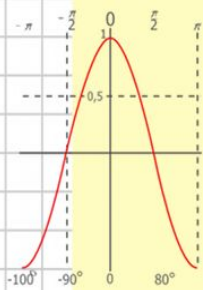
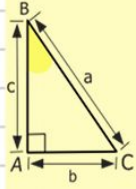
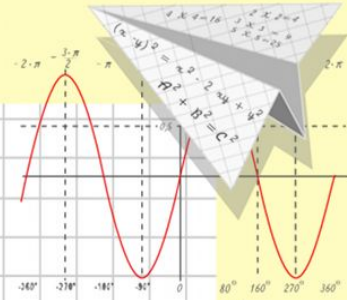
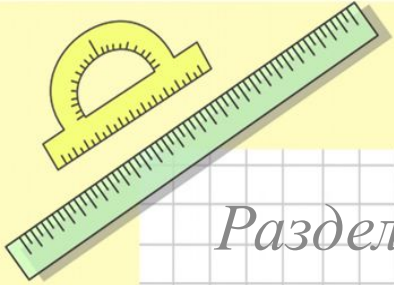


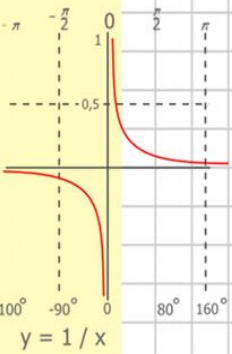
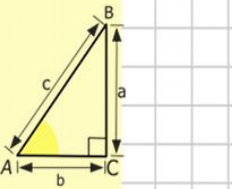
Математик

Раздел 6. Метод ^а координат в пространстве

Занятие 66. Уравнение плоскости



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



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



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

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

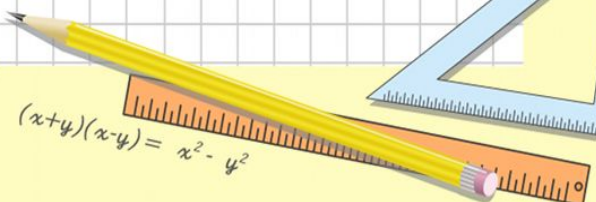


$$\sin 90^\circ = 1$$



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

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



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

уравнение поверхности в пространстве

Уравнение с тремя переменными задает в пространстве некоторую поверхность, если координаты каждой точки этой поверхности являются решением этого уравнения, и, наоборот, все решения уравнения образуют точки этой поверхности.

Например:

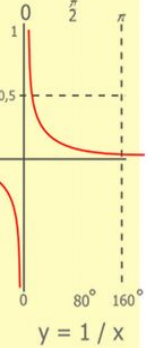
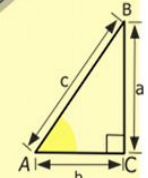
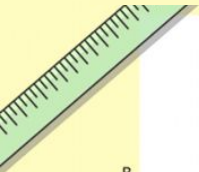
$$2x - y^2 + z = 0$$

$$(2; 3; 5) \rightarrow 2 \cdot 2 - 3^2 + 5 = 4 - 9 + 5 = 0 \quad (\text{верно})$$

$(2; 3; 5)$ - решение уравнения

$$(1; 1; 2) \rightarrow 1 \cdot 2 - 1^2 + 2 = 2 - 1 + 2 = 3 \neq 0 \quad (\text{не верно})$$

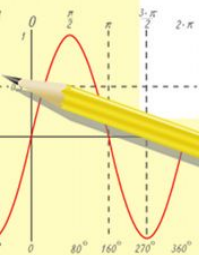
$(1; 1; 2)$ - нерешение уравнения



1	5 00
x 42	

210	
+ 84	

105000	



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

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

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

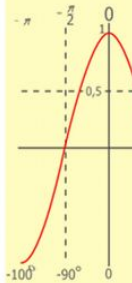
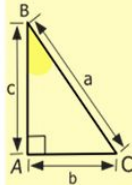
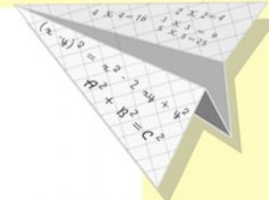


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

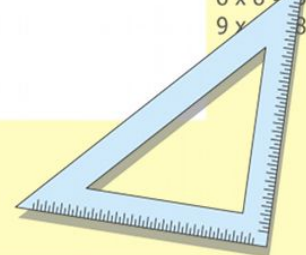
$$x = 70$$

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



$$y = \cos$$

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



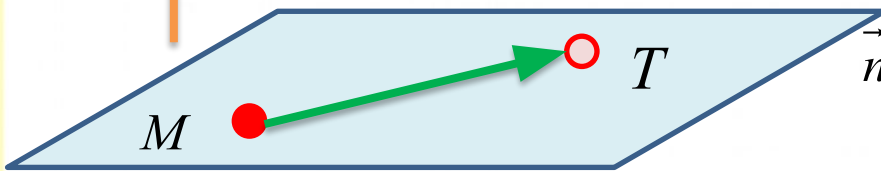
Уравнение плоскости (общее)

Составим уравнение плоскости, проходящей через точку $M = (x_0; y_0; z_0)$ и вектором нормали $\vec{n} = (A; B; C)$

Вектор нормали к плоскости – это вектор, перпендикулярный плоскости

$T = (x; y; z)$ - произвольная точка из

$$\vec{n} \perp \alpha \rightarrow \vec{n} \perp \overrightarrow{MT} \rightarrow \vec{n} \cdot \overrightarrow{MT} = 0$$



$$\vec{n} = (A; B; C)$$

$$\overrightarrow{MT} = (x - x_0; y - y_0; z - z_0)$$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

$$Ax - Ax_0 + By - By_0 + Cz - Cz_0 = 0$$

$$Ax + By + Cz - \underbrace{Ax_0 - By_0 - Cz_0}_{D} = 0$$

$$Ax + By + Cz + D = 0$$

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

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

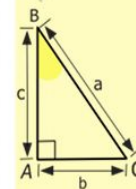
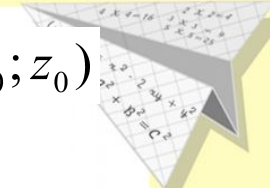
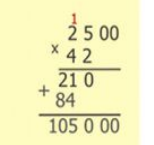
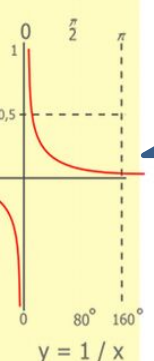
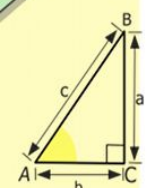
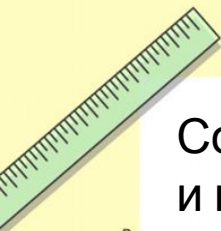
$$\sin 90^\circ = 1$$

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

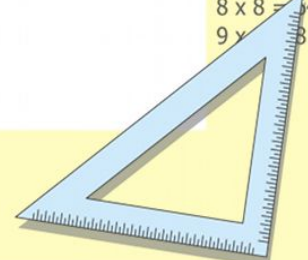
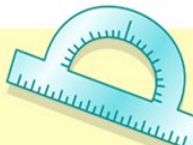
$$\begin{cases} y = 1 \\ x = 25 + 45 \end{cases}$$

$$x = 70$$

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



- 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



Уравнение плоскости

Составить уравнение плоскости, проходящей через данную точку и данным вектором нормали:

$$M = (1; 6; -4) \quad \vec{n} = (3; -2; 5)$$

$$\vec{MT} = (x - 1; y - 6; z + 4)$$

$$3(x - 1) - 2(y - 6) + 5(z + 4) = 0$$

$$3x - 3 - 2y + 12 + 5z + 20 = 0$$

$$3x - 2y + 5z + 29 = 0$$

Ответ $3x - 2y + 5z + 29 = 0$

:

$$M = (3; -2; 0) \quad \vec{n} = (1; 4; -3)$$

$$\vec{MT} = (x - 3; y + 2; z)$$

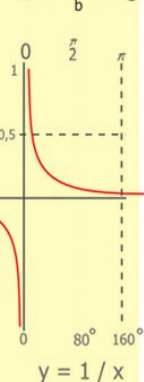
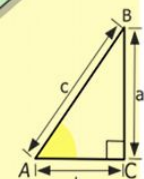
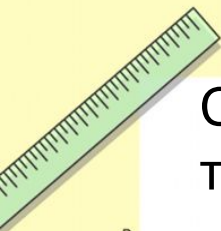
$$(x - 3) + 4(y + 2) - 3z = 0$$

$$x - 3 + 4y + 8 - 3z = 0$$

$$x + 4y - 3z + 5 = 0$$

Ответ $x + 4y - 3z + 5 = 0$

:



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



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

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

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

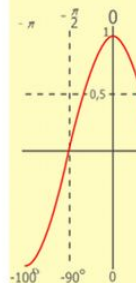
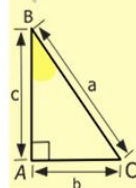
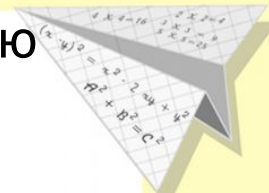


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

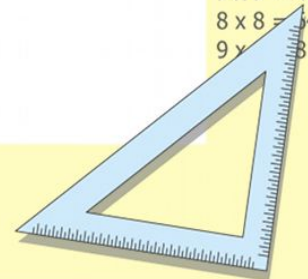
$$x = 70$$

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



$$y = \cos$$

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



Уравнение плоскости

Составить уравнение плоскости, проходящей через данную точку и данным вектором нормали:

$$M = (-5; 0; 3) \quad \vec{n} = (0; -1; 2)$$

$$M = (2; -3; -7) \quad \vec{n} = (4; 0; -1)$$

Ответ

:

Ответ

:

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

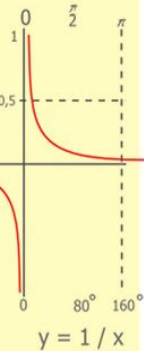
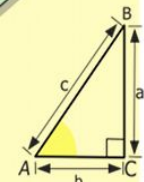
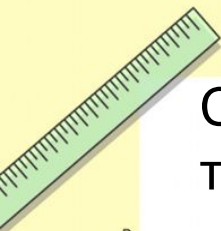
$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

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

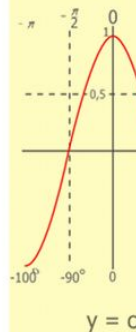
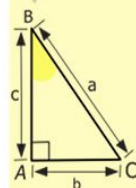
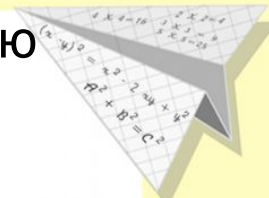
$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

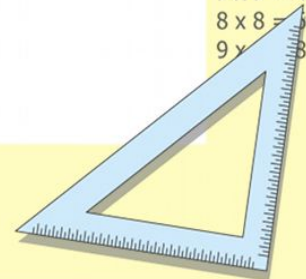
$$(x+y)(x-y) = x^2 - y^2$$



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



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



Уравнение плоскости в отрезках

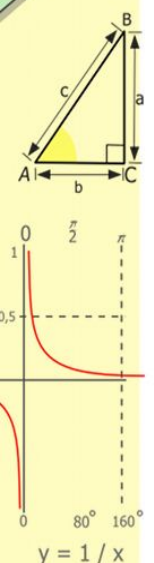
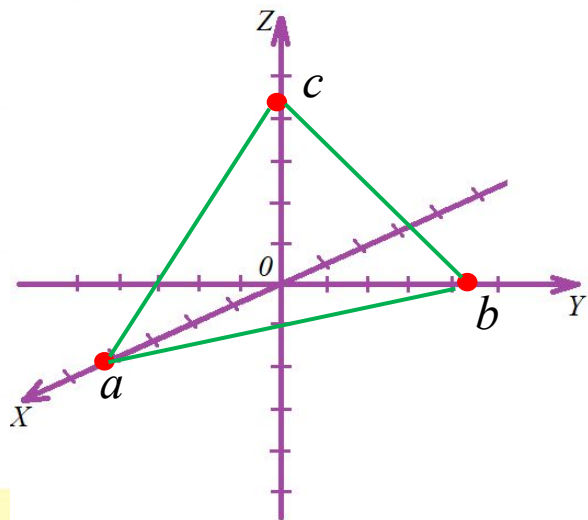
$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$$

где $a, b, c \in \mathbb{R}$

$$x = 0, y = 0 \rightarrow \frac{z}{c} = 1 \rightarrow z = c \rightarrow (0; 0; c)$$

$$y = 0, z = 0 \rightarrow \frac{x}{a} = 1 \rightarrow x = a \rightarrow (a; 0; 0)$$

$$x = 0, z = 0 \rightarrow \frac{y}{b} = 1 \rightarrow y = b \rightarrow (0; b; 0)$$



$\frac{1}{2} 500$
 $\times 42$
 $\hline 210$
 $+ 84$
 $\hline 105000$



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

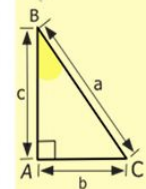
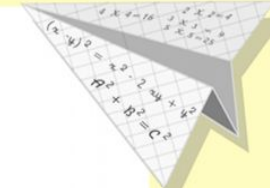
$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

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

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

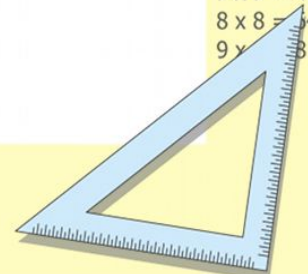
$$\begin{cases} y = 1 \\ x = 25 + 45 \\ \hline x = 70 \end{cases}$$

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



$$y = \cos$$

- 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



Уравнение плоскости

Построить изображение плоскости, заданной уравнением:

$$3x + 4y - z - 24 = 0$$

$$3x + 4y - z = 24$$

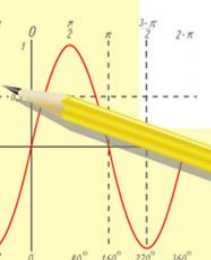
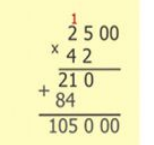
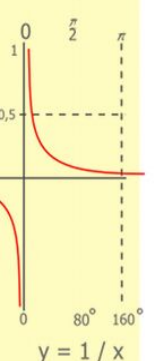
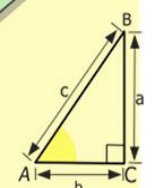
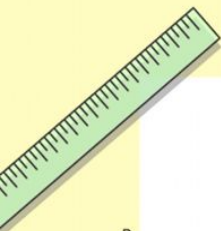
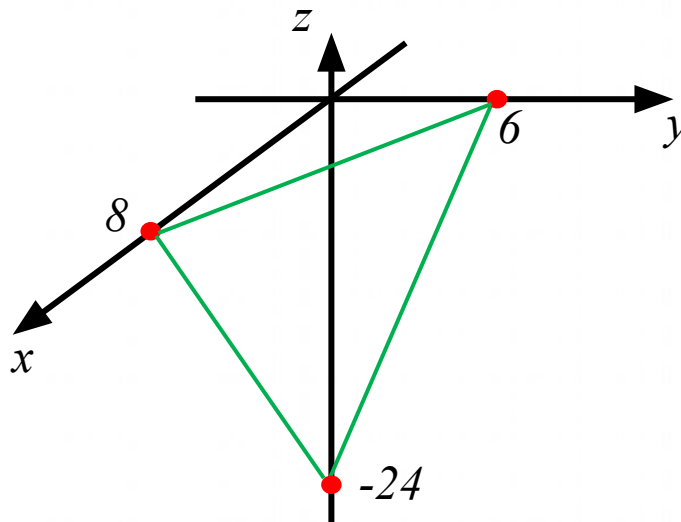
$$\frac{3x}{24} + \frac{4y}{24} - \frac{z}{24} = 1$$

$$\frac{x}{8} + \frac{y}{6} - \frac{z}{24} = 1$$

$$a = 8$$

$$b = 6$$

$$c = -24$$



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

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

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

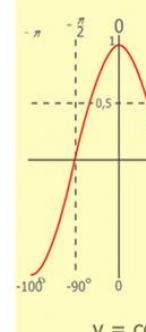
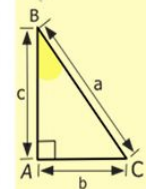
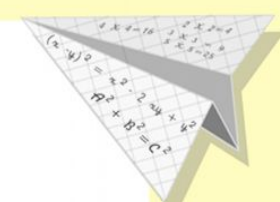


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

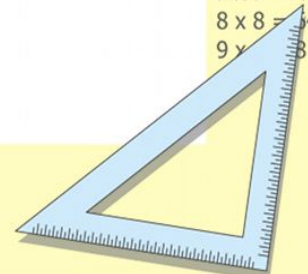
$$\begin{cases} y = 1 \\ x = 25 + 45 \end{cases}$$

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

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



- 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



Уравнение плоскости

Построить изображение плоскости, заданной уравнением:

$$2x - 5y - 9z + 3 = 0$$

$$2x - 5y - 9z = -3$$

$$\frac{2x}{-3} - \frac{5y}{-3} - \frac{9z}{-3} = 1$$

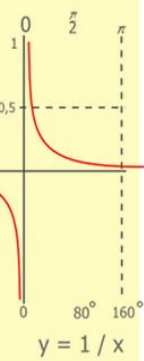
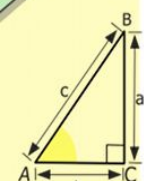
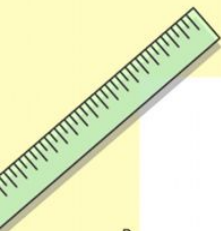
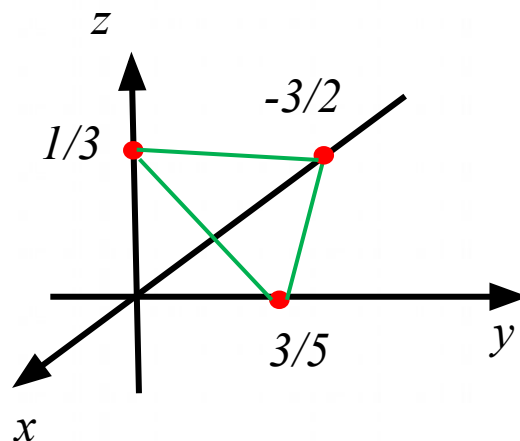
$$-\frac{2x}{3} + \frac{5y}{3} + 3z = 1$$

$$-\frac{x}{3/2} + \frac{y}{3/5} + \frac{z}{1/3} = 1$$

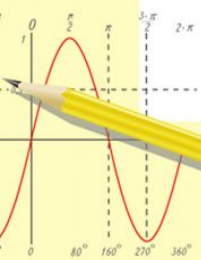
$$a = -3/2$$

$$b = 3/5$$

$$c = 1/3$$



$$\begin{array}{r} 1 \\ \times 2500 \\ 42 \\ \hline 210 \\ + 84 \\ \hline 105000 \end{array}$$



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

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

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

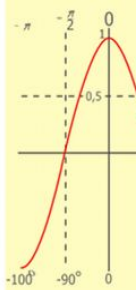
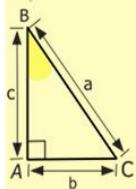
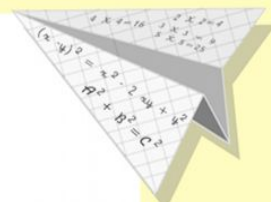


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

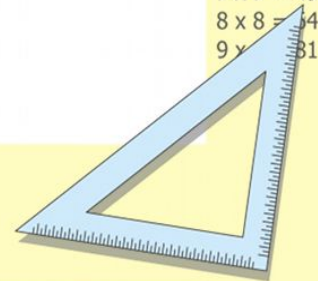
$$x = 70$$

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



$$y = \cos$$

- 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



Уравнение плоскости

Построить изображение плоскости, заданной уравнением:

$$2x + 7z - 28 = 0$$

$$2x + 7z = 28$$

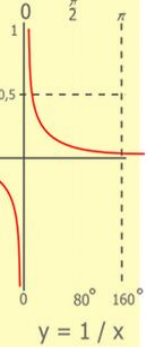
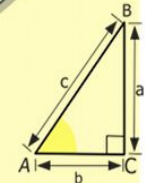
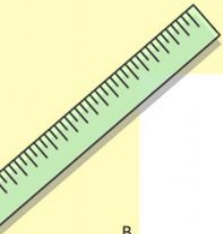
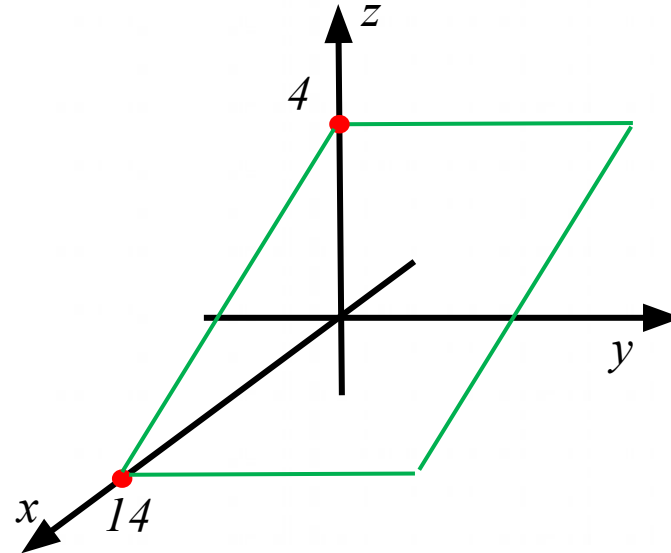
$$\frac{2x}{28} + \frac{7z}{28} = 1$$

$$\frac{x}{14} + \frac{z}{4} = 1$$

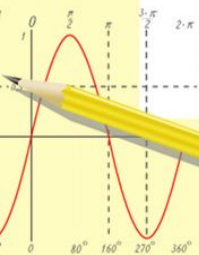
$$a = 14$$

$$OY \parallel \alpha$$

$$c = 4$$



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



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

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

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

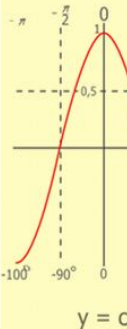
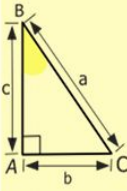
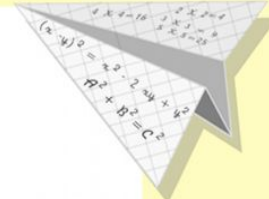


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

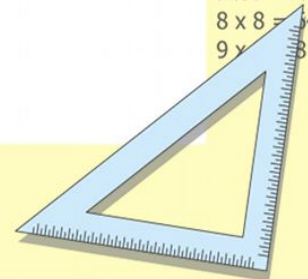
$$x = 70$$

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



$$y = \cos$$

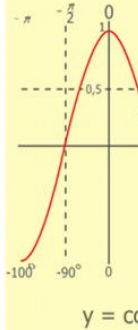
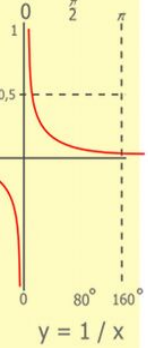
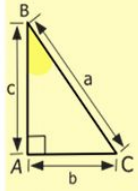
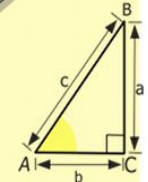
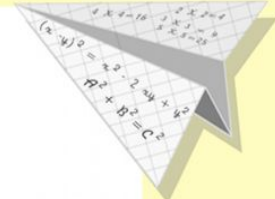
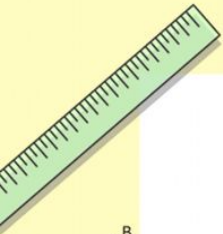
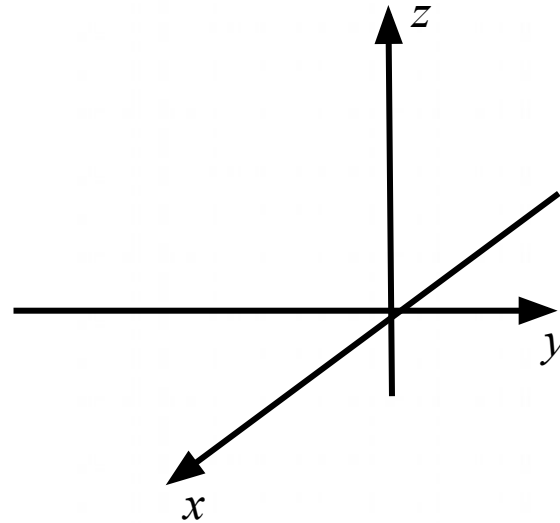
$$\begin{array}{l} 2 \times 2 = 4 \\ 3 \times 3 = 9 \\ 4 \times 4 = 16 \\ 5 \times 5 = 25 \\ 6 \times 6 = 36 \\ 7 \times 7 = 49 \\ 8 \times 8 = 64 \\ 9 \times 9 = 81 \end{array}$$



Уравнение плоскости

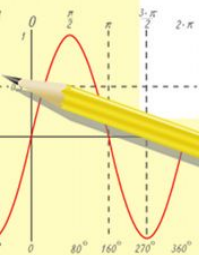
Построить изображение плоскости, заданной уравнением:

$$5y - 3z + 30 = 0$$



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

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



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

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

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



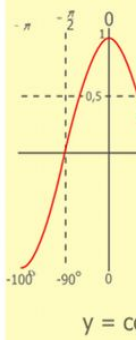
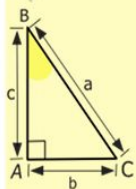
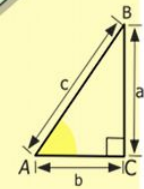
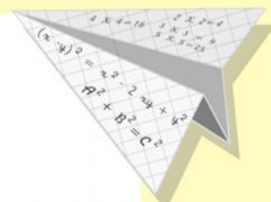
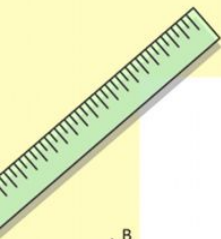
$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

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



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Юрьевич
преподаватель математики
ГБПОУ ЗКНО
Москва, 2021г.



$$\begin{array}{r} 1 \\ 2500 \\ \times 42 \\ \hline 210 \\ + 84 \\ \hline 105000 \end{array}$$

- 2 x 2 = 4
- 3 x 3 = 9
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$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

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

