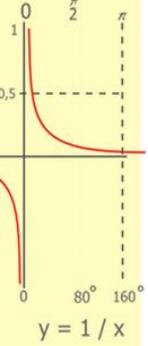
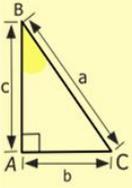
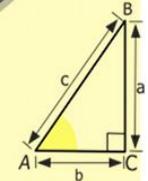
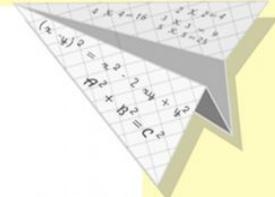
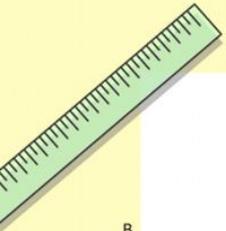


Техника и технология

др.-греч. τεχνικός,
от τέχνη — ИСКУССТВО,
мастерство, умение

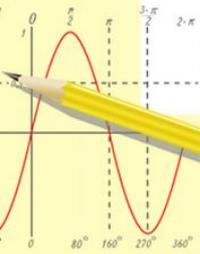
Сухарев Владислав
Ведущий инженер ИБП РАН

Пущино, МБОУ СОШ №3
1 сентября 2017 г.



$$\begin{array}{r} 1\ 2\ 5\ 00 \\ \times 4\ 2 \\ \hline 21\ 0 \\ + 84 \\ \hline 105\ 0\ 00 \end{array}$$

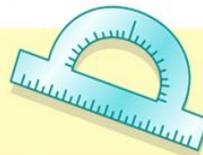
$$\begin{array}{l} 2 \times 2 = 4 \\ 3 \times 3 = 9 \\ 4 \times 4 = 16 \\ 5 \times 5 = 25 \\ 6 \times 6 = 36 \\ 7 \times 7 = 49 \\ 8 \times 8 = 64 \\ 9 \times 9 = 81 \end{array}$$



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

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

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

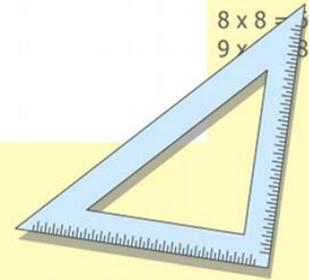


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

$$x = 70$$

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



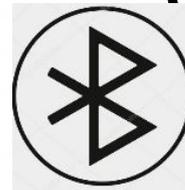
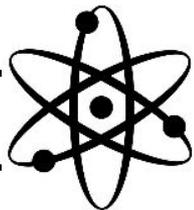
Техника – это..?

Средства труда. ЦЕЛЬ-избавить человека от физически тяжелой однообразной работы.

ЗАДАЧИ

-создать мат. и культур.

1. $OC: P^{\delta} \rightarrow \mathcal{B} \rightarrow \$$



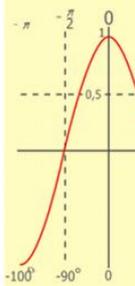
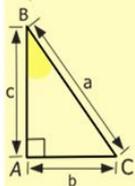
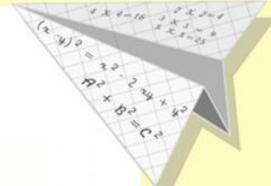
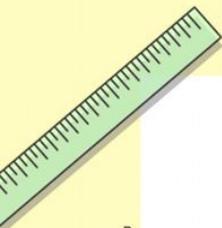
Энергия



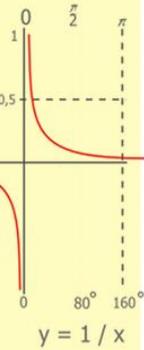
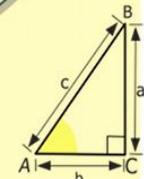
Информация

- средства передвижения

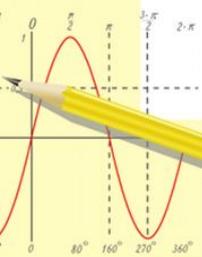
- проноспособность



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



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



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

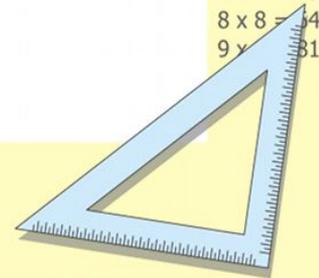
$$\frac{a+b}{c}$$

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



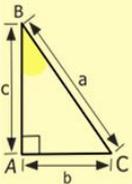
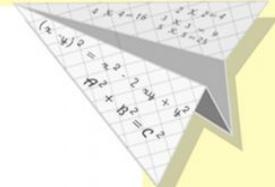
$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \\ y = 1 \\ x = 25 + 45 \\ x = 70 \end{cases}$$

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

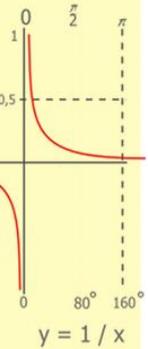
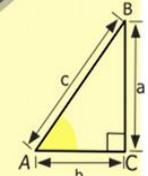
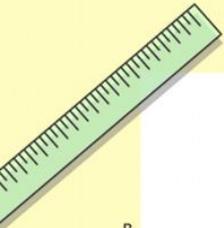


Техника – это..?

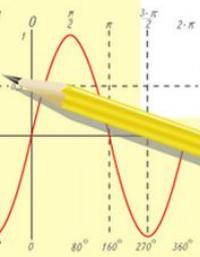
- совокупность знаний, устройств, технологий и деятельности
- технические средства
- техническая деятельность
- приемы, способы и методы (музыкальная, безопасности, юридическая, цирковая)



- 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



$$\begin{array}{r} 1\ 2\ 5\ 00 \\ \times 42 \\ \hline 210 \\ + 84 \\ \hline 105\ 000 \end{array}$$



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

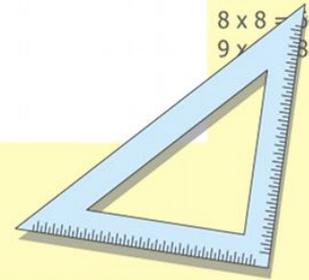
$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

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

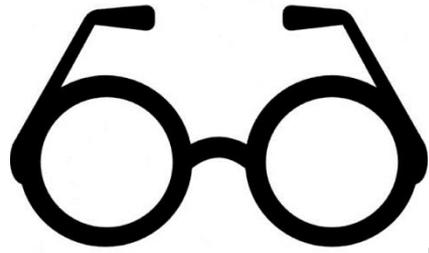


$$\begin{cases} x = \sin 90^\circ \\ x = 25y + 45 \\ y = 1 \\ x = 25 + 45 \\ \hline x = 70 \end{cases}$$

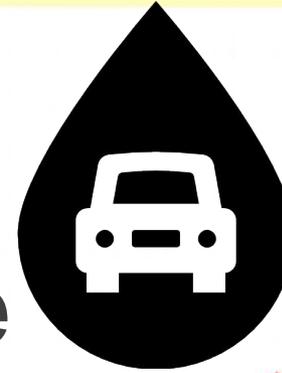
$$(x+y)(x-y) = x^2 - y^2$$



Технические материалы



Смазочные
Оптические

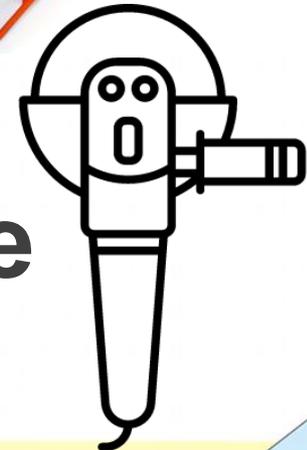


Изоляционные
Лакокрасочные

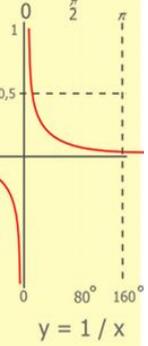
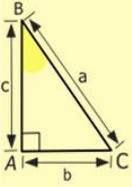
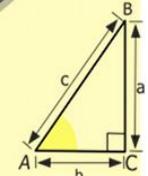
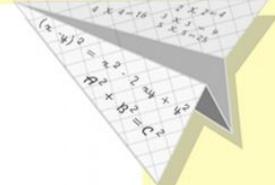
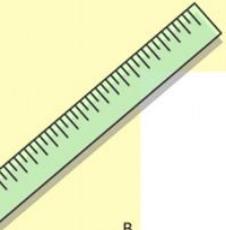


Декоративные

Абразивные

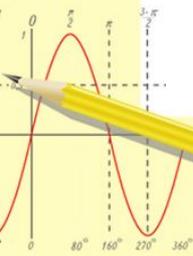


Конструкционные



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

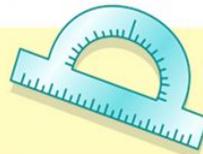
- 2 x 2 = 4
- 3 x 3 = 9
- 4 x 4 = 16
- 5 x 5 = 25
- 6 x 6 = 36
- 7 x 7 = 49
- 8 x 8 = 64
- 9 x 9 = 81



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

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

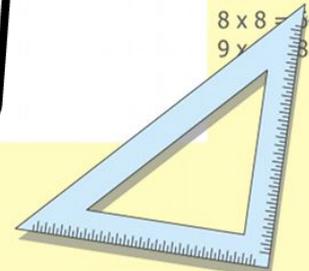
$$\sin 90^\circ = 1$$



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

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

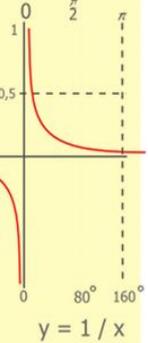
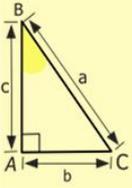
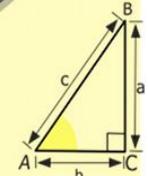
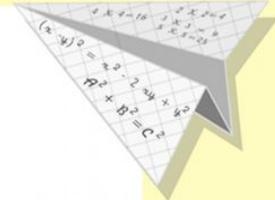
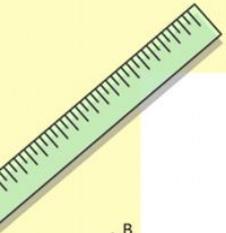
$$(x+y)(x-y) = x^2 - y^2$$



Класс Технологического исполнения

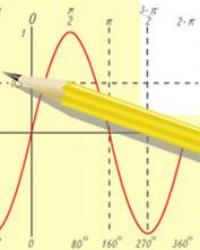
Конструкционные м-лы:

Спекаемые
Деформированные
Литые
Формуемые
Свариваемые
Спекаемые
Склеенные



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

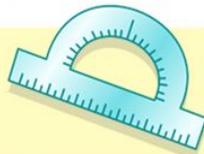
$$\begin{array}{l} 2 \times 2 = 4 \\ 3 \times 3 = 9 \\ 4 \times 4 = 16 \\ 5 \times 5 = 25 \\ 6 \times 6 = 36 \\ 7 \times 7 = 49 \\ 8 \times 8 = 64 \\ 9 \times 9 = 81 \end{array}$$



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

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

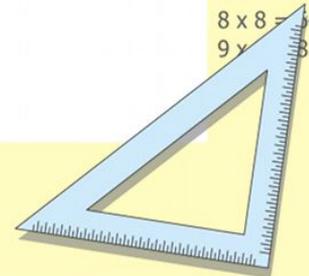
$$\sin 90^\circ = 1$$



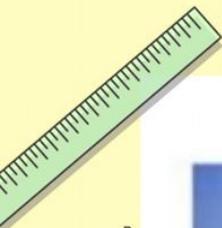
$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

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



I Применение конструкционных материалов



Транспорт



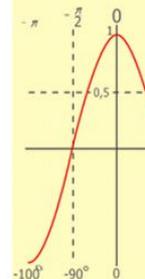
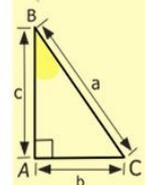
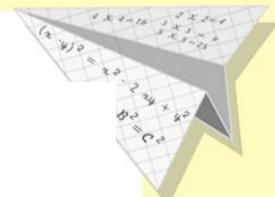
Строительство



Энергетика

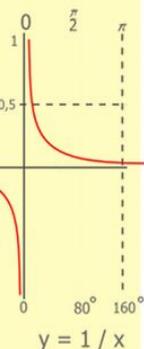
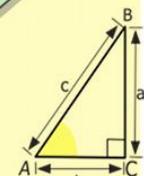


Машиностроение



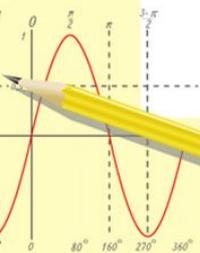
$y = \cos$

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



$y = 1/x$

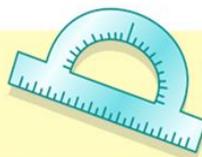
$$\begin{array}{r} 1 \\ \times 2500 \\ \hline 210 \\ + 84 \\ \hline 105000 \end{array}$$



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

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

$\sin 90^\circ = 1$

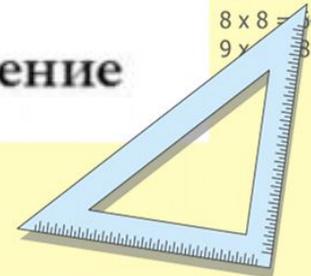


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

$x = 70$

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



Свойства конструкционных материалов

Таких материалов ~ 99 %
(из них сталей 90 – 95 %)

ПРОЧНОСТЬ -

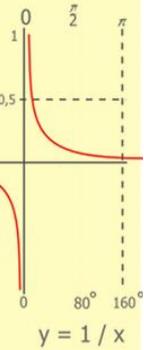
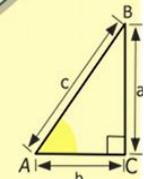
способность выдерживать заданные нагрузки в конструкции

ПЛАСТИЧНОСТЬ -

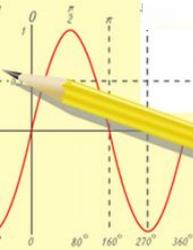
способность выдерживать приемлемые деформации

ВЯЗКОСТЬ

способность сопротивляться разрушению (распространению трещины)



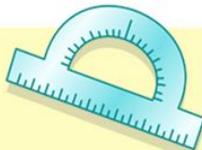
$$\begin{array}{r} 1 \\ \times 2500 \\ \hline 210 \\ + 84 \\ \hline 105000 \end{array}$$



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

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

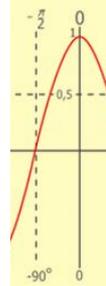
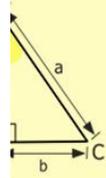
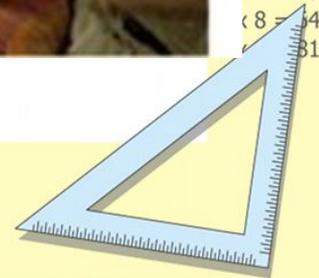
$$\sin 90^\circ = 1$$



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

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

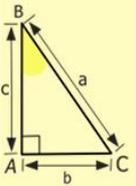
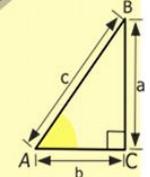
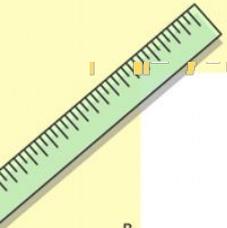
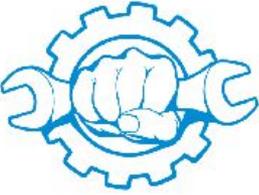
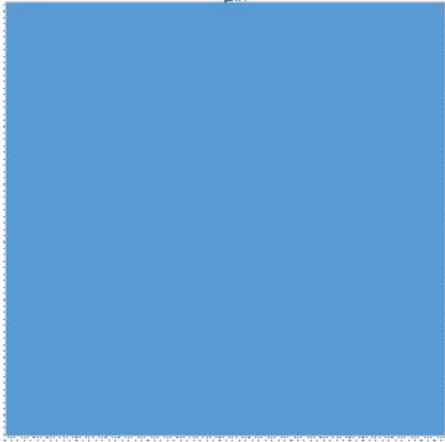
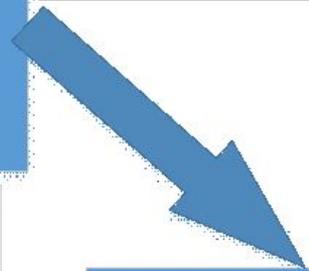
$$(x+y)(x-y) = x^2 - y^2$$



$$y = \cos$$

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

Предмет изучения



$$\begin{array}{r} 125 \\ \times 42 \\ \hline 210 \\ + 84 \\ \hline 1050 \end{array}$$

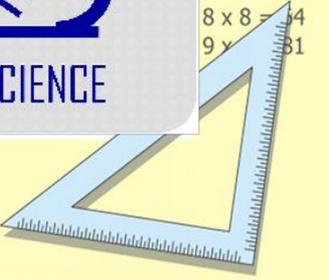
- 2 x 2 = 4
- 3 x 3 = 9
- 4 x 4 = 16
- 5 x 5 = 25
- 6 x 6 = 36
- 7 x 7 = 49
- 8 x 8 = 64
- 9 x 9 = 81



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

$$\frac{x=25+45}{x=70}$$

$$(x-4) = x^2 - 4^2$$

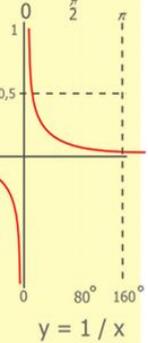
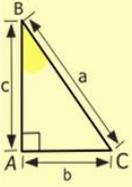
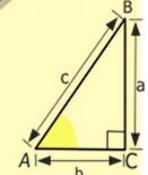
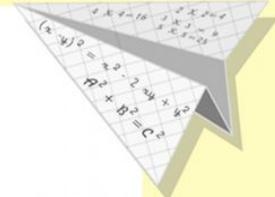
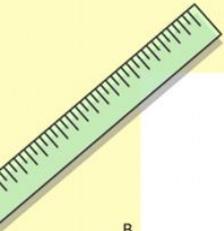


Структура темы «Обработка»

Обработка древесины и древесных материалов

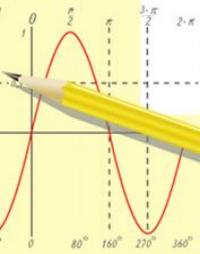
Ручная:
Лобзик
Ножовка
поперечная
Ножовка
продольная
Рубанок
Рашпиль

Машинная:
Сверлильный станок
Фрезеровальный
Токарный по дереву
Электролобзик
Электродрель



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

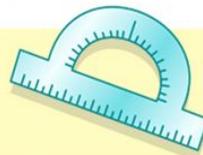
- $2 \times 2 = 4$
- $3 \times 3 = 9$
- $4 \times 4 = 16$
- $5 \times 5 = 25$
- $6 \times 6 = 36$
- $7 \times 7 = 49$
- $8 \times 8 = 64$
- $9 \times 9 = 81$



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

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

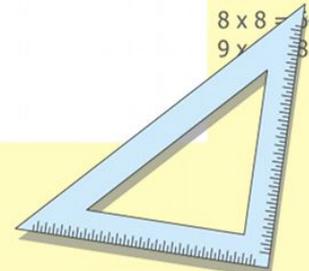
$$\sin 90^\circ = 1$$



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

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

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



Технические науки

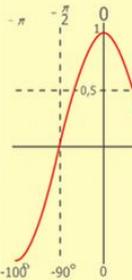
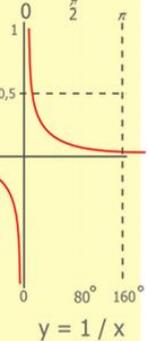
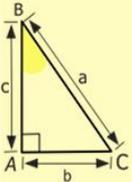
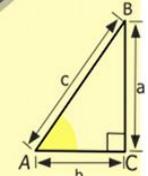
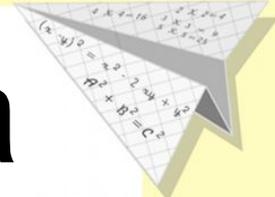
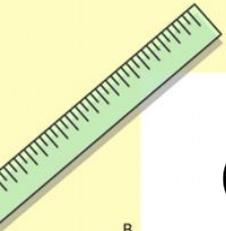
Физика твердого тела

Химия твердого тела

Кристаллография

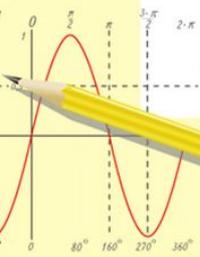
Материаловедение:

- космическое
- нанотехнологии



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

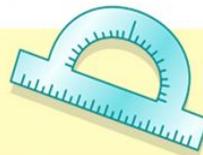
$$\begin{array}{l} 2 \times 2 = 4 \\ 3 \times 3 = 9 \\ 4 \times 4 = 16 \\ 5 \times 5 = 25 \\ 6 \times 6 = 36 \\ 7 \times 7 = 49 \\ 8 \times 8 = 64 \\ 9 \times 9 = 81 \end{array}$$



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

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

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

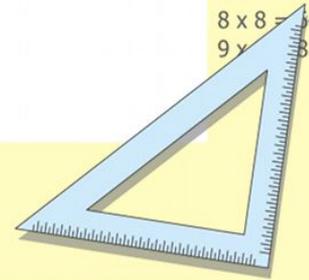


$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

$$x = 70$$

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

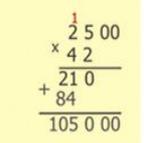
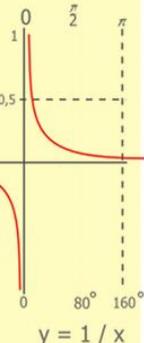
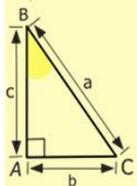
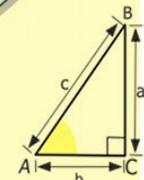
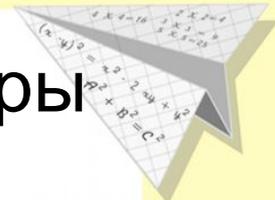
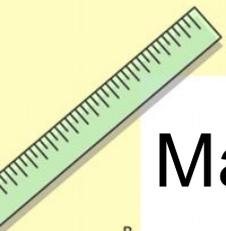


Конструкционными называют

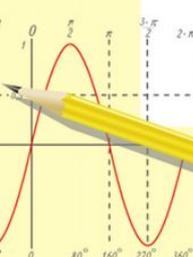
Материалы для изготовления конструкций (деталей машин и сооружений), несущих СИЛОВУЮ НАГРУЗКУ.

Определяющие параметры – МЕХАНИЧЕСКИЕ свойства

Критер кач-ва – 2мры сопротивления внешним нагрузкам - Прочность, вязкость, надежность, ресурс. До пром революции 18 в использовались дерево, камень, бронза, обожженная глина, стекло, железо, растительные и животные волокна.



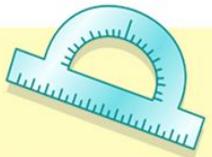
- 2 x 2 = 4
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$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

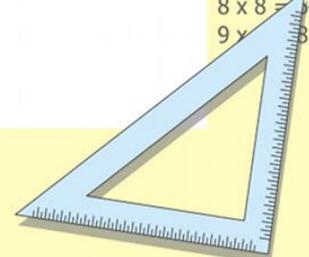
$$\sin 90^\circ = 1$$



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

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

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



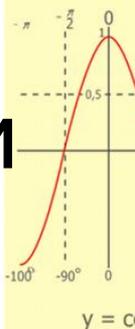
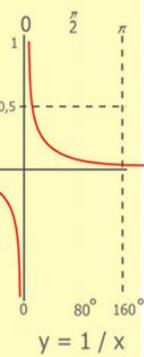
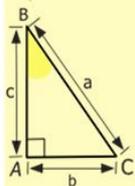
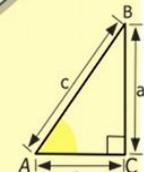
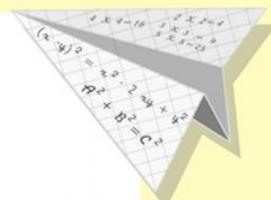
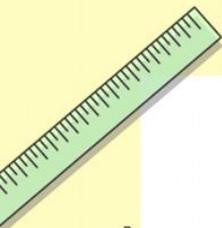
Классификация металлических КМ

Мет. конструкционные материалы

Черный металл и его сплавы –
железо, углеродистые стали, чугуны,
нержавеющие и легированные стали

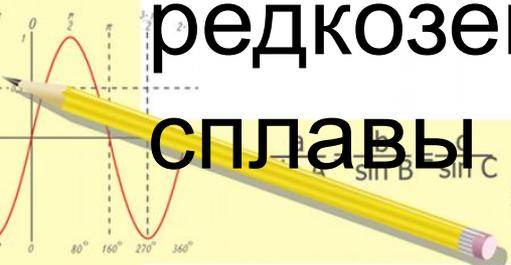
Цветной металл и его сплавы –
алюминий, медь, никель, магний,
олово, бериллий, цирконий, титан,
редкоземельные металлы и их

сплавы



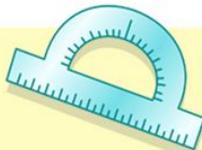
$$\begin{array}{r} 2500 \\ \times 42 \\ \hline 210 \\ + 84 \\ \hline 10500 \end{array}$$

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- $8 \times 8 = 64$
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$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

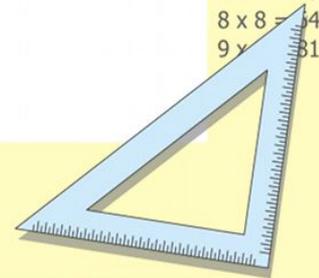
$$\sin 90^\circ = 1$$



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

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

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



Классификация конструкционных

Неметаллические конструкционные материалы.

Пластик,
полимеры,
стекло

Природный
камень,
огнеупорная
глина, резина.

Древесина,
ткань

Производство
строительных
материалов и
текстильных
изделий. Посуда
и др. предметы быта.

Производство
строительных
материалов, шины
автомобилей,
предметы быта.

Производство
одежды и обуви,
строительные
материалы.
мебель и
предметы быта.

Классификация конструкционных



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

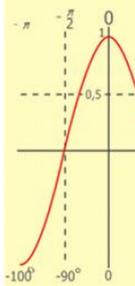
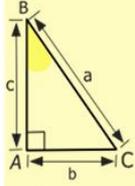
$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

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

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

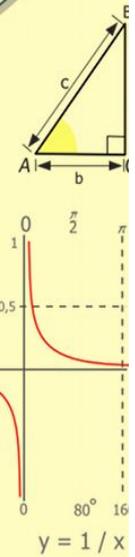
$$\begin{cases} y=1 \\ x=25+45 \\ x=70 \end{cases}$$

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

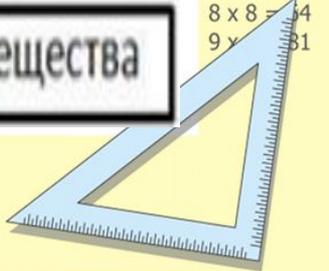
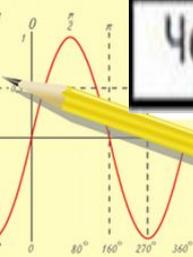


$$y = \cos$$

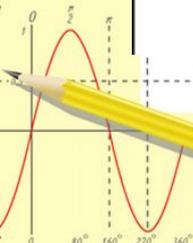
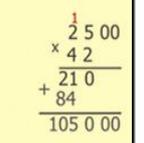
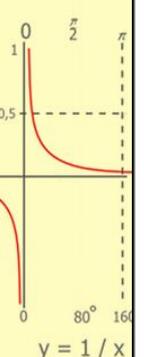
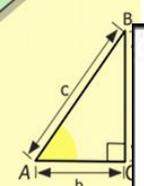
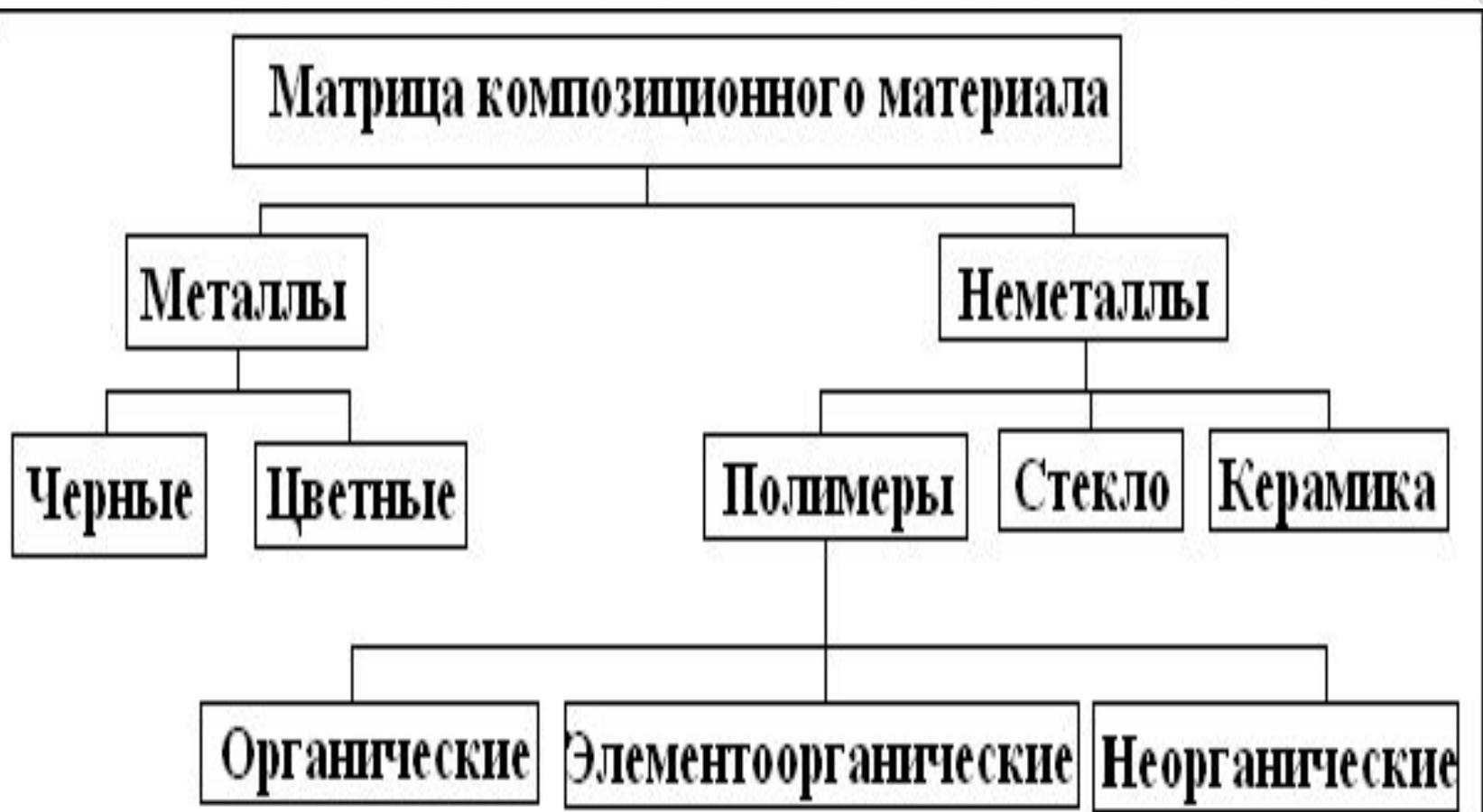
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$$\begin{array}{r} 2500 \\ \times 42 \\ \hline 210 \\ + 84 \\ \hline 105000 \end{array}$$

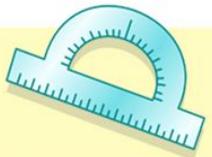


Классификация композитных материалов



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

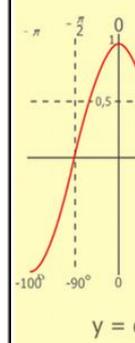
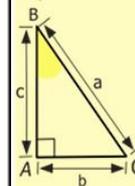
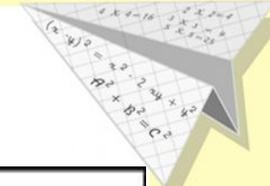
$$\sin 90^\circ = 1$$



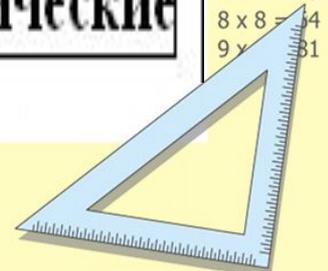
$$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$$

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

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



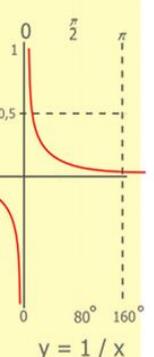
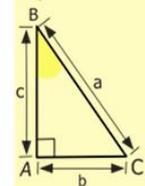
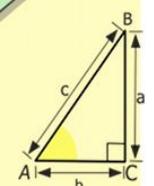
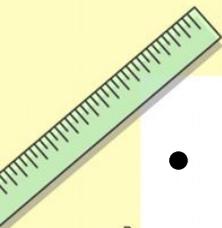
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Источники

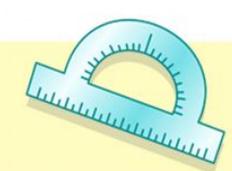
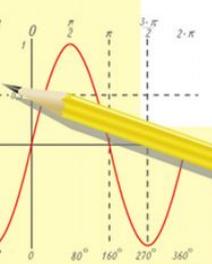
- Кудря А.В., проф. (НИТУ МИСиС), д.т.н. Материалы Научно-практического семинара «Экспертиза научно-технических проектов в области создания новых материалов и нанотехнологий, Москва 26 апреля 2013 года.

- <https://www.nde-ed.org/EducationResources/CommunityCollege/Materials/Introduction/classifications.htm>
- <https://ru.wikipedia.org/wiki/>



$$\begin{array}{r} 1\ 2\ 5\ 00 \\ \times 4\ 2 \\ \hline 21\ 0 \\ + 84 \\ \hline 105\ 0\ 00 \end{array}$$

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



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

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

