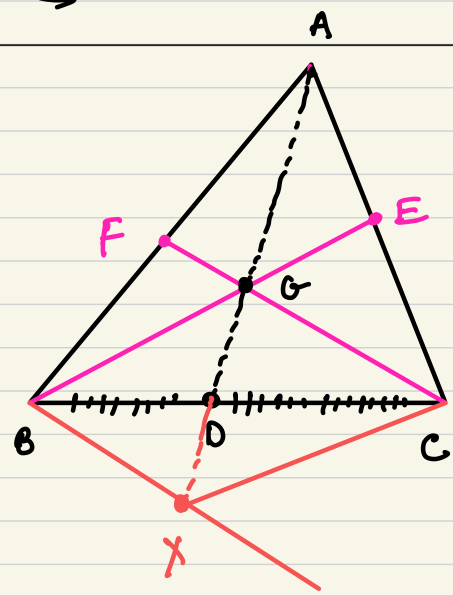
DAY 4

By product

this theorem

$AG = GX = 2GD \Rightarrow \boxed{\dfrac{AG}{GD} = \dfrac{2}{1}}$ Centroid divides median in 2:1 ratio

Homework problem



Join BE and CF two medians.

Suppose they meet at G

Join AG and produce it to meet BC at D:

Claim: D is midpoint of BC.

Construction: Through B draw a line L parallel to CF

Ex AD to meet L at X

Join CX

We will show BXCG is a $\|$gm

side note

diagonals of a $\|$gm bisect each other. implying BD = DC

Proof $\because$ F is midpoint AB and in ΔABX

FG $\|$ BX (by construction)

$\therefore$ G is the midpoint AX (by the converse of the midpoint Theorem) ....(1)

Converse of midpoint theorem

If M is midpoint of XY. then line through M, parallel to YZ, hits the midpoint of third side.

Now in ΔAXC

G is midpoint of AX (by (1))

E is midpoint AC (by given hypothesis)

$\therefore$ GE $\|$ XC (by midpoint theorem)

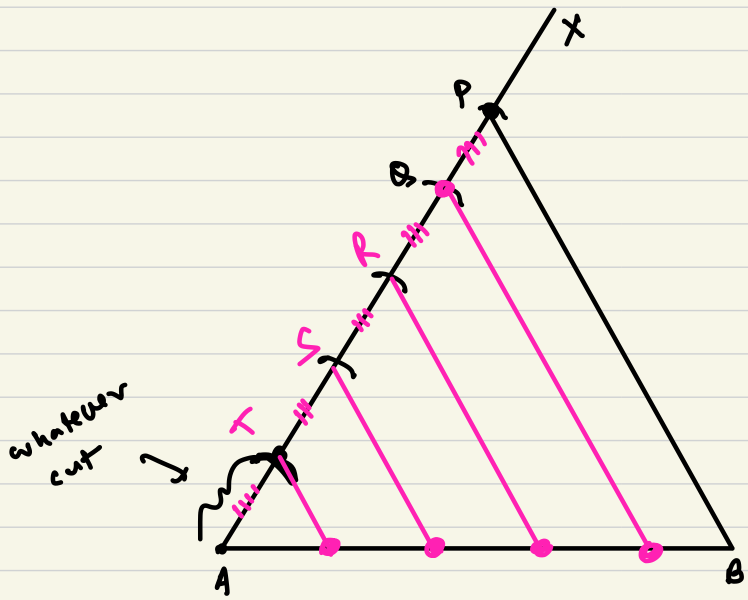
$\therefore$ BG $\|$ XC and BX $\|$ GC (by construction).

$\therefore$ BGCX is a $\|$gm.

$\Rightarrow$ diagonals bisect each other. $\Rightarrow$ BD = DC splitting into 5 equal parts a given line segment

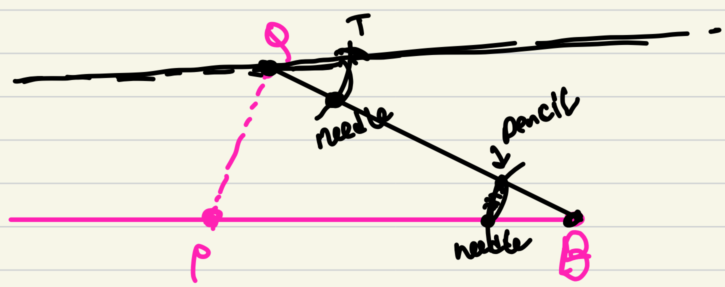
|||

parallel lines.



5:2 ratio

How to draw || lines



Think a little more

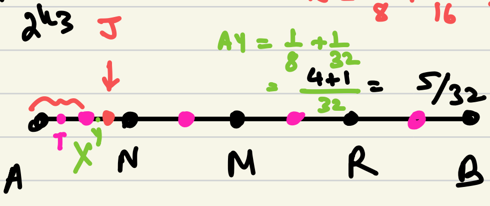
$\frac{1}{2^{k_1}} + \frac{1}{2^{k_2}} + \frac{1}{2^{k_3}}$

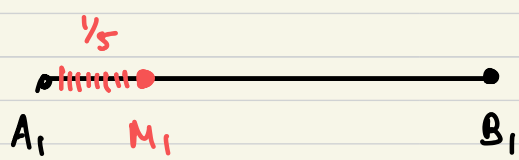
$AJ = \frac{1}{8} + \frac{1}{16} = \frac{2+1}{16} = \frac{3}{16}$

$AY = \frac{1}{8} + \frac{1}{32} = \frac{4+1}{32} = 5/32$

$AT = \frac{1}{16}$

$AN = \frac{1}{4}$



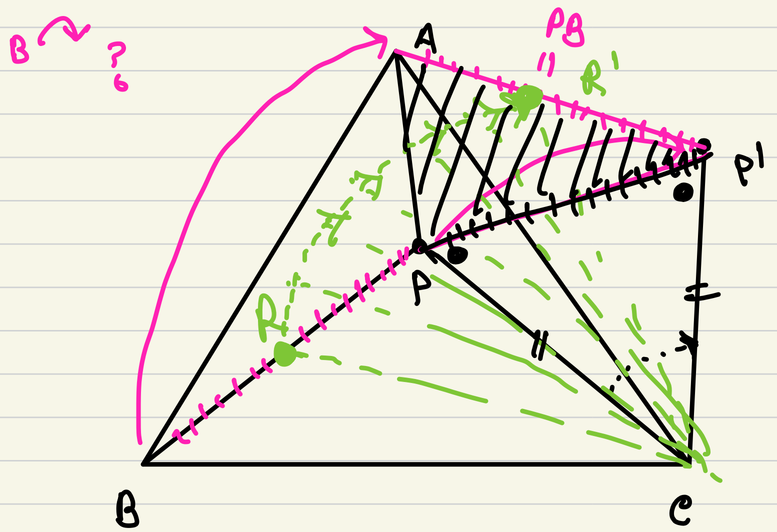


Homework

Show that using pieces of length $\frac{1}{2k}$ one cannot produce pieces of length $\frac{1}{\sqrt{3}}$

Transformation method

ABC is equilateral



It is possible to draw another triangle using PA, PB, PC no matter where P is

Rotation 60° about C

$\Delta APP'$ AP, AP' = PB, PP' = PC

Notice $\Delta PP'C$ is equilateral