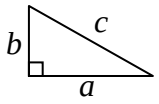
Math 040/050 Formula Sheet

Scientific Notation

$a \times 10^b$ where $1 \le a < 10$ and b is an integer.

Pythagorean Theorem (right Δ's)

$a^2 + b^2 = c^2$ where c is the hypotenuse



Imaginary Numbers

$i = \sqrt{-1} \quad i^2 = -1 \quad \sqrt{-a} = i\sqrt{a}$

Linear Relationships

$y = mx + b$

$y - y_1 = m(x - x_1)$

x-int: $(\_\_,0)$ y-int: $(0,\_\_)$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$\parallel$ lines have the same slope

$\perp$ lines have slopes that are opposite reciprocals

Products / Factoring Rules

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

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

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

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

Note: $(a+b)^2 \neq a^2 + b^2$

Interest Formulas

Simple: $I = P\,r\,t$

Compounded: $A = P\left(1 + \dfrac{r}{n}\right)^{n \cdot t}$

Continuously compounded: $A = Pe^{r \cdot t}$

Doubling Time: $t = \dfrac{\ln 2}{r}$

Distance = Rate · Time

Good luck on your test!

Long division

Make sure to write in zero placeholders for missing terms.

Exponent Rules

$x^a x^b = x^{a+b} \qquad x^0 = 1$

$(x^a)^b = x^{a \cdot b} \qquad (xy)^a = x^a y^a$

$\dfrac{x^a}{x^b} = x^{a-b} \qquad \left(\dfrac{x}{y}\right)^{-a} = \left(\dfrac{y}{x}\right)^a$

$x^{-a} = \dfrac{1}{x^a} \qquad \dfrac{1}{x^{-a}} = x^a$

$x^{a/b} = \sqrt[b]{x^a}$ if $\sqrt[b]{x^a}$ is real

Absolute Value Equations & Inequalities

Let X, X_1 and X_2 be algebraic expressions and k be a positive constant.

If $|X| = k$, solve $X = k$ or $X = -k$.

If $|X_1| = |X_2|$, solve $X_1 = X_2$ or $X_1 = -X_2$.

If $|X| < k$, solve $-k < X < k$.

If $|X| > k$, solve $X > k$ or $X < -k$.

Interval Notation

$a < x \le b \;\Rightarrow\; (a, b]$

$x < a \;\Rightarrow\; (-\infty, a)$

$x \ge a \;\Rightarrow\; [a, \infty)$

Logarithmic Rules

$\log_b 1 = 0 \qquad \log_b b = 1$

$\log_b b^x = x \qquad b^{\log_b x} = x$

$\log_b MN = \log_b M + \log_b N$

$\log_b M^p = p \cdot \log_b M$

$\log_b \dfrac{M}{N} = \log_b M - \log_b N$

Change of base: $\log_b x = \dfrac{\ln x}{\ln b}$

Quadratic Equations

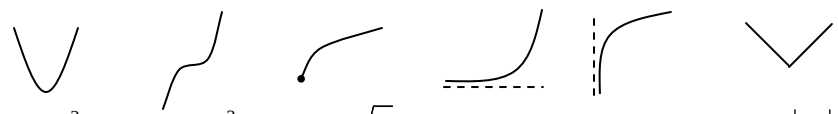
The solution to $ax^2 + bx + c = 0$ is $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

The x-coordinate of the vertex is given by $x = \dfrac{-b}{2a}$.

For $y = a(x-h)^2 + k$, the vertex is (h, k).

Rectangle	Circle	Triangle	Sphere	Cylinder
$P = 2w + 2\ell$	$C = 2\pi r$	$A = \frac{1}{2}bh$	$SA = 4\pi r^2$	$SA = 2\pi r^2 + 2\pi rh$
$A = w \cdot \ell$	$A = \pi r^2$		$V = \frac{4}{3}\pi r^3$	$V = \pi r^2 h$

Graph Shapes



Distance and Midpoint

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

$M = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$