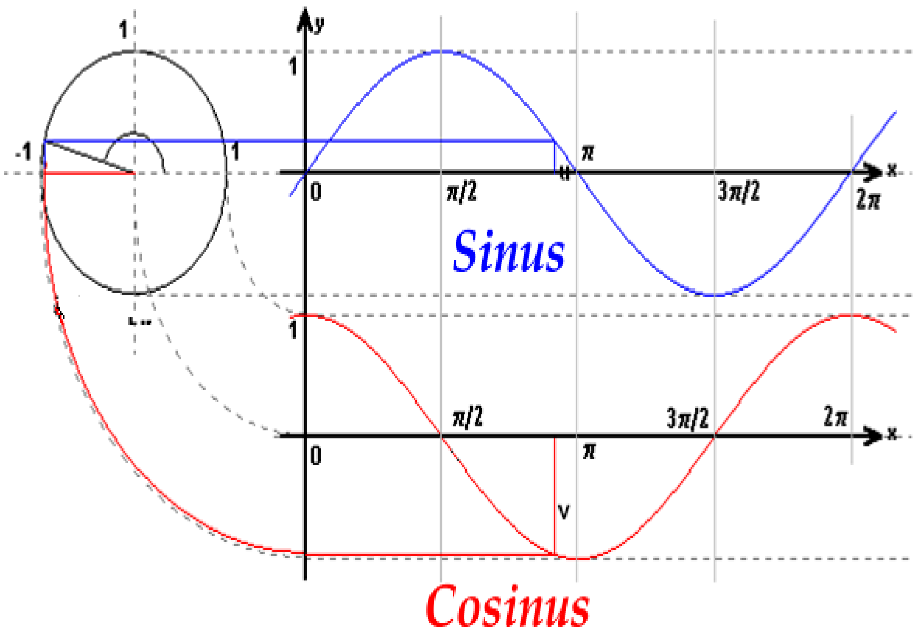
Examples of good practice

Mathematics

Teacher Adina Vasilica

Trigonometric functions sin & cos

- **General goals :**
- - forming skills and abbilities;
- - achieving and thoroughgoing study of new knowledge;
- **Operational goals :**
- - the pupils should be able to recognize different values in radians on the trigonometric circle;
- -- the pupils should use correctly the dynamic elements of the lesson;
- - the pupils should be able to establish correctly dhe differences between sin and cos
- **Didactic strategies :**
- - didactic methods and procedures: communication methods, practical activities methods, verifying and evaluating the results methods
- - frontal methods of organizing the lesson



LESSON PLANNING: TEACHER'S ACTIVITIES

1. **Preparing the pupils for the lesson (2 minutes)**
2. **Reviewing the useful knowledge and preparing the new lesson (7 minutes)**

- momentul **m1** : o scurtă amintire a funcției de trecere de la dreapta reală la cercul trigonometric şi a proprietăților acesteia ; activitatea desfăşurată de elevi reprezintă studiul reprezentării grafice pe cercul trigonometric a valorilor uzual întâlnite : valorile putând fi selectate de către elevi.

3. Teaching the new knowledge (**20 minutes**)

- momentul **m2 :** definirea funcțiilor sinus şi cosinus, reprezentarea acestora pe cercul trigonometric ; exemplu de aflare a funcțiilor uzuale.
- momentul **m3 :** prezentarea tabelului de valori al funcțiilor sin şi cos ; elevii studiază graficul funcției sinus pe intervalul, grafic ce face corespondența între cercul trigonometric şi dreapta reală.
- momentul **m4 :** proprietăți fundamentale ale funcțiilor : sin şi cos ; activitatea desfăşurată de elevi reprezintă validarea unei soluții trigonometrice de forma :

- Este studiată reducerea la primul cadran.

- momentul **m5 :** reprezentarea grafică a funcțiilor sinus şi cosinus, studiul semnului acestora pentru cele IV cadrane.

4. Fixing and strenghtening the knowledge acchieved (**10 minutes**)

- momentul **m6 :** profesorul discută reprezentările grafice ale funcțiilor în acelaşi sistem de axe.

5. Test (**10 minutes**)

- fiecare elev va răspunde la 5 întrebări propuse ce vor constitui pentru profesor o metodă de verificare / evaluare activă şi dinamică a rezultatelor .

6. Homework (**1 minute**)

SIN

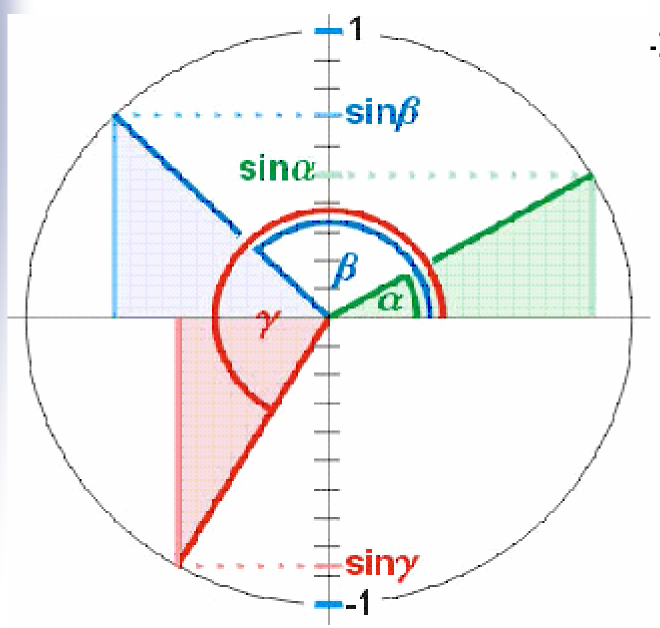
Domeniu f: -∞ < x <∞

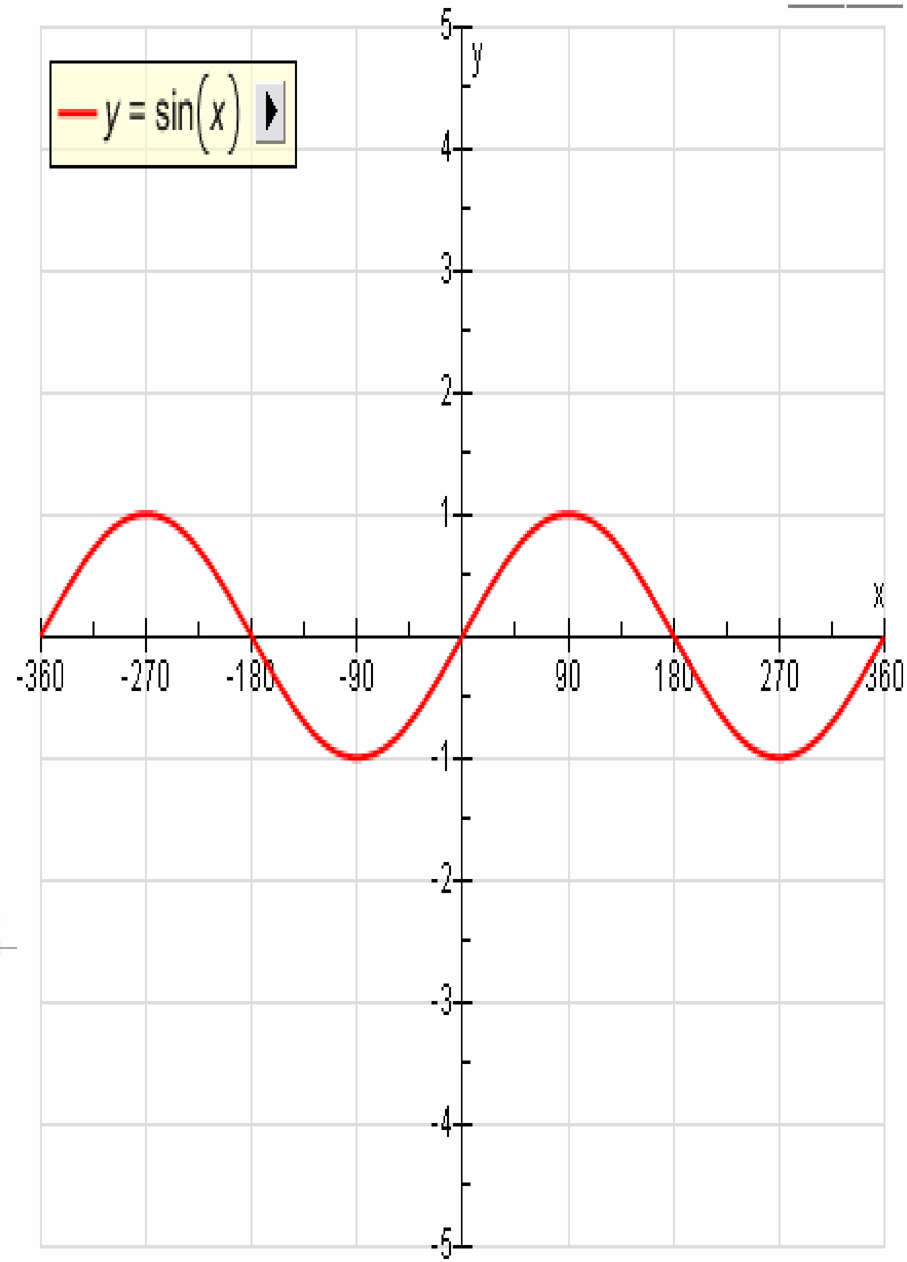
Codomeniu f:-1 ≤ y ≤1

Perioada: 2π

sin(x+ 2kπ) =sinx

sin(-x)=-sinx **–functie impara**





COS

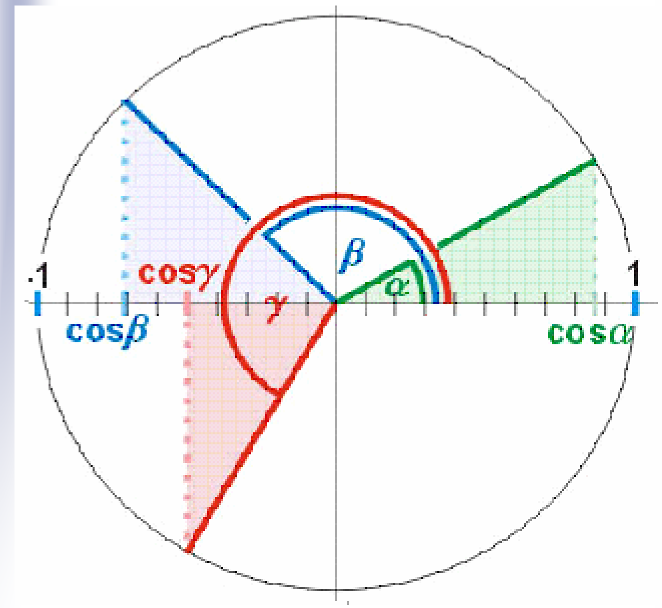
Domeniu f: -∞ < x <∞

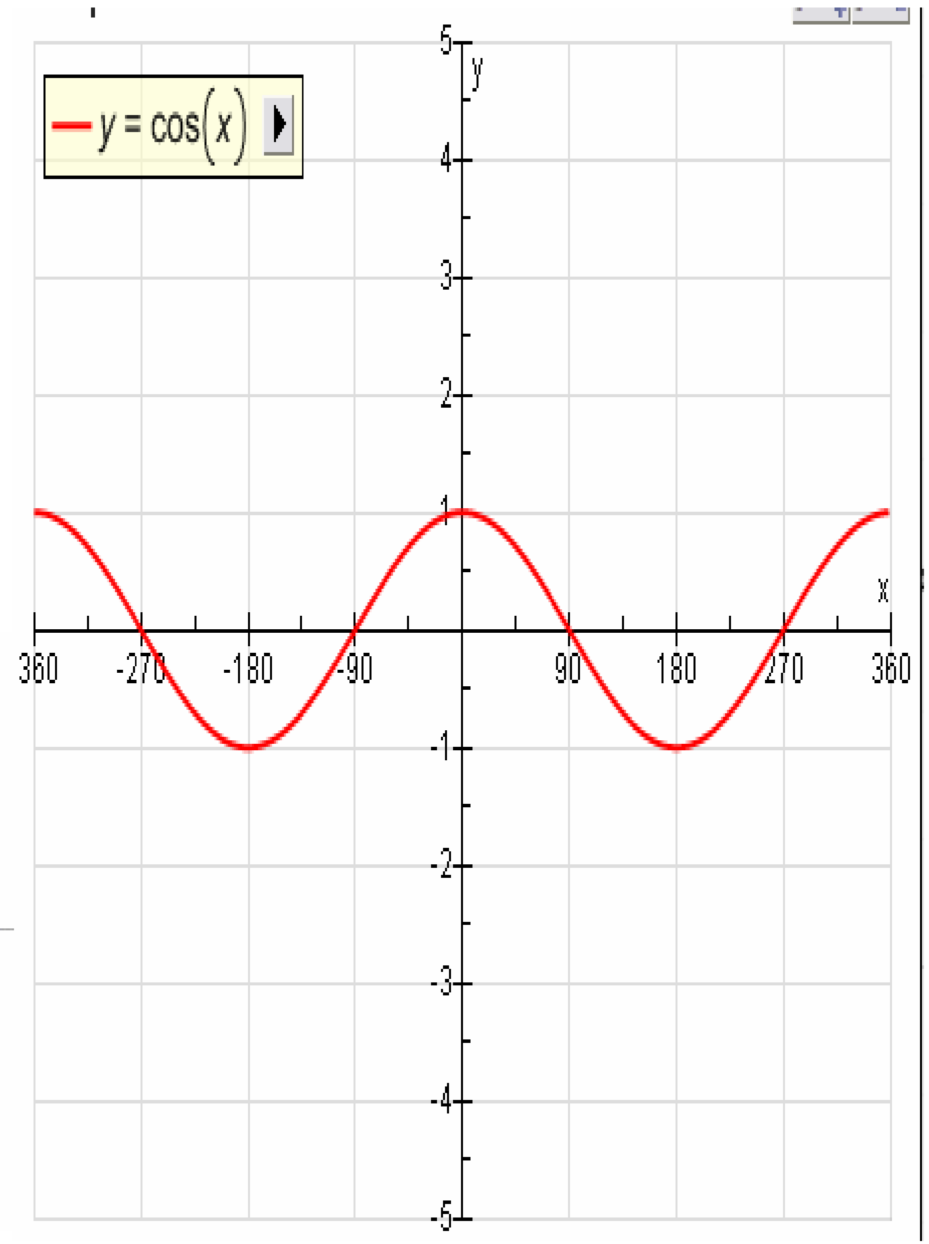
Codomeniu f:-1 ≤ y ≤ 1

Perioada: 2π

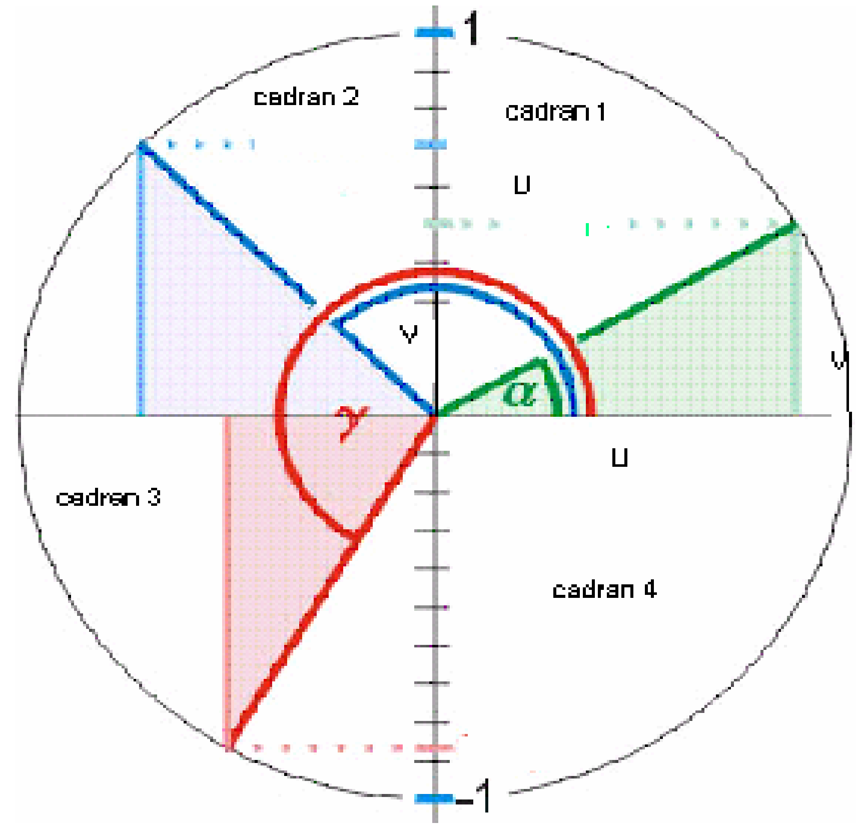
cos(x+ 2kπ) =cosx

cos(-x)=cosx **– functie para**



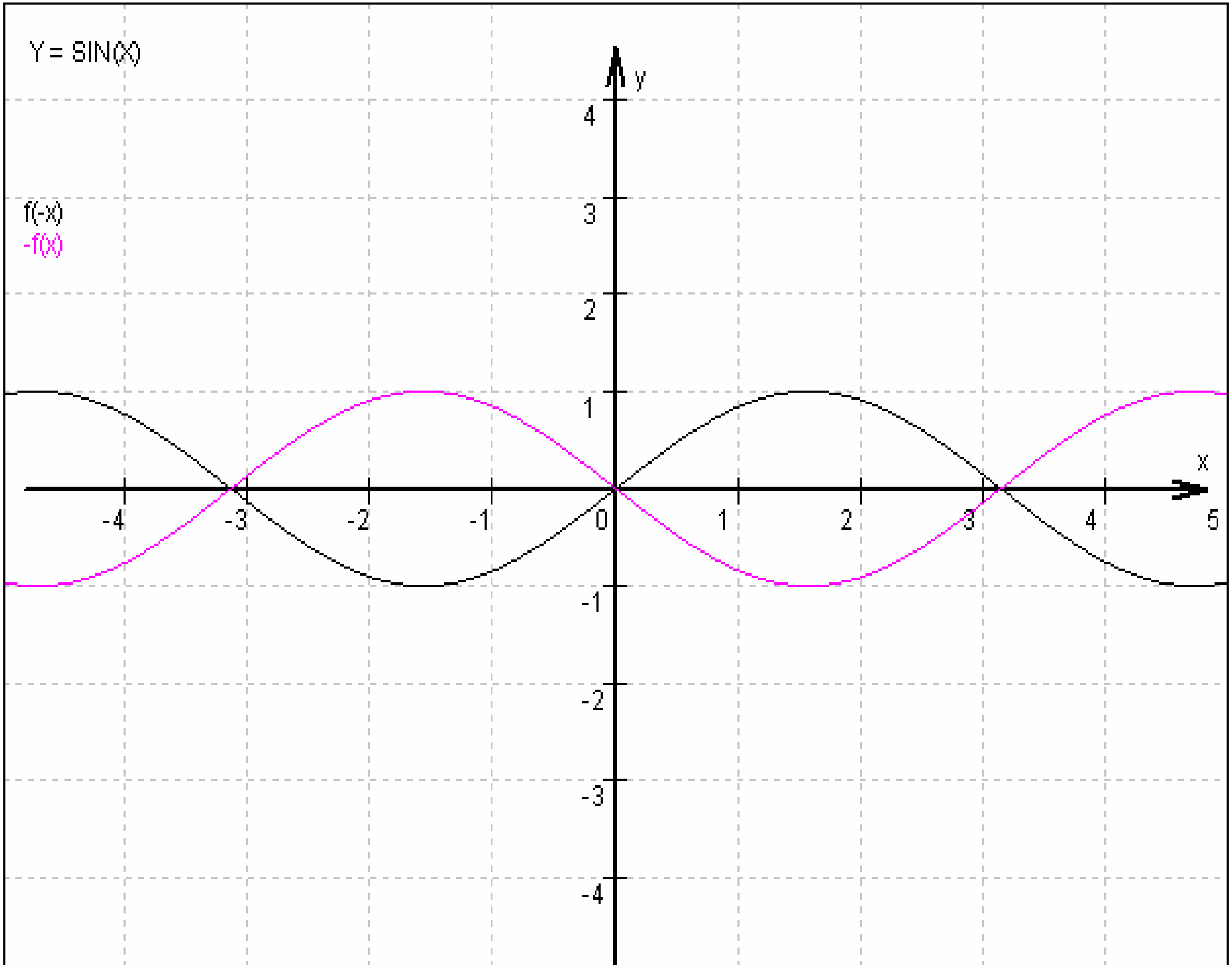


- $y = \sin \alpha = v$
- $y = \cos \alpha = u$

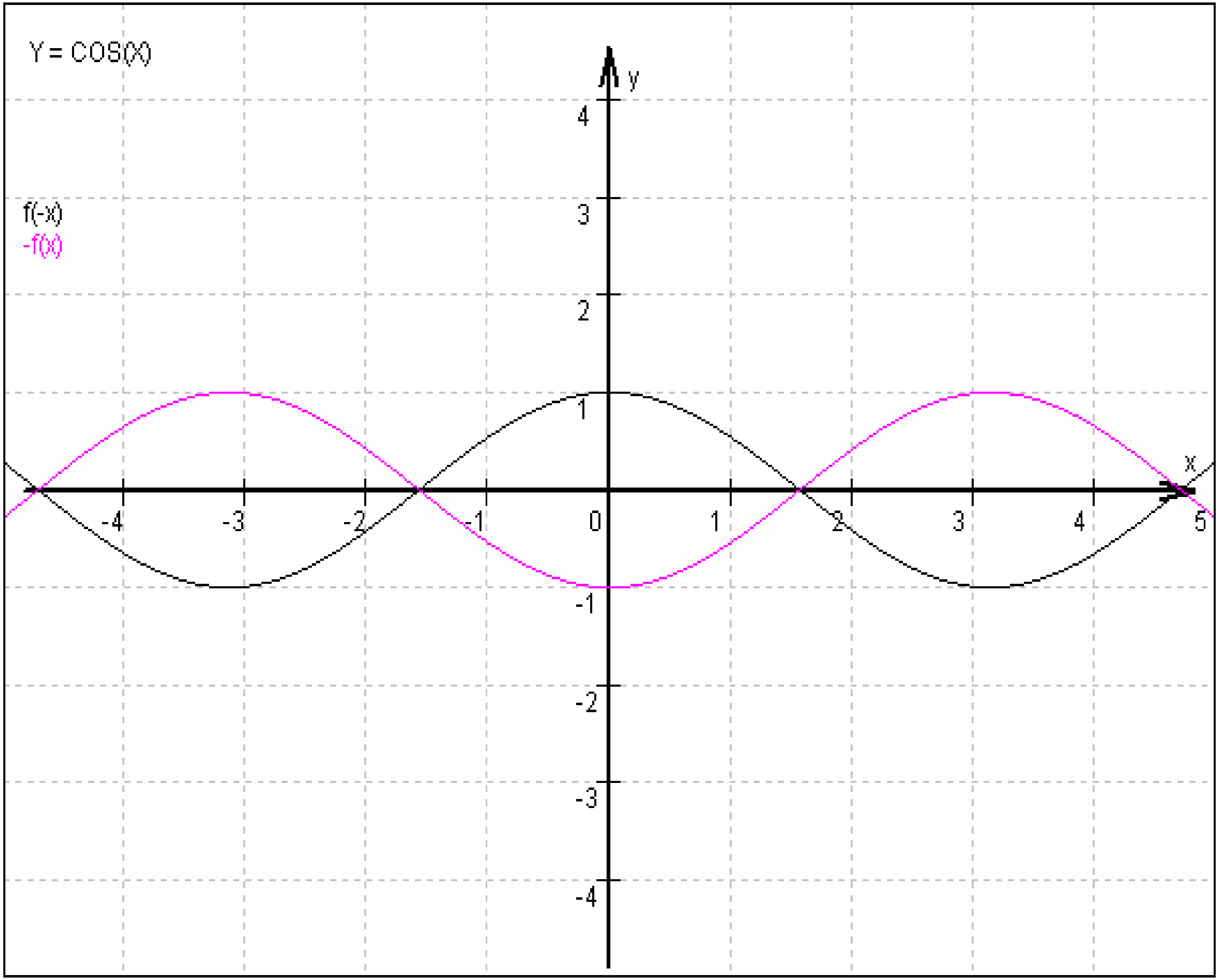


Cadran	**1**	**2**	**3**	**4**
	x	**π -x**	**π +x**	**2 π -x**
sinus	sinx	sinx	-sinx	-sinx
cosinus	cosx	- cosx	- cosx	cosx

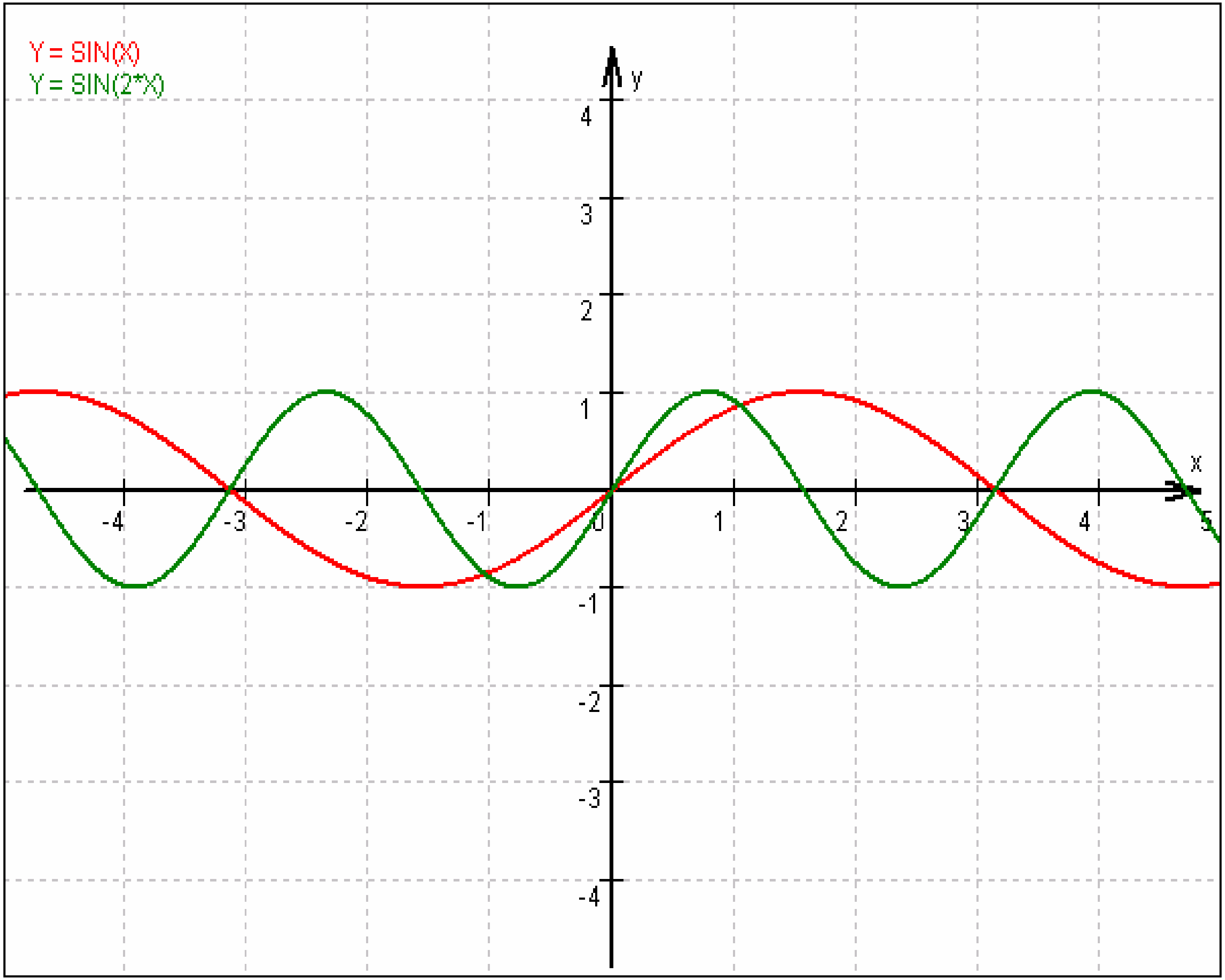
$Y = f(x) = \sin(x)$; $f(-x) = \sin(-x) = -\sin(x) = -f(x)$



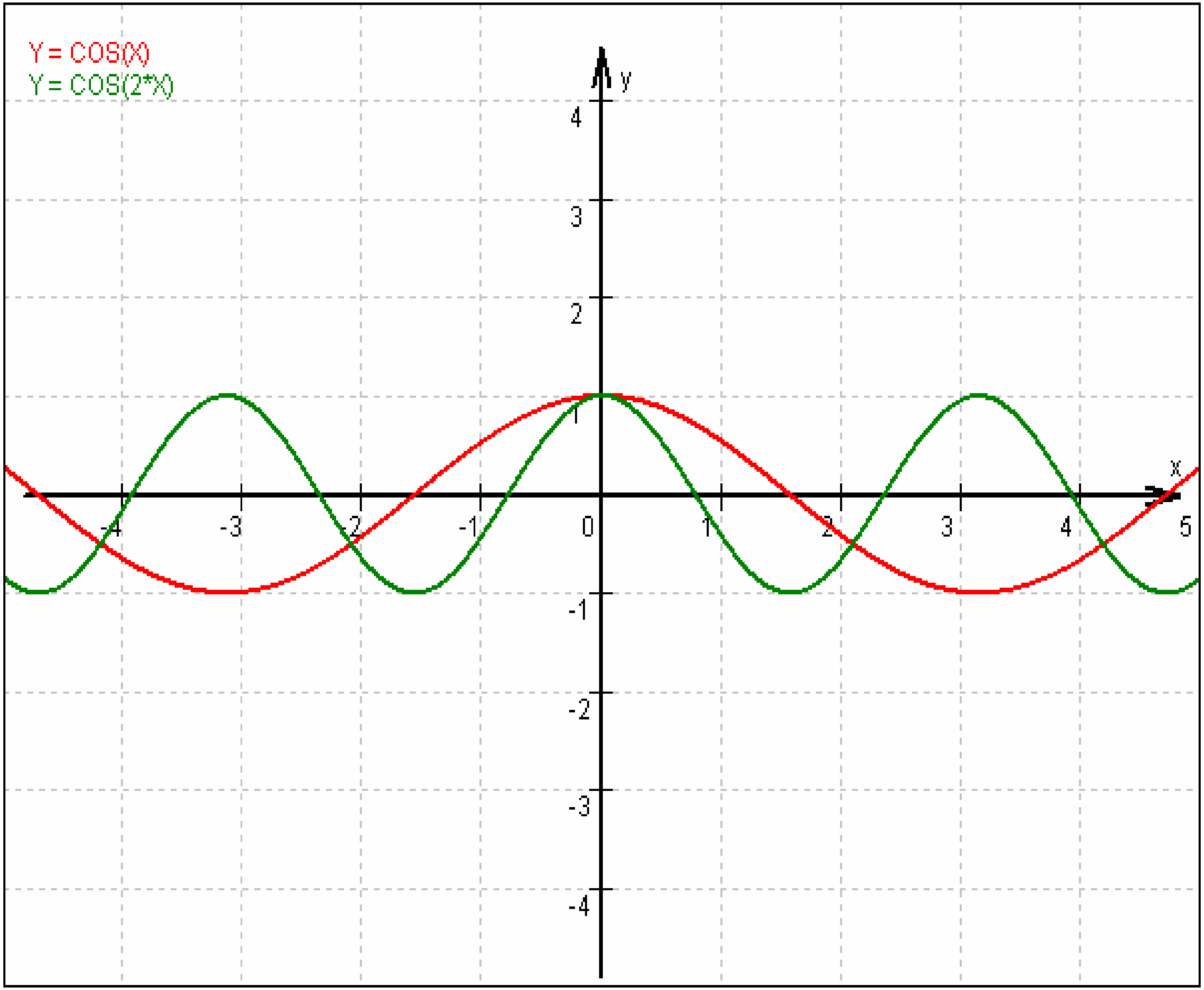
Y= f(x)= cos(x);   f(-x)= cos(-x)= cos(x);   -f(x)= -cos(x)



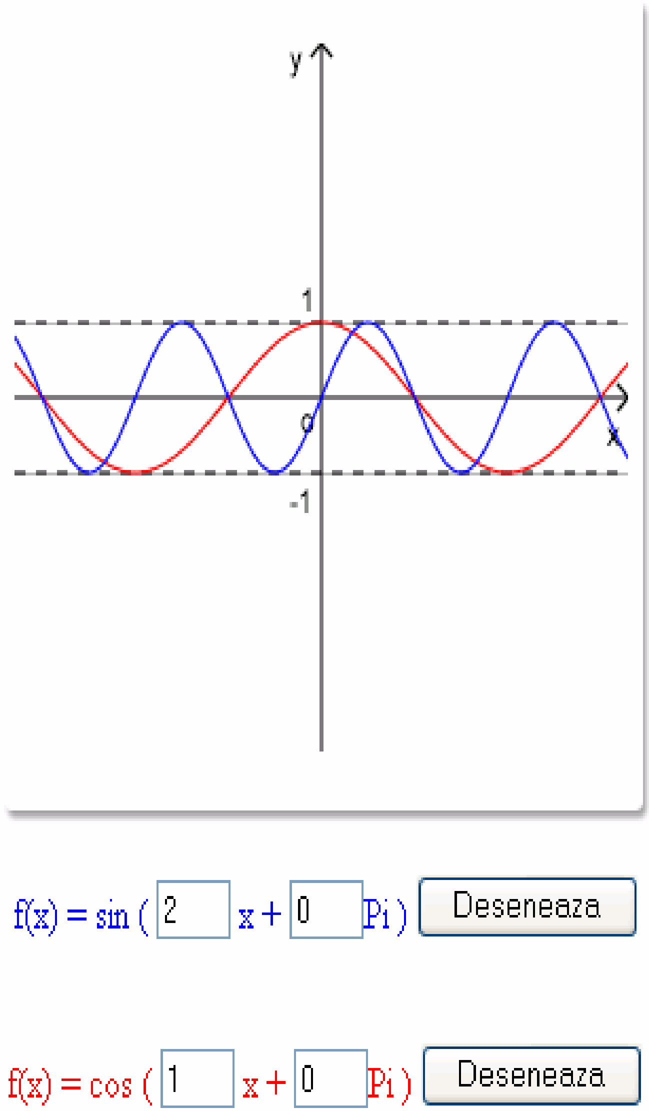
f(x)=sin x ; g(x)=sin(2x)



f(x)=cos x ; g(x)=cos (2x)

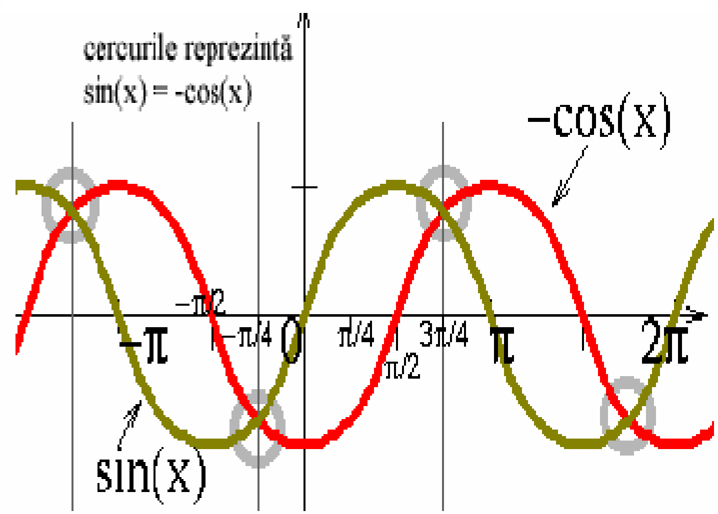


AEL exercises:



Exercițiu :

Studiați figurile următoare discutându-le pe fiecare detaliat :



Applications with definite integral in Plan Geometry

Ariile unor suprafețe plane

- f:[a;b]→R- functie continua,f(x)≥0 iar Γf ={(x,y)|a≤x≤b,0≤y≤f(x)} este subgraficul lui f, atunci Γf are aria:

$$\text{aria}(\Gamma f)=\int_a^b f(x)dx$$

1. Dacă f(x)≥0 atunci

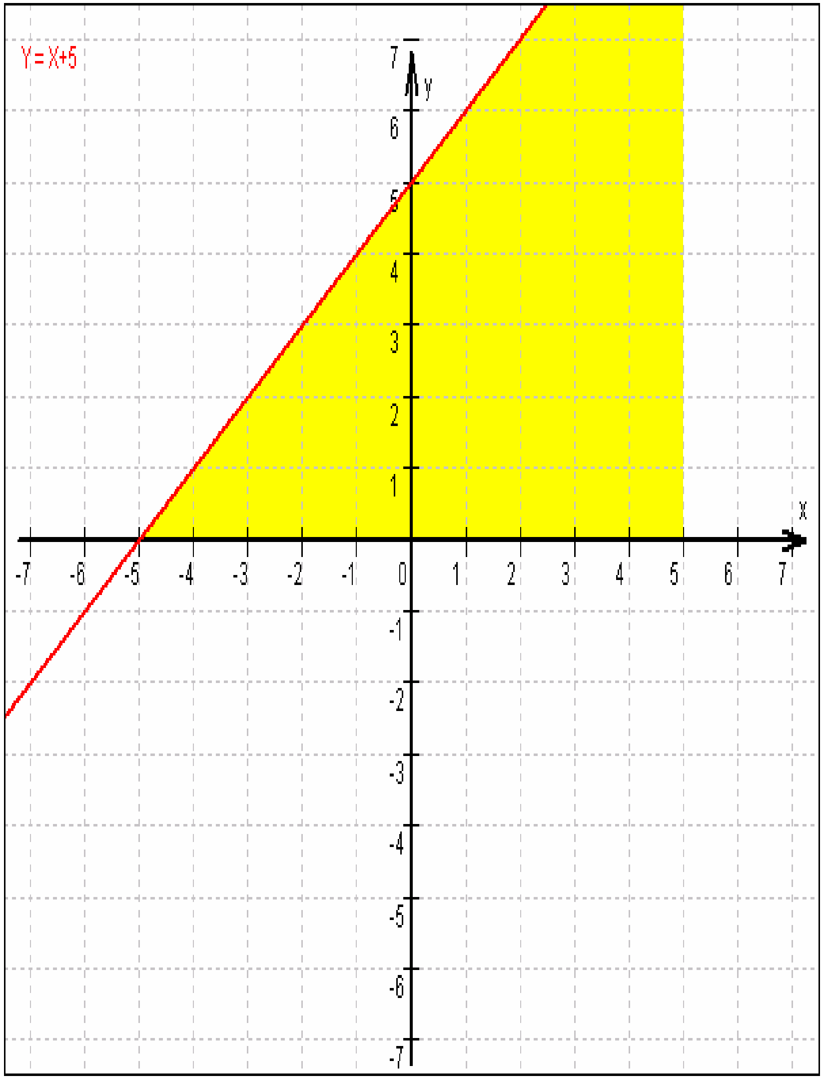
$$\text{aria}(\Gamma f)\geq 0$$

2. Dacă f(x)≤0 atunci graficul lui f este sub axa Ox

şi $$\text{aria}(\Gamma f)=-\int_a^b f(x)dx$$

3. Dacă f,g:[a;b]→R-funcții continue, f(x)≤g(x), (∀)x∈[a;b] atunci

$$\text{aria}(\Gamma f)=\int_a^b [g(x)-f(x)]\,dx$$



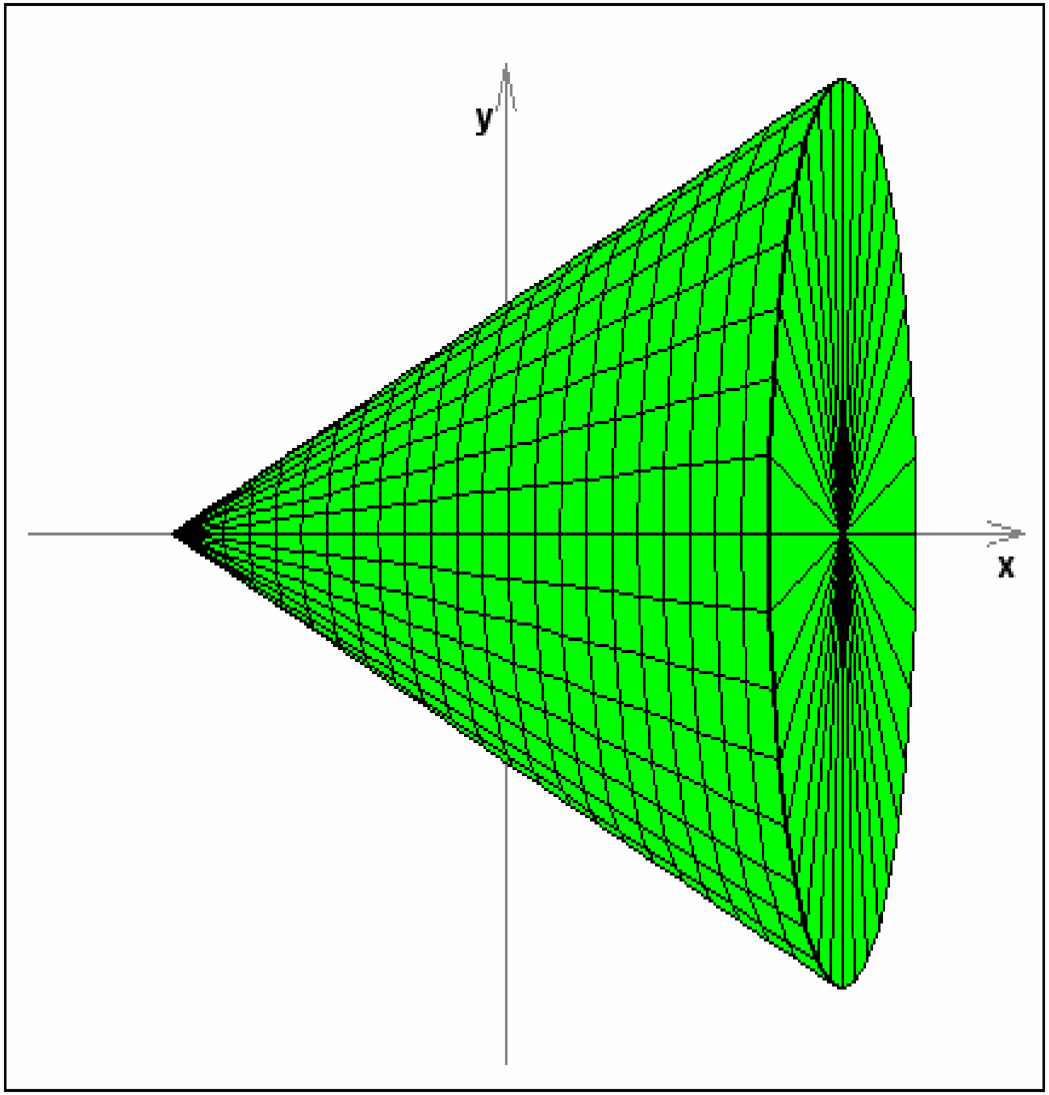
Ex: f(x)=x+5 ; aria(Γf)=50

Applications with definite integral in Space Geometry

Volumele corpurilor de rotație

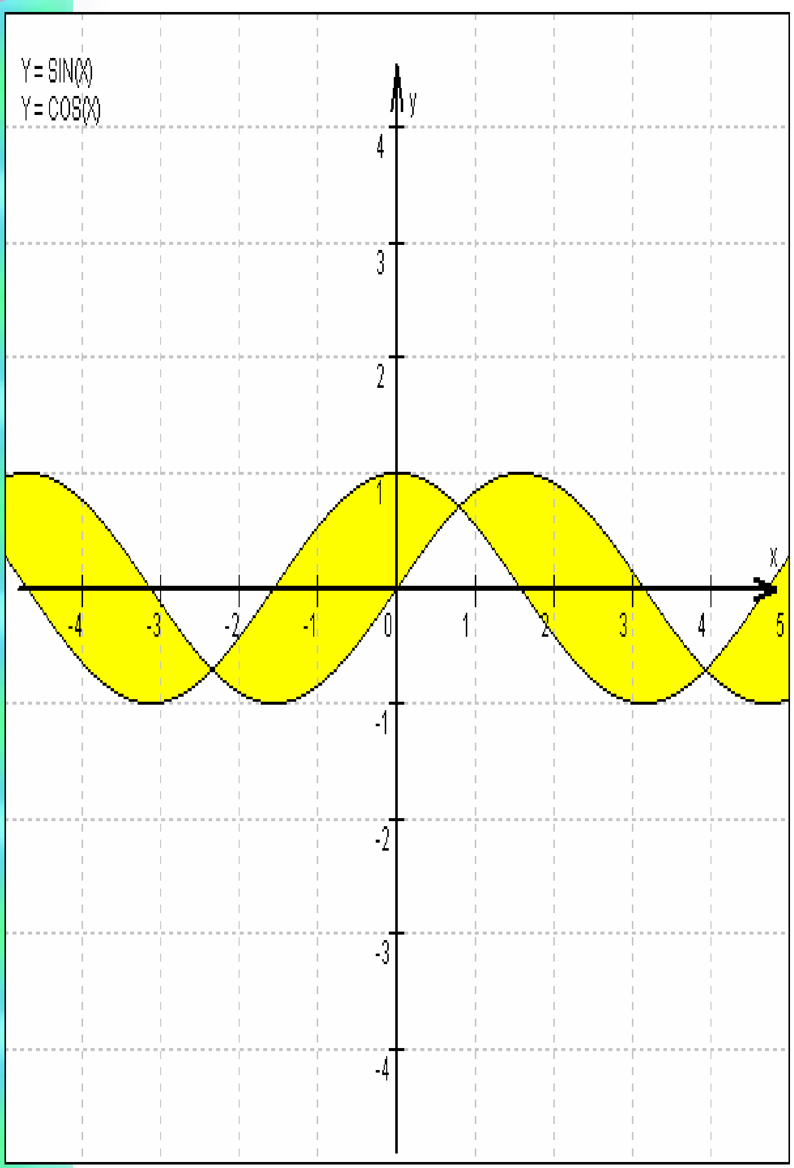
- f:[a;b]→[0;∞) -functie continua atunci corpul de rotatie determinat de f are volumul

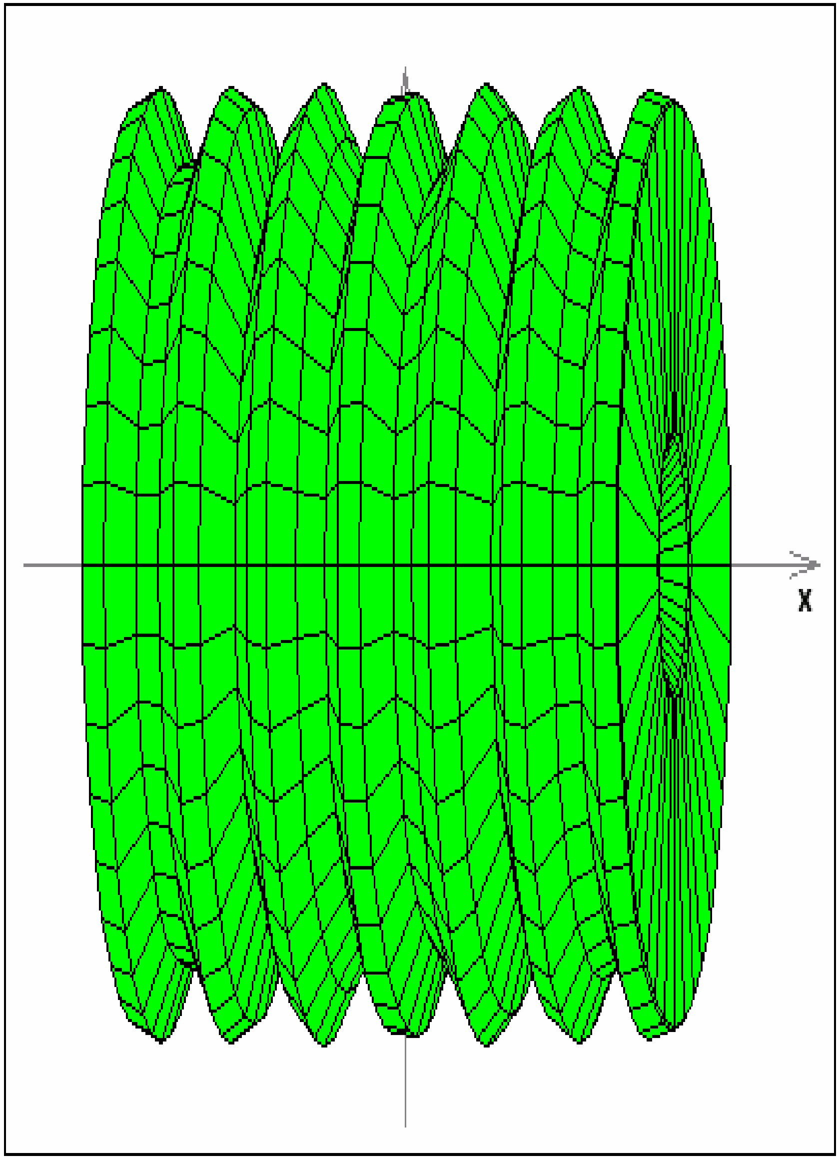
$$V(cf)= \pi \int_a^b f^2(x)dx$$



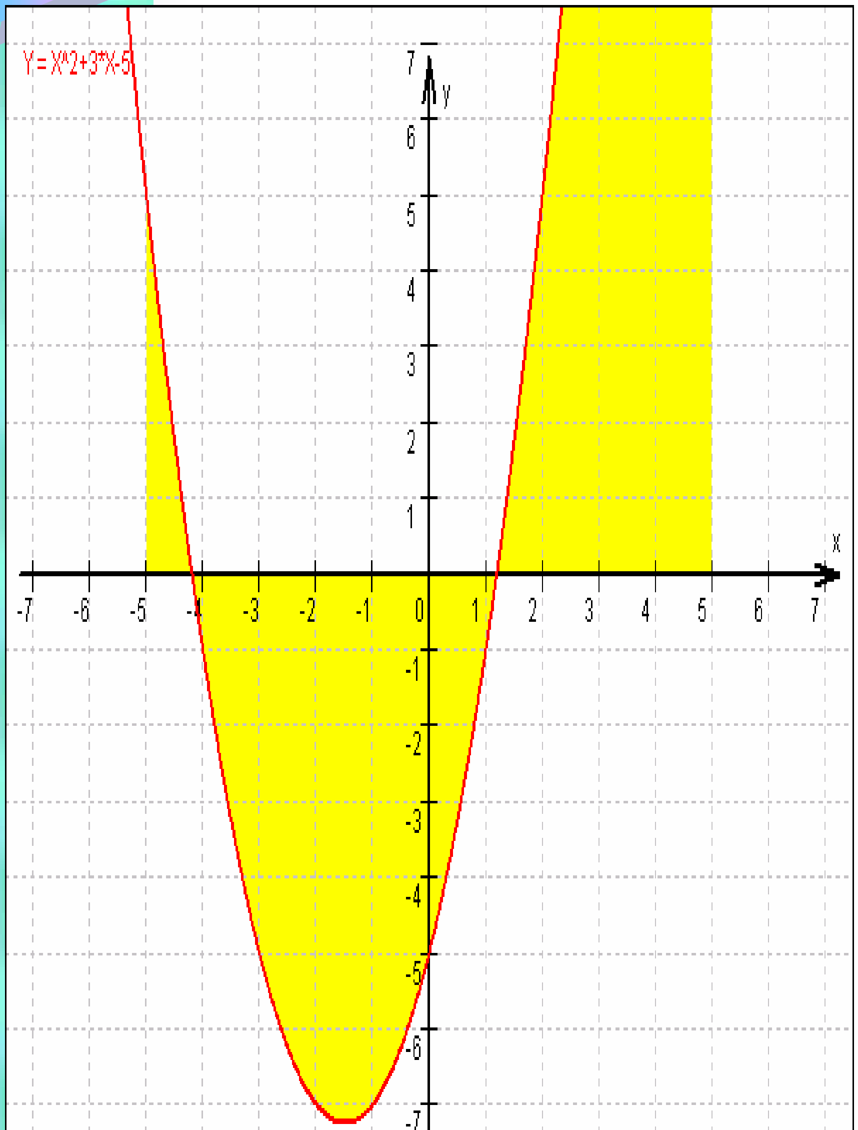
Ex: f(x)=x+5; V(Cf)=(1000/3)π

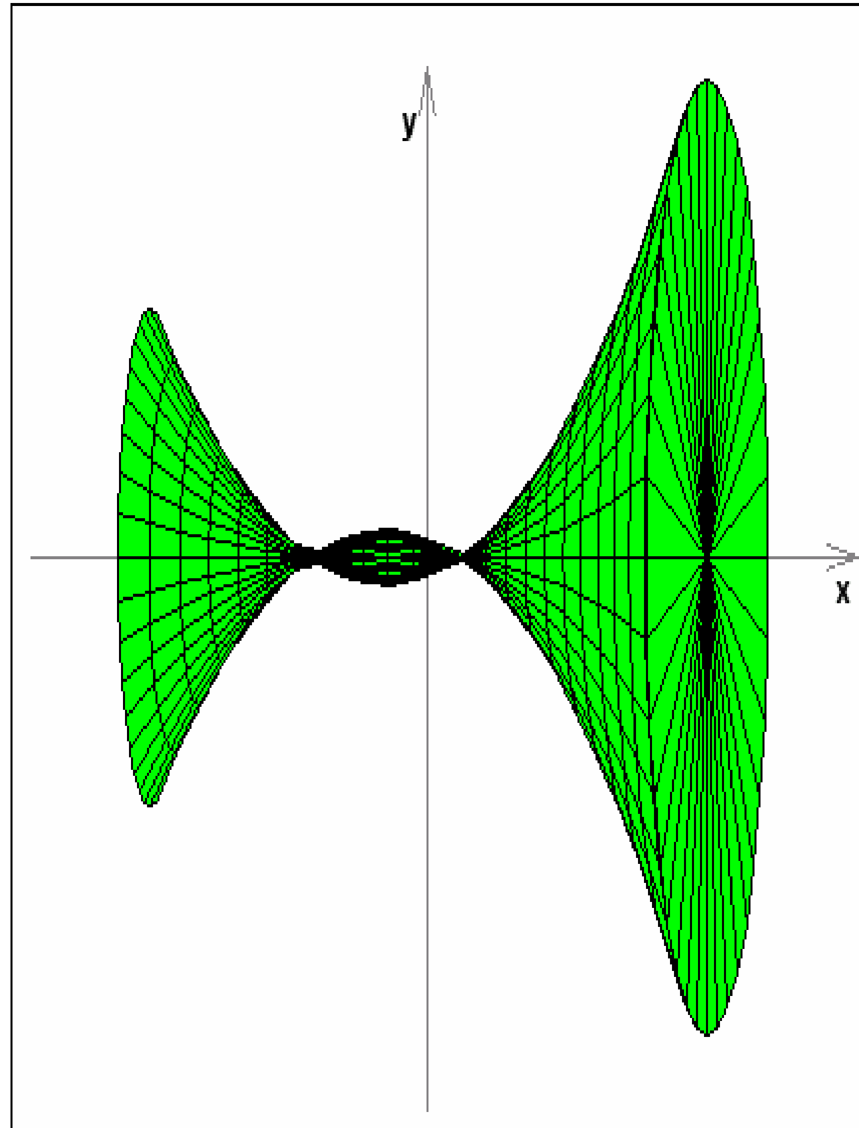
Ex: f(x)= sin(x), g(x)=cos(x)



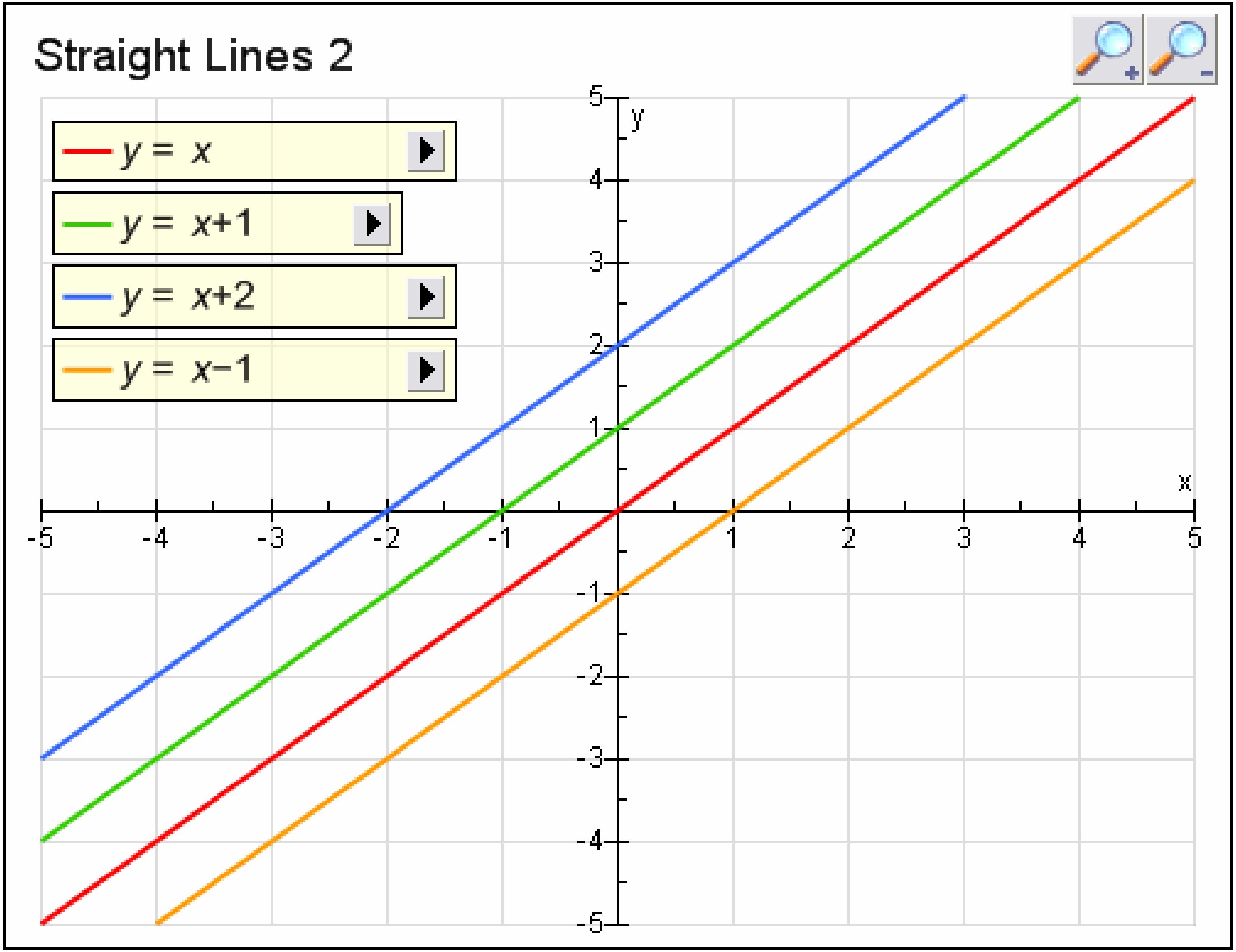


Ex: $f(x)=x^2+3x-5$

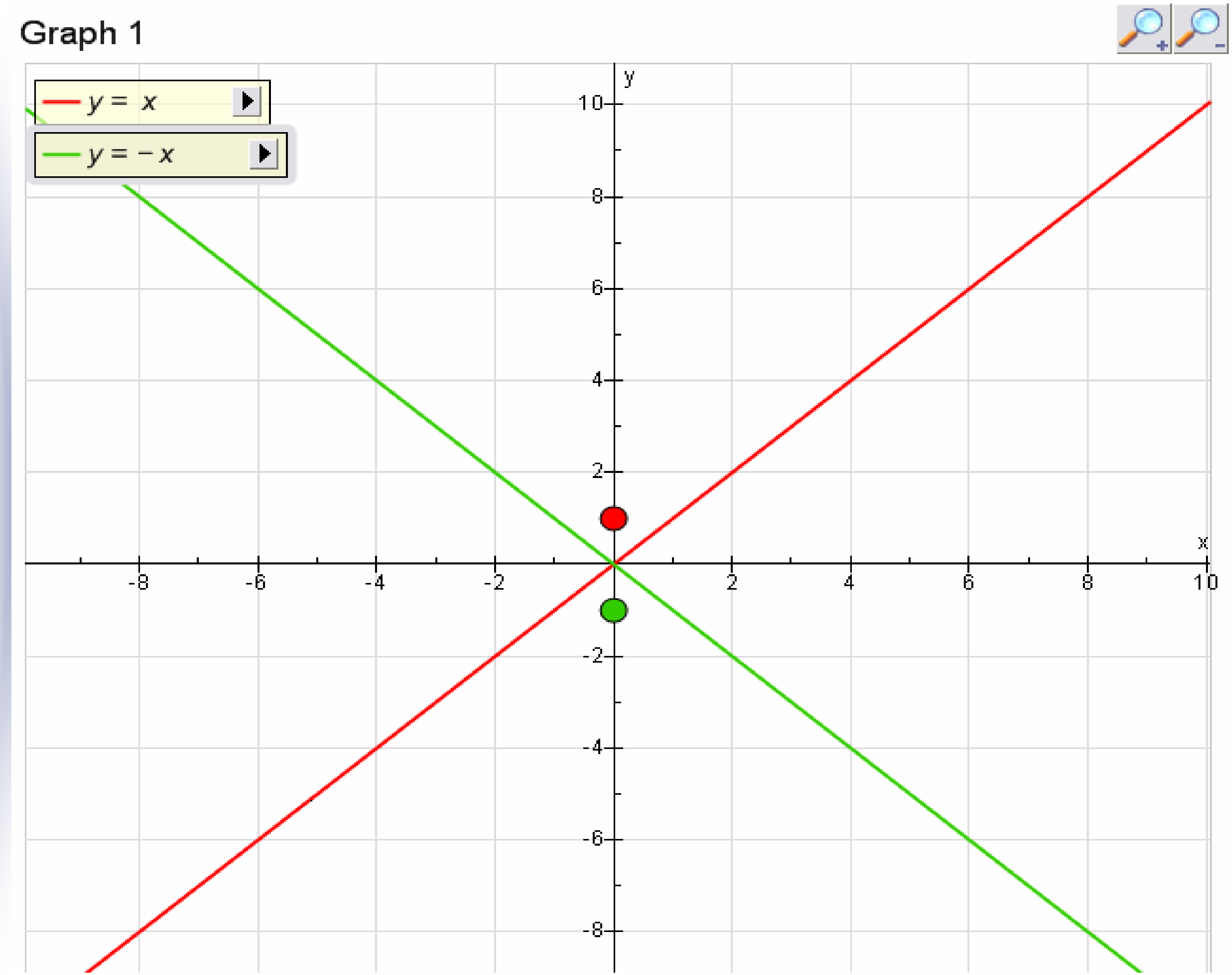




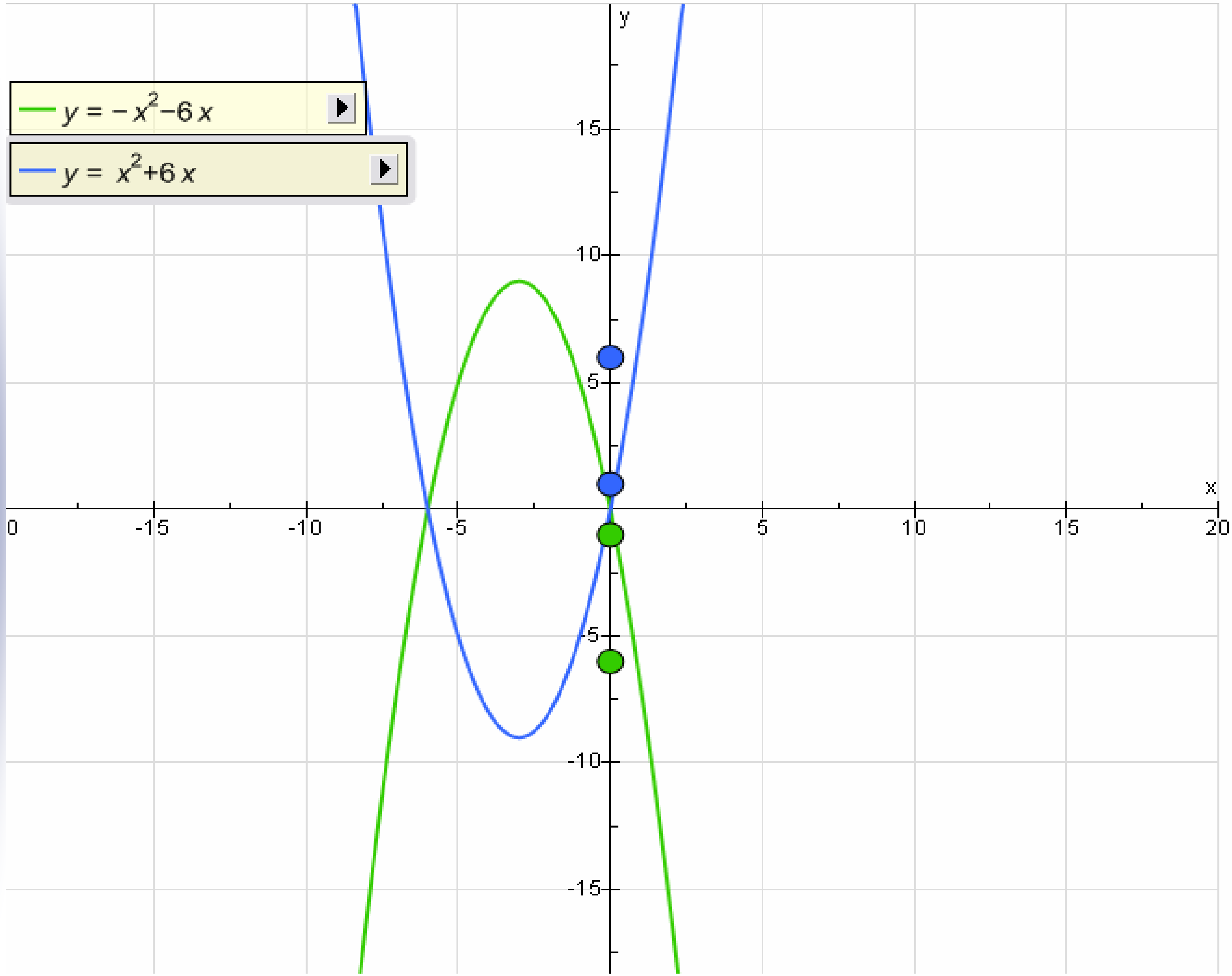
Crocodile Mathematics



Crocodile Mathematics



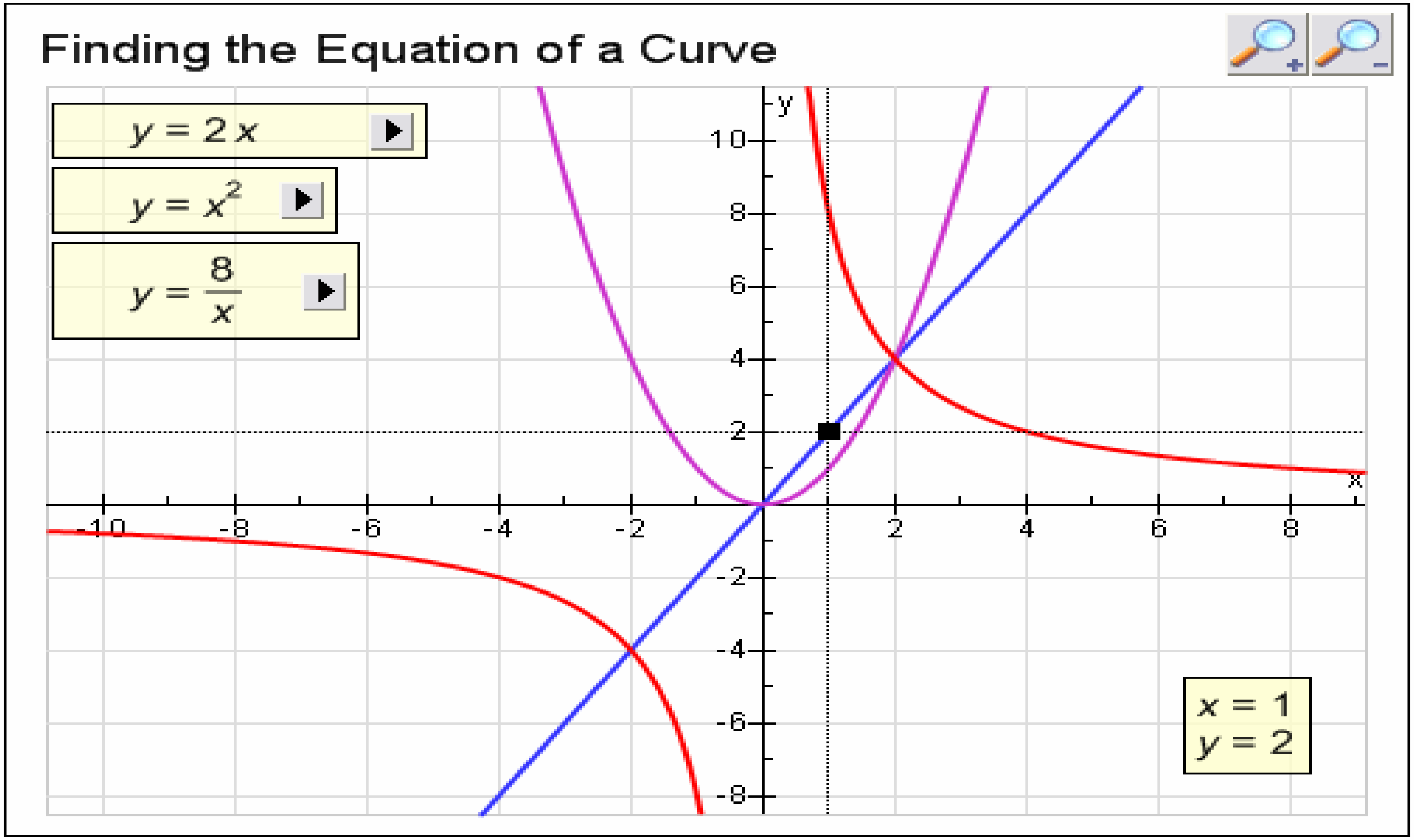
Crocodile Mathematics



Crocodile Mathematics

Finding the Equation of a Curve

For each curve move the trace point through x values of 1, 2, 3, 4 etc., making note of the x and y values at each point. From this work out which equation relates to which curve.



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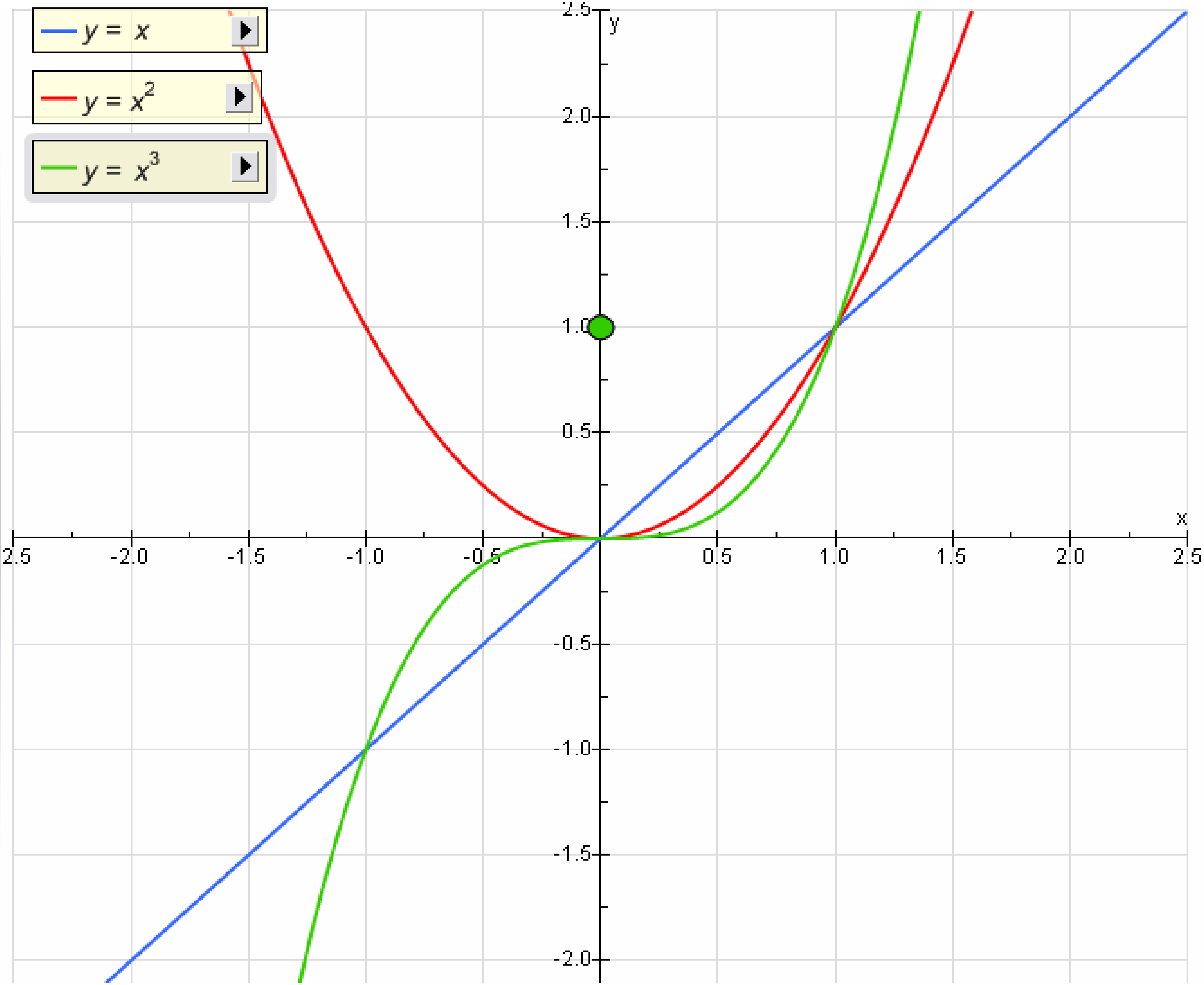

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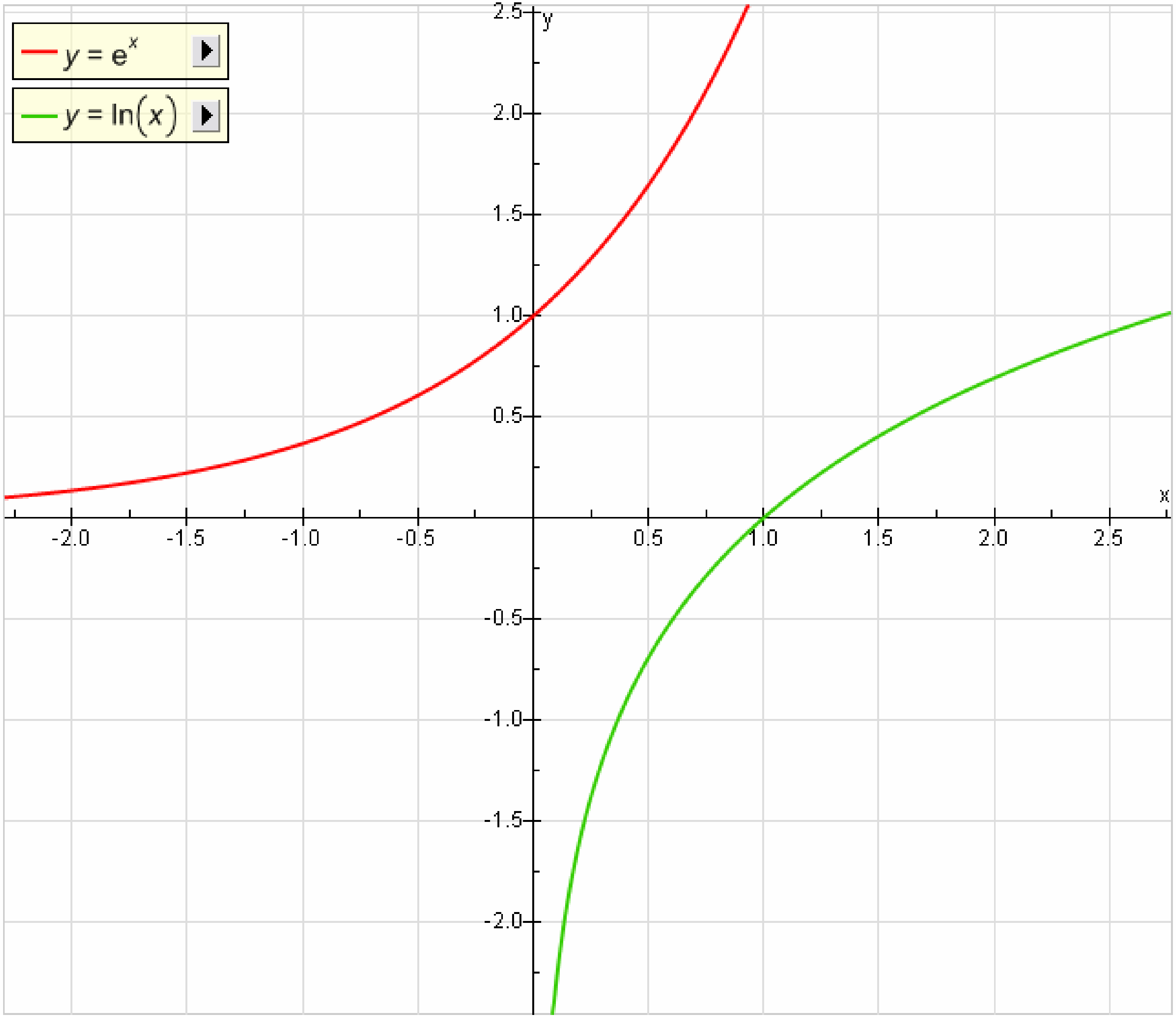

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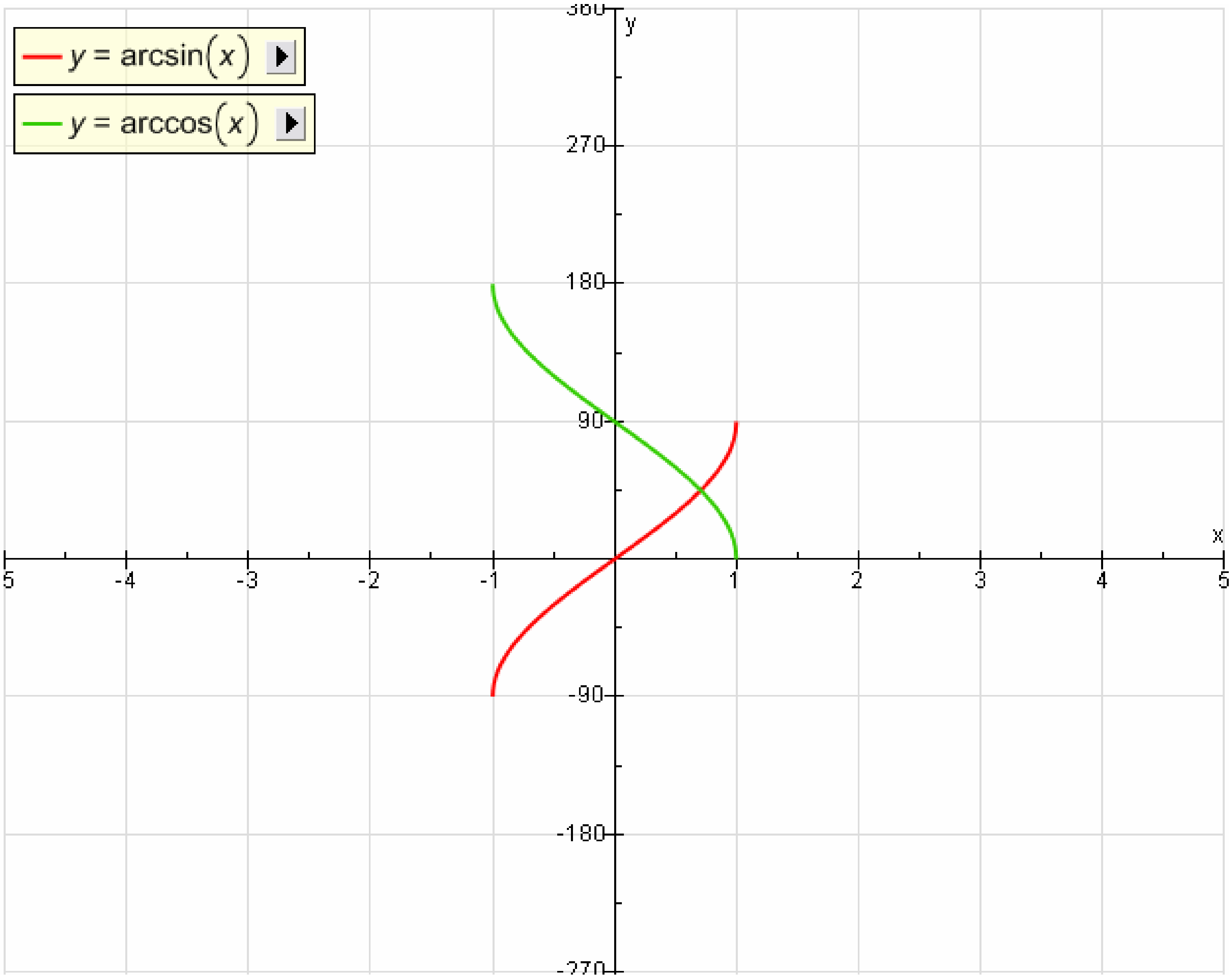
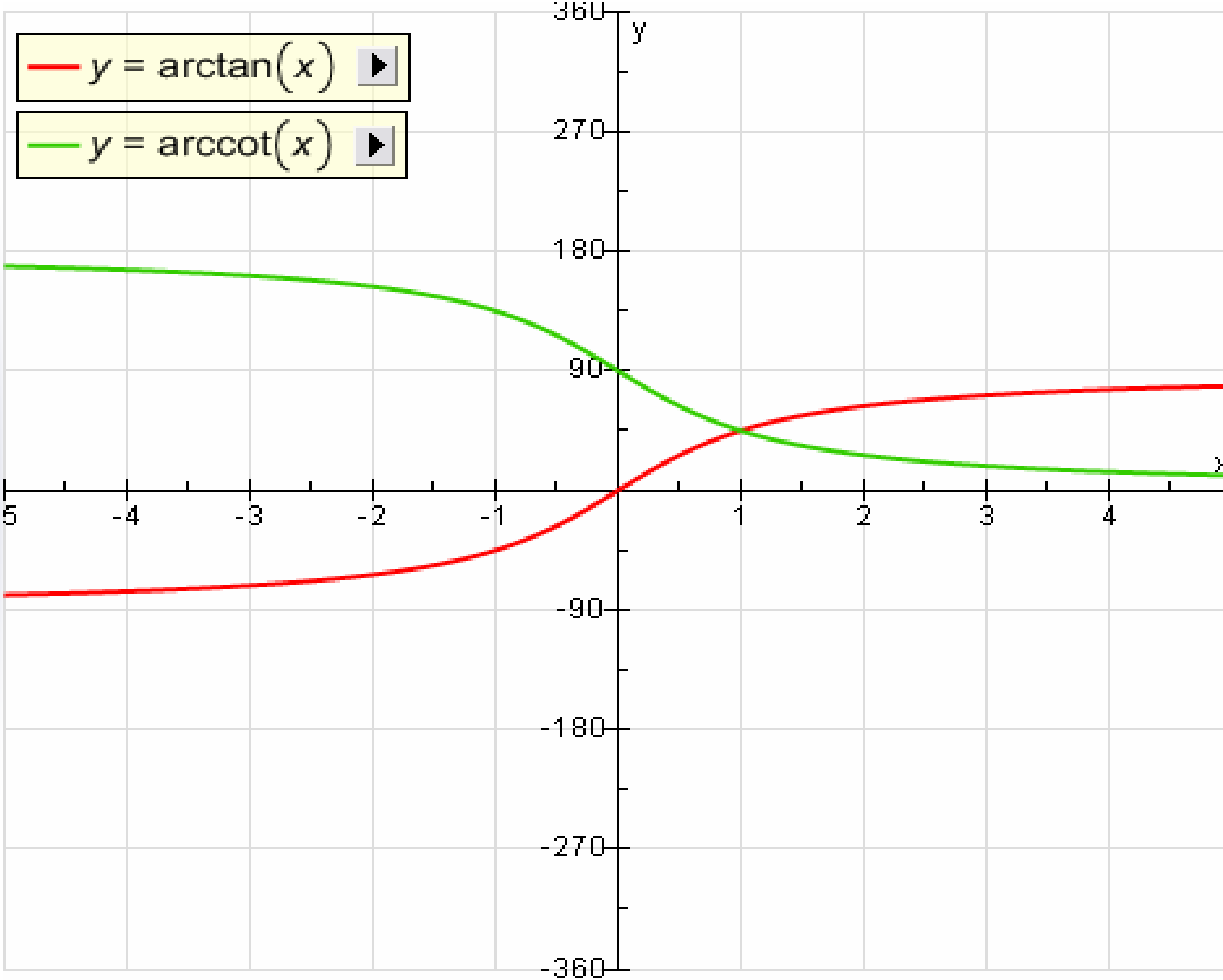


Crocodile Mathematics

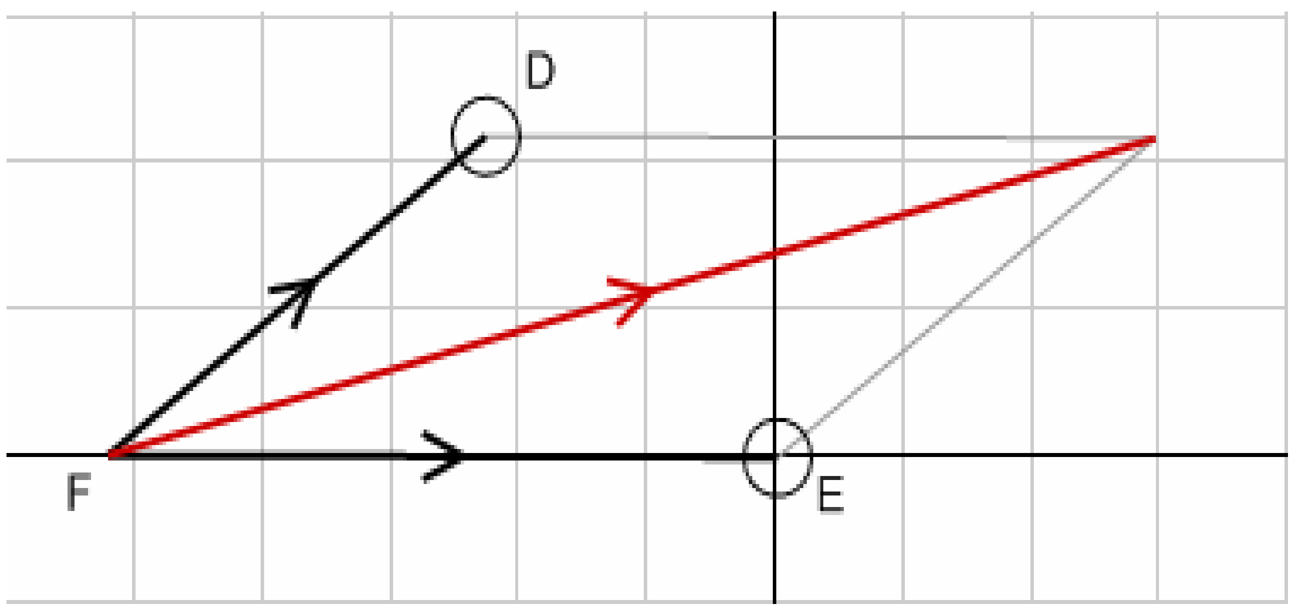


Crocodile Mathematics

Adding Vectors With Parallelograms

One way of adding vectors is shown below:

- draw the two vectors from the same point (FD and FE)
- draw parallel lines to complete the parallelogram
- the resultant is the vector from the starting point to the opposite corner of the parallelogram.

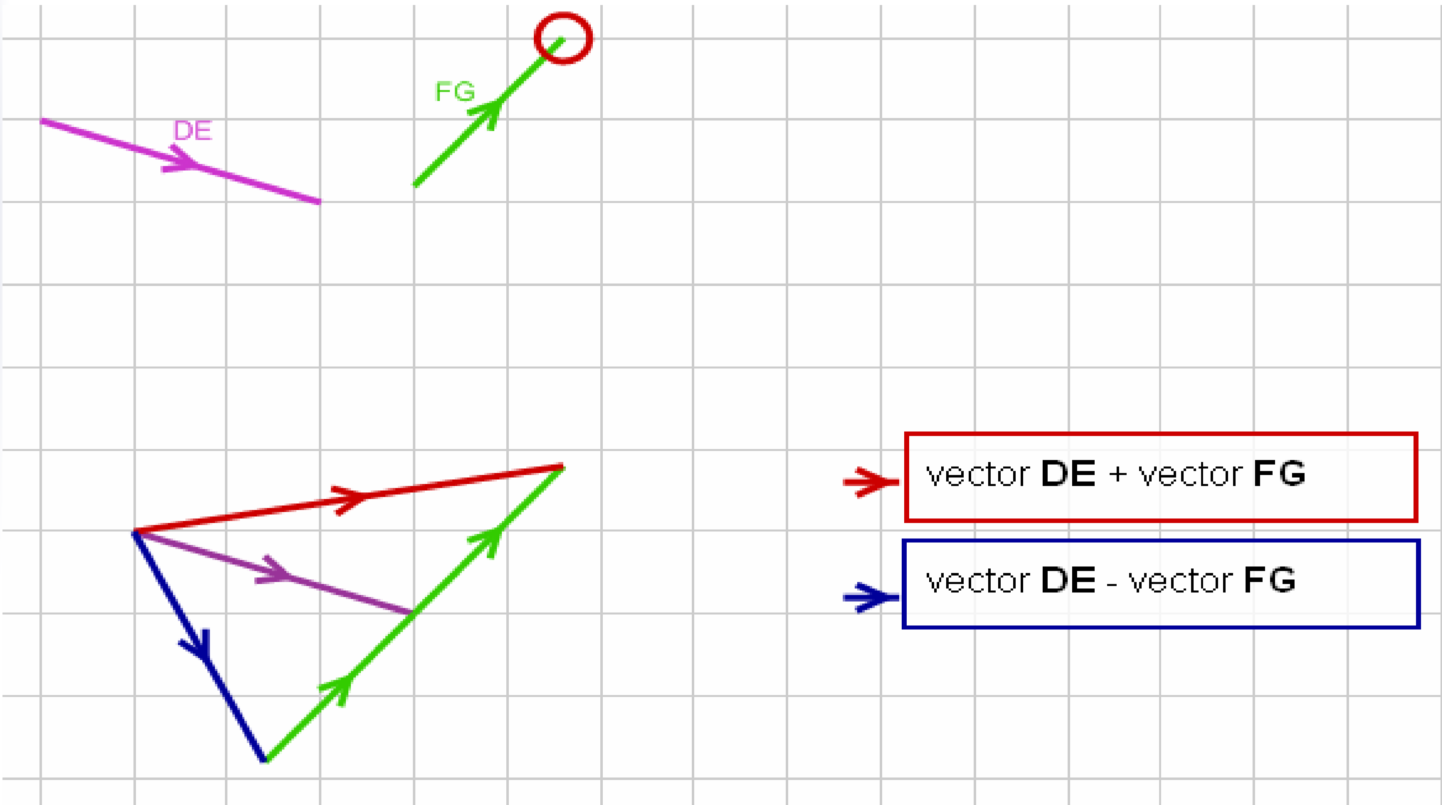


Crocodile Mathematics

Adding and Subtracting Vectors

You can move the vector FG below by dragging the red circle. Below them a diagram shows the result of adding vector DE to vector FG, and the result of subtracting vector FG from vector DE

Subtracting vector FG from vector DE is the same as adding the inverse of vector FG to vector DE.

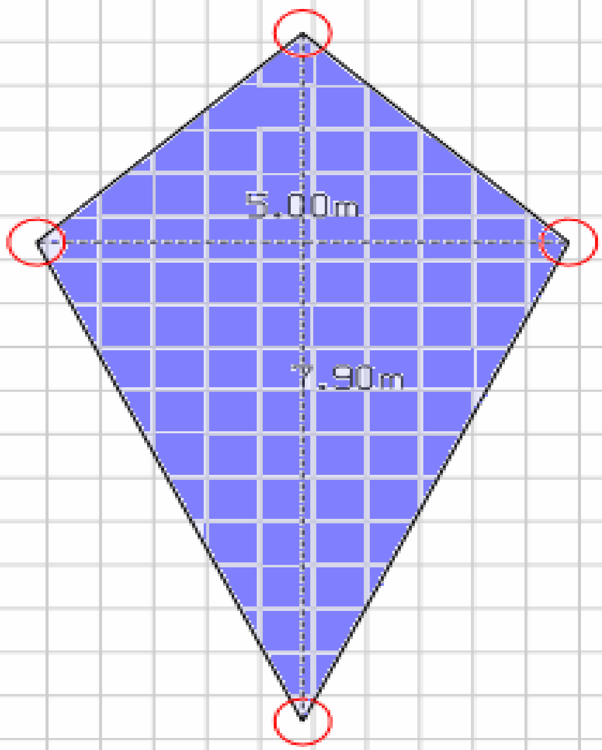


Crocodile Mathematics

Area of a kite

The area of a kite is half the product of its diagonals.

Drag any of the circled points to investigate



Area of kite = $\frac{1}{2} \times 5.00 \times 7.90$

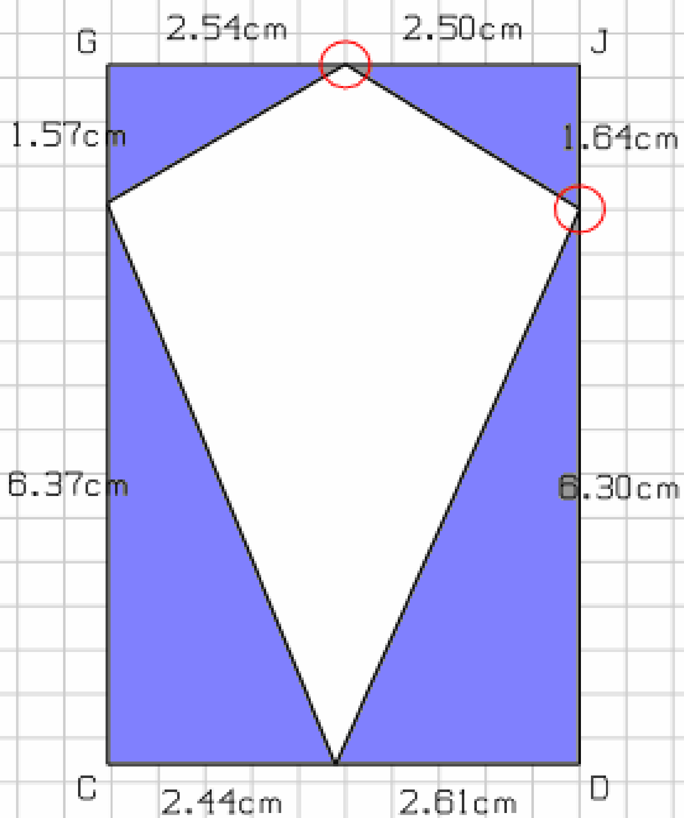
$= 19.75\ m^2$

Crocodile Mathematics

Area of a Kite (2)

The area of a kite is equal to half the area of its surrounding rectangle.

Drag the circled points below to investigate



Area of kite = 20.05 cm²

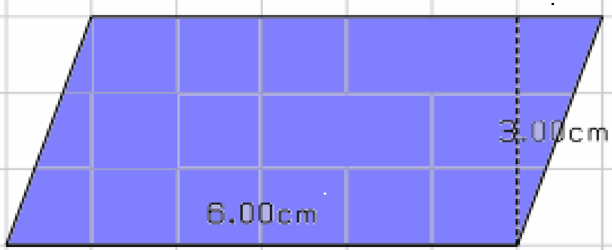
Area of grey area = 20.05 cm²

Crocodile Mathematics

Area of a parallelogram

Area of a parallelogram = base x height

You will notice that this is the same formula used to work out the area of a rectangle.
Drag the triangle at the right side of the parallelogram and move it across and join it to the left side of the parallogram - the shape is now a rectangle!



Area of parallelogram = 6 x 3

= 18 cm²

Area of rectangle = 6 x 3

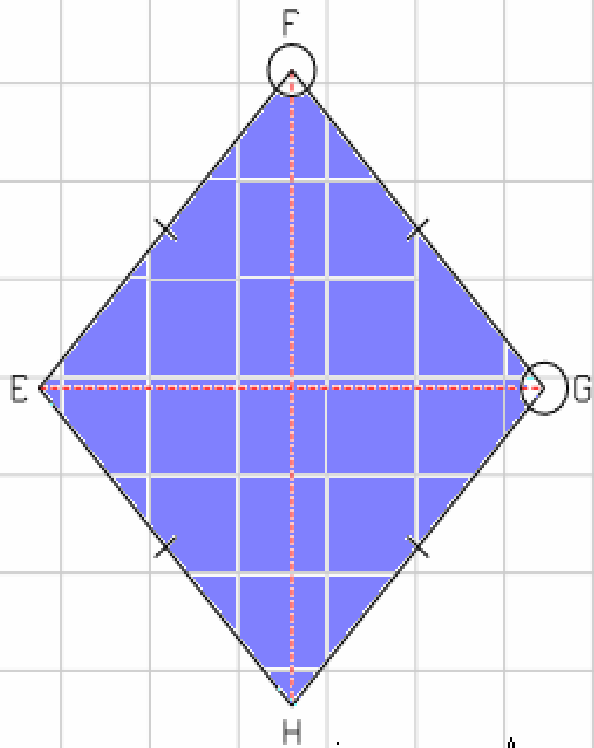
= 18 cm²

Crocodile Mathematics

Area of a Rhombus

The area of a rhombus is half the product of its diagonals.

Drag the circled points to investigate.



Line FH = 6.49 cm

Line EG = 5.70 cm

Area of EFGH = $\frac{1}{2} \times 6.49 \times 5.70$

$= 18.49\ \text{cm}^2$

Crocodile Mathematics