

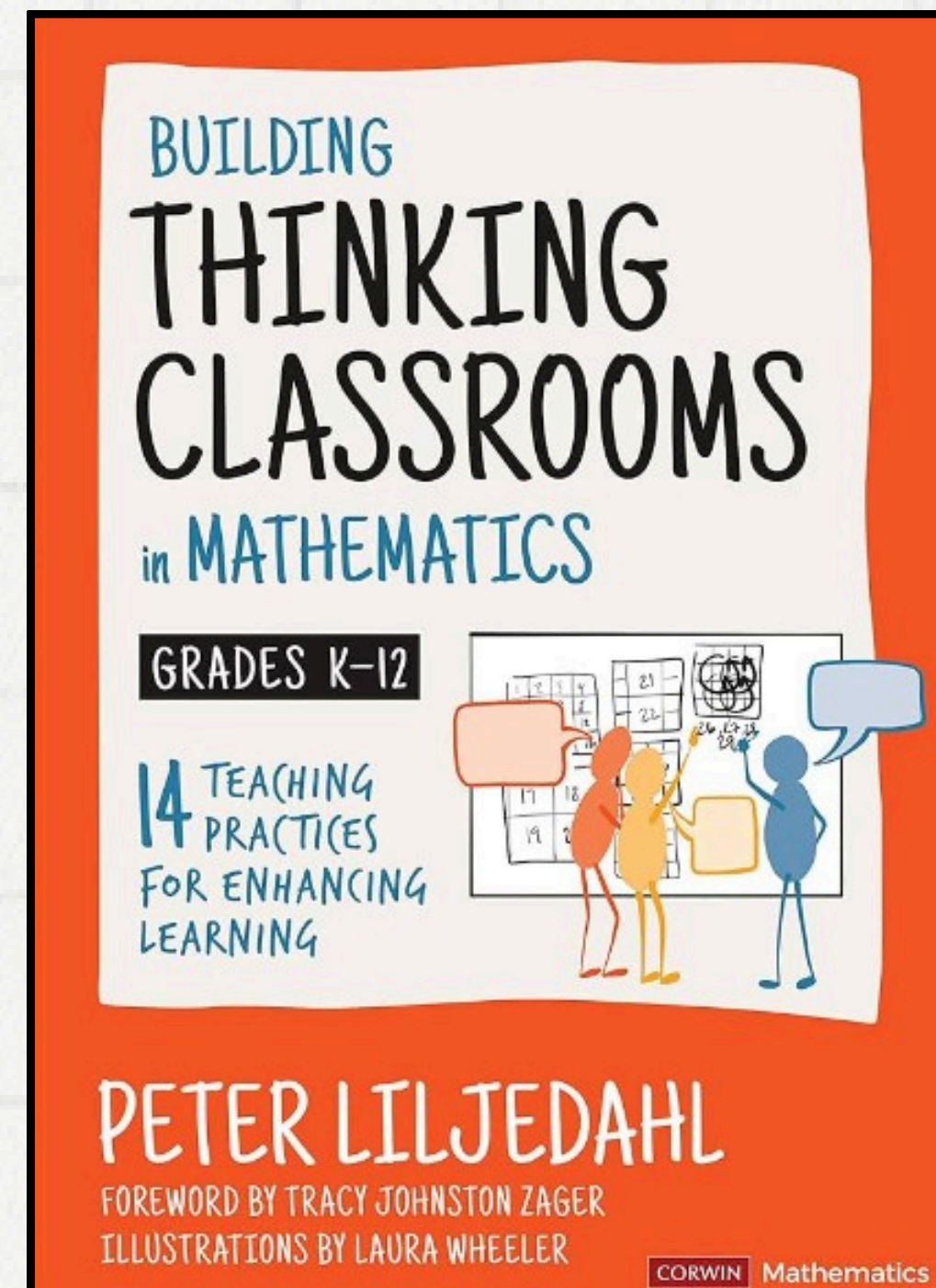
✧ **UČENJE BEZ
POUČAVANJA**

**Kristina Gregurin
OŠ Antuna Augustinčiča**

✧ **10. kongres nastavnika matematike
2. srpnja 2024.**



**20% učenika
razmišlja 20%
nastavnog sata**



**Razmišljanje je nužan
preduvjet učenja.**

Rad pred pločom - očekivanja

Nasumične grupe

Stojimo sa članovima svoje grupe pred pločom.

Suradnja

Suradujemo.
Ustrajni smo.
Ispробavamo

Dijelimo marker

Jedan je marker po grupi.
Izmjenjujemo se.

Brisanje

Tražimo dopuštenje za brisanje tuđih ideja.

Što prof napiše..

Ne brišemo ono što prof. označi ili zaokruži.

Radimo zajedno

Odgovorni smo za učenje svakog člana.
Ako je potrebno pogledamo ideje drugih grupa.

STUPNJEVANJE ZADATAKA - "THIN SLICING"

- ➔ **KURIKULARNI ZADATCI SVE VEĆE SLOŽENOSTI**
- ➔ **ZA USVAJANJE MATEMATIČKIH PROCEDURA I POSTUPAKA**
(NEMA PUNO RAZLIČITIH NAČINA RJEŠAVANJA)
- ➔ **ZADAJEMO JEDNOSTAVAN PA SVE TEŽI I TEŽI**
- ➔ **NE OBJAŠNJAVAMO POSTUPAK**

KONSOLIDACIJA ZA "THIN SLICING"

"TEACHER SCRIBES"

- UČENICI SU OKUPLJENI OKO UČITELJA
- UČITELJ NE POUČAVA, VEĆ PREOBLIKUJE IDEJE KOJE NUDE UČENICI

➔ KOJI ZADATAK BI NAJLAKŠE RIJEŠIO I ZAŠTO

➔ PRONAĐI I ISPRAVI GREŠKU

➔ CILJ: NASTAVAK RAZMIŠLJANJA



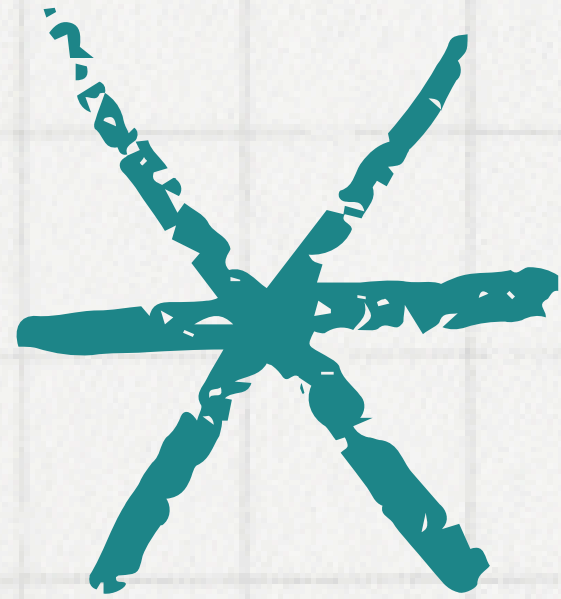
Tijek sata

**U PRVIH 5 MINUTA SATA
PREZENTIRATI INFORMACIJE/
MATEMATIČKE ČINJENICE O TEMI.**

**ZADATI ZADATAK KOJEG SVI
UČENICI MOGU RIJEŠITI.**

**POSTUPNO ZADAVATI SVE TEŽE
ZADATKE.**

**KOD SLOŽENIJIH MOŽEMO DO 3
ZADATKA ISTE SLOŽENOSTI.**



Tijek sata



KONSOLIDACIJA

BILJEŠKE

**ZADATCI ZA PROVJERU SVOG
RAZUMIJEVANJA**



Primjer zadatka sve veće složenosti

- | | |
|-----------------------------------|---------------------------------------|
| 1. $4^2 =$ | 9. $\left(-\frac{9}{10}\right)^2 =$ |
| 2. $13^2 =$ | 10. $\frac{-6^2}{7} =$ |
| 3. $\left(\frac{1}{2}\right)^2 =$ | 11. $\frac{-1}{5^2} =$ |
| 4. $\frac{2^2}{3} =$ | 12. $-\left(\frac{3}{4}\right)^2 =$ |
| 5. $\frac{5}{8^2} =$ | 13. $-\left(-\frac{5}{12}\right)^2 =$ |
| 6. $2 \cdot 1^2 =$ | 14. $-1.5^2 =$ |
| 7. $(-3)^2 =$ | 15. $10 + 3^2 =$ |
| 8. $-11^2 =$ | 16. $7^2 - 5^2 =$ |

1. $(-3)^2 =$
2. $-(-4)^2 =$
3. $-5^2 =$
4. $-(-6^2) =$
5. $-\left(\frac{5}{6}\right)^2 =$
6. $-\left(-\frac{7}{9}\right)^2 =$
7. $-\left(-\frac{2^2}{5}\right) =$
8. $-\frac{(-1)^2}{8} =$
9. $13^2 - 3^2 =$
10. $3 + 2^2 =$
11. $10 \cdot 4^2 =$
12. $-6^2 : 3 =$

1. $\frac{1}{3} + \left(\frac{1}{3}\right)^2 =$
2. $\left(\frac{3}{4}\right)^2 - \left(\frac{1}{2}\right)^2 =$
3. $\frac{1}{4} - \left(-\frac{1}{2}\right)^2 =$
4. $-\frac{1}{2^2} - \left(\frac{1}{2}\right)^2 =$
5. $-\left(\frac{2}{5} + \frac{2}{3}\right)^2 =$
6. $-(-5.8 + 4.3)^2 =$
7. $-\frac{5}{6} \cdot \left(\frac{3}{5}\right)^2 =$
8. $-1.5^2 \cdot 2 =$
9. $-\frac{2^2}{5} : \frac{5}{6} =$
10. $\frac{50}{81} : \left(-\frac{3}{10}\right)^2 =$
11. $\frac{1^2}{2} \cdot \frac{1}{2} - \frac{2^2}{8} =$
12. $-\frac{2^2}{3} \cdot \frac{1}{3} + \left(-\frac{2}{3}\right)^2 =$

Popuni tablicu!

Za treći stupac upotrijebi kalkulator!

10^2	$10 \cdot 10$	100
5^3		
7^5		
	$4 \cdot 4 \cdot 4 \cdot 4$	
$\left(\frac{1}{8}\right)^3$		
	$\frac{2}{9} \cdot \frac{2}{9} \cdot \frac{2}{9} \cdot \frac{2}{9} \cdot \frac{2}{9}$	
$3 \cdot 2^4$		
	$-6 \cdot (-6) \cdot (-6) \cdot (-6)$	
$(-7)^5$		
$(-1)^7$		
$\left(-\frac{3}{4}\right)^8$		
$(-1.3)^4$		

Primjer zadatka sve veće složenosti

POTENCIJA	PREDZNAK BAZE	ZAPIS U OBLIKU UMNOŠKA	PREDZNAK BROJA
$(-1.3)^5$			
-1.3^5			
$\left(-\frac{2}{5}\right)^3$			
$-\frac{2^3}{5}$			
$(-1.3)^4$			
-1.3^4			

Primjer zadatka sve veće složenosti

1. $3 \heartsuit + 4 \heartsuit =$

2. $-4 \text{ 😊} + 9 \text{ 😊} =$

3. $7 \heartsuit + 8 \text{ 😊} - 10 \heartsuit + 18 \text{ 😊} =$

U idućim zadacima rješenje zapiši u obliku potencije:

4. $3 \cdot 7^5 + 6 \cdot 7^5 =$

5. $-8 \cdot 3^{25} + 3 \cdot 3^{25} =$

6. $2^{14} + 7 \cdot 2^{14} =$

7. $-\frac{1}{2} \cdot 5^{39} - \frac{1}{4} \cdot 5^{39} =$

8. $-9 \cdot 5^8 - 3 \cdot 5^{15} - 2 \cdot 5^8 + 19 \cdot 5^{15} =$

U idućim zadacima upotrijebi kalkulator tako da rješenje nije u obliku potencije:

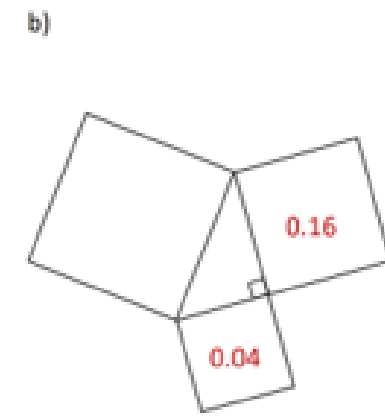
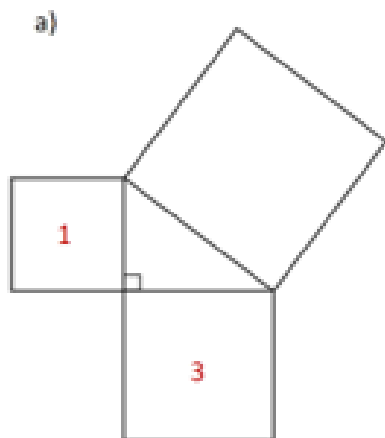
9. $7 \cdot 10^2 + 2 \cdot 10^3 =$

10. $-3 \cdot 5^4 - 9 \cdot 5^7 =$

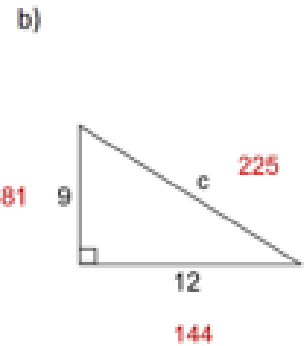
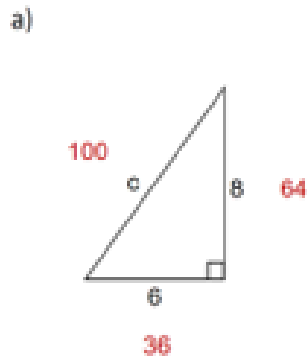
11. $-11 \cdot 5^8 + 16 \cdot 5^3 =$

12. $3 \cdot 2 \cdot 7^4 + 1 \cdot 2 \cdot 7^0 =$

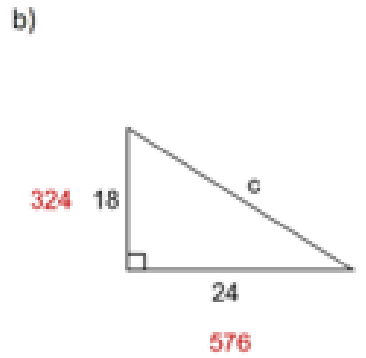
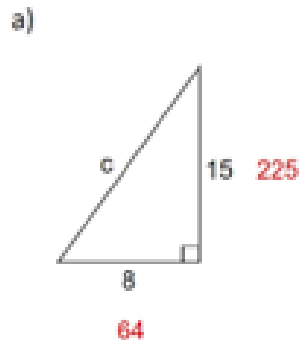
1.



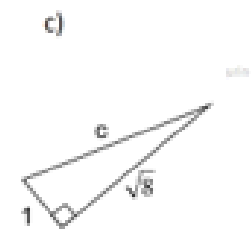
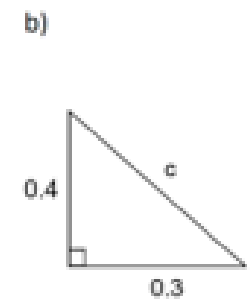
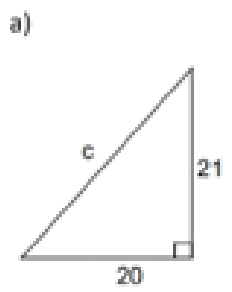
2.



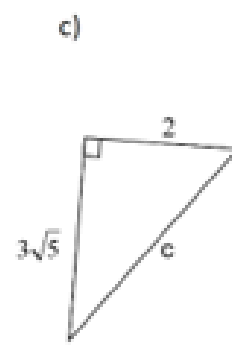
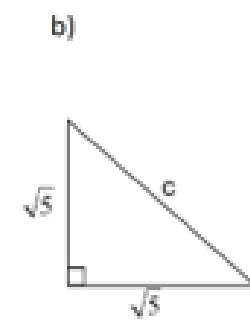
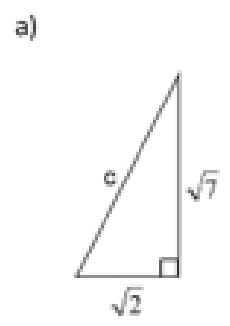
3.



4.



5.



Primjer zadatka sve veće složenosti

Primjer zadatka sve veće složenosti

$$\begin{array}{l} 1) \quad 3x + 6y = 66 \\ \quad -3x + 2y = 14 \\ \hline \quad \quad (2,10) \end{array}$$

$$\begin{array}{l} 4) \quad 6x - 3y = 21 \\ \quad 6x + 5y = 29 \\ \hline \quad \quad (4,1) \end{array}$$

$$\begin{array}{l} 7) \quad 7x - y = -4 \\ \quad -2x + 3y = -7 \\ \hline \quad \quad (-1,-3) \end{array}$$

$$\begin{array}{l} 2) \quad -x - 5y = 26 \\ \quad x + 2y = -11 \\ \hline \quad \quad (-1,-5) \end{array}$$

$$\begin{array}{l} 5) \quad 3x - 2y = -17 \\ \quad 4x - 2y = -22 \\ \hline \quad \quad (-5,1) \end{array}$$

$$\begin{array}{l} 8) \quad x + 6y = -8 \\ \quad 3x - 5y = 22 \\ \hline \quad \quad (4,-2) \end{array}$$

$$\begin{array}{l} 3) \quad 3x + 5y = 46 \\ \quad -4x - 5y = -48 \\ \hline \quad \quad (2,8) \end{array}$$

$$\begin{array}{l} 6) \quad -3x + 2y = 16 \\ \quad 6x - 5y = -34 \\ \hline \quad \quad (-4,2) \end{array}$$

$$\begin{array}{l} 9) \quad 5x + 2y = 17 \\ \quad 3x + 4y = 27 \\ \hline \quad \quad (1,6) \end{array}$$

Primjer zadatka sve veće složenosti

$$\begin{array}{l} \text{a) } x = 5 \\ \quad y = x - 3 \end{array}$$

$$\begin{array}{l} \text{b) } y = -4 \\ \quad x = -y + 1 \end{array}$$

$$\begin{array}{l} \text{c) } y = -2 \\ \quad x + 3y = 4 \end{array}$$

$$\begin{array}{l} \text{d) } 3x = 15 \\ \quad y = 6x - 7 \end{array}$$

$$\begin{array}{l} \text{e) } y = 6x \\ \quad 2x + y = 32 \end{array}$$

$$\begin{array}{l} \text{f) } x = -3y \\ \quad 2x + 5y = 8 \end{array}$$

$$\begin{array}{l} \text{g) } y = x - 3 \\ \quad 4x + y = 7 \end{array}$$

$$\begin{array}{l} \text{h) } x = -3y + 5 \\ \quad -2x + 3y = 17 \end{array}$$

$$\begin{array}{l} \text{i) } x - 2y = 0 \\ \quad x + 13y = 30 \end{array}$$

$$\begin{array}{l} \text{j) } x + 3y = 11 \\ \quad x - 7y = -19 \end{array}$$

$$\begin{array}{l} \text{k) } 2x + y = 13 \\ \quad 5x + y = 19 \end{array}$$

$$\begin{array}{l} \text{l) } -3x + y = -2 \\ \quad 2x + 5y = 7 \end{array}$$

$$\begin{array}{l} \text{m) } x + 2y = -6 \\ \quad 4x + 3y = 1 \end{array}$$

$$\begin{array}{l} \text{n) } 4x - y = -5 \\ \quad 2x - 3y = 5 \end{array}$$

IZVORI

Tri strane - podcast o obrazovanju

Youtube - uvodna epizoda



Spotify - uvodna epizoda



Facebook grupa - Building Thinking Classrooms Hrvatska (Croatia)

Službena stranica (eng) buildingthinkingclassrooms.com

Evaluacija radionice - Učenje bez
poučavanja



Hvala!

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