



Discipline-Mathematics

The 8th grade"

Professor Nichiforenco Galina

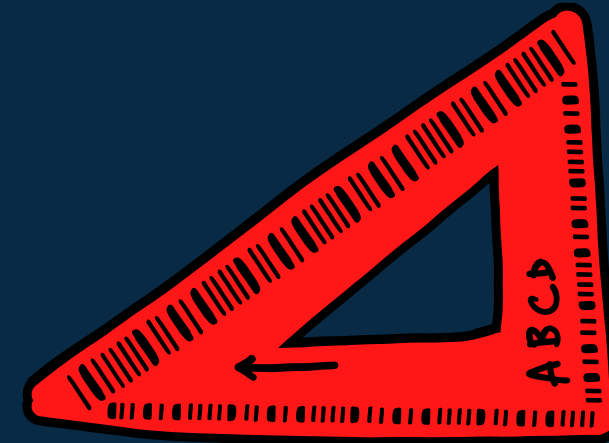


**APPLICATIONS OF SIMILARITY
OF TRIANGLES IN PRACTICAL
ACTIVITY**

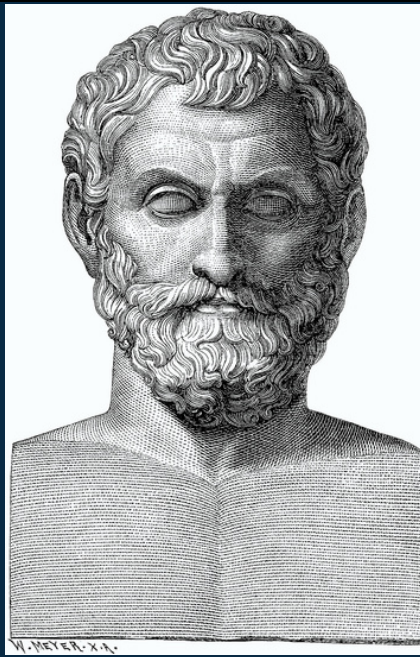
Participants-Berdaga Ion, Andrian Vladas, Poloboc
Gabriela, Tudorica Iraida, Daniel Ciobanu

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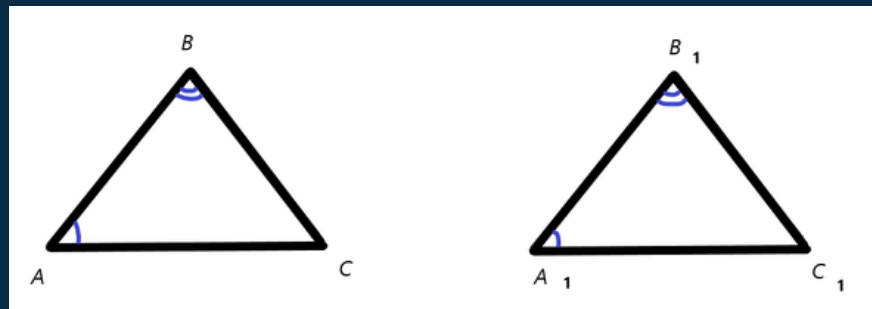
THEORETICAL NOTIONS



- **Two triangles** are called similar if they have their respective congruent angles and their respective proportional sides.
- **Thales' theorem** - A parallel to one of the sides of a triangle determines on the other two sides or on their extensions proportional segments.
- **Reciprocal of Thales' theorem** - If a line determines proportional segments on two sides of a triangle, then the line is parallel to the third side of the triangle.
- **Theorem (similarity transitivity)** - Dacă $\triangle ABC \sim \triangle A_1B_1C_1$, $\triangle A_1B_1C_1 \sim \triangle A_2B_2C_2$, atunci $\triangle ABC \sim \triangle A_2B_2C_2$.
- **Fundamental similarity theorem** - A line parallel to one of the sides of a triangle determines with the support lines of its other two sides a triangle similar to the given one.
- **Teorma (of equidistant parallels)** - If three or more parallel lines determine congruent segments on a secant, then they determine congruent segments on any other secant, and the distances between each two adjacent lines are equal.

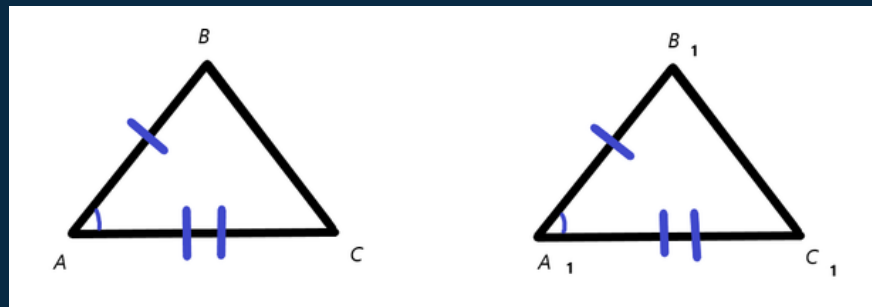
CRITERIA FOR THE RESEMBLANCE OF TWO TRIANGLES

Criterion UU. The UU criterion. If two triangles of one triangle are respectively congruent with two triangles of another triangle, then the triangles are similar.



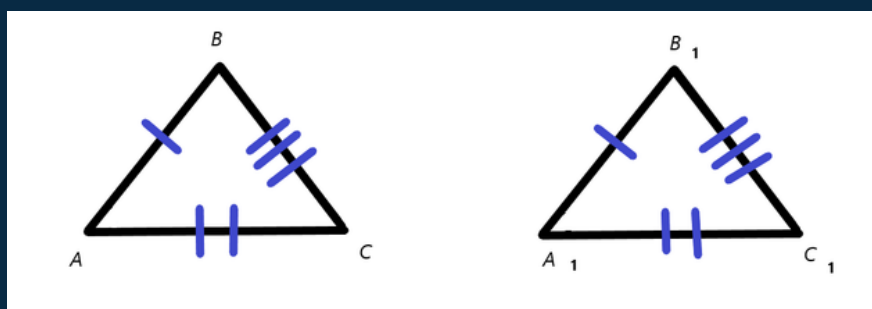
$$\begin{array}{l} \angle A \equiv \angle A_1 \\ \angle B \equiv \angle B_1 \end{array} \left| \begin{array}{l} \text{UU} \\ \longrightarrow \end{array} \right. \triangle ABC \sim \triangle A_1B_1C_1$$

Criterion LUL. If two triangles of one triangle are respectively proportional congruent to two sides of another triangle and the angles formed by these sides are congruent, then the triangles are similar.



$$\begin{array}{l} \angle A \equiv \angle A_1 \\ \frac{AB}{A_1B_1} = \frac{AC}{A_1C_1} \end{array} \left| \begin{array}{l} \text{LUL} \\ \longrightarrow \end{array} \right. \triangle ABC \sim \triangle A_1B_1C_1$$

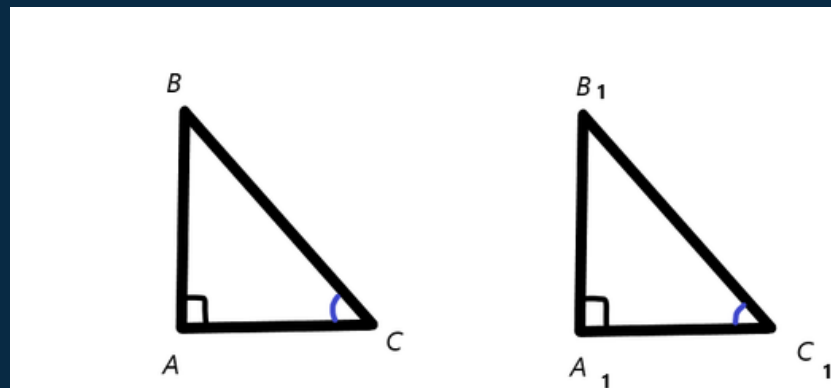
Criterion LLL. If the sides of one triangle are respectively proportional to the sides of another triangle, then the triangles are similar.



$$\frac{AB}{A_1B_1} = \frac{AC}{A_1C_1} = \frac{BC}{B_1C_1} \left| \begin{array}{l} \text{LLL} \\ \longrightarrow \end{array} \right. \triangle ABC \sim \triangle A_1B_1C_1$$

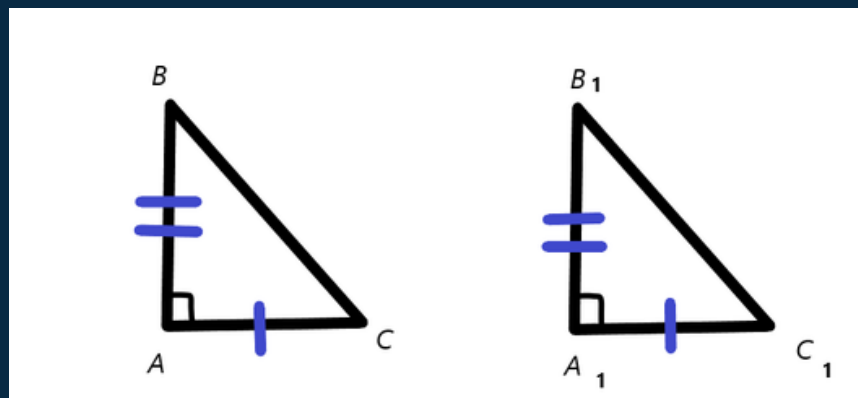
CRITERIA FOR THE RESEMBLANCE OF TWO RIGHT TRIANGLES

Criterion U. If a right angle of a right triangle is congruent with a right angle of another right triangle, then these triangles are similar.



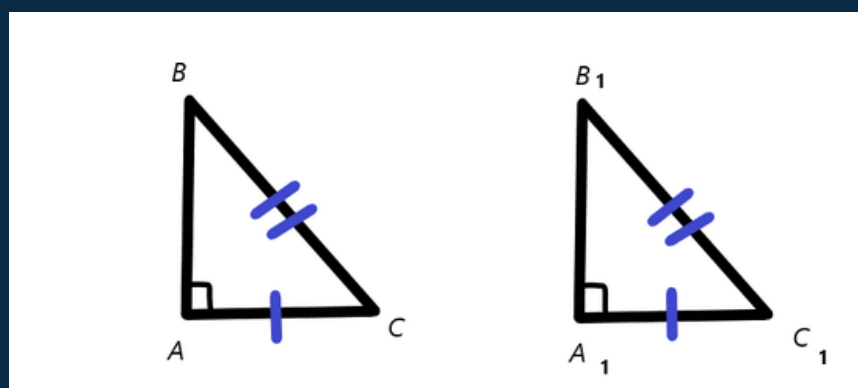
$$\begin{array}{l} \angle A = \angle A_1 = 90^\circ \\ \angle C \equiv \angle C_1 \end{array} \left| \begin{array}{l} U \\ \longrightarrow \end{array} \right. \triangle ABC \sim \triangle A_1B_1C_1$$

Criterion CC. If the two legs of a right triangle are respectively proportional to two legs of another right triangle, then these triangles are also not.



$$\begin{array}{l} \angle A = \angle A_1 = 90^\circ \\ \frac{AB}{A_1B_1} = \frac{AC}{A_1C_1} \end{array} \left| \begin{array}{l} CC \\ \longrightarrow \end{array} \right. \triangle ABC \sim \triangle A_1B_1C_1$$

Criterion CL. If the hypotenuse and one leg of a right triangle are respectively proportional to the hypotenuse and one leg of another right triangle, then these triangles are similar.



$$\begin{array}{l} \angle A = \angle A_1 = 90^\circ \\ \frac{AB}{A_1B_1} = \frac{BC}{B_1C_1} \end{array} \left| \begin{array}{l} CL \\ \longrightarrow \end{array} \right. \triangle ABC \sim \triangle A_1B_1C_1$$

THE SHADOW METHOD

The shadow method consists in measuring the shadow of the monument "Ștefan cel Mare", knowing the height of the student who will also be measured his shadow.

Tools used-

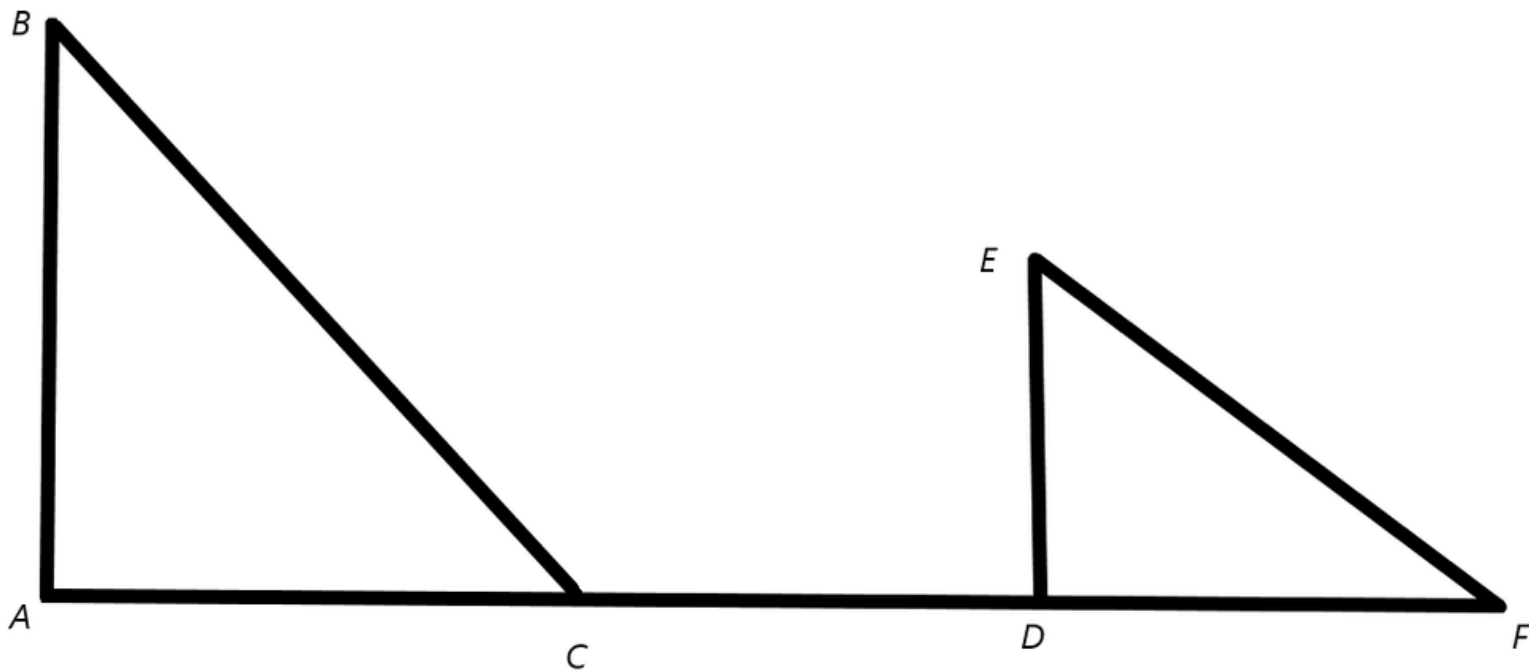
- Roulette

AB -înălțimea monumentului „Ștefan cel Mare”

AC -umbra monumentului

ED -înălțimea elevului

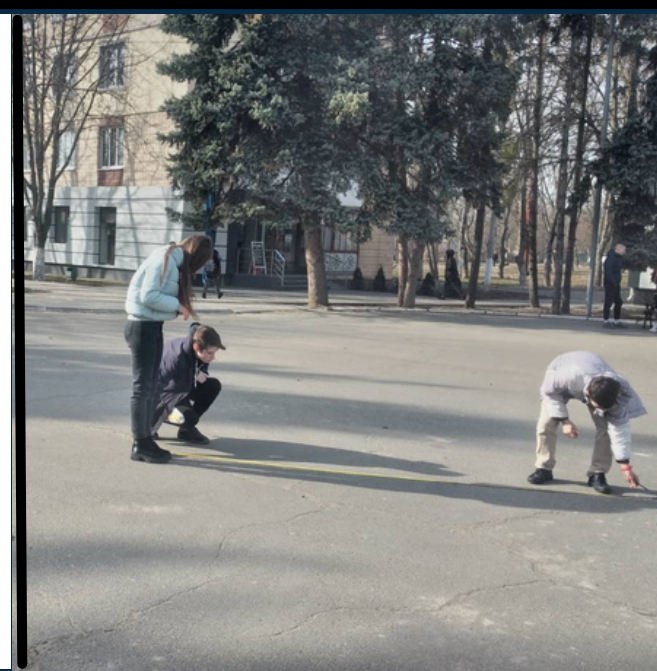
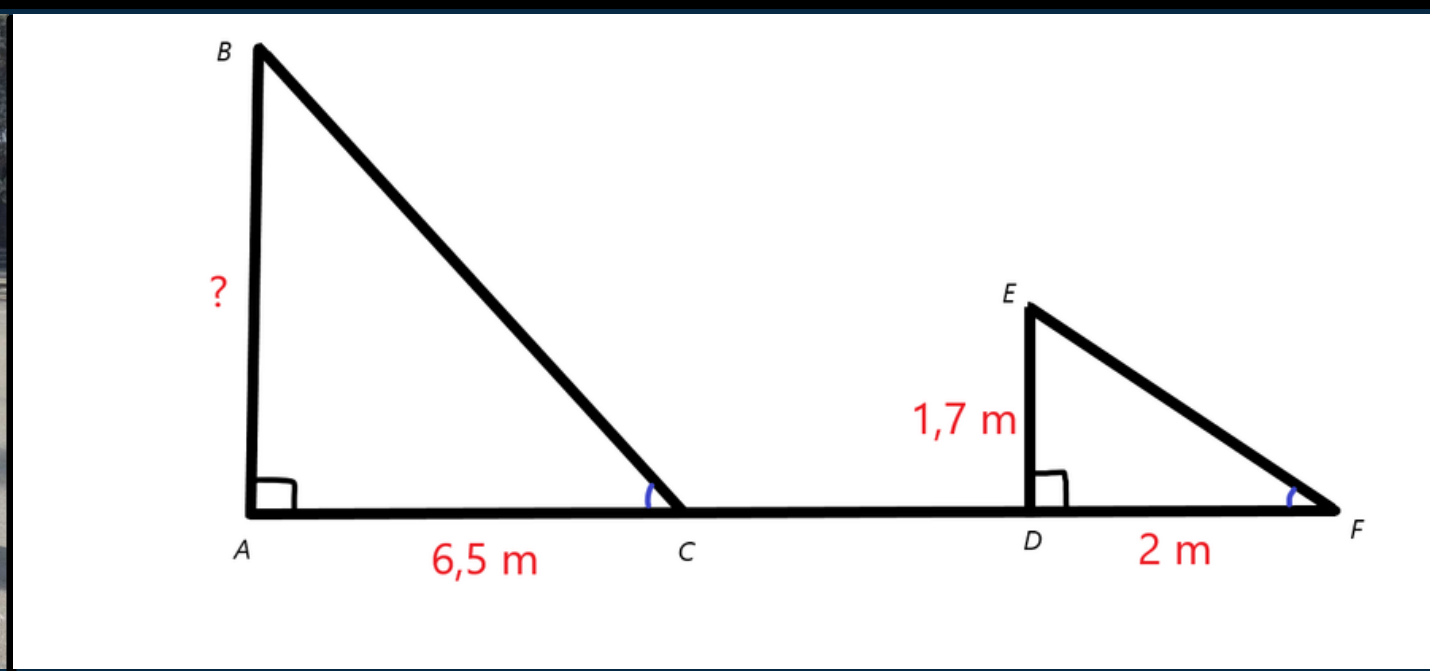
DF -umbra elevului



PROBLEM 1

Is given:
 $AC = 6,5 \text{ m}$
 $DF = 2 \text{ m}$
 $DE = 1,7 \text{ m}$

$BA = ? \text{ m}$



The solving:

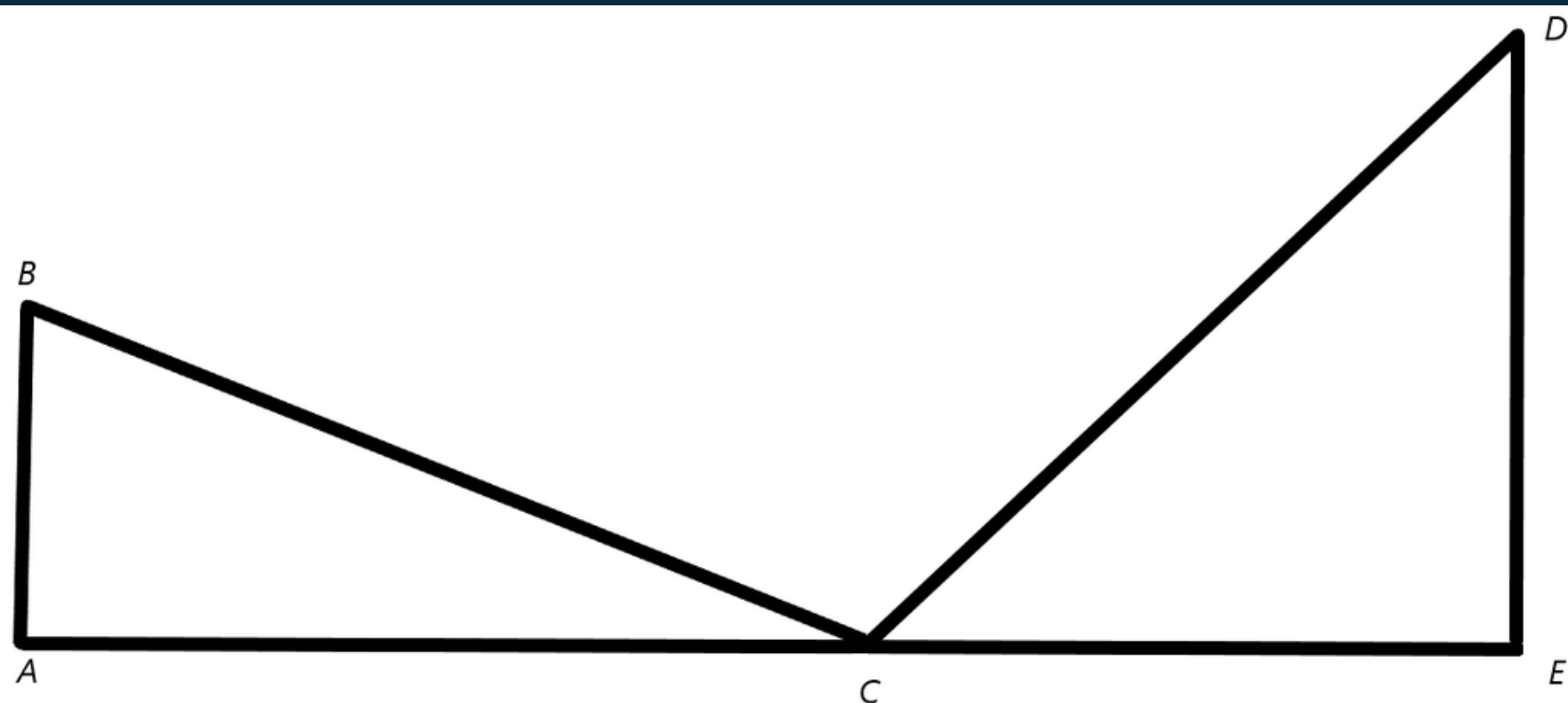
$$\left. \begin{array}{l} \angle A = \angle D = 90^\circ \\ \angle C \equiv \angle F \end{array} \right\} \xrightarrow{U} \triangle ABC \sim \triangle DEF \longrightarrow \frac{DE}{BA} = \frac{DF}{AC} ;$$

$$BA = \frac{DE \cdot AC}{DF} = \frac{1,7 \text{ m} \cdot 6,5 \text{ m}}{2 \text{ m}} = 5,525 \text{ m}$$

Answer: The height of the monument is 5.525 m

THE MIRROR METHOD

The mirror method consists in positioning a mirror at a certain distance from a person until it is seen in it, then the mirror from the same position is turned towards the monument.



Tools used-

- Roulette
- Mirror

C-oglină

BA-înălțimea elevului

AC-distanța dintre elev și oglindă

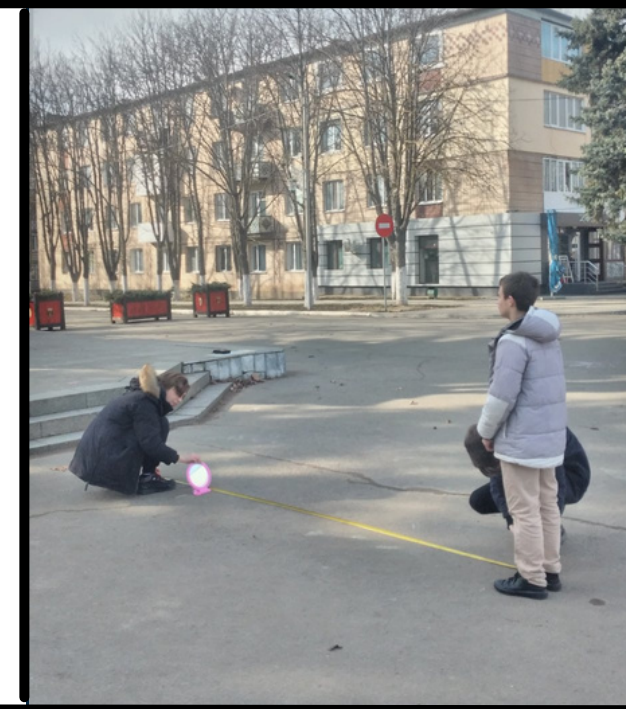
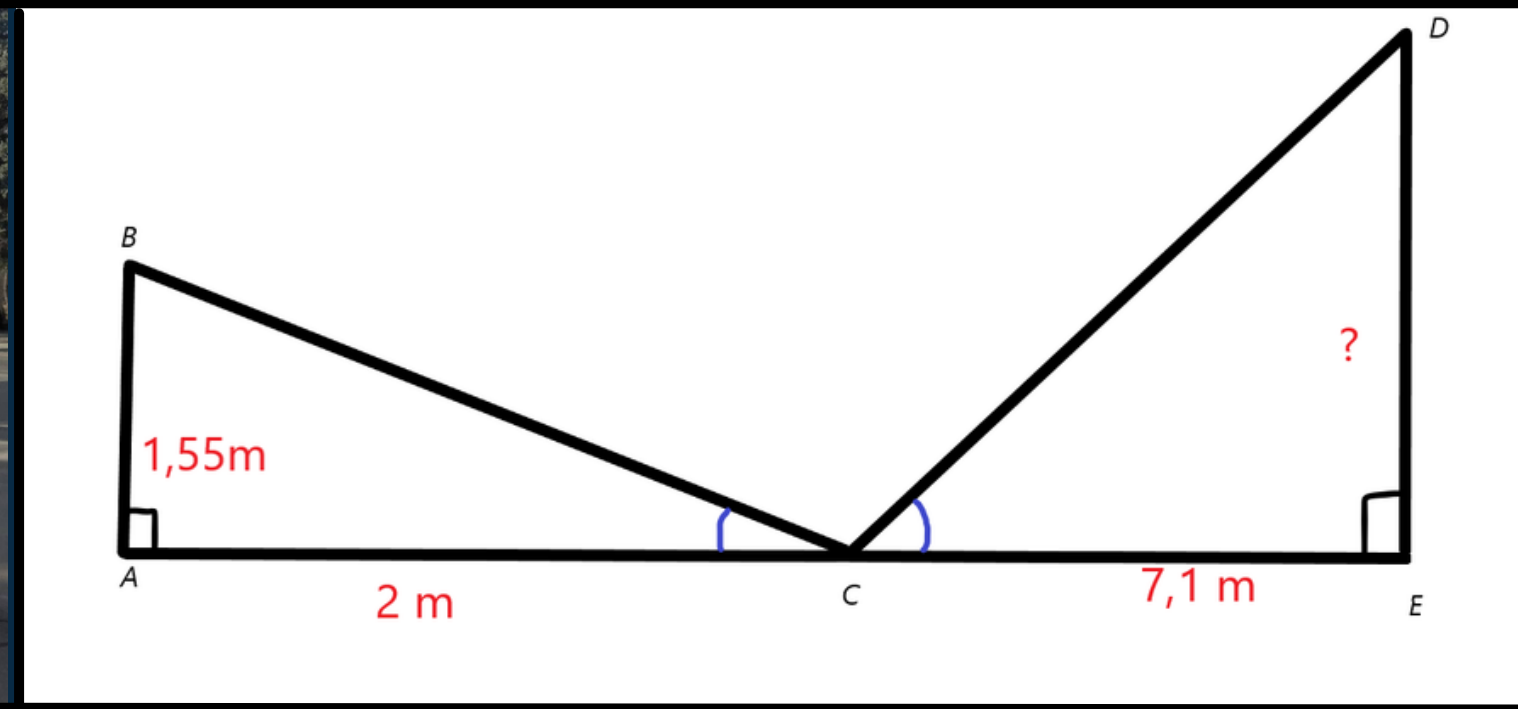
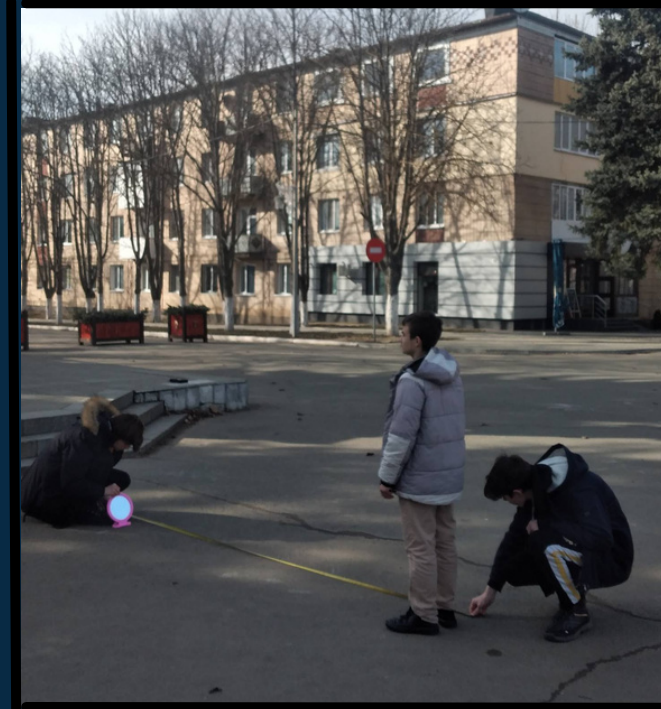
DE-înălțimea monumentului „Ștefan cel Mare”

CE-distanța dintre monument și oglindă

PROBLEM 2

Is given:
 $AB=1,55\text{ m}$
 $AC=2\text{ m}$
 $CE=7,1\text{ m}$

$DE=?\text{ m}$



The Solving:

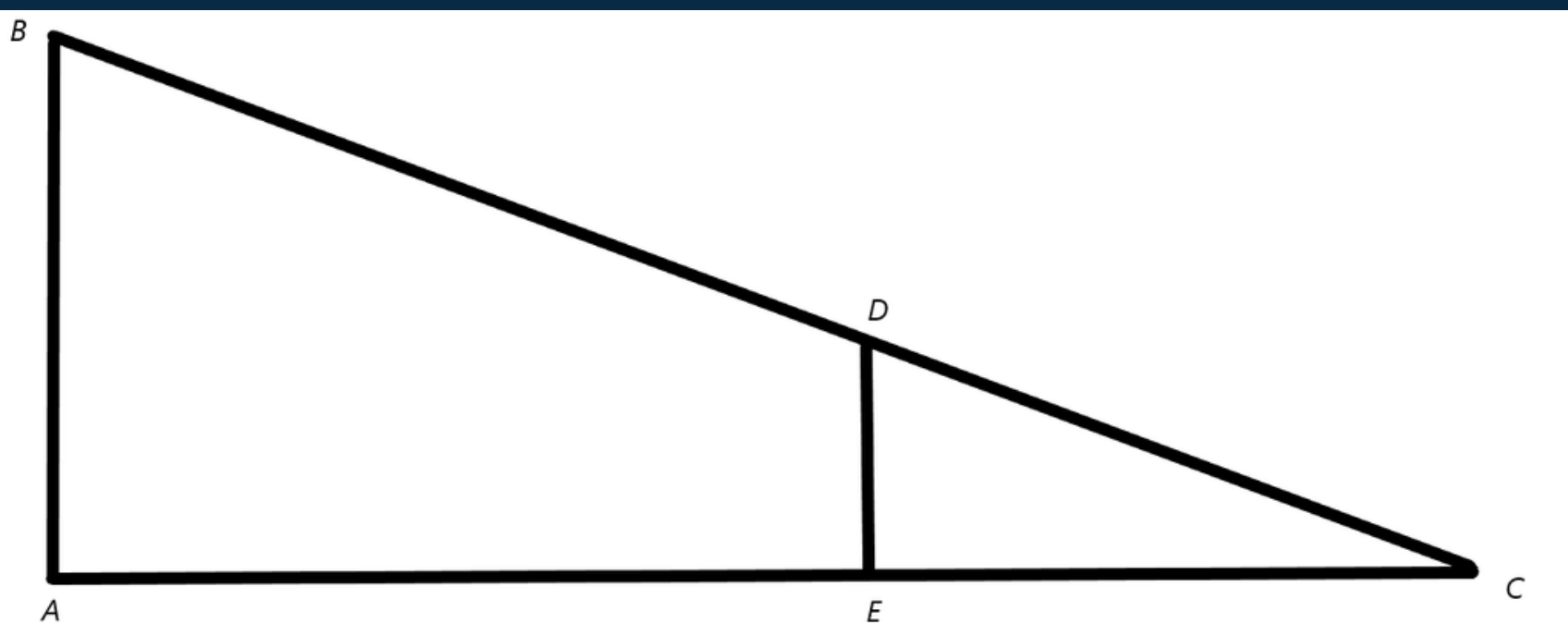
$$\begin{array}{l} \angle A = \angle E = 90^\circ \\ \angle ACB \equiv \angle DCE \end{array} \left| \begin{array}{l} \text{U} \\ \longrightarrow \end{array} \right. \triangle ABC \sim \triangle DEC \longrightarrow \frac{AB}{DE} = \frac{AC}{CE} ;$$

$$DE = \frac{AB \cdot CE}{AC} = \frac{1,55\text{ m} \cdot 7,1\text{ m}}{2\text{ m}} = 5,5025\text{ m}$$

Answer: The height of the monument is 5.5025 m

THE METHOD OF USING A WOODEN AND LASER

The method of using a wooden and laser is to place a piece of wood in front of the monument in an upright position, and the laser is placed on the wood, so as to indicate a point forming an angle.



Tools used-

- Roulette
- Wood
- Laser

C-punctul găsit cu ajutorul laserului

BA-înălțimea monumentul „Ștefan cel Mare”

AC-distanța de la monument până la punctul găsit cu ajutorul laserului

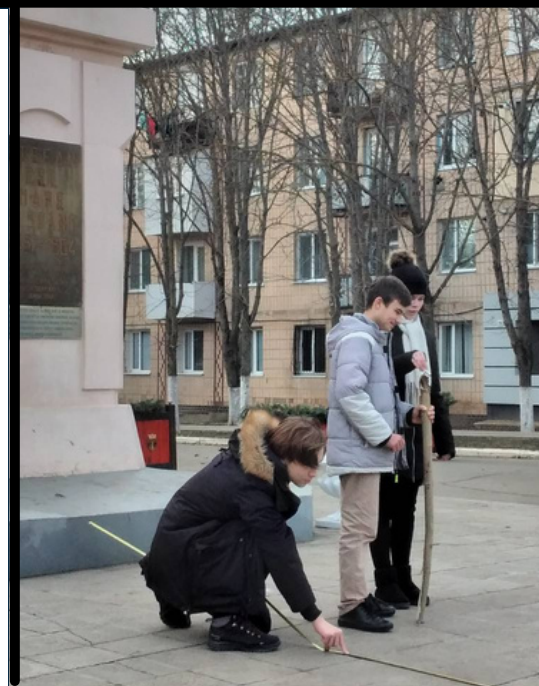
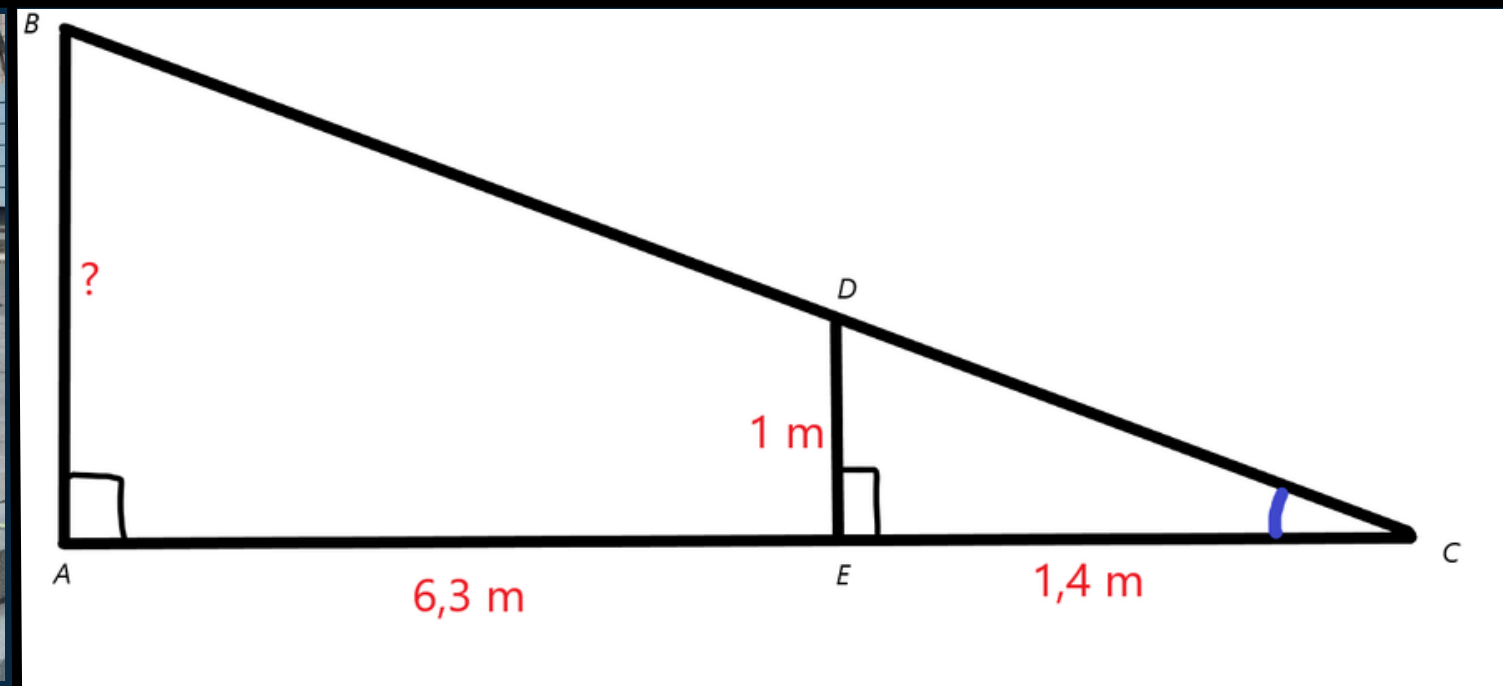
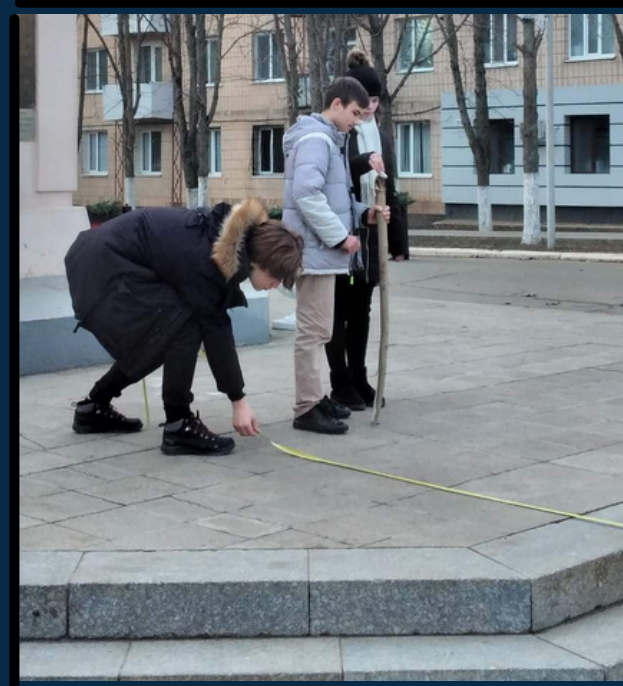
DE-înălțimea instrumentului din lemn

EC- distanța de la instrumentul din lemn până la punctul găsit cu ajutorul laserului

PROBLEM 3

Is given:
 $AE = 6,3 \text{ m}$
 $DE = 1 \text{ m}$
 $EC = 1,4 \text{ m}$

$AB = ? \text{ m}$



The solving:

$$DE \parallel AB \xrightarrow{\text{TFA}} \triangle ABC \sim \triangle DEC \longrightarrow \frac{EC}{AC} = \frac{DC}{BC} = \frac{DE}{BA} ;$$

$$BA = \frac{DE \cdot AC}{EC} = \frac{1 \text{ m} \cdot 7,7 \text{ m}}{1,4 \text{ m}} = 5,5 \text{ m}$$

Answer: The height of the monument is 5.5 m

HISTORY

The monument is dedicated to Ștefan cel Mare, ruler of Moldavia between 1457-1504. During his 47-year reign, he fought 36 battles (34 of which he won) with neighboring states, but also with the Ottoman Empire to defend the borders of the state he ruled. He also founded many churches and monasteries, which is one of the reasons why the Romanian Orthodox Church canonized him.

The monument was built in 1995 at the initiative of the director of S.C. Fortus S.A. from the city of Iasi.

Donated by the "Mihai Viteazul" Foundation Romania

Executed by S.C. Fortus S.A. IASI

Sculptor - Dan Covataru

Architect - Semion Șoinet

Location - Republic of Moldova, Ștefan Vodă city, Libertății street



REFLECTION FROM LITERATURE (POETRY)



Ștefan, of the Moldovan sun,
Ștefan, fruitful glie,
Heavenly ground, straight sword,
Ștefan, wise mind,
The fear of pagan claws
What is believed by all masters;
At the border, it's not too late
You built a castle

With silver battlements,
Well-guarded towers
And fearless guards
In wars, try.
Great heart,
In true faith,
God gave it to us
Peace be to him king;
Dew of carol dew
Of the ancestral mirror.

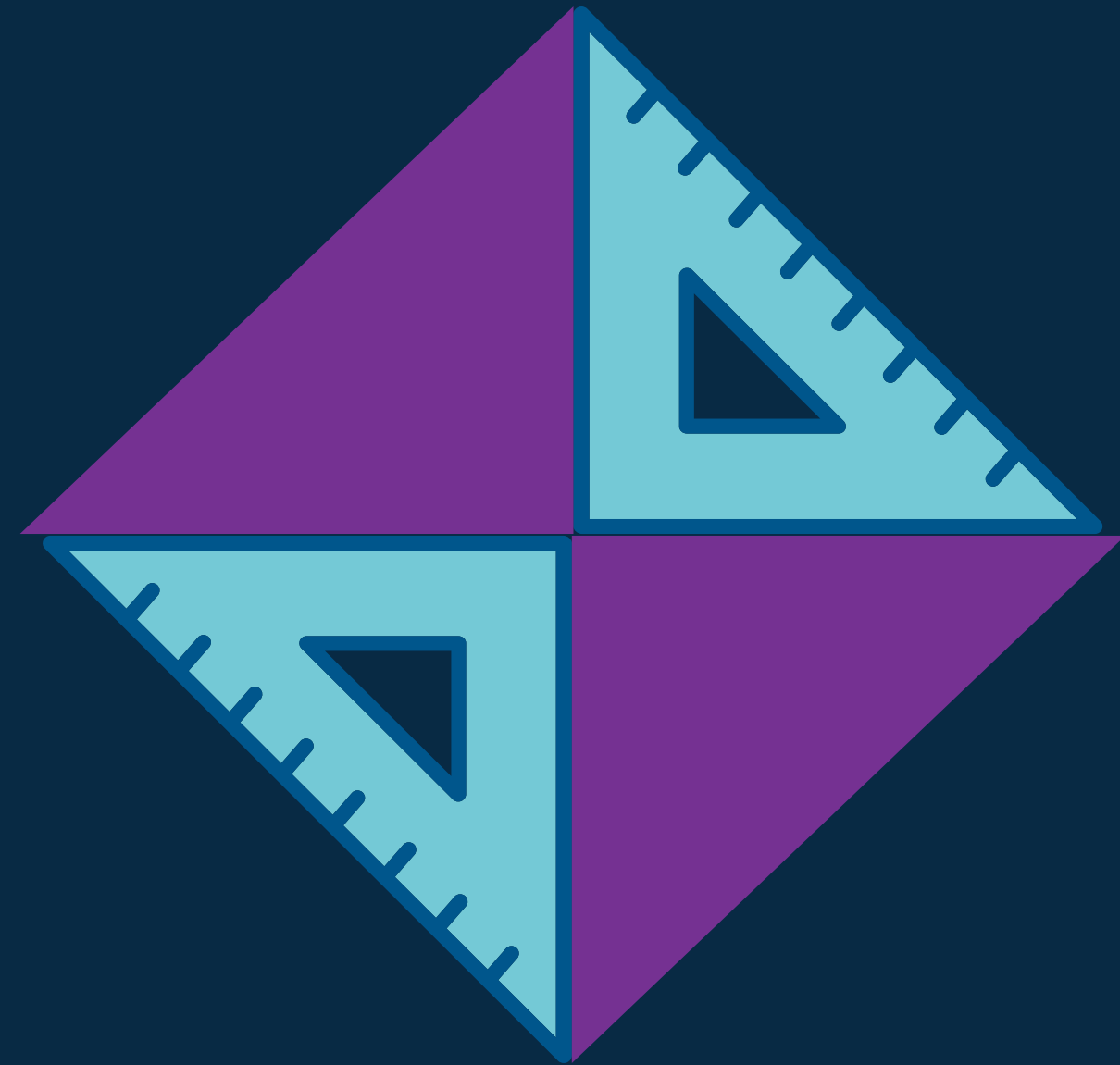
According to legend, Ștefan cel Mare, after beating the Turks with the help of the people of Vrancea, most likely in 1475, wrote a calf leather uric (deed of ownership or donation, confirmation of an inheritance), in gold letters, through which each of the seven sons received a mountain. And then seven villages appeared in those places. The name of the village comes from the name of the warrior who ruled that place. Thus, the village of Nistorești, from Nistor, the village of Bârsești, from Bârsan, the village of Negriștea, from Negru, the village of Păulești, from Pavel, the village of Bodești, from Bodea, the village of Spulber from Spulber and the village of Spirești, from Spirea.

LITERATURE REFLECTION (PROSE)



CONCLUSION

In carrying out this project, our group became convinced that mathematics can help a lot in life, even without calculating the height of a tall monument like Stephen the Great. reached a success that showed us that working in a team will be a lot of success.



BIBLIOGRAPHY

-Mathematics textbook class
VIII

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-other sites

