Formler till nationellt prov i matematik kurs 3

Algebra

Regler

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

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

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

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

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

Andragradsekvationer $x^2 + px + q = 0 \qquad x = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q}$

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^{12}	10^{9}	10^{6}	10^{3}	10^{2}	10^{-1}	10^{-2}	10^{-3}	10^{-6}	10^{-9}	10^{-12}

Potenser

$$a^x a^y = a^{x+y} \qquad \frac{a^x}{a^y} = a^{x-y} \qquad (a^x)^y = a^{xy} \qquad a^{-x} = \frac{1}{a^x}$$

$$a^x b^x = (ab)^x \qquad \frac{a^x}{b^x} = \left(\frac{a}{b}\right)^x \qquad a^{\frac{1}{n}} = \sqrt[n]{a} \qquad a^0 = 1$$

Geometrisk summa $a + ak + ak^2 + \ldots + ak^{n-1} = \frac{a(k^n - 1)}{k - 1}$ där $k \neq 1$

Logaritmer $y = 10^x \Leftrightarrow x = \lg y \qquad y = \mathrm{e}^x \Leftrightarrow x = \ln y$

$$\lg x + \lg y = \lg xy \qquad \lg x - \lg y = \lg \frac{x}{y} \qquad \lg x^p = p \cdot \lg x$$

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

Funktioner

Räta linjen

$y = kx + m$ $\qquad k = \dfrac{y_2 - y_1}{x_2 - x_1}$

Andragradsfunktioner

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

Potensfunktioner

$y = C \cdot x^a$

Exponentialfunktioner

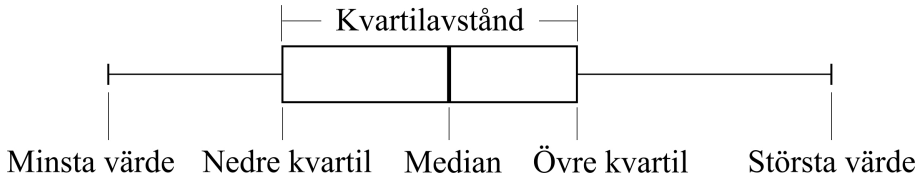
$y = C \cdot a^x$ $\qquad a > 0$ och $a \neq 1$

Statistik och sannolikhet

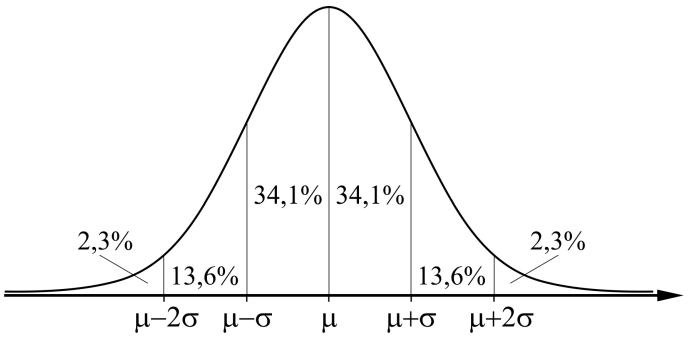
Standardavvikelse

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

Lådagram



Normalfördelning



Differential- och integralkalkyl

Derivatans definition

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h} = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

Derivator

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

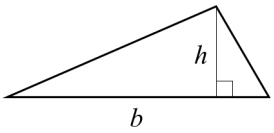
Primitiva funktioner

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

Geometri

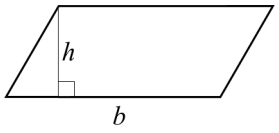
Triangel

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



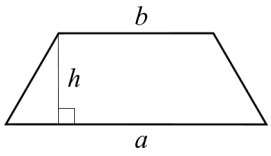
Parallellogram

$$A = bh$$



Parallelltrapets

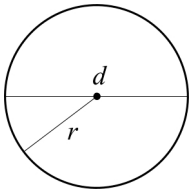
$$A = \frac{h(a+b)}{2}$$



Cirkel

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

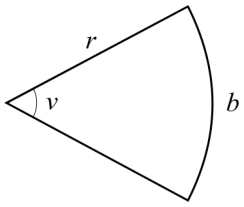
$$O = 2\pi r = \pi d$$



Cirkelsektor

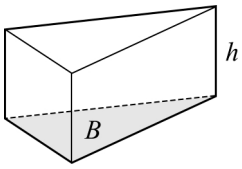
$$b = \frac{v}{360} \cdot 2\pi r$$

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



Prisma

$$V = Bh$$

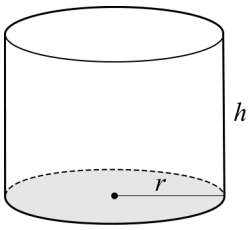


Cylinder

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

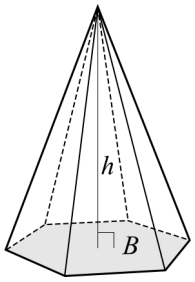
$$A = 2\pi r h$$

(Mantelarea)



Pyramid

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

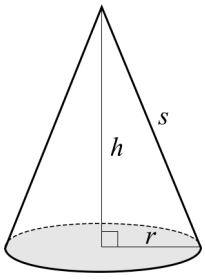


Kon

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

$$A = \pi r s$$

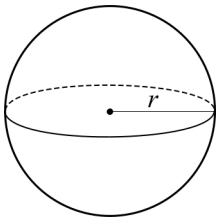
(Mantelarea)



Klot

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

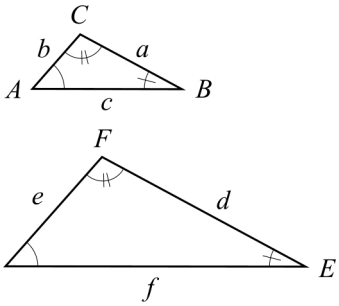
$$A = 4\pi r^2$$



Likformighet

Trianglarna *ABC* och *DEF* är likformiga.

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



Skala

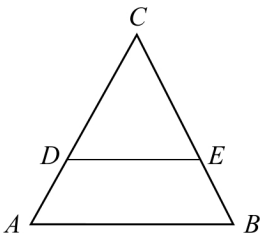
Areaskalan = (Längdskalan)^2
Volymskalan = (Längdskalan)^3

Topptriangel- och transversalsatsen

Om DE är parallell med AB gäller

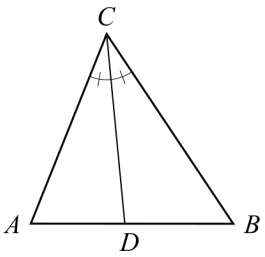
$$\frac{DE}{AB}=\frac{CD}{AC}=\frac{CE}{BC} \text{ och}$$

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



Bisektrissatsen

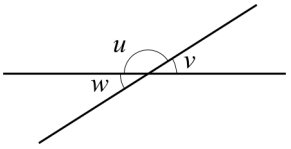
$$\frac{AD}{BD}=\frac{AC}{BC}$$



Vinklar

$u+v=180°$ Sidovinklar

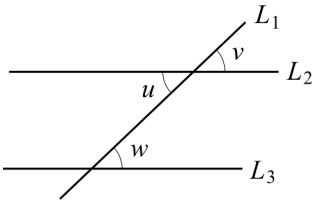
$w=v$ Vertikalvinklar



L_1 skär två parallella linjer L_2 och L_3

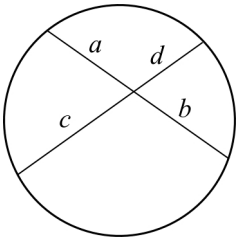
$v=w$ Likbelägna vinklar

$u=w$ Alternatvinklar



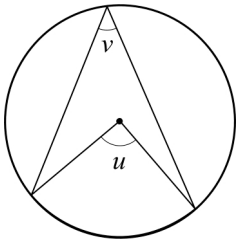
Kordasatsen

$ab=cd$



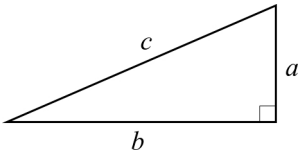
Randvinkelsatsen

$u=2v$



Pythagoras sats

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



Avståndsformeln

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

Mittpunktsformeln

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

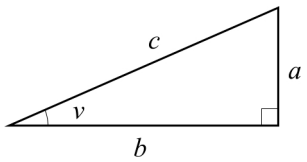
Trigonometri

Definitioner

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

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

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

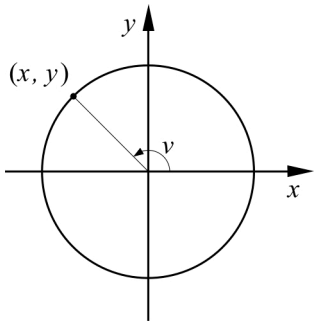


Enhetscirkeln

$$\sin v = y$$

$$\cos v = x$$

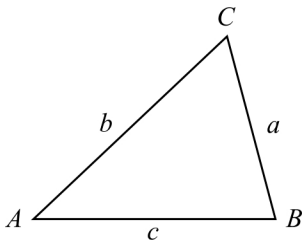
$$\tan v = \frac{y}{x}$$



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

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

Areasatsen $T = \dfrac{ab\sin C}{2}$



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

Exakta värden

Vinkel v	0°	30°	45°	60°	90°	120°	135°	150°	180°
$\sin v$	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