

## USEFUL FORMULAS FOR USMA MATHEMATICAL RECALL KNOWLEDGE

The following constitutes a basic mathematical vocabulary that will be built upon during each cadet's four-semester core mathematics experience and in his or her future math/science/engineering courses. Each cadet is responsible for knowing the properties, formulas and relationships presented in this document prior to their arrival. These items are recall knowledge - cadets are also required to be proficient in the more conceptual, less-verbatim ideas and skills reflected in each core math course's Course Objectives.

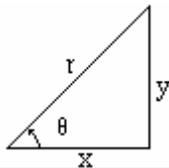
### ALGEBRA

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| <p>1. <math>ax^2 + bx + c = 0 \Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}</math></p> <p>3. <math>(a^b)^c = a^{bc}</math></p> <p>5. <math>y = \log_b x \Rightarrow x = b^y</math></p> <p>7. <math>\log_b x^a = a \log_b x</math></p> <p>9. <math>\log_b \frac{a}{c} = \log_b a - \log_b c</math></p> | <p>2. <math>a^b \cdot a^c = a^{b+c}</math></p> <p>4. <math>\frac{a^b}{a^c} = a^{b-c}</math></p> <p>6. <math>\log_b b^x = b^{\log_b x} = x</math></p> <p>8. <math>\log_b ac = \log_b a + \log_b c</math></p> <p>10. <math>\log_b a = \frac{\log_c a}{\log_c b}</math></p> |
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### ANALYTIC GEOMETRY

Rectangle:	Area = $lw$	Perimeter = $2l + 2w$
Circle:	Area = $\pi r^2$	Circumference = $2\pi r$
Rectangular Solid:	Volume = $lwh$	Surface Area = $2lw + 2lh + 2hw$
Cylinder:	Volume = $\pi r^2 l$	Surface Area = $2\pi r^2 + 2\pi rl$
Sphere:	Volume = $\frac{4}{3} \pi r^3$	Surface Area = $4 \pi r^2$
Distance between $(x_1, y_1)$ and $(x_2, y_2) = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$		

### TRIGONOMETRY

With reference to a right triangle:	$2\pi$ radians = 360 degrees	
$\sin \theta = \frac{y}{r}$	$\cos \theta = \frac{x}{r}$	$\tan \theta = \frac{y}{x}$
$\tan \theta = \frac{\sin \theta}{\cos \theta}$	$x^2 + y^2 = r^2$	$\sin^2 \theta + \cos^2 \theta = 1$
$\cot \theta = \frac{1}{\tan \theta}$	$\sec \theta = \frac{1}{\cos \theta}$	$\csc \theta = \frac{1}{\sin \theta}$

# USEFUL FORMULAS FOR USMA MATHEMATICAL RECALL KNOWLEDGE

## RELATIONSHIPS

Corresponding sides of similar triangles are proportional

Distance = average rate  $\times$  time

## PROPERTIES OF FUNCTIONS

