

Formulas that you need to know and be able to use for the final

Arithmetic Operations

$$a(b+c) = ab+ac$$

$$\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$$

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

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

Exponents and radicals

$$x^m x^n = x^{m+n}$$

$$\frac{x^m}{x^n} = x^{m-n}$$

$$(x^m)^n = x^{mn}$$

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

$$(xy)^n = x^n y^n$$

$$\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$$

$$x^{1/n} = \sqrt[n]{x}$$

$$x^{m/n} = \sqrt[n]{x^m} = (\sqrt[n]{x})^m$$

$$\sqrt[n]{xy} = \sqrt[n]{x} \sqrt[n]{y}$$

$$\sqrt[n]{\frac{x}{y}} = \frac{\sqrt[n]{x}}{\sqrt[n]{y}}$$

Factoring special polynomials

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

$$x^3 + y^3 = (x+y)(x^2 - xy + y^2)$$

$$x^3 - y^3 = (x-y)(x^2 + xy + y^2)$$

Cases of the Binomial Theorem

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

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

$$(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

$$(x - y)^3 = x^3 - 3x^2y + 3xy^2 - y^3$$

Quadratic Formula

$$\text{If } ax^2 + bx + c = 0, \text{ then } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Inequalities and Absolute Value

If $a < b$ and $b < c$, then $a < c$.

If $a < b$ then $a + c < b + c$.

If $a < b$ and $c > 0$ then $ca < cb$.

If $a < b$ and $c < 0$ then $ca > cb$.

If $a > 0$, then

- $|x| = a$ means $x = a$ or $x = -a$
- $|x| < a$ means $-a < x < a$
- $|x| > a$ means $x > a$ or $x < -a$

Geometric Formulas

- area of triangle
- area of rectangle
- area of circle
- area of sector of a circle
- arc length of sector of a circle
- volume of sphere
- surface area of sphere
- volume of cylinder

Analytic Geometry

- Distance formula
- Midpoint formula
- Slope of line through two given points
- Point-slope equation of line
- Slope-intercept equation of line
- Equation of circle with center (h, k) and radius r

Basic Trigonometry

- conversion between radian and degree
- length of circular arc where angle is given in radians
- definitions of trig functions in terms of right triangles
- definitions of trig functions in terms of the unit circle
- **values of the trig functions for standard angles**

Fundamental Trigonometric Identities

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{1}{\tan \theta}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$1 + \cot^2 \theta = \csc^2 \theta$$

$$\sin(-\theta) = -\sin(\theta)$$

$$\cos(-\theta) = \cos(\theta)$$

Law of Sines

Law of Cosines

Angle addition and subtraction formulas, double-angle formulas, and half-angle formulas will be given to you should they be required.

Exponential and Logarithm Functions

$$\log_a x = y \Leftrightarrow a^y = x$$

$$\ln x = \log_e x$$

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

$$\log_a (a^x) = x$$

$$a^{\log_a x} = x$$

$$\ln(e^x) = x$$

$$e^{\ln x} = x$$

$$\log_a (xy) = \log_a x + \log_a y$$

$$\log_a \left(\frac{x}{y} \right) = \log_a x - \log_a y$$

$$\log_a x^r = r \log_a x$$