

# Formelblad matematik 3

## Algebra

### Regler

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$(a+b)(a-b) = a^2 - b^2$$

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

### Andragradsekvationer

$$x^2 + px + q = 0$$

$$ax^2 + bx + c = 0$$

$$x = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q}$$

$$x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

## Aritmetik

### Prefix

T	G	M	k	h	d	c	m	μ	n	p
tera	giga	mega	kilo	hekto	deci	centi	milli	mikro	nano	piko
10 <sup>12</sup>	10 <sup>9</sup>	10 <sup>6</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	10 <sup>-6</sup>	10 <sup>-9</sup>	10 <sup>-12</sup>

### Potenser

$$a^x a^y = a^{x+y}$$

$$\frac{a^x}{a^y} = a^{x-y}$$

$$(a^x)^y = a^{xy}$$

$$a^{-x} = \frac{1}{a^x}$$

$$a^x b^x = (ab)^x$$

$$\frac{a^x}{b^x} = \left(\frac{a}{b}\right)^x$$

$$a^{\frac{1}{n}} = \sqrt[n]{a}$$

$$a^0 = 1$$

### Geometrisk summa

$$a + ak + ak^2 + \dots + ak^{n-1} = \frac{a(k^n - 1)}{k - 1} \quad \text{där } k \neq 1$$

### Logaritmer

$$y = 10^x \Leftrightarrow x = \lg y$$

$$y = e^x \Leftrightarrow x = \ln y$$

$$\lg x + \lg y = \lg xy$$

$$\lg x - \lg y = \lg \frac{x}{y}$$

$$\lg x^p = p \cdot \lg x$$

### Absolutbelopp

$$|a| = \begin{cases} a & \text{om } a \geq 0 \\ -a & \text{om } a < 0 \end{cases}$$

## Funktioner och samband

### Räta linjen

$$y = kx + m \quad k = \frac{y_2 - y_1}{x_2 - x_1}$$

$ax + by + c = 0$ , där inte både  $a$  och  $b$  är noll

### Potensfunktioner

$$y = C \cdot x^a$$

### Andragsgradsfunktioner

$$y = ax^2 + bx + c \quad a \neq 0$$

### Exponentialfunktioner

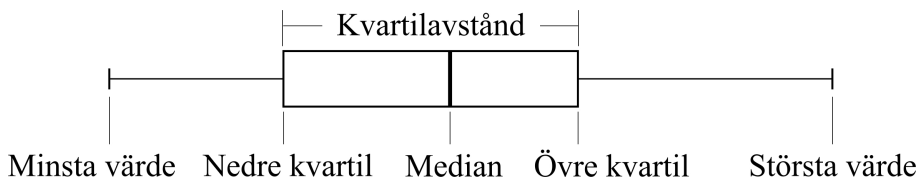
$$y = C \cdot a^x \quad a > 0 \text{ och } a \neq 1$$

## Statistik och sannolikhet

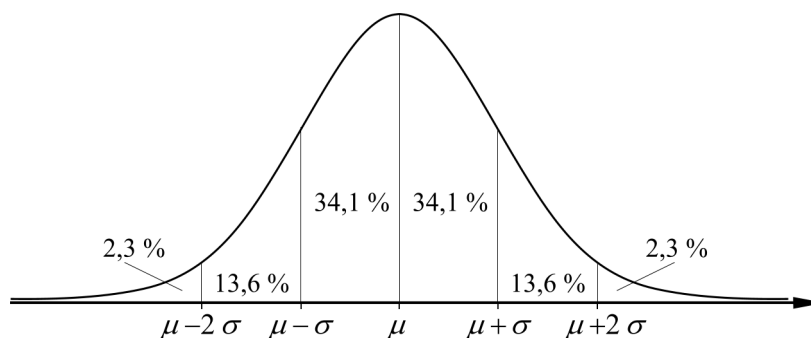
### Standardavvikelse för ett stickprov

$$s = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n-1}}$$

### Lådagram



### Normalfördelning



## Differential- och integralkalkyl

**Derivatans definition**  $f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h} = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$

### Derivator

Funktion	Derivata
$x^n$ där $n$ är ett reellt tal	$nx^{n-1}$
$a^x$ ( $a > 0$ )	$a^x \ln a$
$e^x$	$e^x$
$e^{kx}$	$k \cdot e^{kx}$
$\frac{1}{x}$	$-\frac{1}{x^2}$
$k \cdot f(x)$	$k \cdot f'(x)$
$f(x) + g(x)$	$f'(x) + g'(x)$

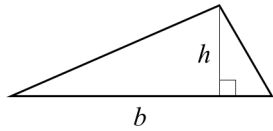
### Primitiva funktioner

Funktion	Primitiva funktioner
$k$	$kx + C$
$x^n$ ( $n \neq -1$ )	$\frac{x^{n+1}}{n+1} + C$
$e^x$	$e^x + C$
$e^{kx}$	$\frac{e^{kx}}{k} + C$
$a^x$ ( $a > 0, a \neq 1$ )	$\frac{a^x}{\ln a} + C$

## Geometri

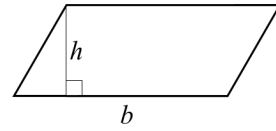
### Triangel

$$A = \frac{bh}{2}$$



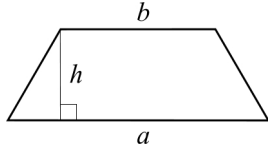
### Parallelogram

$$A = bh$$



### Parallelltrapets

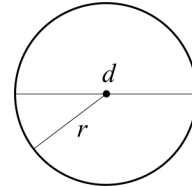
$$A = \frac{h(a+b)}{2}$$



### Cirkel

$$A = \pi r^2 = \frac{\pi d^2}{4}$$

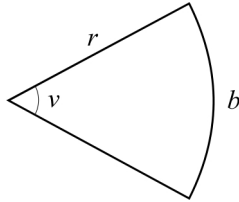
$$O = 2\pi r = \pi d$$



### Cirkelsektor

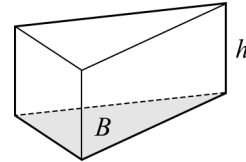
$$b = \frac{v}{360^\circ} \cdot 2\pi r$$

$$A = \frac{v}{360^\circ} \cdot \pi r^2 = \frac{br}{2}$$



### Prisma

$$V = Bh$$

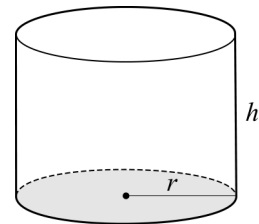


### Cylinder

$$V = \pi r^2 h$$

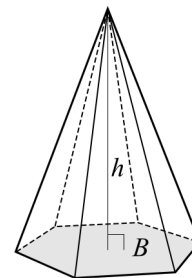
Mantelarea

$$A = 2\pi r h$$



### Pyramid

$$V = \frac{Bh}{3}$$

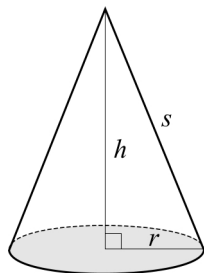


### Kon

$$V = \frac{\pi r^2 h}{3}$$

Mantelarea

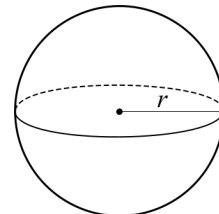
$$A = \pi r s$$



### Klot

$$V = \frac{4\pi r^3}{3}$$

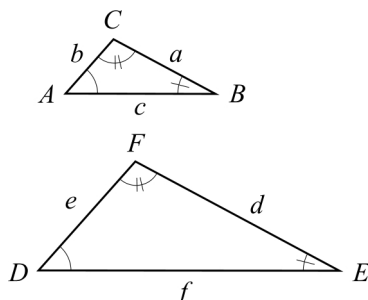
$$A = 4\pi r^2$$



### Likformighet

Triangelarna  $ABC$  och  $DEF$  är likformiga.

$$\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$$



### Skala

$$\text{Areaskalan} = (\text{Längdskalan})^2$$

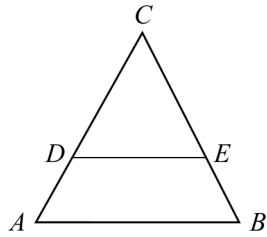
$$\text{Volymskalan} = (\text{Längdskalan})^3$$

**Topptriangel- och transversalsatsen**

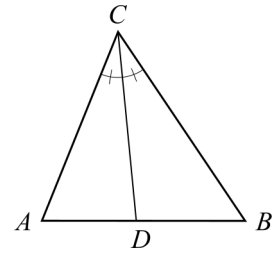
Om  $DE$  är parallell med  $AB$  gäller

$$\frac{DE}{AB} = \frac{CD}{AC} = \frac{CE}{BC} \text{ och}$$

$$\frac{CD}{AD} = \frac{CE}{BE}$$

**Bisektrissatsen**

$$\frac{AD}{BD} = \frac{AC}{BC}$$

**Vinklar**

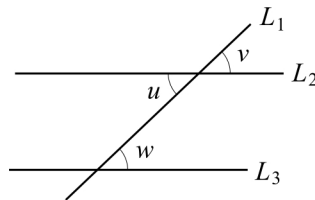
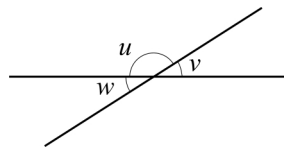
$$u + v = 180^\circ \quad \text{Sidovinklar}$$

$$w = v \quad \text{Vertikalvinklar}$$

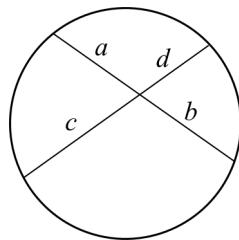
$L_1$  skär två parallella linjer  $L_2$  och  $L_3$

$$v = w \quad \text{Likbelägna vinklar}$$

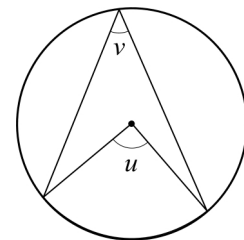
$$u = w \quad \text{Alternativvinklar}$$

**Kordasatsen**

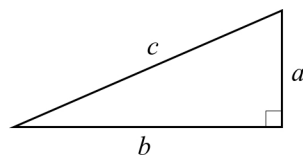
$$ab = cd$$

**Randvinkelsatsen**

$$u = 2v$$

**Pythagoras sats**

$$a^2 + b^2 = c^2$$

**Avståndsformeln**

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

**Mittpunktsformeln**

$$x_m = \frac{x_1 + x_2}{2} \quad \text{och} \quad y_m = \frac{y_1 + y_2}{2}$$

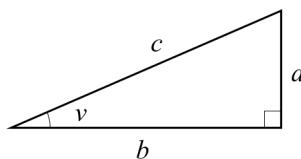
# Trigonometri

## Definitioner

$$\sin v = \frac{a}{c}$$

$$\cos v = \frac{b}{c}$$

$$\tan v = \frac{a}{b}$$

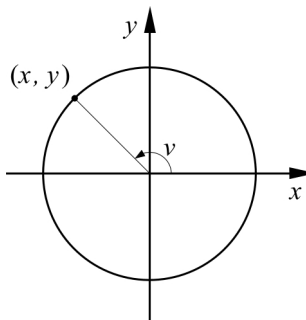


## Enhetscirkeln

$$\sin v = y$$

$$\cos v = x$$

$$\tan v = \frac{y}{x}$$



## Sinussatsen

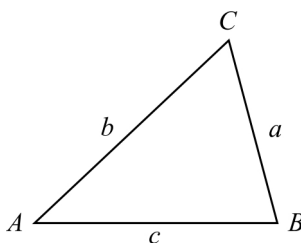
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

## Cosinussatsen

$$a^2 = b^2 + c^2 - 2bc \cos A$$

## Areasatsen

$$T = \frac{ab \sin C}{2}$$



## Cirkelns ekvation $(x-a)^2 + (y-b)^2 = r^2$

## Exakta värden

Vinkel $v$	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$135^\circ$	$150^\circ$	$180^\circ$
$\sin v$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\cos v$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	-1
$\tan v$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Ej def.	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0