

NUMBER AND QUANTITY

Sequences

Sequence with a constant of c :

arithmetic sequence: $a_n = a_1 + c(n - 1)$

geometric sequence: $a_n = a_1(c)^{n-1}$

Logarithms

$\log_a b = c \rightarrow a^c = b$

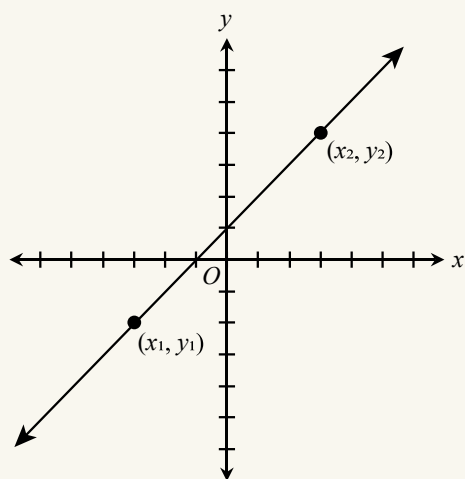
Rates

distance = speed \times time

variation: quantity = rate \times time

ALGEBRA

Linear Graphs



slope-intercept formula: $y = mx + b$

$m = \text{slope} = (y_1 - y_2) / (x_1 - x_2)$

$b = \text{y-intercept} = (0, b)$

distance formula: $\sqrt{[(y_1 - y_2)^2 + (x_1 - x_2)^2]}$

midpoint formula: $\text{midpoint} = [(x_1 + x_2)/2, (y_1 + y_2)/2]$

Quadratics

FOIL (First, Outer, Inner, Last): $(a + b)(c + d) = ac + ad + bc + bd$

quadratic formula: $X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

discriminant: $b^2 - 4ac$

If . . .

- discriminant $> 0 \rightarrow 2$ real solutions
- discriminant $= 0 \rightarrow 1$ real solution
- discriminant $< 0 \rightarrow$ no real solutions

FUNCTIONS

Function Notation

$f \circ g(x) = f(g(x))$

note: this is different from $fg(x)$, which is $f(x) \times g(x)$

Trigonometry on the Coordinate Plane

π radians = 180°

STATISTICS AND PROBABILITY

Percents

percent = part / whole $\times 100\%$

% symbol = divide by 100

$a\%$ of $b = a/100 \times b = a \times b/100$

percent change = change / original

Statistics

average (mean) = sum of terms / number of terms

median = middle number (or average of 2 middle numbers)

mode = most common number

range = biggest - smallest

Probability and Counting Techniques

probability = number of desired terms / total number of terms

$P(\text{event happens}) + P(\text{event doesn't happen}) = 1$

$P(A \text{ and } B) = P(A) \times P(B)$

GEOMETRY

Lines and Angles

supplementary angles add to 180°

complementary angles add to 90°

vertical angles are congruent

Triangles

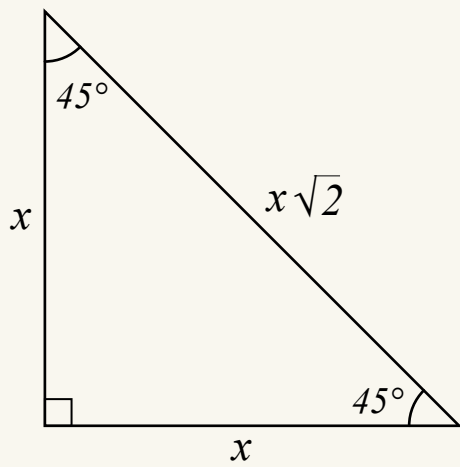
angles of a triangle add to 180°

area of a triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

Pythagorean theorem: $a^2 + b^2 = c^2$

45 : 45 : 90 triangle ratio: $x : x : x\sqrt{2}$

30 : 60 : 90 triangle ratio: $x : x\sqrt{3} : 2x$



Polygons

trapezoid area = average of bases \times height = $(b_1 + b_2)/2 \times h$

perimeter = sum of sides

sum of angles in n-sided figure = $(n - 2) \times 180^\circ$

area of a rectangle = length \times width

area of a parallelogram = base \times height

Circles and Parabolas

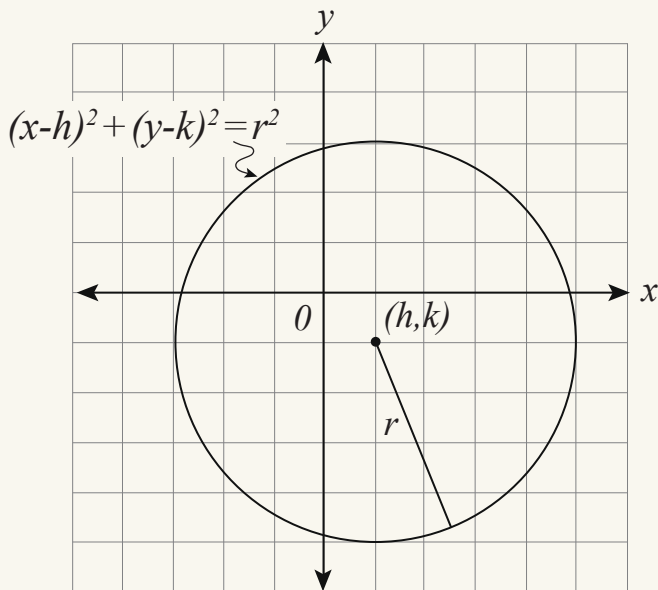
circle arc length = central angle / $360^\circ \times$ circumference

circle sector area = central angle / $360^\circ \times$ area

area of circle = πr^2

circumference of circle = $2\pi r$

diameter of circle = $2r$



radius = r

$(x - h)^2 + (y - k)^2 = r^2$

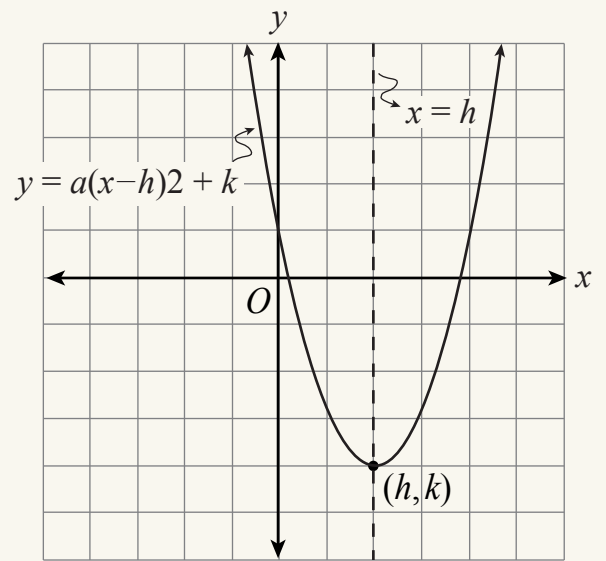
center of circle = (h, k)

Vertex form for a parabola:

$y = a(x - h)^2 + k$

vertex = (h, k)

axis of symmetry: $x = h$



3D Figures

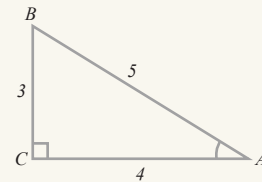
surface area of rectangular prism: $2(\text{length} \times \text{width} + \text{length} \times \text{height} + \text{width} \times \text{height})$

volume of rectangular prism: $V = lwh$

volume of right cylinder: $V = \pi r^2 h$

Triangles and Trigonometry

SOH-CAH-TOA:



Sine (sin)	Cosine (cos)	Tangent (tan)
$\frac{\text{opposite}}{\text{hypotenuse}}$	$\frac{\text{adjacent}}{\text{hypotenuse}}$	$\frac{\text{opposite}}{\text{adjacent}}$
$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{4}$

$\sin(x) = \text{opposite} / \text{hypotenuse}$

$\cos(x) = \text{adjacent} / \text{hypotenuse}$

$\tan(x) = \text{opposite} / \text{adjacent}$

$\sin^2(x) + \cos^2(x) = 1$

$\sin(x) = \cos(90 - x)$

$\cos(x) = \sin(90 - x)$