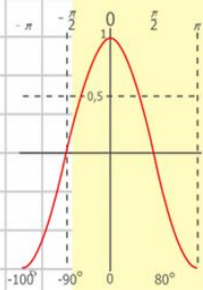
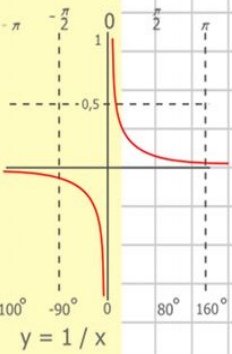
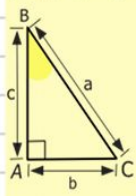
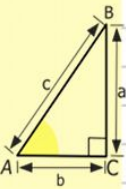
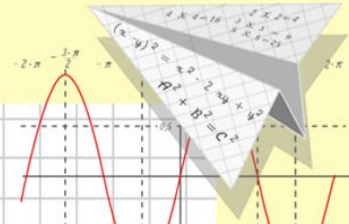
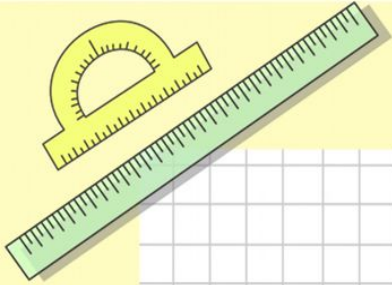


# Математик

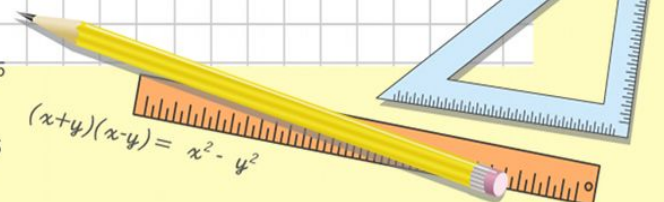
а

# Логарифмические уравнения и методы их решения



$$\begin{array}{r} 1 \\ 2500 \\ \times 42 \\ \hline 210 \\ + 84 \\ \hline 10500 \end{array}$$

- $2 \times 2 = 4$
- $3 \times 3 = 9$
- $4 \times 4 = 16$
- $5 \times 5 = 25$
- $6 \times 6 = 36$
- $7 \times 7 = 49$
- $8 \times 8 = 64$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

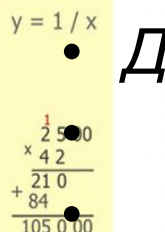
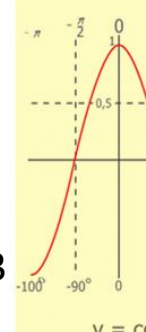
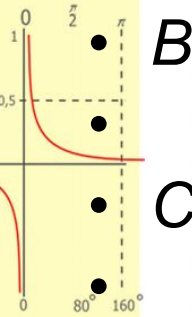
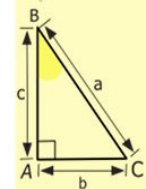
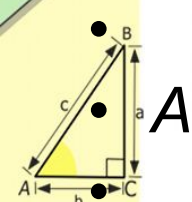
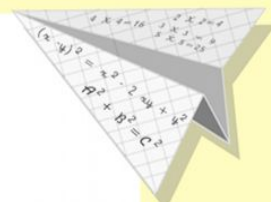
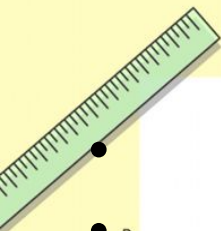
$$\sin 90^\circ = 1$$

$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

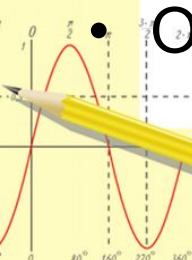
$$\begin{cases} y = 1 \\ x = 25 + 45 \end{cases}$$

$$x = 70$$

$$(x+y)(x-y) = x^2 - y^2$$



- 2 x 2 = 4
- 3 x 3 = 9
- 4 x 4 = 16
- 5 x 5 = 25
- 6 x 6 = 36
- 7 x 7 = 49
- 8 x 8 = 64
- 9 x 9 = 81



	1	2	3	4	5
A	$\log_4 16$	$\log_3 27$	$\log_2 64$	$\log_3 81$	$\log_2 32$

B	$\log_{25} 125$	$2^{\log_2 7}$	$\lg 0,001$	$\log_{27} 3$	$\log_{121} 11$
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C	$8^{\log_8 15 + \log_8 3}$	$\lg 0,01$	$5^{\log_5 3 - \log_5 6}$	$\log_2 128$	$\log_{81} 27$
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Д	$-\lg 0,1$	$3^{1/2 \log_3 144}$	$3 / \lg 1000$	$\log_4 1/256$	$7^{\log_7 0,6 - \log_7 3}$
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- -3      5      3      0,5      0,2      1      0,75

- О      Ж      Д      Н      Р      П      Е

$$\frac{a}{A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

$$\sin 90^\circ = 1$$



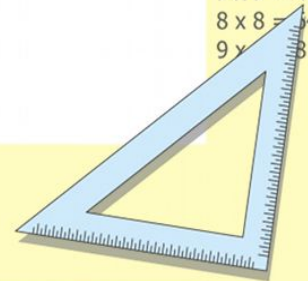
$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

$$\begin{cases} y = 1 \\ x = 25 + 45 \end{cases}$$


---


$$x = 70$$

$$(x+y)(x-y) = x^2 - y^2$$



# «Изобретение логарифмов, сократив работу астронома, продлило ему жизнь»

## Лаплас

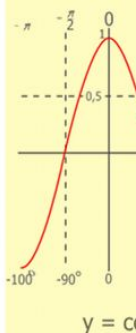
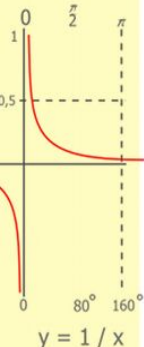
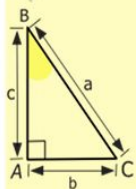
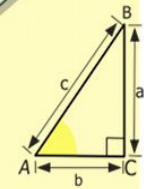
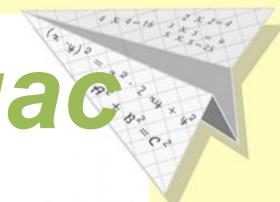
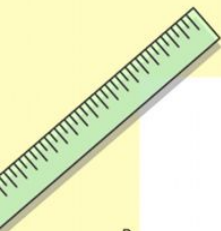
**Джон Непер** – 1613 год – изобретение логарифма

1614 год – изобретение логарифмической таблицы

**Генри Бригс** – 1624 год – создание таблиц логарифмов

1703 год – перевод таблиц на русский язык

**Л. Магницкий** – 1716 год – издание семизначных логарифмических таблиц



$$\begin{array}{r} 2\ 5\ 00 \\ \times 42 \\ \hline 21\ 0 \\ + 84 \\ \hline 105\ 0\ 00 \end{array}$$

- 2 x 2 = 4
- 3 x 3 = 9
- 4 x 4 = 16
- 5 x 5 = 25
- 6 x 6 = 36
- 7 x 7 = 49
- 8 x 8 = 64
- 9 x 9 = 81



$$\sin B = \sin C$$

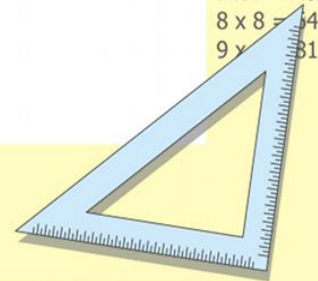
$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

$$\sin 90 = 1$$



$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$
$$\begin{cases} y = 1 \\ x = 25 + 45 \end{cases}$$
$$\frac{x}{70}$$

$$(x+y)(x-y) = x^2 - y^2$$



• 1. Какие из выражений имеют смысл?

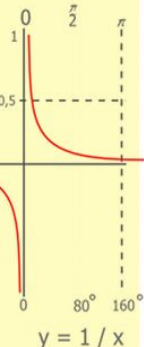
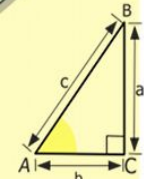
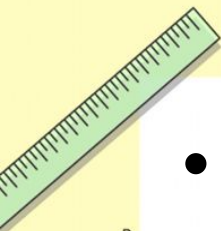
$$\log_2(3 - 2\sqrt{2}), \sqrt{\log_2 \frac{1}{16}}, \sqrt{\log_4 0.5^0}$$

$$\log_3 \log_2 16, \log_5(-x^2)$$

2. Выяснить, при каких значениях  $x$  существует логарифм:

а)  $\log_2(4 - x)$  б)  $\log_3(x^2 + 9)$

в)  $\log_3 \frac{1}{1-2x}$  г)  $\log_2(11 - x^2)$



$$\begin{array}{r} 2500 \\ \times 42 \\ \hline 210 \\ + 84 \\ \hline 10500 \end{array}$$



$$\frac{a}{A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

$$\sin 90^\circ = 1$$

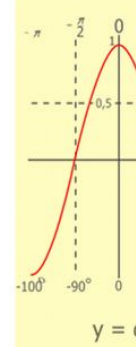
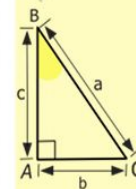


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

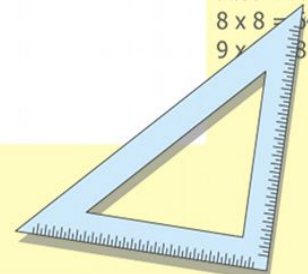
$$\begin{cases} y = 1 \\ x = 25 + 45 \end{cases}$$

$$(x+y)(x-y) = x^2 - y^2$$

$$\frac{\quad}{x=70}$$



$$\begin{array}{l} 2 \times 2 = 4 \\ 3 \times 3 = 9 \\ 4 \times 4 = 16 \\ 5 \times 5 = 25 \\ 6 \times 6 = 36 \\ 7 \times 7 = 49 \\ 8 \times 8 = 64 \\ 9 \times 9 = 81 \end{array}$$



# Решите уравнение:

а)  $2^x = 3$

е)  $\lg x = 0$

б)  $3^{\log_3 x} = 5$

ж)  $\ln(x + 1) + \ln(x - 1) = \ln 3$

в)  $7^{\log_7 x^2} = 36$

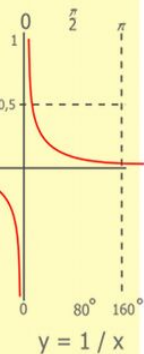
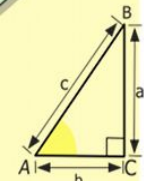
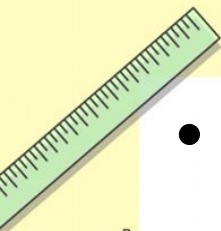
з)  $\log_3 x = 5\log_3 2 - 2\log_3 2$

г)  $\log_2(x - 4) = 3$

и)  $\log_2(\log_3 x) = 1$

д)  $\lg(2x + 1) = \lg x$

к)  $\log_a(\log_3(\log_2 x)) = 0$



$$\begin{array}{r} 2500 \\ \times 42 \\ \hline 2100 \\ + 8400 \\ \hline 105000 \end{array}$$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

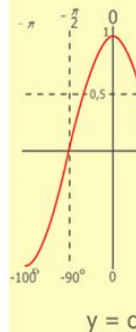
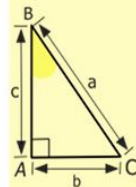
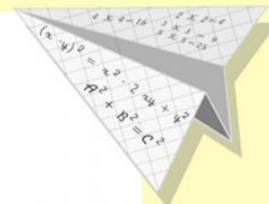
$$\sin 90^\circ = 1$$



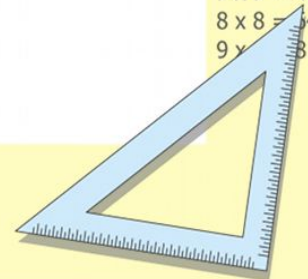
$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

$$\begin{cases} y = 1 \\ x = 25 + 45 \\ \hline x = 70 \end{cases}$$

$$(x+y)(x-y) = x^2 - y^2$$



$2 \times 2 = 4$   
 $3 \times 3 = 9$   
 $4 \times 4 = 16$   
 $5 \times 5 = 25$   
 $6 \times 6 = 36$   
 $7 \times 7 = 49$   
 $8 \times 8 = 64$   
 $9 \times 9 = 81$



# • Ответы:

а)  $\log_2 3$

е) 1

б) 5

ж) 2

в) -6;6

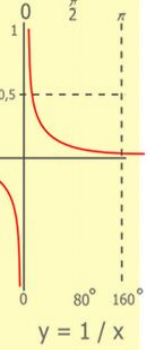
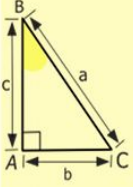
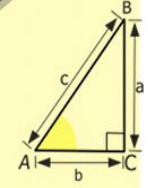
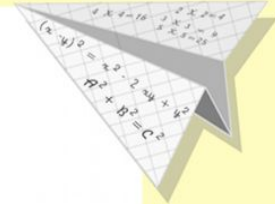
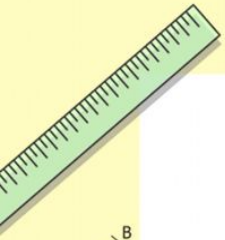
з) 8

г) 12

и) 9

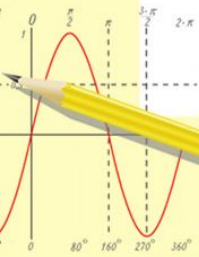
д) -1

к) 8



$$\begin{array}{r} 2500 \\ \times 42 \\ \hline 2100 \\ + 8400 \\ \hline 105000 \end{array}$$

- 2 x 2 = 4
- 3 x 3 = 9
- 4 x 4 = 16
- 5 x 5 = 25
- 6 x 6 = 36
- 7 x 7 = 49
- 8 x 8 = 64
- 9 x 9 = 81



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

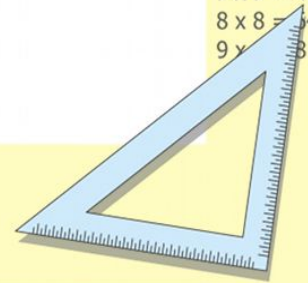
$$\sin 90^\circ = 1$$



$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

$$\begin{cases} y = 1 \\ x = 25 + 45 \\ \hline x = 70 \end{cases}$$

$$(x+y)(x-y) = x^2 - y^2$$



# Решите уравнение

a)  $\log_{x+1}(x^2 - 3x + 1) = 1$

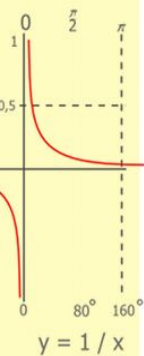
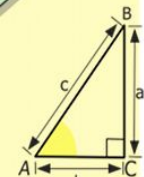
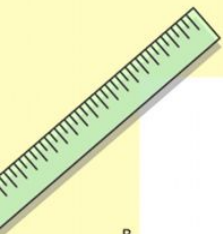
б)  $2\lg(x - 1) = \frac{1}{2}\lg x^5 - \lg\sqrt{x}$

в)  $2\log_2^2 x + 5\log_2 x - 3 = 0$

г)  $x^{\lg x - 2} = 1000$

д)  $\log_2 x + \log_x 2 = 2$

е)  $\log_{1/5} x = x - 6$



$$\begin{array}{r} \frac{1}{2} 500 \\ \times 42 \\ \hline 210 \\ + 84 \\ \hline 105000 \end{array}$$



$$\frac{a}{A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

$$\sin 90^\circ = 1$$

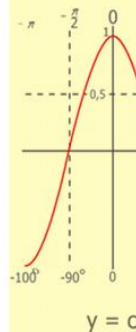
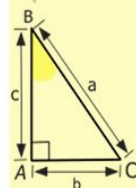
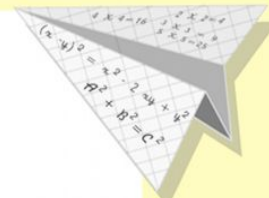


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

$$\begin{cases} y = 1 \\ x = 25 + 45 \end{cases}$$

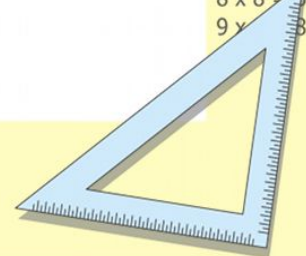
$$x = 70$$

$$(x+y)(x-y) = x^2 - y^2$$



$$y = \cos$$

$$\begin{array}{l} 2 \times 2 = 4 \\ 3 \times 3 = 9 \\ 4 \times 4 = 16 \\ 5 \times 5 = 25 \\ 6 \times 6 = 36 \\ 7 \times 7 = 49 \\ 8 \times 8 = 64 \\ 9 \times 9 = 81 \end{array}$$

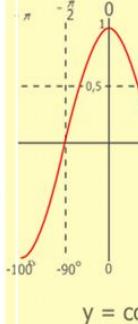
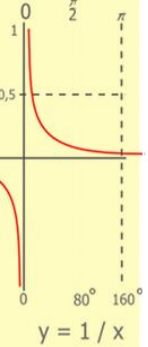
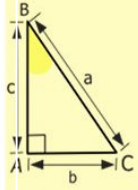
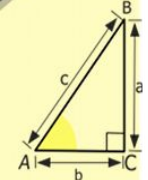
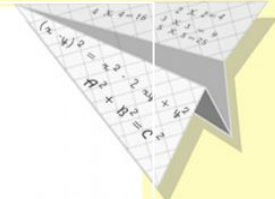
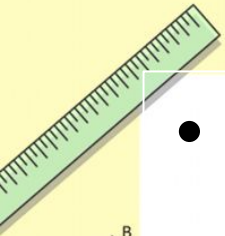


# Домашнее задание:

## Решить уравнение

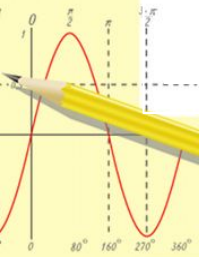
a)  $\log_3(5x-2) - 2 \log_3 \sqrt{3x+1} = 1 - \log_3 4$

a)  $\log_4 \left( 2 + \log_3 \left( 1 + \log_2 \left( 1 + 3 \log_3 (x - 1) \right) \right) \right) = \frac{1}{2}$



$$\begin{array}{r} 1 \\ \times 2500 \\ \hline 210 \\ + 84 \\ \hline 105000 \end{array}$$

2 x 2 = 4
3 x 3 = 9
4 x 4 = 16
5 x 5 = 25
6 x 6 = 36
7 x 7 = 49
8 x 8 = 64
9 x 9 = 81



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

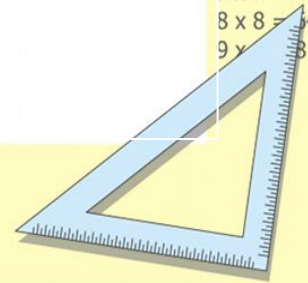
$$\sin 90^\circ = 1$$



$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

$$\begin{cases} y = 1 \\ x = 25 + 45 \\ \hline x = 70 \end{cases}$$

$$(x+y)(x-y) = x^2 - y^2$$



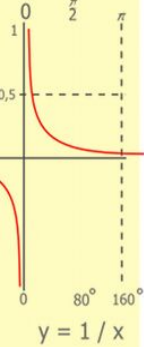
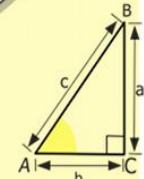




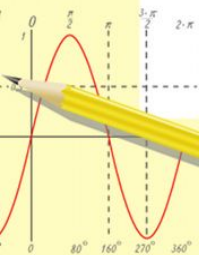
У великого геометра древности  
**Фалеса** спросили:

- Что есть больше всего?
- **Пространство**, - ответил учёный
- Что мудрее всего?
- **Время**,
- **Что приятнее всего?**
- **Достичь желаемого!**

**Желаем Вам удачи в достижении  
Желаемого!!!**



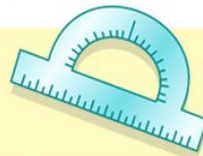
$$\begin{array}{r} 2500 \\ \times 42 \\ \hline 210 \\ + 84 \\ \hline 10500 \end{array}$$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

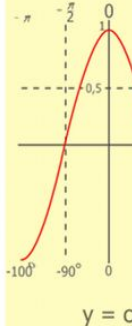
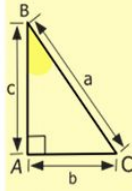
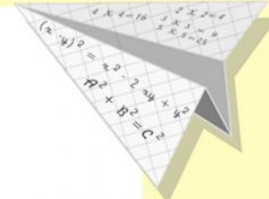
$$\sin 90^\circ = 1$$



$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

$$\begin{cases} y = 1 \\ x = 25 + 45 \\ \hline x = 70 \end{cases}$$

$$(x+y)(x-y) = x^2 - y^2$$



$$\begin{array}{l} 2 \times 2 = 4 \\ 3 \times 3 = 9 \\ 4 \times 4 = 16 \\ 5 \times 5 = 25 \\ 6 \times 6 = 36 \\ 7 \times 7 = 49 \\ 8 \times 8 = 64 \\ 9 \times 9 = 81 \end{array}$$

