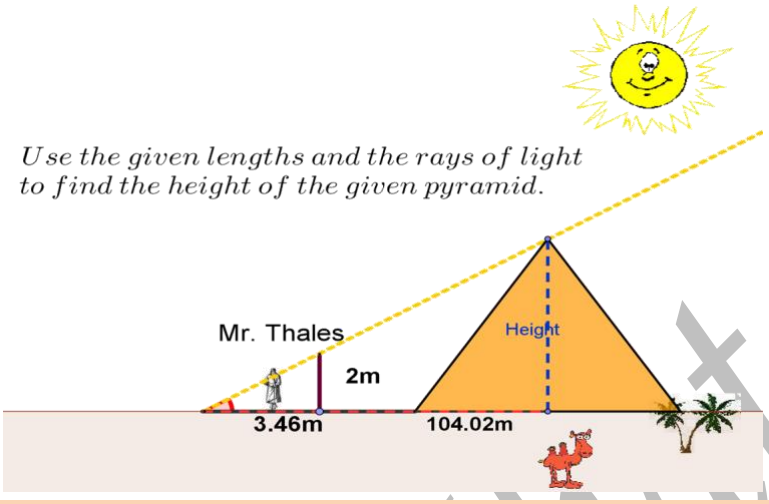
Critical Thinking



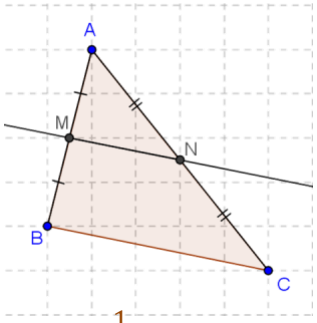
If you were not able to do it, then learning the following objectives might do

Introduction:

Thales' Property*, states that** "Any straight line drawn ***parallel to one side of a triangle, divides the other two sides ***proportionally***"

A. Preliminary Exercise:

Ex1: In the adjacent figure, points M & N are the respective midpoints of $[AB]$&$[AC]$.



1) What is the relative positions of (MN)&(BC) ? Justify.

……

……

2) Find the ratios of: *AM to AB, AN to AC & MN to BC.*

……

……

……(ans: $\frac{1}{2}$)

3) Choose the only correct answer

Compare the formed ratios:

i. Equal.
ii. Not equal.
iii. Negative

4) Cross out the wrong answer:

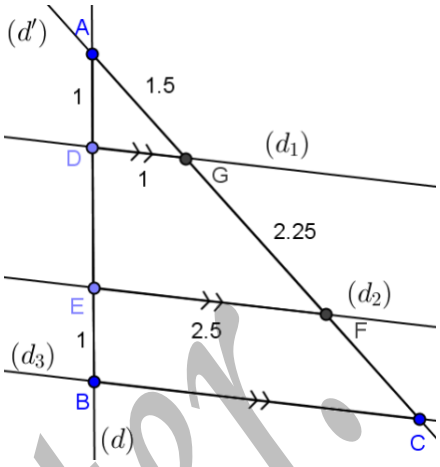
We notice that the straight line joining (any points; midpoints) of two sides of a (triangle; rectangle) divides the (sides; angles) in a ratio equals (half; three quarters)

5) Rewrite the above statement

……

……

Ex2: In the adjacent figure (d) & (d') are two intersecting straight lines at A. $(d_1),(d_2)$ & (d_3) are three parallel straight lines, so that $AE = 2.5cm$.



1- Compute if possible the following ratios:

Ratios formed by segments on:		
Ratios	Straight line (d)	Straight line (d')
1st - set	$\frac{AD}{AE} =$	$\frac{AG}{AF} =$
2nd - set	$\frac{AE}{AB} =$	$\frac{AF}{AC} =$

(ans: $\frac{AD}{AE} = \frac{AG}{AF} = \frac{2}{5}; \frac{AE}{AB} = \frac{AF}{AC} = \frac{5}{7}$)

2- Compare the 1st - set of ratios. ……

3- Now, compare the ratios of 1st - set with $\frac{DG}{EF}$. ……

4- Underline the correct answer?

We conclude that, any straight line drawn (perpendicular; parallel) to a side of a (quadrilateral; triangle) divides the other sides (proportionally; equally)

5- Find using the 2nd - set of ratios, the measure of segment $[AC]$.

……

……

(ans: $AC = 5.25cm$)

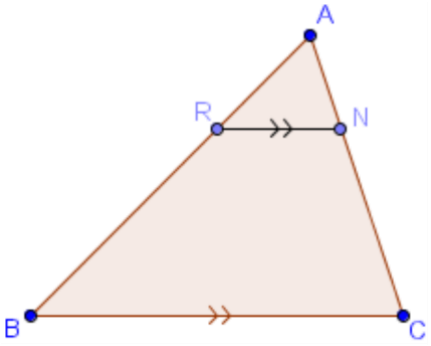
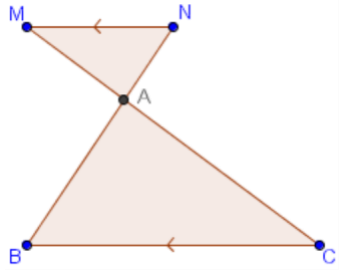
B. *Statement:*

Thales' Property*, states that** "Any straight line drawn ***parallel to one side of a triangle, divides the other two sides ***proportionally***"

C. *Usage or Goals of:*

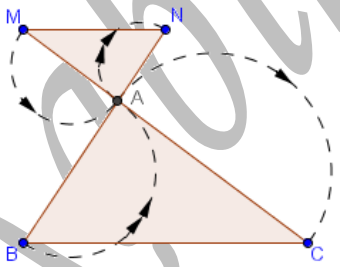
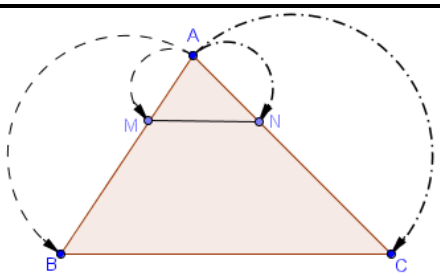
Thales' property
1. Find measure of a segment.
2. Establish a relation between sides. (A side is double the other or so)
3. Detect if a ratio is constant or variable.
4. Locating a point on a line or a segment.

D. Ratios of Thales':

	Geometric approach	Analytic approach
Triangular – Configuration	If the points $R\&N$ are placed on same side of points $B\&C$, such that: $(RN)//(BC)$ then, 	***a.*** If taken from ***main vertex***: $\frac{AR}{AB}_{1}=\frac{AN}{AC}_{2}=\frac{RN}{BC}_{3}=\begin{cases} i-\frac{AR}{AB}=\frac{AN}{AC}(\text{From ratios } 1\&2) \\ ii-\frac{AR}{AB}=\frac{RN}{BC}(\text{From ratios } 1\&3) \\ iii-\frac{AN}{AC}=\frac{RN}{BC}(\text{From ratios } 2\&3) \end{cases}$ ***b.*** If taken from ***extremities*** of one of the parallel lines: $i\text{-}\ \frac{RA}{RB}=\frac{NA}{NC}$ ***OR*** $\frac{RB}{RA}=\frac{NC}{NA}$ (Starting from ***inner line***) $ii\text{-}\ \frac{BR}{BA}=\frac{CN}{CA}$ ***OR*** $\frac{BA}{BR}=\frac{CA}{CN}$ (Starting from ***base line***)
X-Configuration		If $M\&N$ are any two points placed on the other side of points $B\&C$, such that: $(MN)//(BC)$ then, $\frac{AM}{AC}=\frac{AN}{AB}=\frac{MN}{BC}.$

✓ ***Converse of Thales' Property:***

"If two sides of a triangle are cut by a section of a straight line ***proportionally***, then this line is ***parallel*** to the third side of the given triangle."

	
IF: $\frac{AM}{AC}=\frac{AN}{AB}$	***IF:*** $\frac{AM}{AB}=\frac{AN}{AC}$ *or* $\frac{AM}{AB}=\frac{MN}{BC}$ *or* $\frac{AN}{AC}=\frac{MN}{BC}$
$Thus, (MN)//(BC)$	

Summary

Statement, conditions & Uses of Converse of Thales'

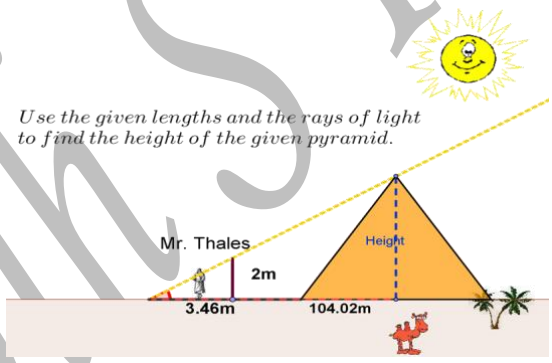
Statement: "If two sides of a triangle are cut by a section of a straight line ***proportionally***, then this line is ***parallel*** to the third side of the given triangle."

Conditions: To apply converse Thales' theorem:

1. Measure of at least four segment
2. Two sets of collinear points.

Usages: Prove Parallel lines

Now, can you answer the questions of the critical thinking part?



(ans: $\frac{3.46}{104.02} = \frac{2}{height}$ $(using\ Thales'\ Property)$)