ACT FORMULA SHEET

MATH

NUMBER AND QUANTITY

Sequences

Sequence with a constant of c:

arithmetic sequence: an = a1 + c(n – 1)

geometric sequence: an = a1(c)n – 1

Logarithms

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

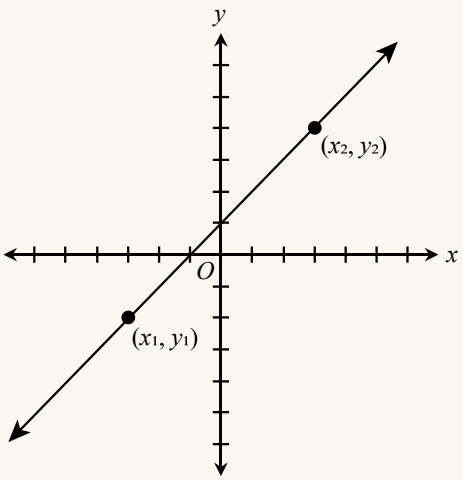
Rates

distance = speed × time

variation: quantity = rate × time

ALGEBRA

Linear Graphs



slope-intercept formula: y = mx +b

m = slope = (y1 – y2) / (x1 – x2)

b = y-intercept = (0,b)

distance formula: √[(y1 – y2)² + (x1 – x2)²]

midpoint formula: midpoint = [(x1 + x2)/2, (y1 + y2)/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: b² – 4ac

If . . .

- discriminant > 0 → 2 real solutions
- discriminant = 0 → 1 real solution
- discriminant < 0 → no real solutions

FUNCTIONS

Function Notation

fog(x) = f(g(x))

note: this is different from fg(x), which is f(x) × g(x)

Trigonometry on the Coordinate Plane

π radians = 180°

STATISTICS AND PROBABILITY

Percents

percent = part / whole × 100%

% symbol = divide by 100

a% of b = a/100 × b = a × 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(event happens) + P(event doesn't happen) = 1

P(A and B) = P(A) × P(B)

GEOMETRY

Lines and Angles

supplementary angles add to 180°

complementary angles add to 90°

vertical angles are congruent

Triangles

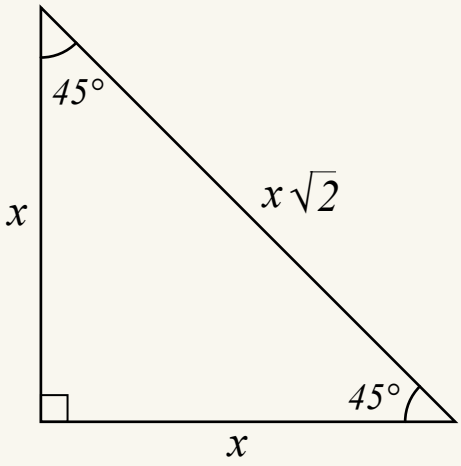
angles of a triangle add to 180°

area of a triangle = ½ × base × height

Pythagorean theorem: a² + b² = c²

45 : 45 : 90 triangle ratio: x : x : x√2

30 : 60 : 90 triangle ratio: x : x√3 : 2x



Polygons

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

perimeter = sum of sides

sum of angles in n-sided figure = (n – 2) × 180°

area of a rectangle = length × width

area of a parallelogram = base × height

Circles and Parabolas

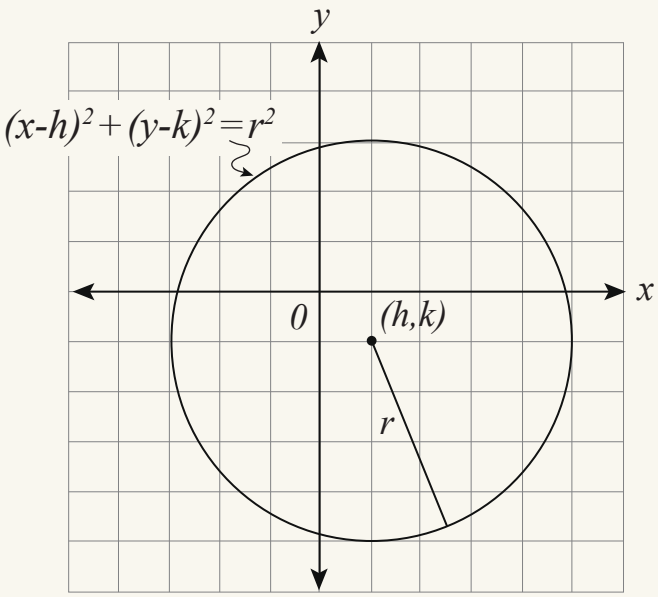
circle arc length = central angle / 360° × circumference

circle sector area = central angle / 360° × area

area of circle = πr^2

circumference of circle = $2\pi r$

diameter of circle = 2r



radius = r

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

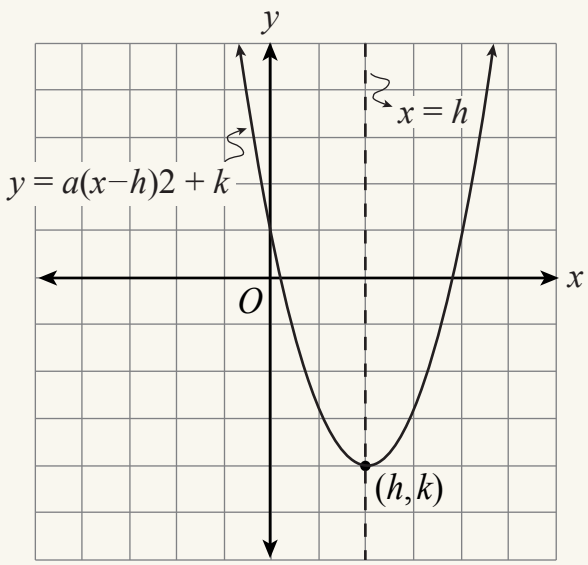
center of circle = (h, k)

Vertex form for a parabola:

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

vertex = (h, k)

axis of symmetry: x = h



3D Figures

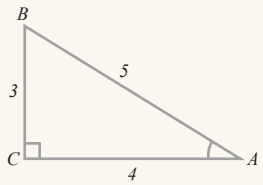
surface area of rectangular prism: 2(length × width + length × height + width × height)

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) = opposite / hypotenuse

cos(x) = adjacent / hypotenuse

tan(x) = opposite / adjacent

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

sin(x) = cos(90 – x)

cos(x) = sin(90 – x)