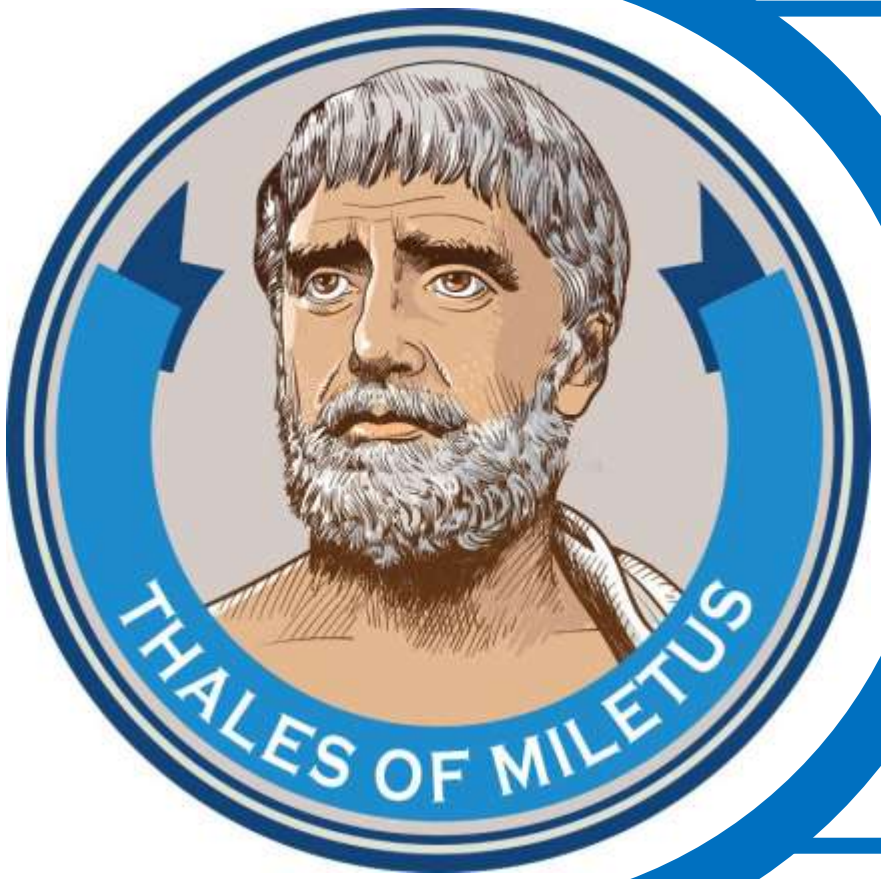
THALES THEOREM



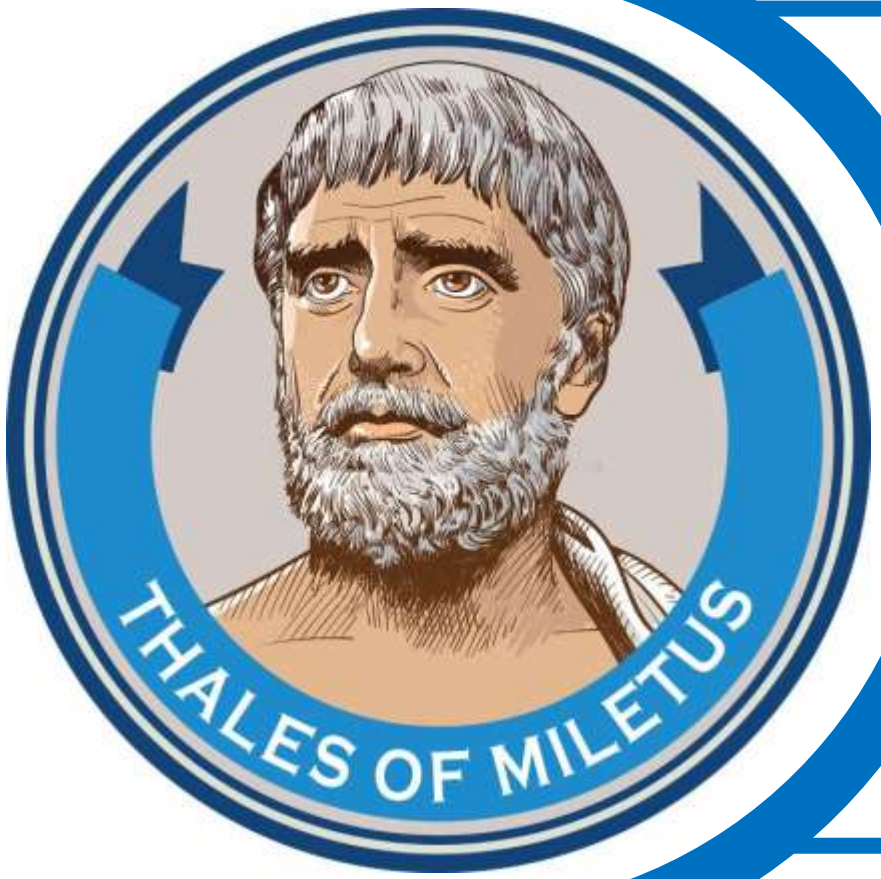
A Greek mathematician who founded geometry, physicist and astronomer

He predicted the solar eclipse.

He was the first to research scientific philosophy.

He gave many theories in geometry.

He proposed the **THALES THEOREM**.



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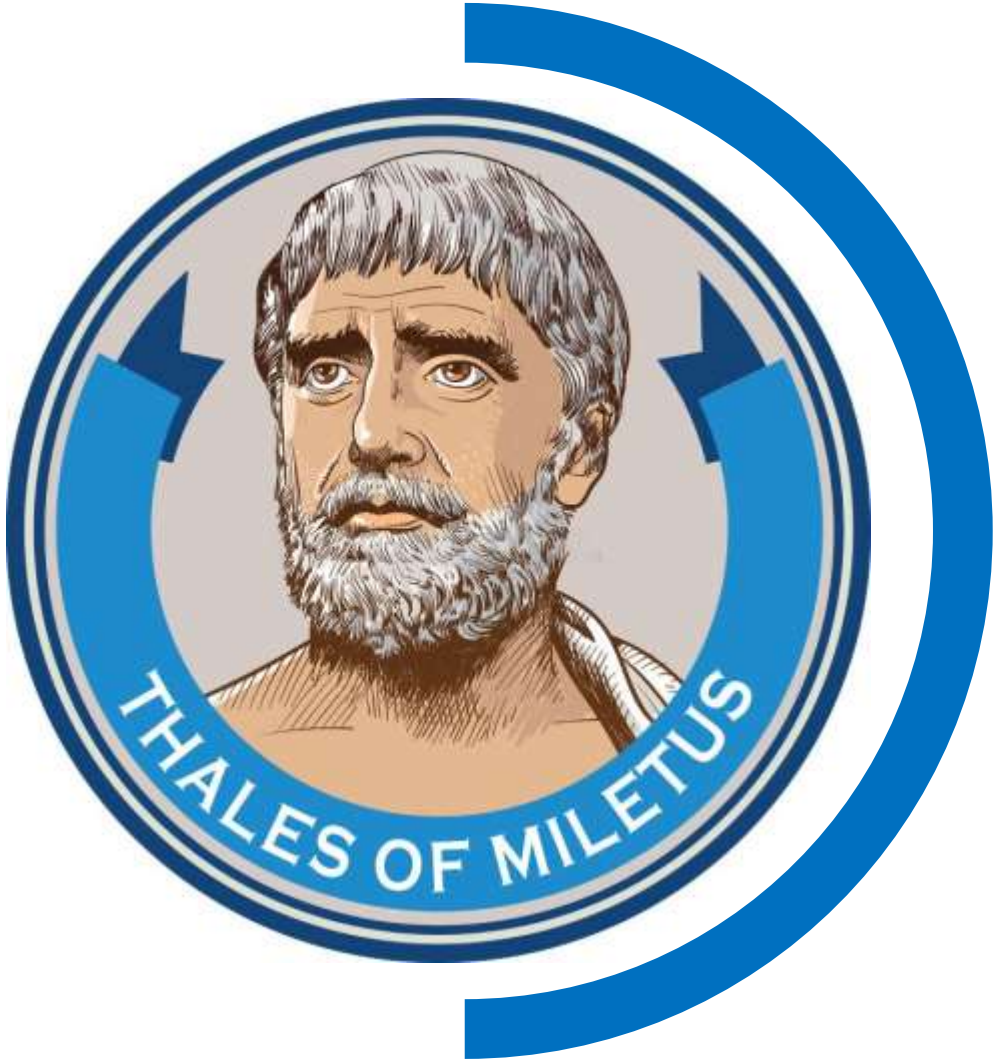
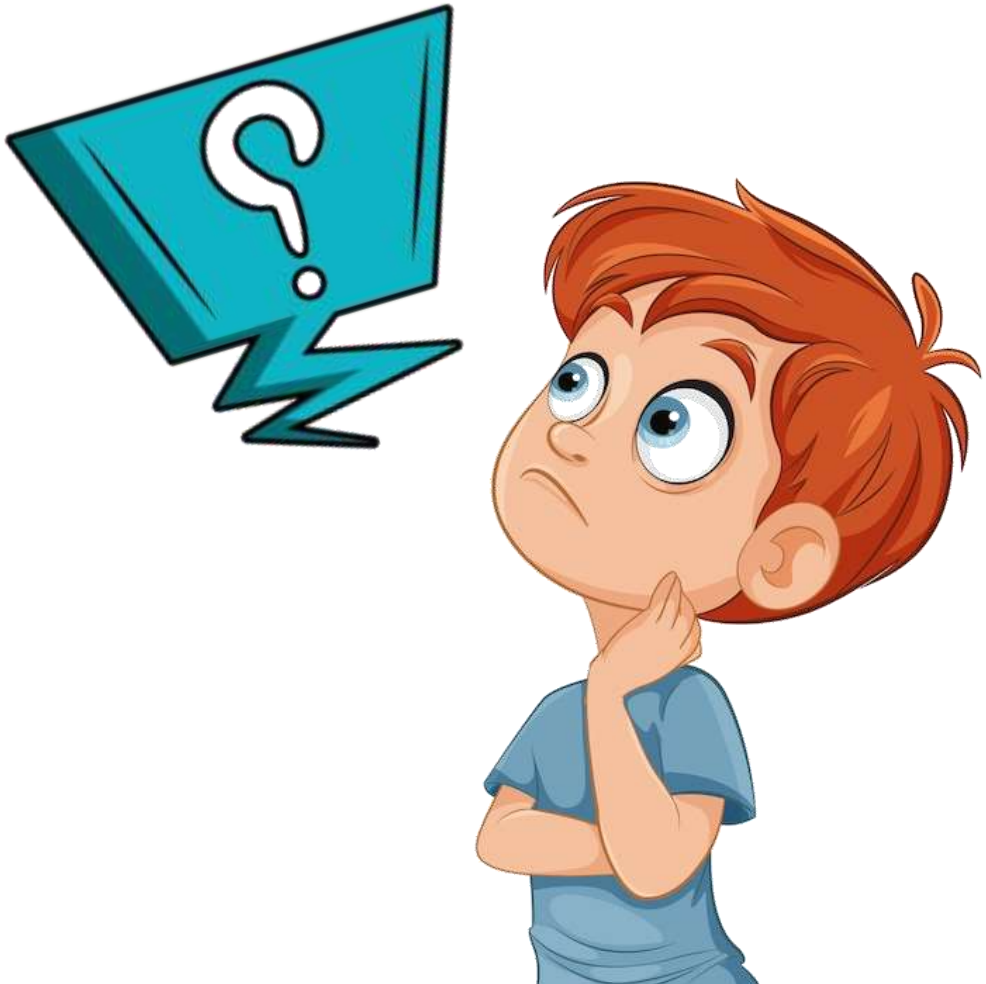


He proposed the **THALES THEOREM**.

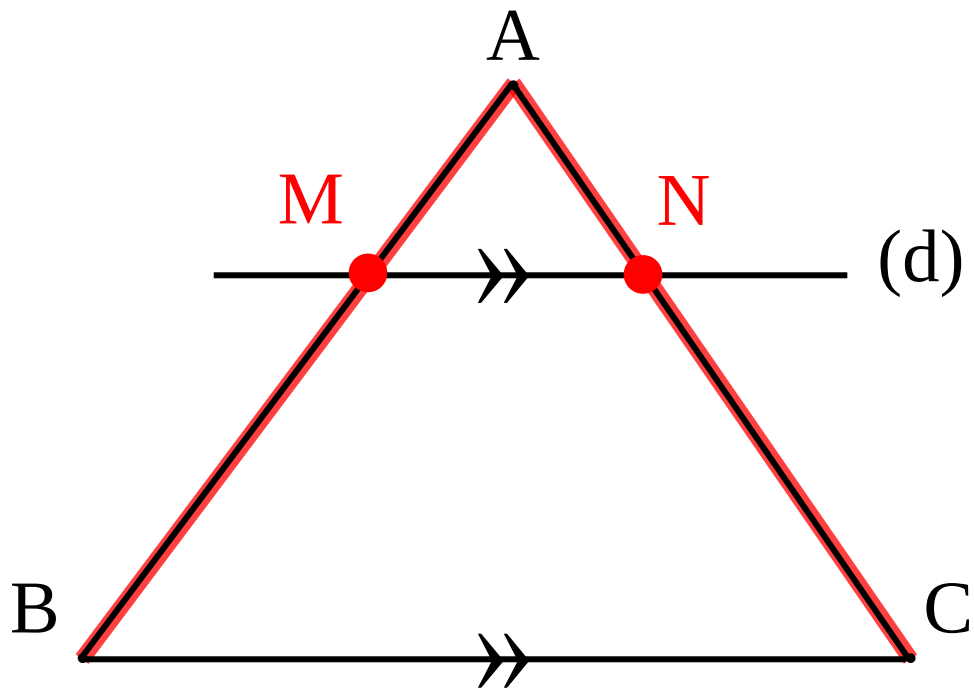


STORY OF THALES THEOREM (video from ScienceWorld Channel on YouTube)

HOW TO APPLY THALES THEOREM?

ABC is a triangle.
(d) // (BC).
(d) Cuts the two sides [AC] and [AB] proportionally.

$$\frac{AM}{AB} = \frac{AN}{AC}$$

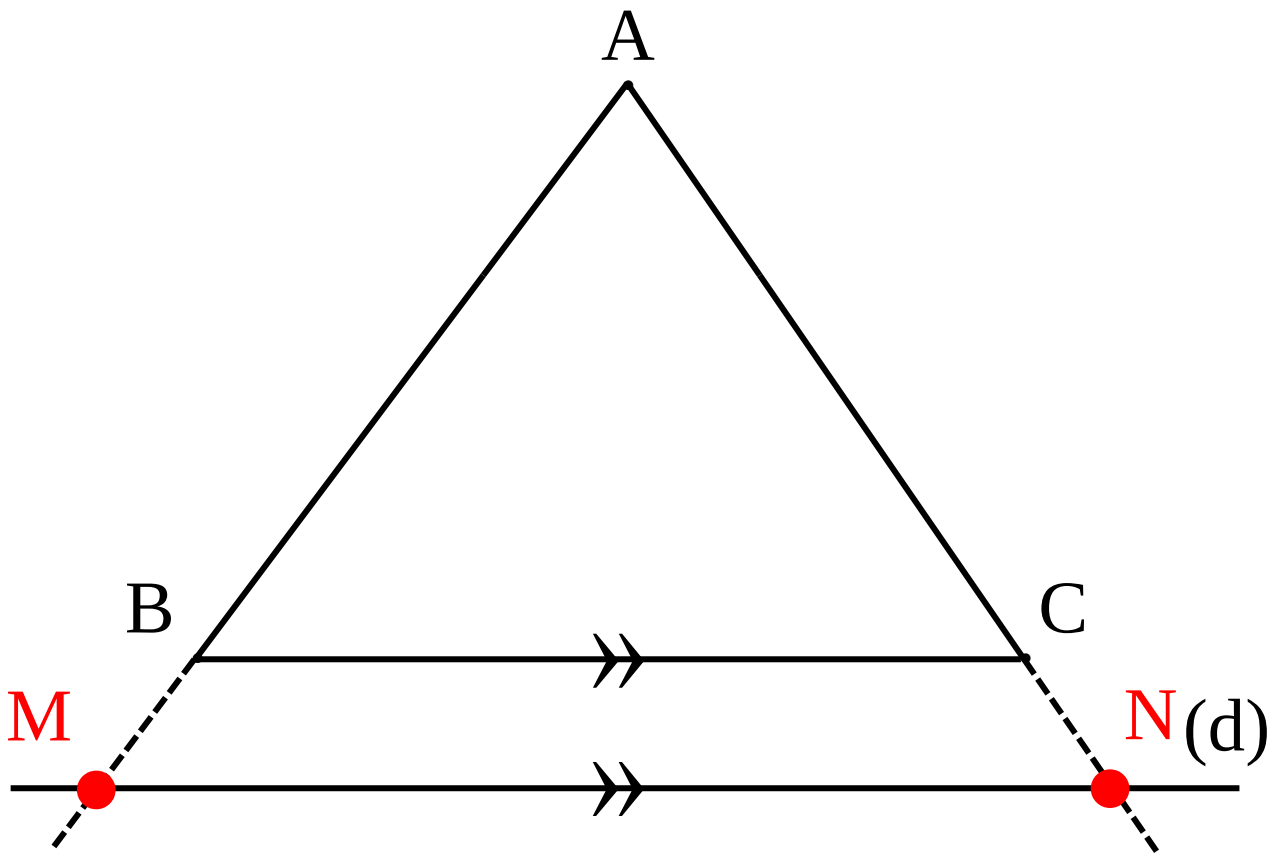


HOW TO APPLY THALES THEOREM?

Same in these two other cases.

$$\frac{AM}{AB} = \frac{AN}{AC}$$

Case 1

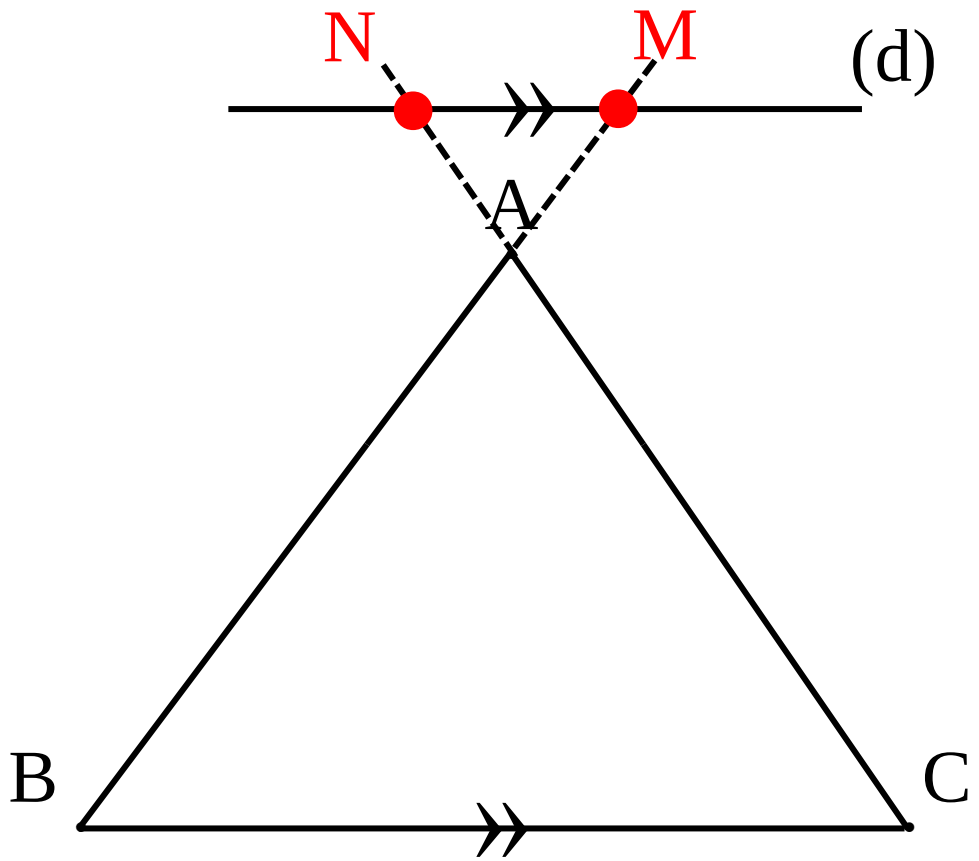


HOW TO APPLY THALES THEOREM?

Same in these two other cases.

$$\frac{AM}{AB} = \frac{AN}{AC}$$

Case 2

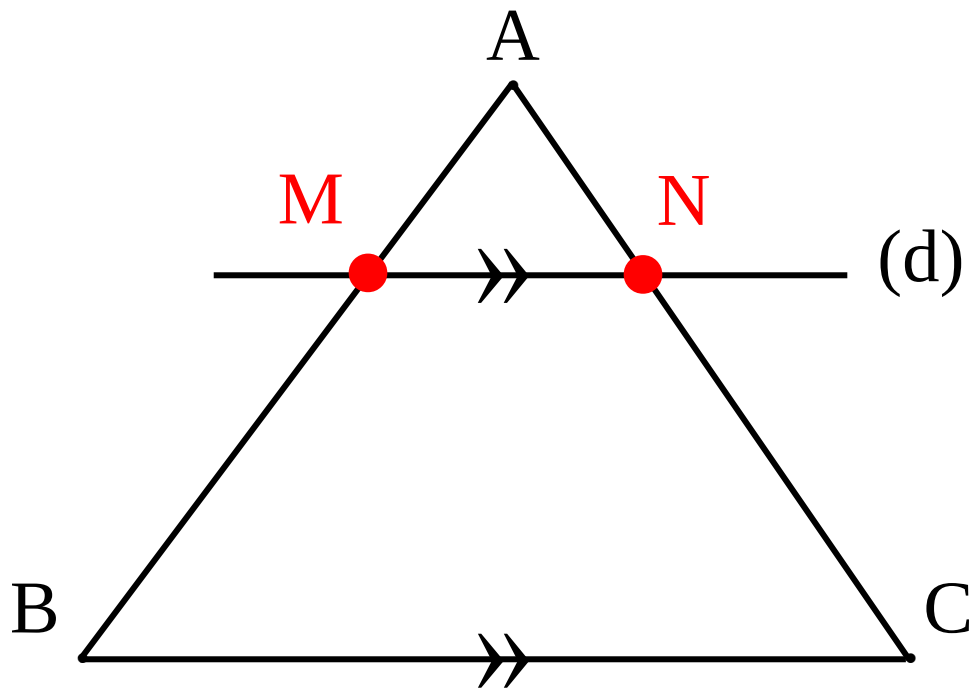


HOW TO APPLY THALES THEOREM?

Other properties of Thales theorem

1

$$\frac{AM}{AB} = \frac{AN}{AC} = \frac{MN}{BC}$$



Remark:

We can start the ratio by AB:

$$\frac{AB}{AM} = \frac{AC}{AN} = \frac{BC}{MN}$$

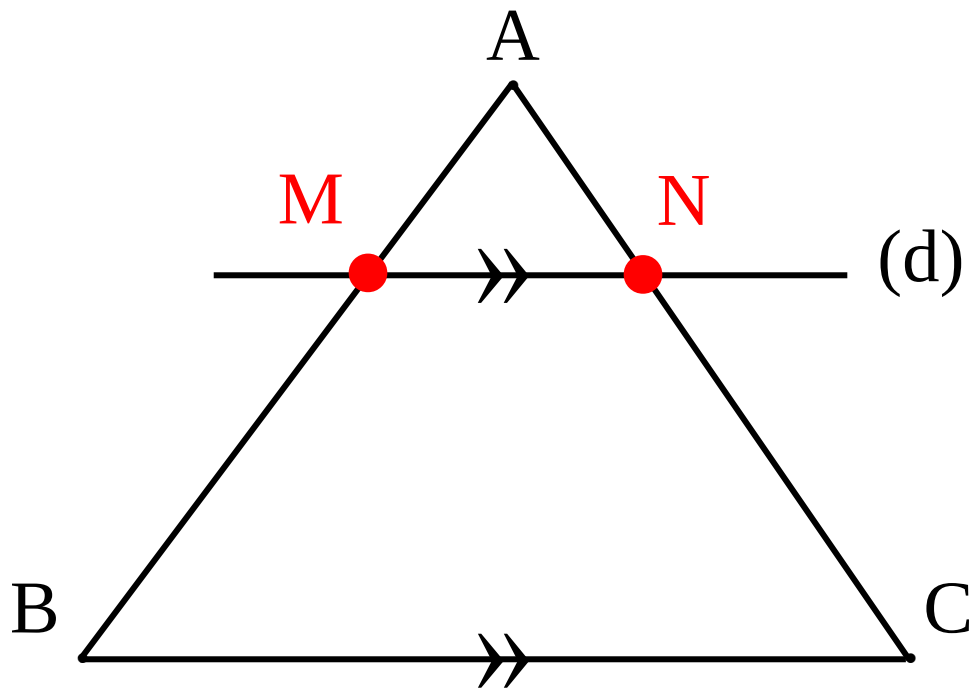
HOW TO APPLY THALES THEOREM?

Other properties of Thales theorem

2

$$\frac{MA}{MB} = \frac{NA}{NC}$$

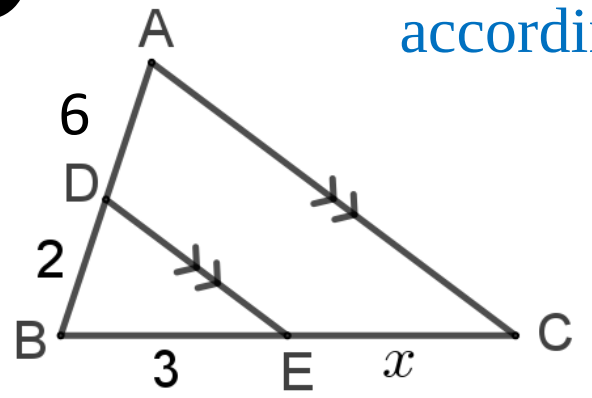
$$\frac{AB}{MB} = \frac{AC}{NC}$$



APPLICATION #1

Calculate x in each case.

1



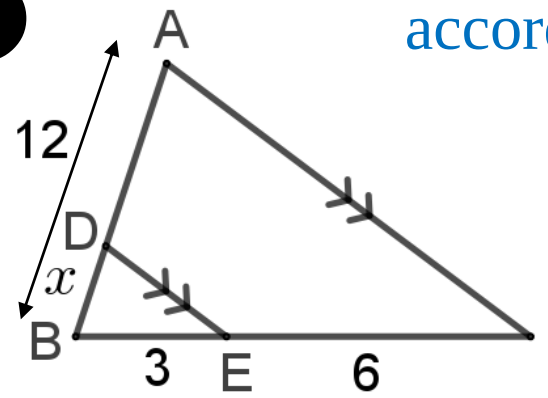
(DE)//(AC),
according to Thales theorem

$$\frac{BD}{DA} = \frac{BE}{EC}$$

$$\frac{2}{6} = \frac{3}{x}$$

$$x = \frac{6\times3}{2} = 9$$

2



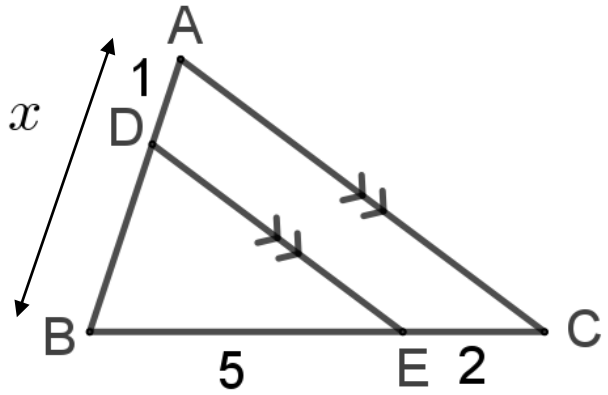
(DE)//(AC),
according to Thales theorem

$$\frac{BD}{BA} = \frac{BE}{BC}$$

$$\frac{x}{12} = \frac{3}{3+6}$$

$$x = \frac{12\times3}{9} = 4$$

3



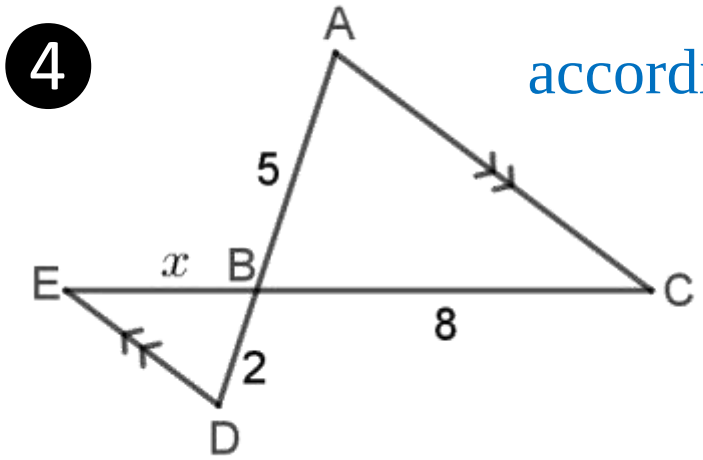
(DE)//(AC),
according to Thales theorem

$$\frac{BA}{DA} = \frac{BC}{EC}$$

$$\frac{x}{1} = \frac{5+2}{2}$$

$$x = \frac{7}{2} = 3.5$$

4



(DE)//(AC),
according to Thales theorem

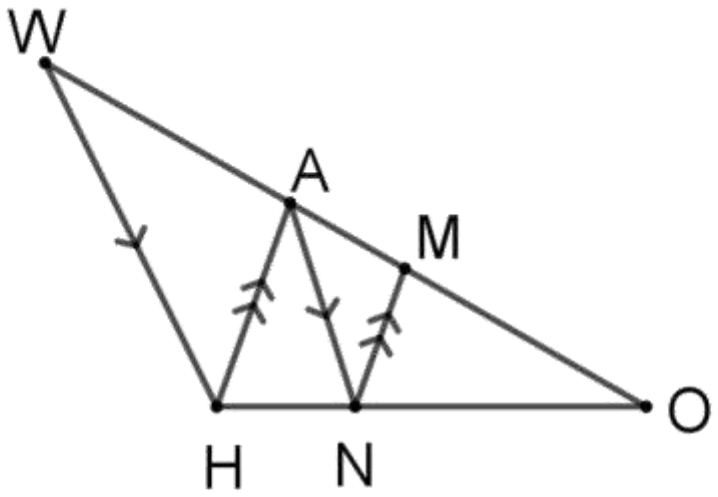
$$\frac{BA}{BD} = \frac{BC}{BE}$$

$$\frac{5}{2} = \frac{8}{x}$$

$$x = \frac{2\times8}{5} = 3.2$$

APPLICATION #2

Show that $\frac{MO}{MA} = \frac{AO}{AW}$



In the triangle OAH:

(MN) // (AH)

According to Thales theorem,

$\frac{MO}{MA} = \frac{NO}{NH}$

In the triangle OWH:

(AN) // (WH)

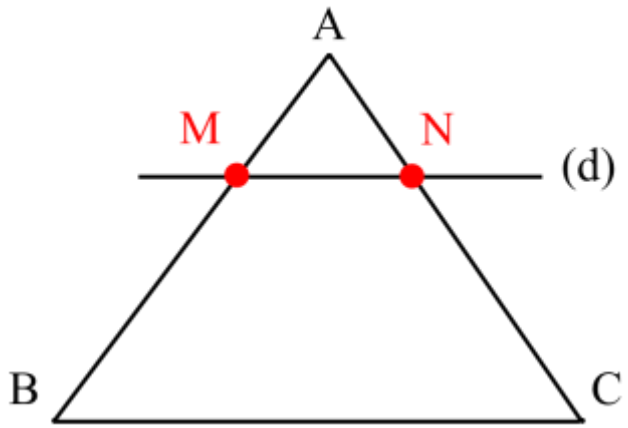
According to Thales theorem,

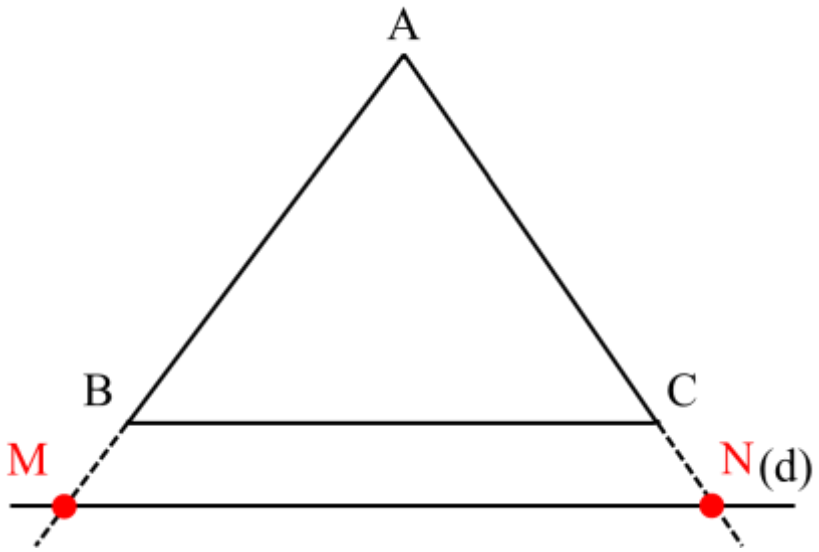
$\frac{AO}{AW} = \frac{NO}{NH}$

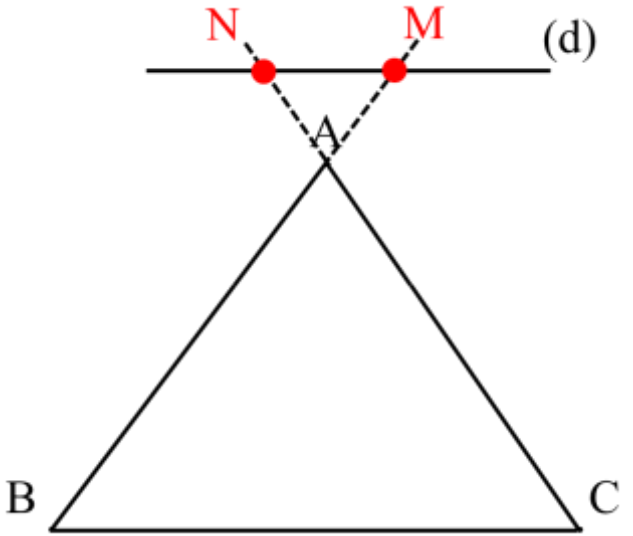
Then $\frac{MO}{MA} = \frac{AO}{AW} = \frac{NO}{NH}$

CONVERSE OF THALES THEOREM

If M is a point of (AB) and N is a point of (AC) such that: $\frac{AM}{AB} = \frac{AN}{AC}$, then (MN) // (BC)



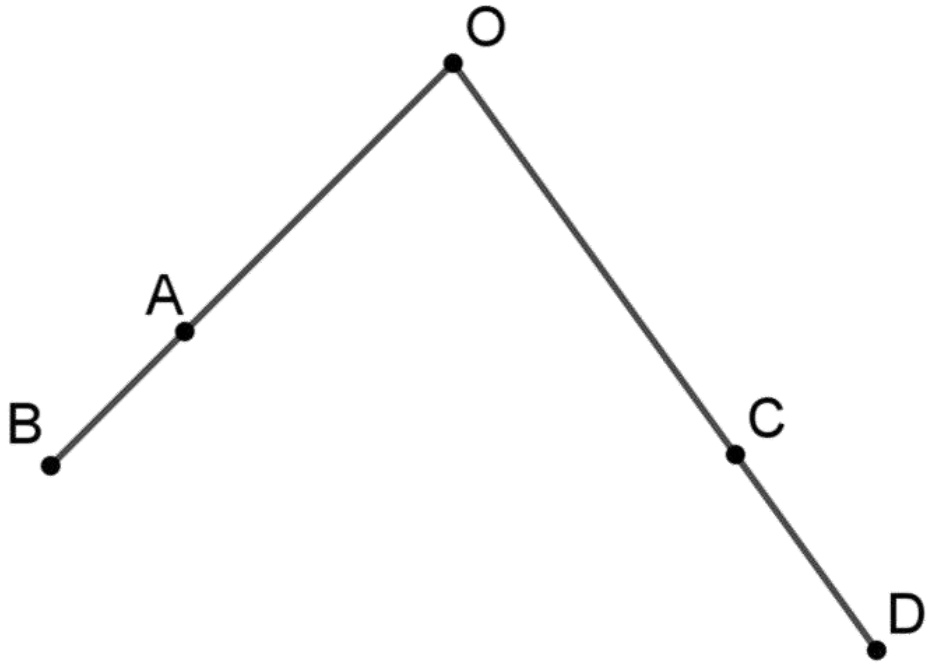




APPLICATION #3

In the following figure, we have OA = 2cm, OB = 2.5 cm, OC = 3 cm and OD = 3.75 cm

Show that (AC) and (BD) are parallel.



$\frac{OA}{OB} = \frac{2}{2.5} = \frac{4}{5}$

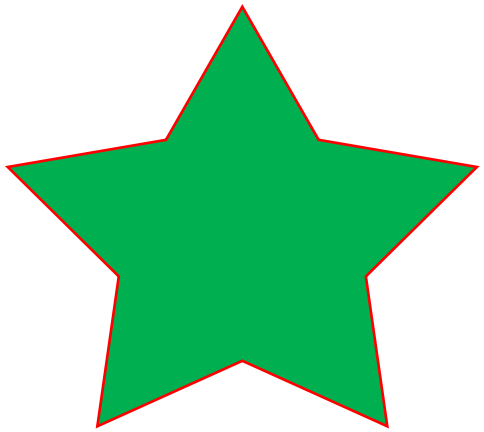
$\frac{OC}{OD} = \frac{3}{3.75} = \frac{4}{5}$

$\frac{0A}{OB} = \frac{OC}{OD}$ so, according to the converse of Thales theorem, (AC) and (BD) are parallel.

DILATION (ENLARGEMENT AND REDUCTION)

Enlargement

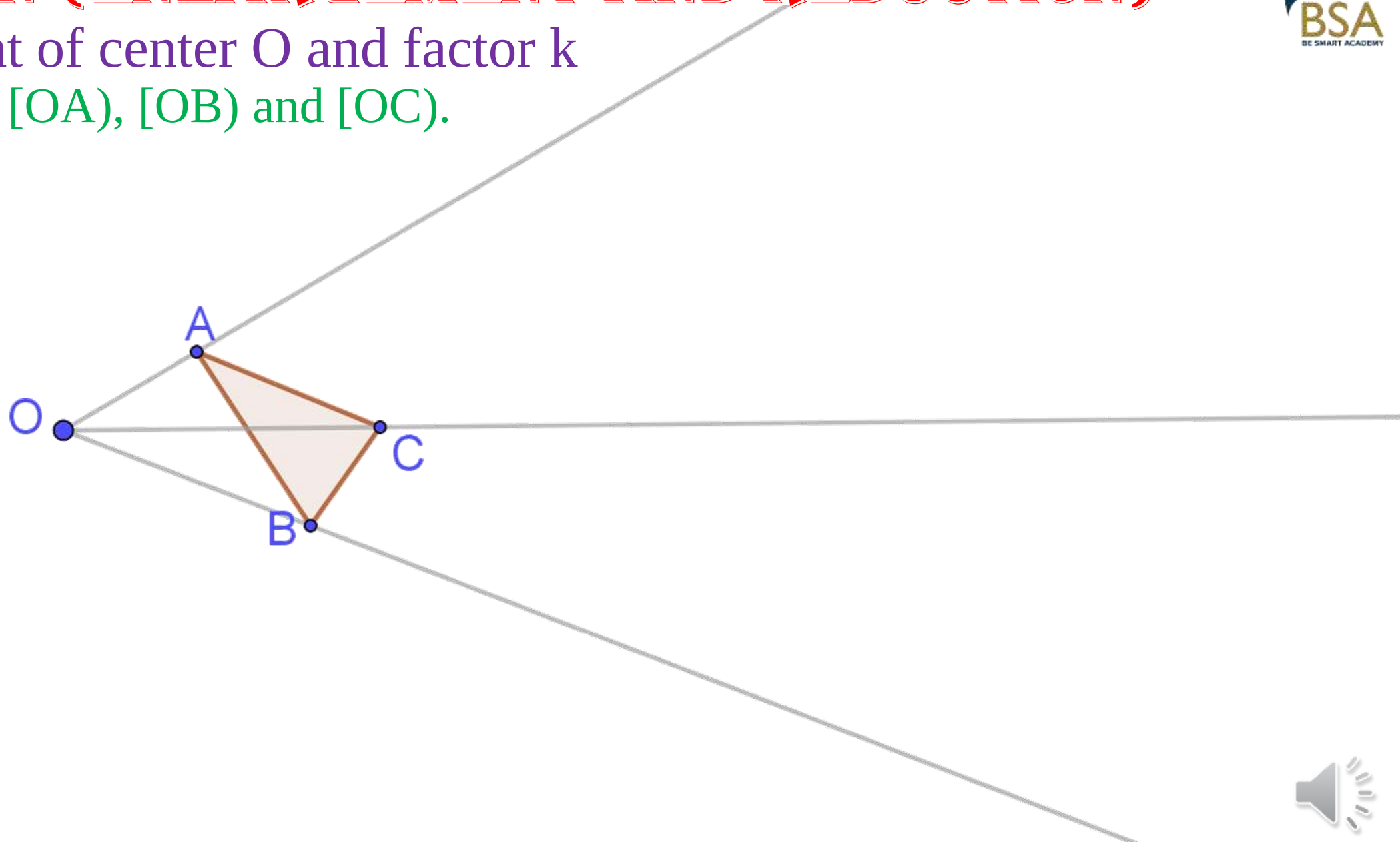
How to enlarge (magnify) a figure.



DILATION (ENLARGEMENT AND REDUCTION)

Enlargement of center O and factor k

Step 1: Draw [OA), [OB) and [OC).



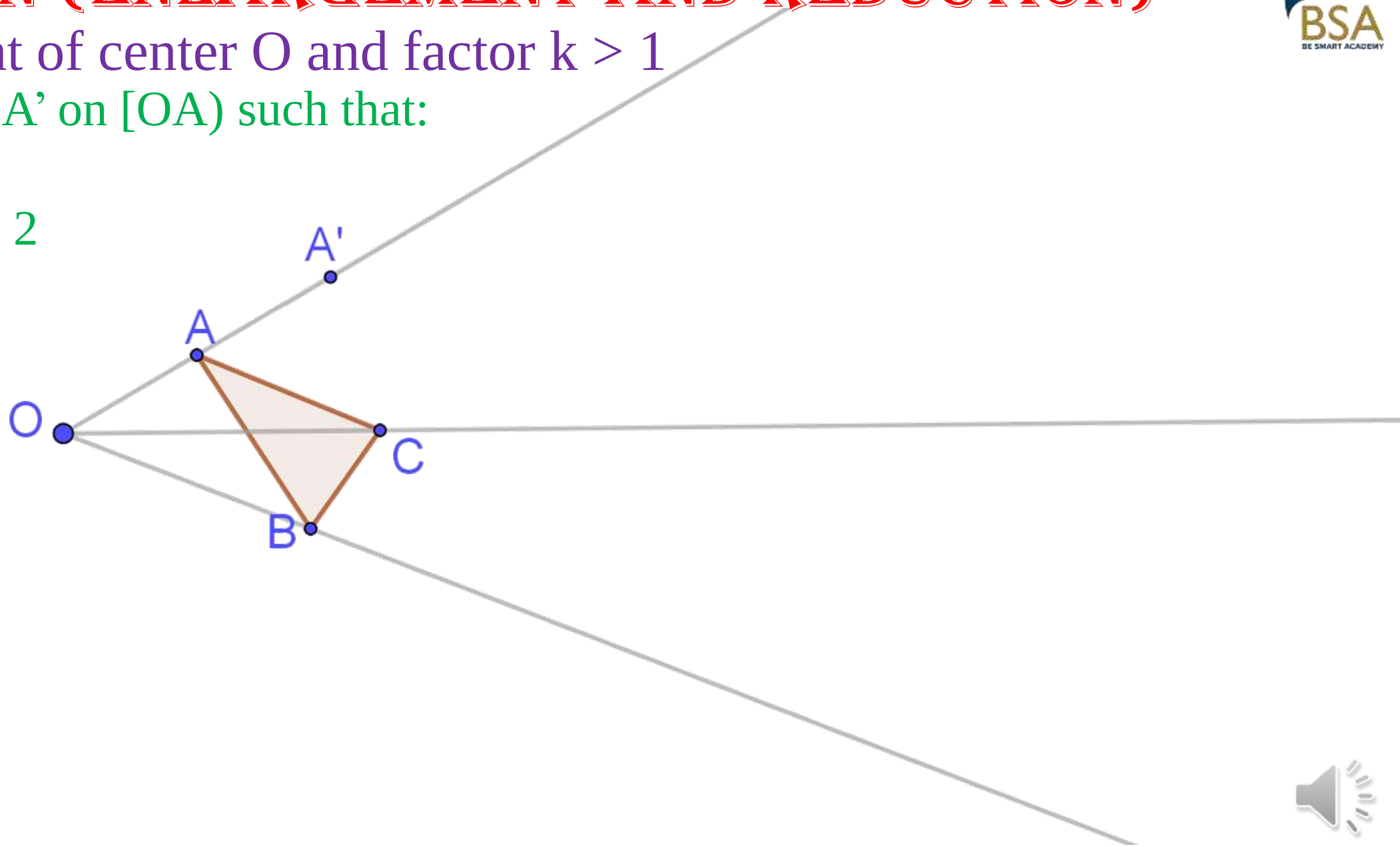
DILATION (ENLARGEMENT AND REDUCTION)

Enlargement of center O and factor k > 1

Step 2: Place A’ on [OA) such that:

$OA' = kOA$

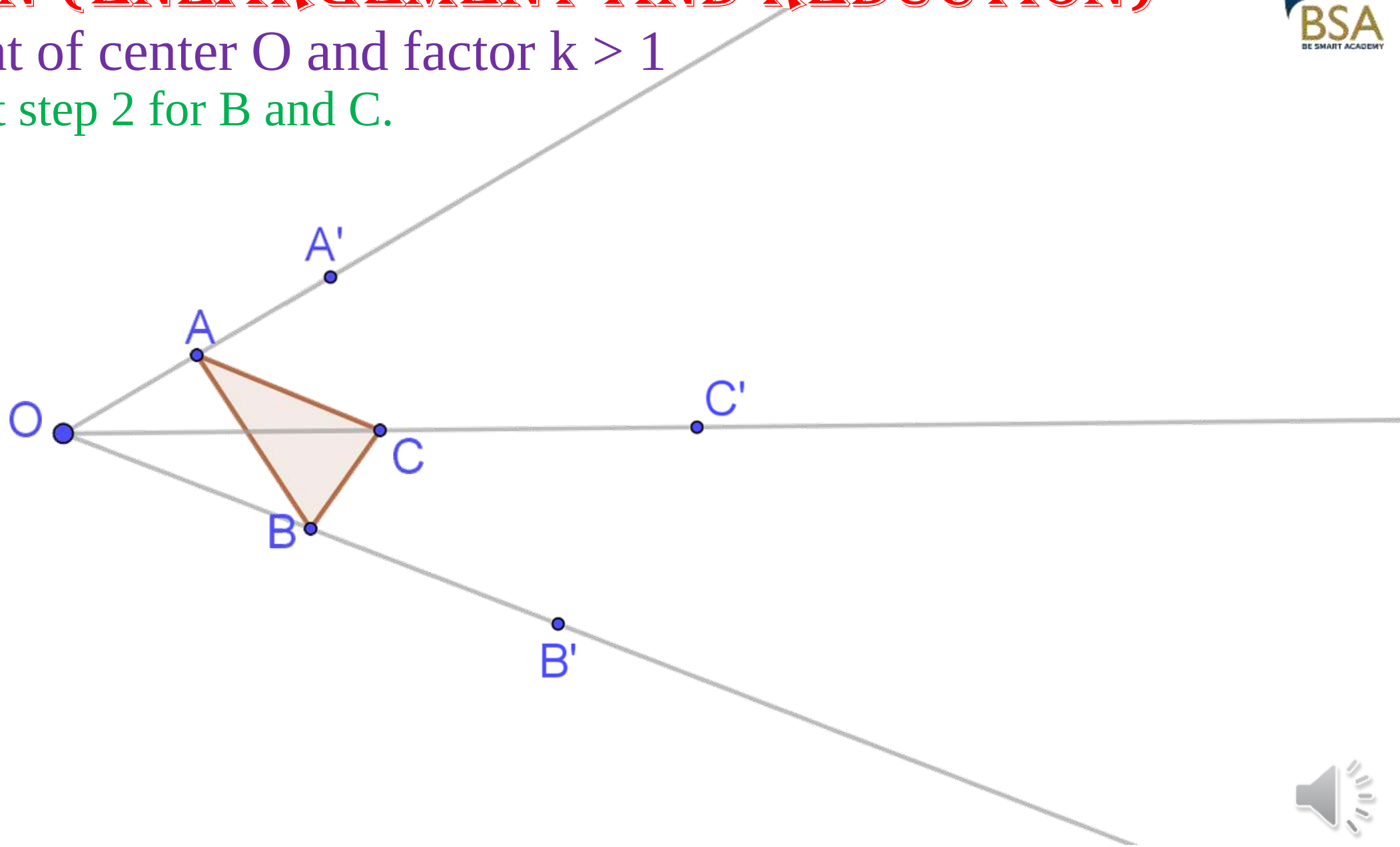
Example: k = 2



DILATION (ENLARGEMENT AND REDUCTION)

Enlargement of center O and factor k > 1

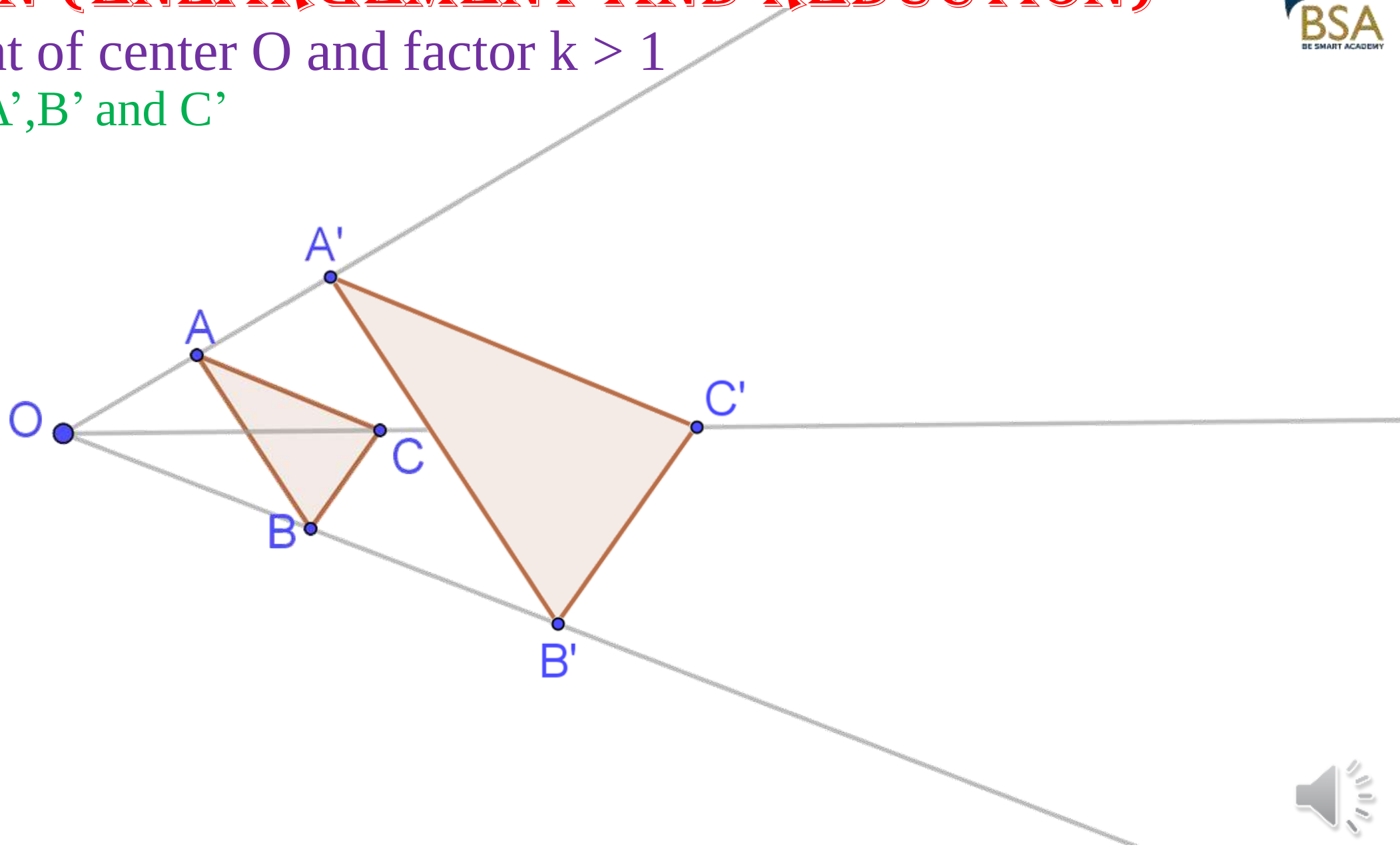
Step 3: repeat step 2 for B and C.



DILATION (ENLARGEMENT AND REDUCTION)

Enlargement of center O and factor k > 1

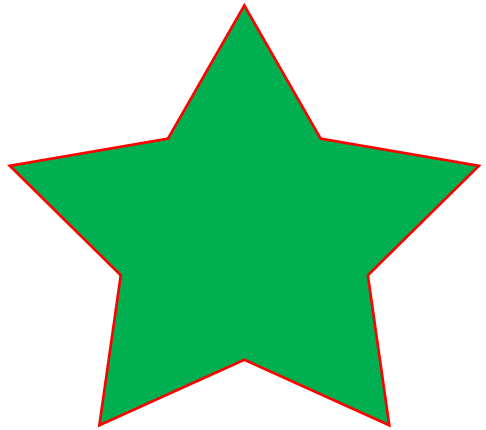
Step 4: Join A',B' and C'



DILATION (ENLARGEMENT AND REDUCTION)

Reduction

To reduce a figure, same steps must be followed as enlargement.

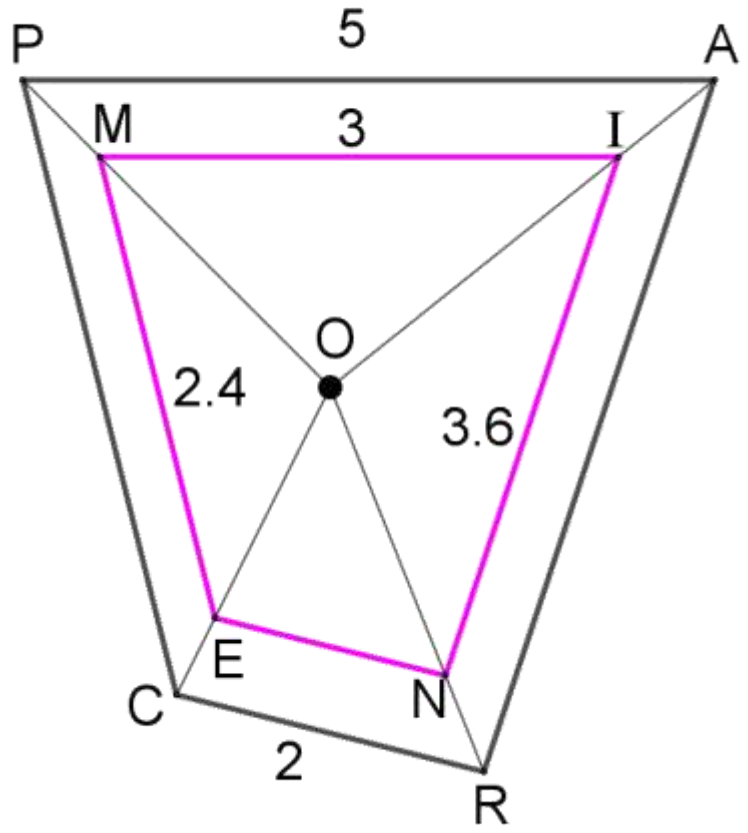


APPLICATION #4

In the following figure, PARC is the enlargement with center O of MINE.

a) What is the scale factor of this enlargement?

b) Calculate the lengths AR, EN and PC.



a) PARC is an enlargement of MINE:

$$\frac{OP}{OM} = \frac{OA}{OI} = \frac{PA}{MI} = \frac{5}{3}$$

So the factor is $\frac{5}{3}$.

b) $AR = \frac{5}{3}$ $\quad NI = \frac{5}{3} \times 3.6 = 6$

$CR = \frac{5}{3} EN$ so $EN = \frac{3}{5} CR = \frac{3}{5} \times 2 = 1.2$

$PC = \frac{5}{3} ME = \frac{5}{3} \times 2.4 = 4$