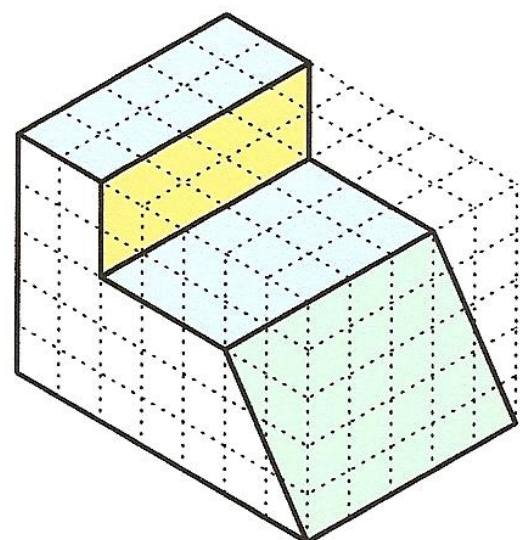
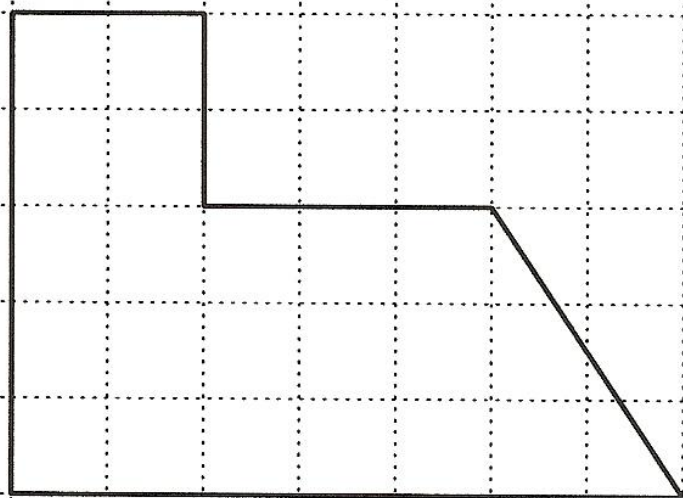
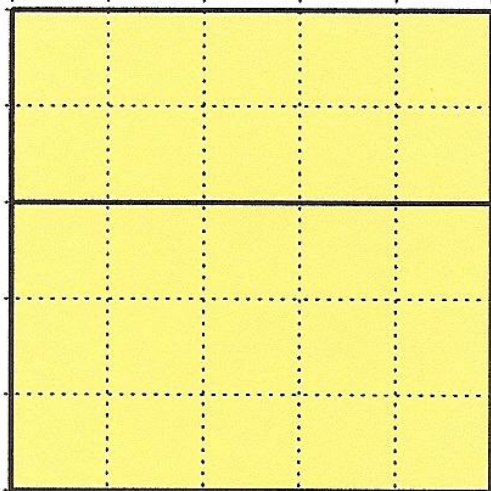


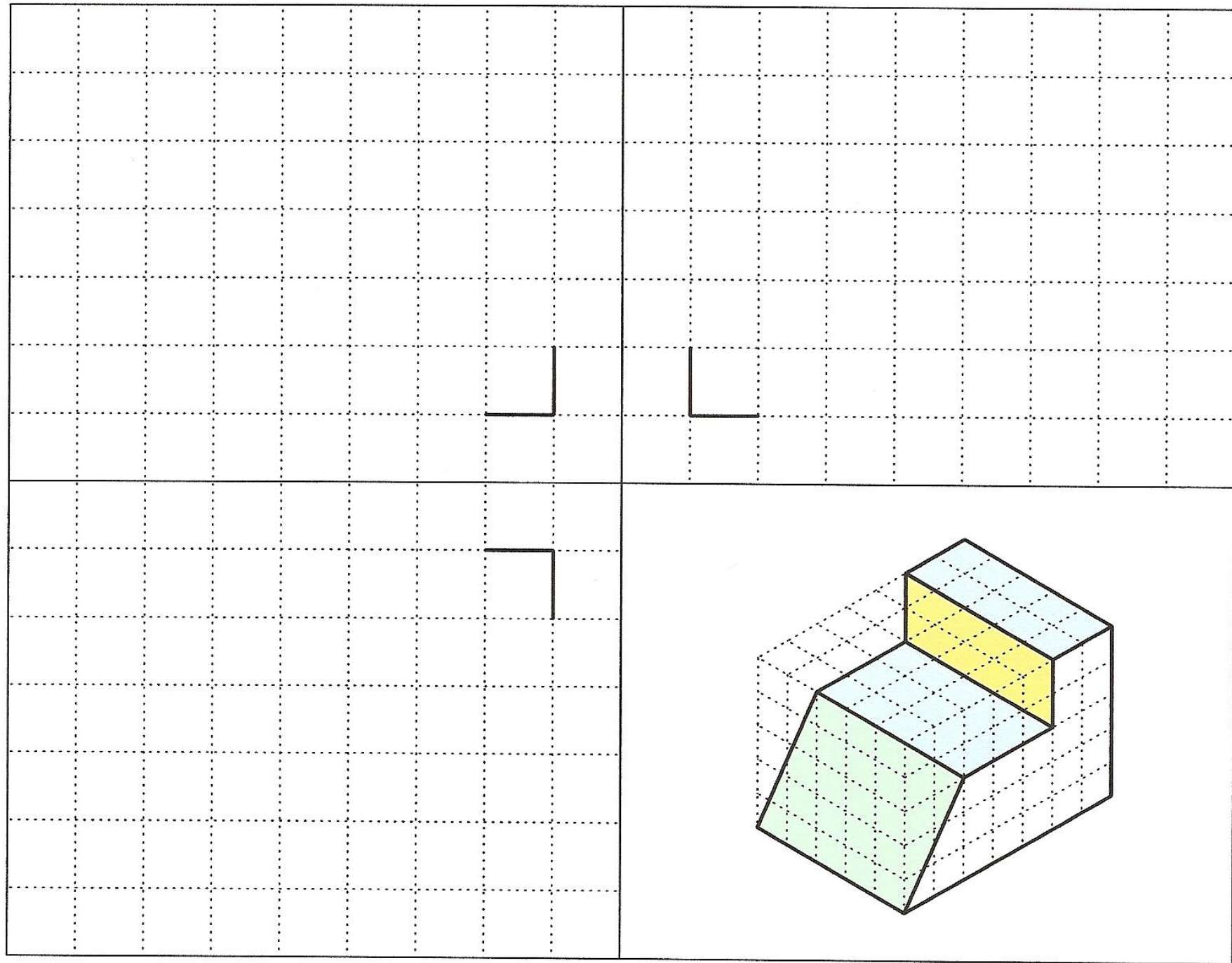


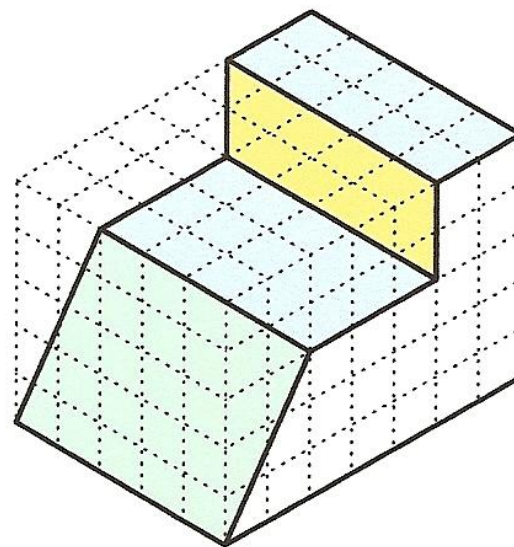
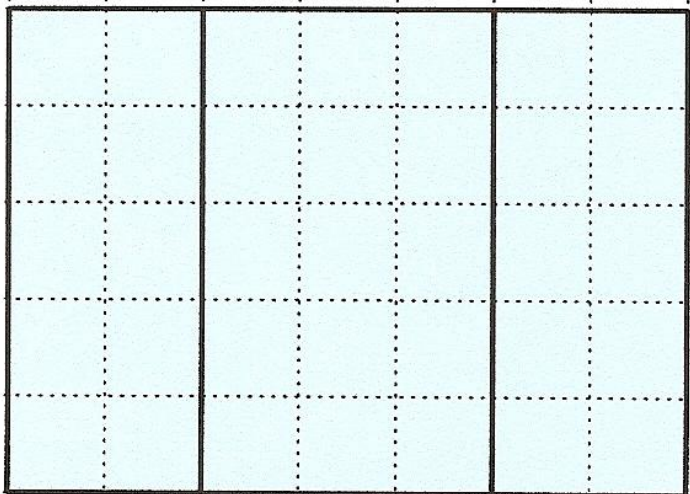
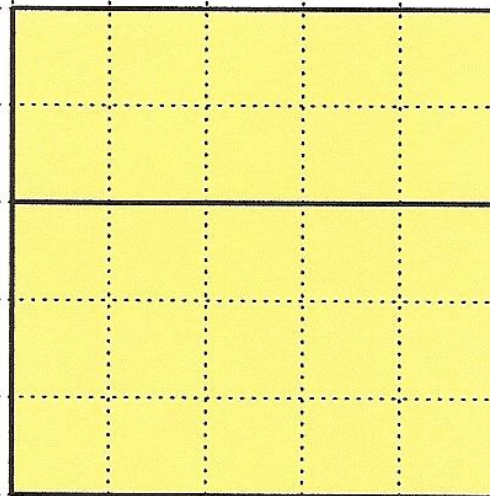
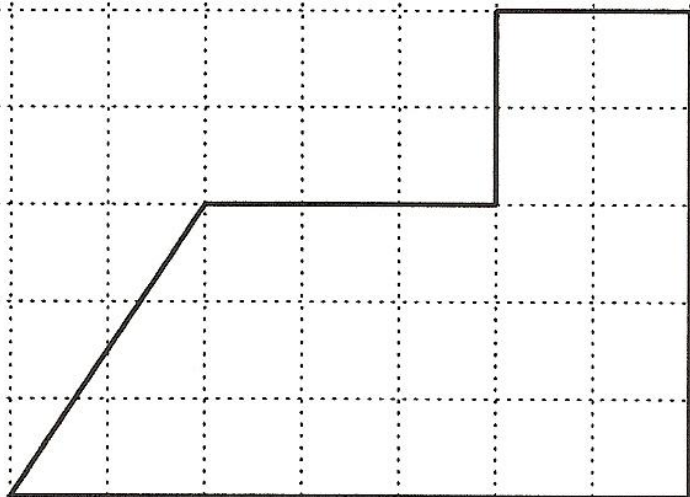


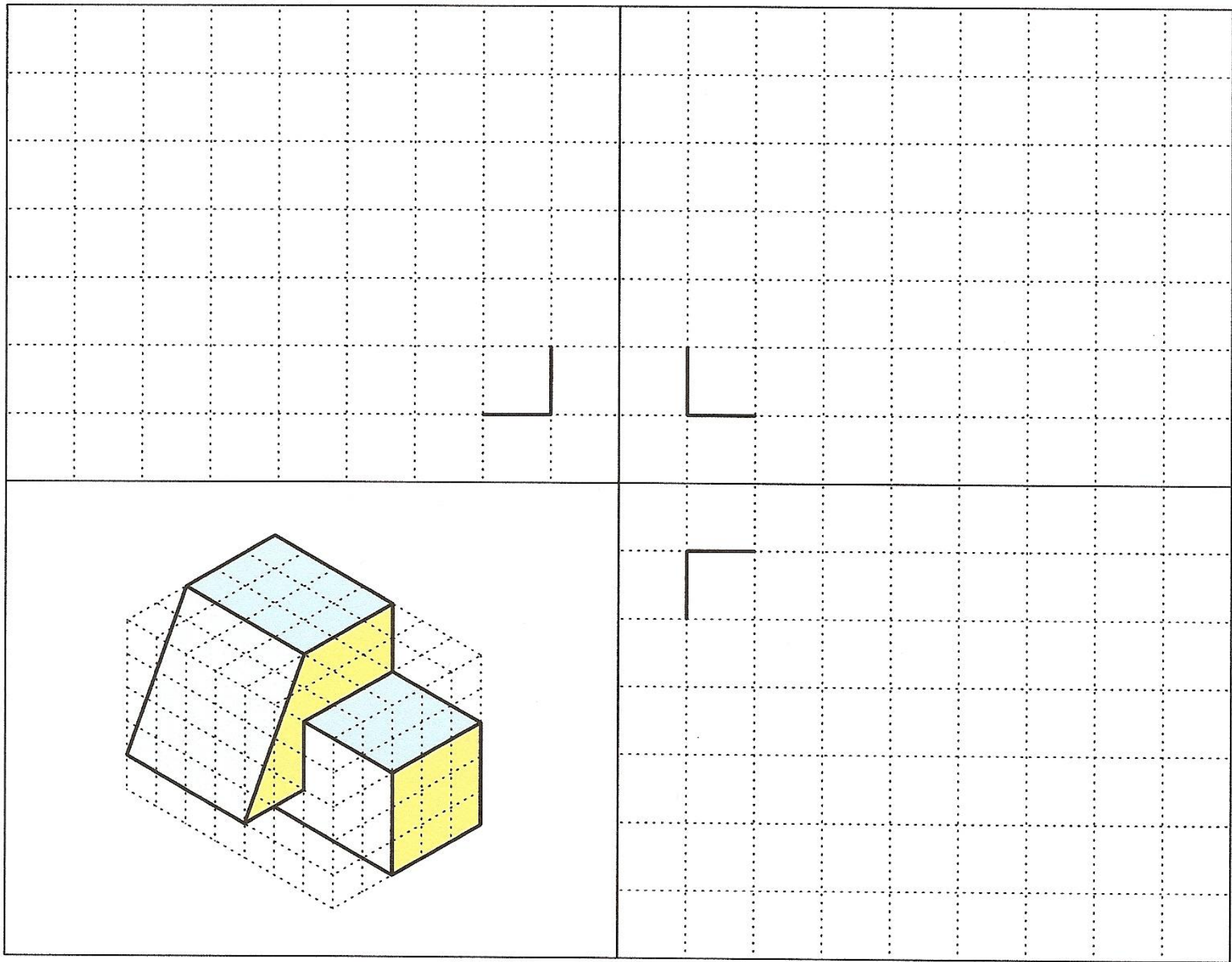


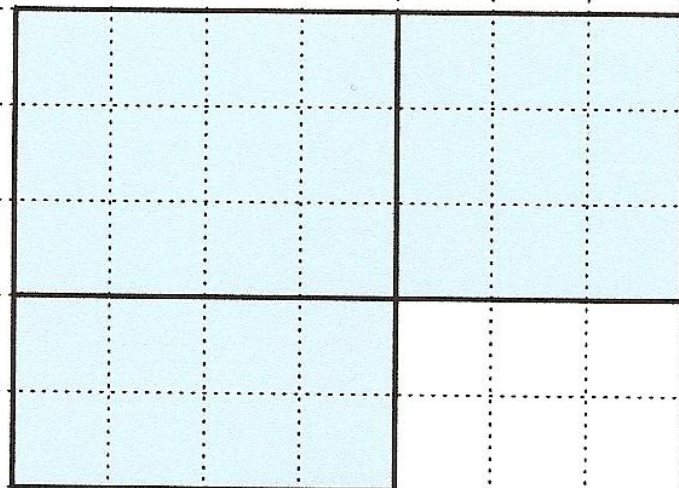
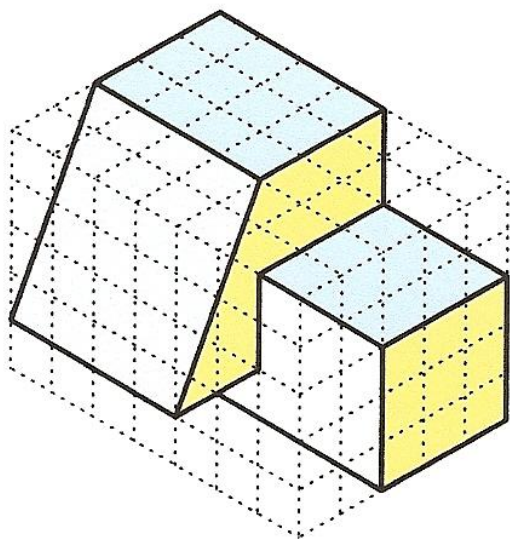
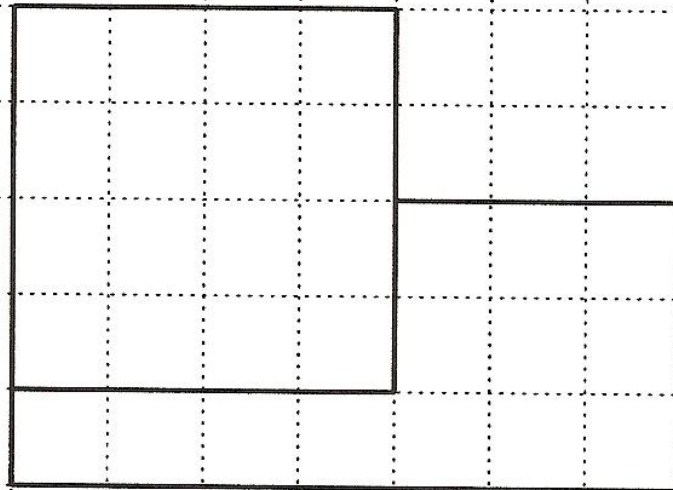
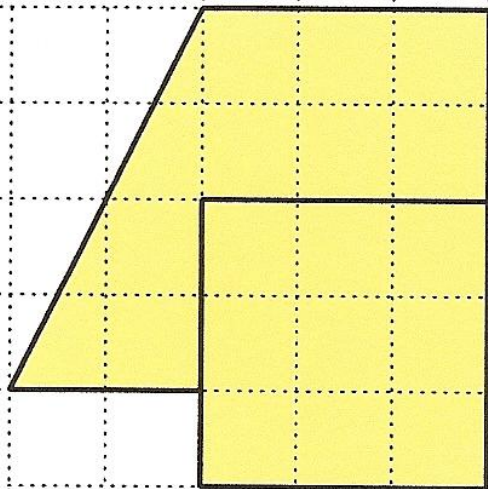


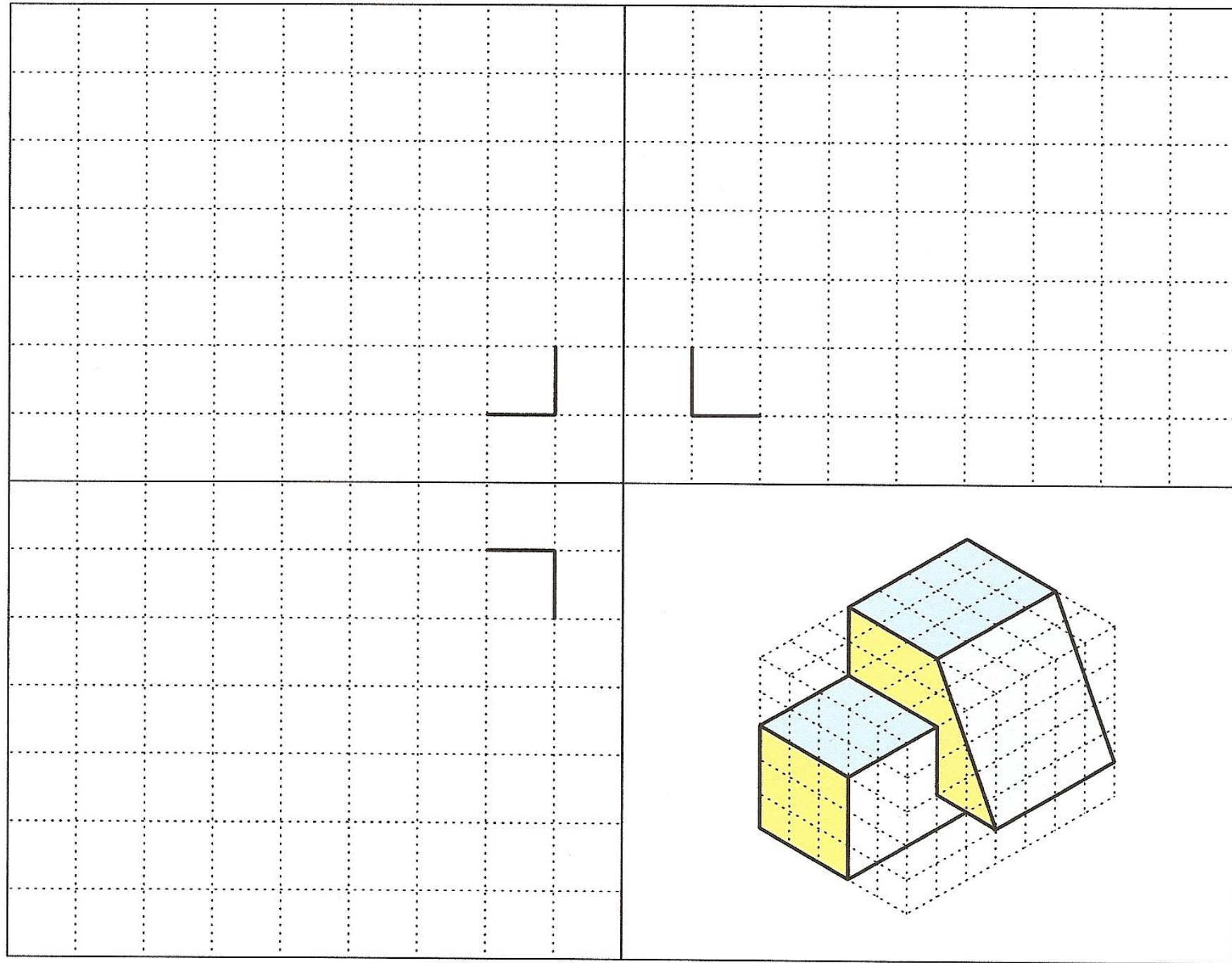


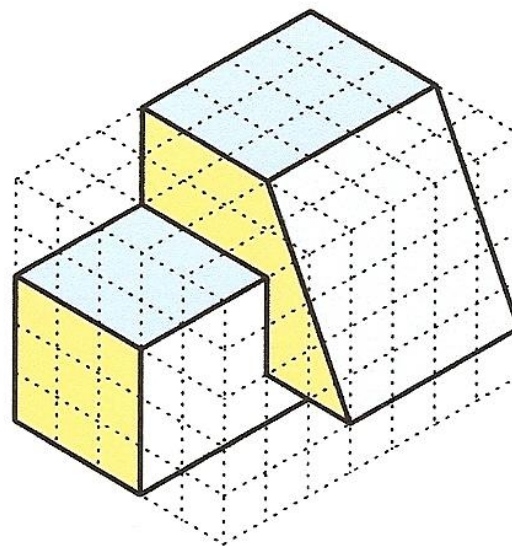
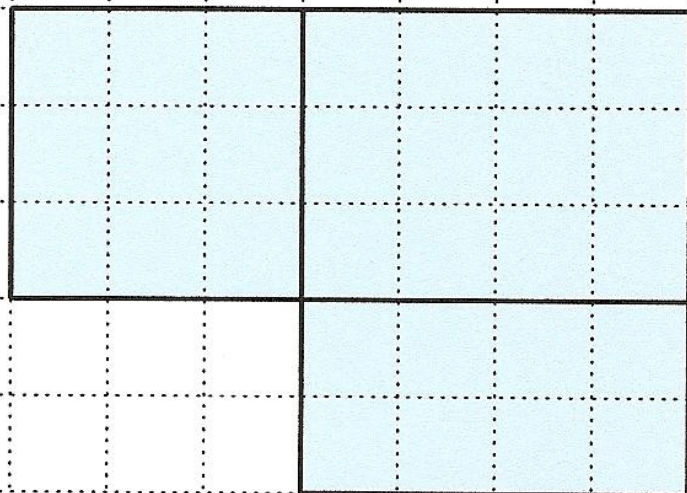
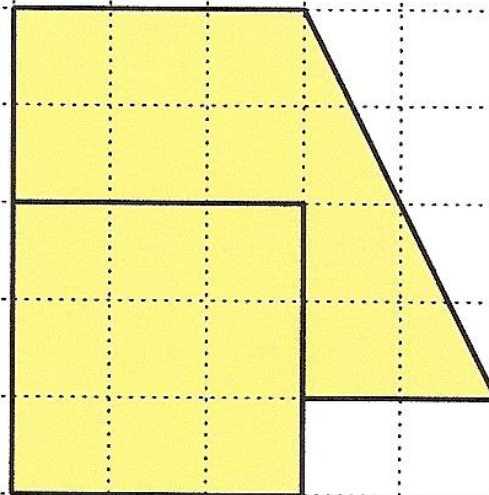
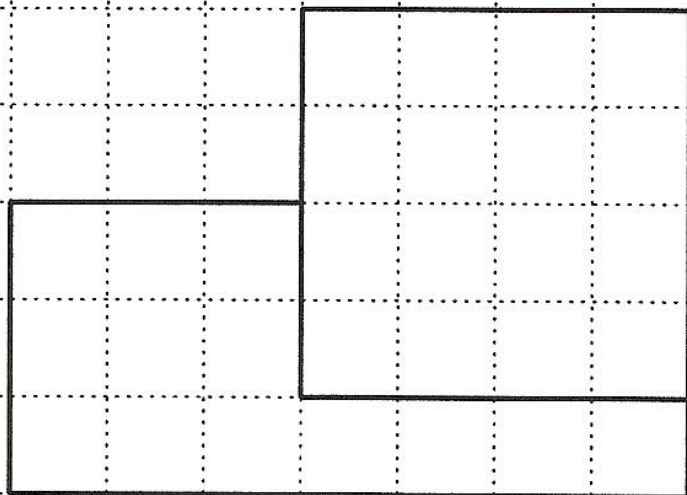


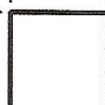
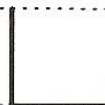
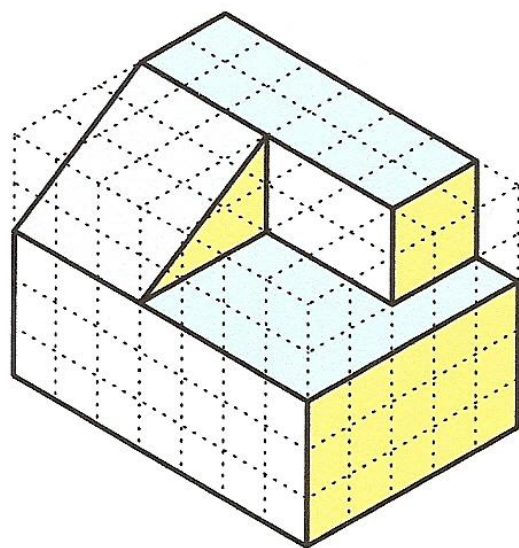


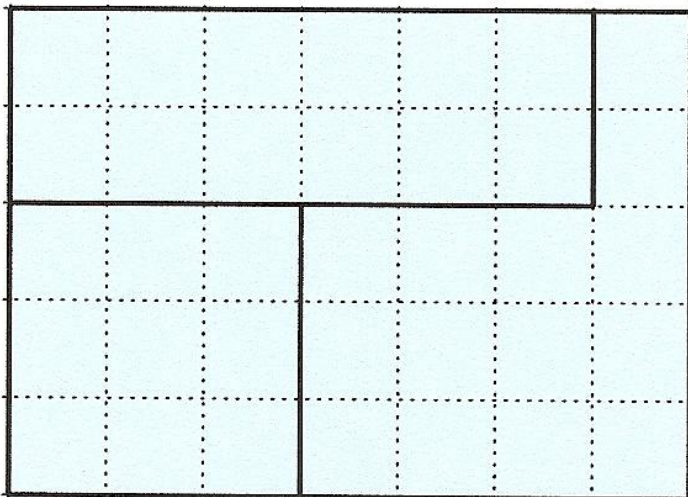
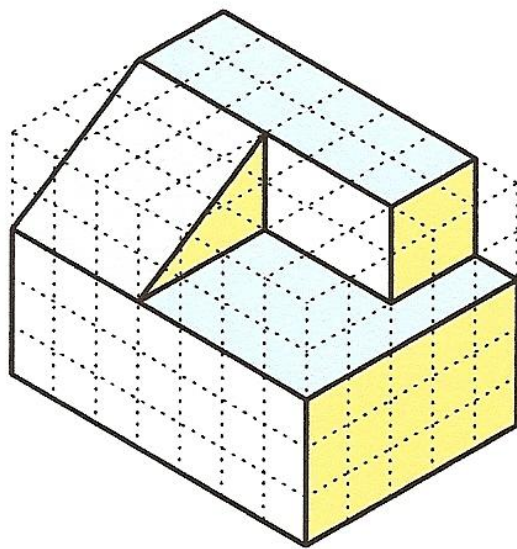
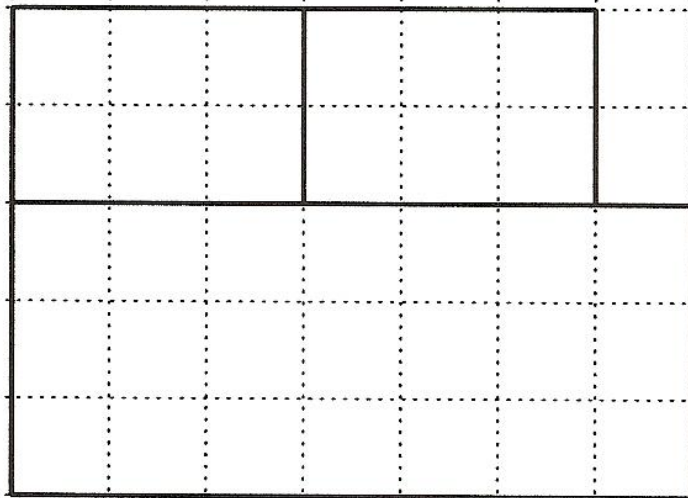
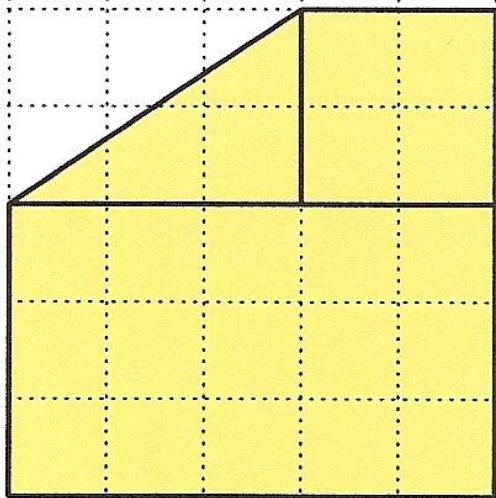


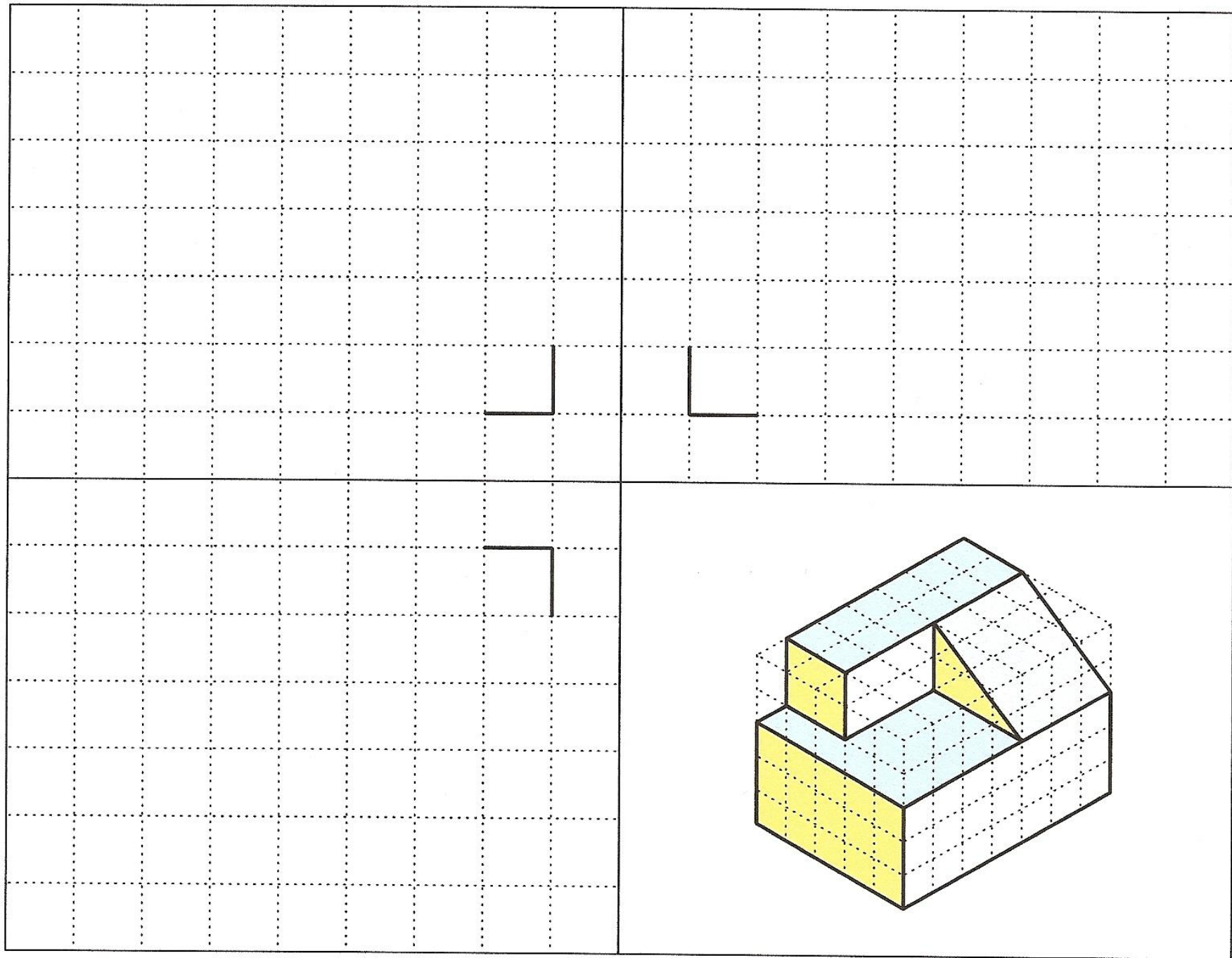


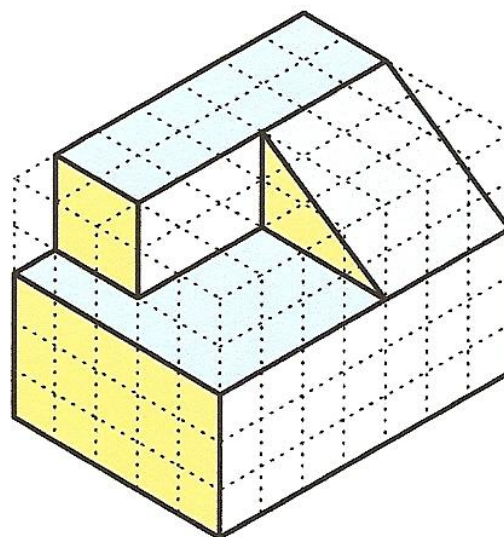
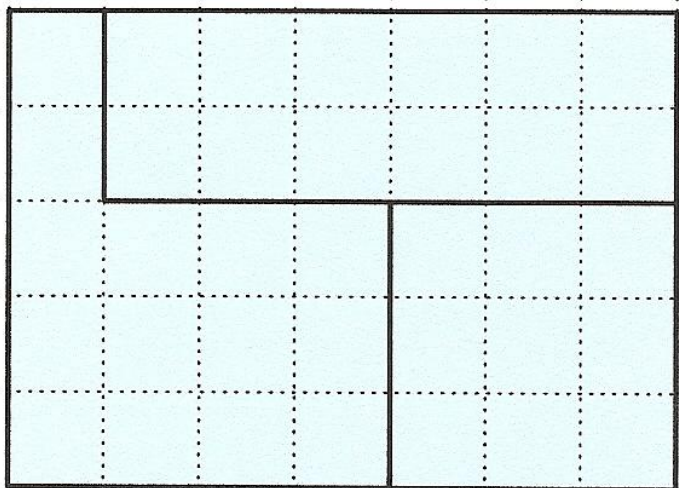
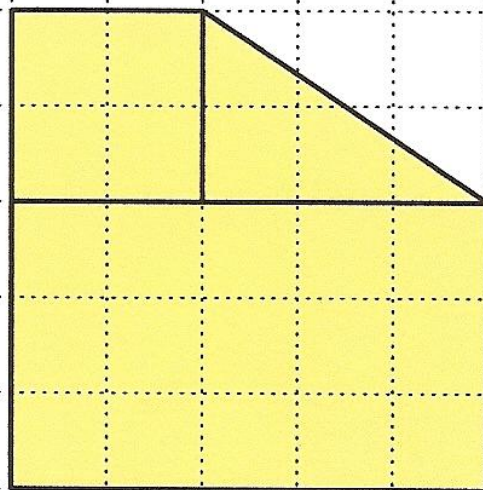
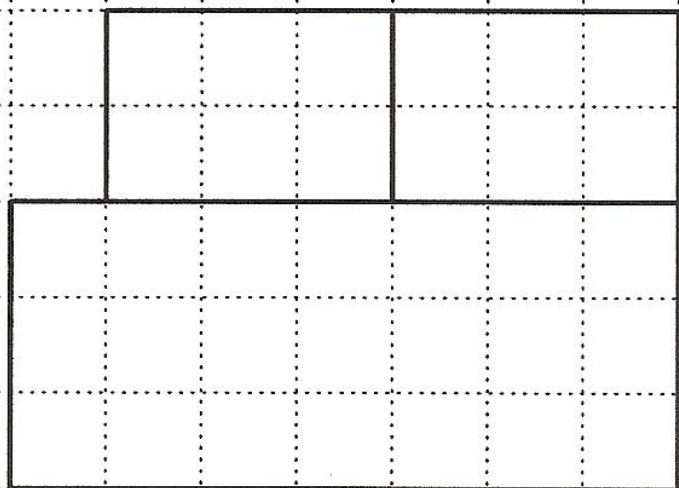


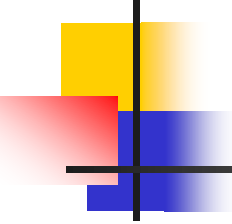












Zadaci za vježbu

U sljedećim zadacima nacrtaj tlocrt, nacrt i bokocrt zadanih tijela koristeći različite boje za svaku projekciju!

Strelicama u aksonometriji odredi smjer gledanja za svaku projekciju.

