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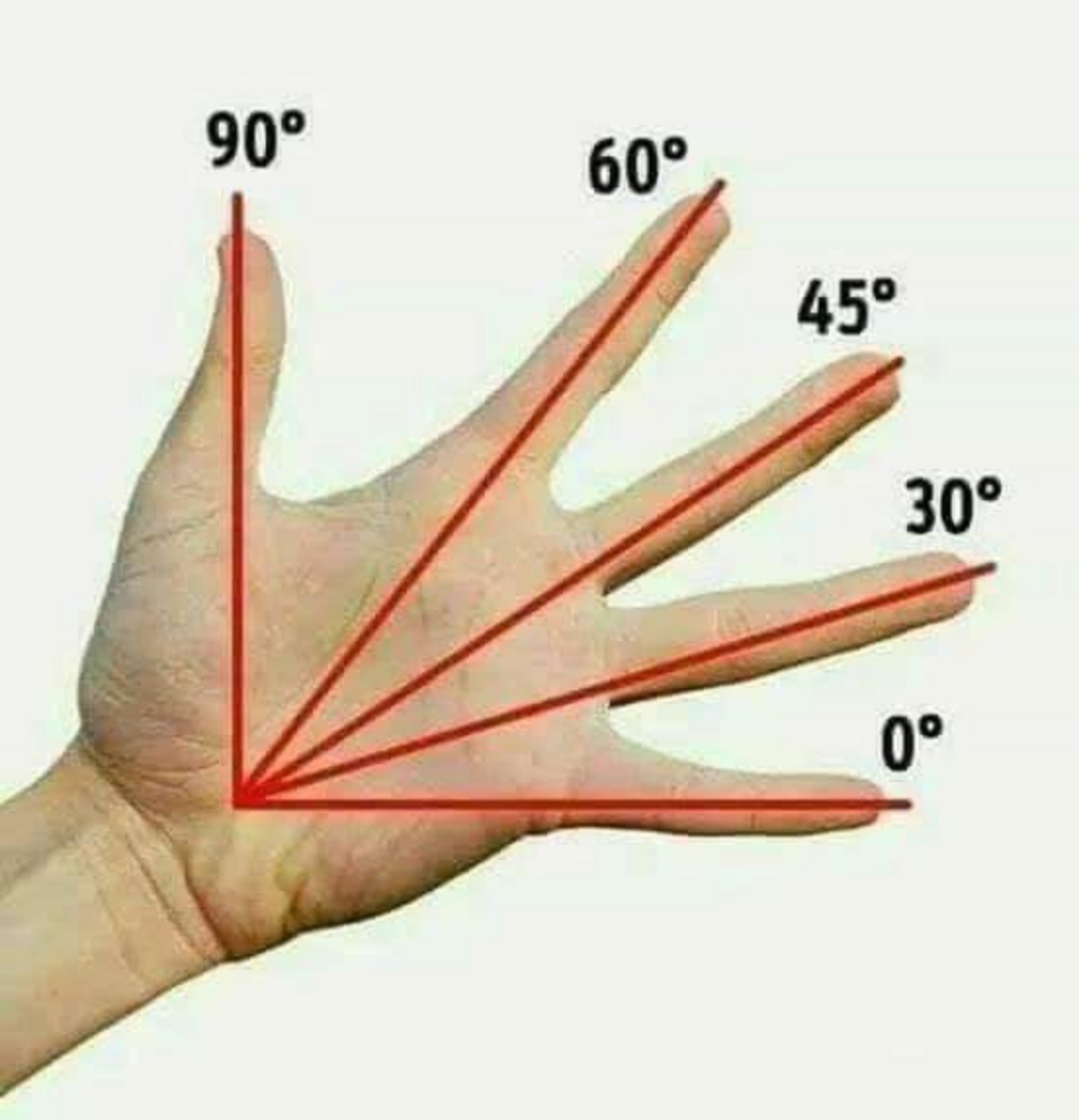
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Important Algebraic Formulas

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

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

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

$a^2 + b^2 = (a+b)^2 - 2ab \quad or \quad a^2 + b^2 = (a-b)^2 + 2ab$

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

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

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

$(a+b)^2 - (a-b)^2 = 4ab$

$a^4 + b^4 = (a+b)(a-b)[(a+b)^2 - 2ab]$

$(a-b)^2 = (a+b)^2 - 4ab$

$(a+b)^2 = (a-b)^2 + 4ab$

$a^4 + b^4 = [(a+b)^2 - 2ab]^2 - 2(ab)^2$

$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

$(a+b-c)^2 = a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$

$(a-b-c)^2 = a^2 + b^2 + c^2 - 2ab + 2bc - 2ca$

$a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$a^4 + a^2b^2 + b^4 = (a^2 + ab + b^2)(a^2 - ab + b^2$

$a^4 + a^2 + 1 = (a^2 + a + 1)(a^2 - a + 1)$

$if\ a+b+c = 0\ then\ \ a^3 + b^3 + c^3 = 3abc$

$a^8 - b^8 = (a^4 + b^4)(a^2 + b^2)(a+b)(a-b)$

Laws of Indices

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Regra	Exemplo
$a^m \times a^n = a^{m+n}$	$2^5 \times 2^3 = 2^8$
$a^m \div a^n = a^{m-n}$	$5^7 \div 5^3 = 5^4$
$(a^m)^n = a^{m \times n}$	$(10^3)^7 = 10^{21}$
$a^1 = a$	$17^1 = 17$
$a^0 = 1$	$34^0 = 1$
$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	$\left(\frac{5}{6}\right)^2 = \frac{25}{36}$
$a^{-m} = \frac{1}{a^m}$	$9^{-2} = \frac{1}{81}$
$a^{\frac{x}{y}} = \sqrt[y]{a^x}$	$49^{\frac{1}{2}} = \sqrt[2]{49} = 7$

Powers and Square Roots To Memorize!!!		
$1^2 = 1$	$1^3 = 1$	$\sqrt{1} = 1$
$2^2 = 4$	$2^3 = 8$	$\sqrt{4} = 2$
$3^2 = 9$	$3^3 = 27$	$\sqrt{9} = 3$
$4^2 = 16$	$4^3 = 64$	$\sqrt{16} = 4$
$5^2 = 25$	$5^3 = 125$	$\sqrt{25} = 5$
$6^2 = 36$	$6^3 = 216$	$\sqrt{36} = 6$
$7^2 = 49$	$1^4 = 1$	$\sqrt{49} = 7$
$8^2 = 64$	$2^4 = 16$	$\sqrt{64} = 8$
$9^2 = 81$	$3^4 = 81$	$\sqrt{81} = 9$
$10^2 = 100$	$4^4 = 256$	$\sqrt{100} = 10$
$11^2 = 121$	$5^4 = 625$	$\sqrt{121} = 11$
$12^2 = 144$	$1^5 = 1$	$\sqrt{144} = 12$
$13^2 = 169$	$2^5 = 32$	$\sqrt{169} = 13$
$14^2 = 196$	$3^5 = 243$	$\sqrt{196} = 14$
$15^2 = 225$	$4^5 = 1024$	$\sqrt{225} = 15$
$16^2 = 256$	$1^6 = 1$	$\sqrt{256} = 16$
$17^2 = 289$	$2^6 = 64$	$\sqrt{289} = 17$
$18^2 = 324$	$3^6 = 729$	$\sqrt{324} = 18$
$19^2 = 361$	$1^7 = 1$	$\sqrt{361} = 19$

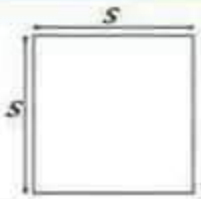
Square and Square Root Table

Square	Square Root	Square	Square Root
$1^2 = 1$	$\sqrt{1} = 1$	$16^2 = 256$	$\sqrt{256} = 16$
$2^2 = 4$	$\sqrt{4} = 2$	$17^2 = 289$	$\sqrt{289} = 17$
$3^2 = 9$	$\sqrt{9} = 3$	$18^2 = 324$	$\sqrt{324} = 18$
$4^2 = 16$	$\sqrt{16} = 4$	$19^2 = 361$	$\sqrt{361} = 19$
$5^2 = 25$	$\sqrt{25} = 5$	$20^2 = 400$	$\sqrt{400} = 20$
$6^2 = 36$	$\sqrt{36} = 6$	$21^2 = 441$	$\sqrt{441} = 21$
$7^2 = 49$	$\sqrt{49} = 7$	$22^2 = 484$	$\sqrt{484} = 22$
$8^2 = 64$	$\sqrt{64} = 8$	$23^2 = 529$	$\sqrt{529} = 23$
$9^2 = 81$	$\sqrt{81} = 9$	$24^2 = 576$	$\sqrt{576} = 24$
$10^2 = 100$	$\sqrt{100} = 10$	$25^2 = 625$	$\sqrt{625} = 25$
$11^2 = 121$	$\sqrt{121} = 11$	$26^2 = 676$	$\sqrt{676} = 26$
$12^2 = 144$	$\sqrt{144} = 12$	$27^2 = 729$	$\sqrt{729} = 27$
$13^2 = 169$	$\sqrt{169} = 13$	$28^2 = 784$	$\sqrt{784} = 28$
$14^2 = 196$	$\sqrt{196} = 14$	$29^2 = 841$	$\sqrt{841} = 29$
$15^2 = 225$	$\sqrt{225} = 15$	$30^2 = 900$	$\sqrt{900} = 30$

SQUARE

$P = 4s$

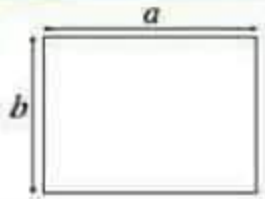
$A = s^2$



RECTANGLE

$P = 2a + 2b$

$A = ab$



CIRCLE

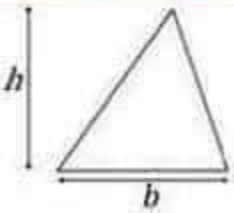
$P = 2\pi r$

$A = \pi r^2$

TRIANGLE

$P = a + b + c$

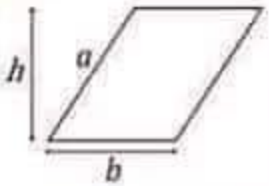
$A = \frac{1}{2}bh$



PARALLELOGRAM

$P = 2a + 2b$

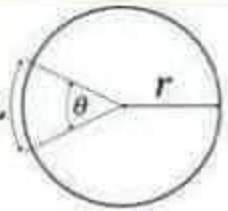
$A = bh$



CIRCULAR SECTOR

$L = \pi r \frac{\theta}{180^\circ}$

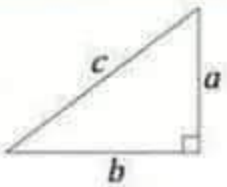
$A = \pi r^2 \frac{\theta}{360^\circ}$



PYTHAGOREAN THEOREM

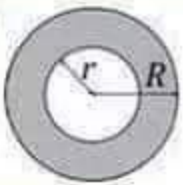
$a^2 + b^2 = c^2$

$c = \sqrt{a^2 + b^2}$



CIRCULAR RING

$A = \pi(R^2 - r^2)$



SPHERE

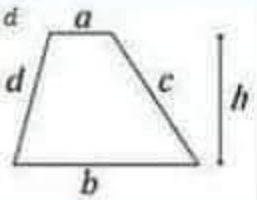
$S = 4\pi r^2$

$V = \frac{4\pi r^3}{3}$

TRAPEZOID

$P = a + b + c + d$

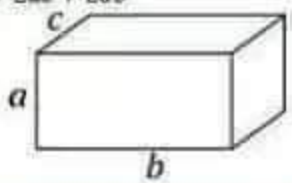
$A = h\frac{a+b}{2}$



RECTANGULAR BOX

$A = 2ab + 2ac + 2bc$

$V = abc$

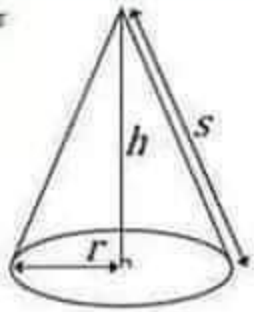


RIGHT CIRCULAR CONE

$A = \pi r^2 + \pi rs$

$s = \sqrt{r^2 + h^2}$

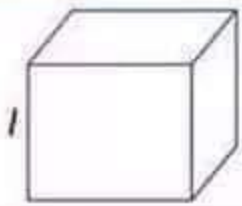
$V = \frac{1}{3}\pi r^2 h$



CUBE

$A = 6l^2$

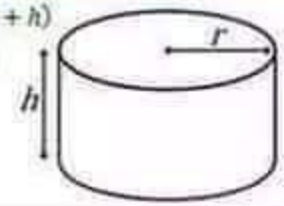
$V = l^3$



CYLINDER

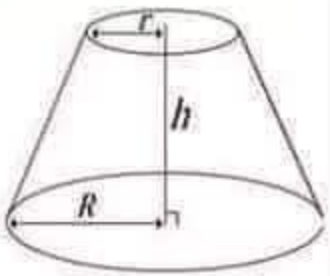
$A = 2\pi r(r + h)$

$V = \pi r^2 h$



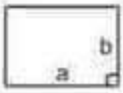
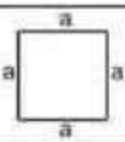
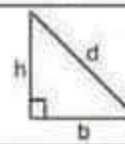
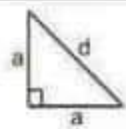
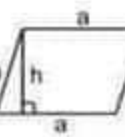
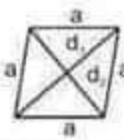
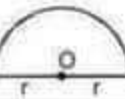
FRUSTUM OF A CONE

$V = \frac{1}{3}\pi h(r^2 + rR + R^2)$



TRANSITION TO ALGEBRA FORMULA CHART

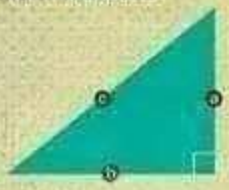
Distance formula $d = rt$	Percent proportion $\frac{is}{of} = \frac{\%}{100}$
Simple Interest formula $I = prt$	Percent of Change $\frac{difference}{original} = \frac{\%}{100}$
Distance between to ordered pairs $d = \sqrt{(x_2 - x)^2 + (y_2 - y_1)^2}$	Midpoint $\left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2}\right)$
Pythagorean Theorem $c^2 = a^2 + b^2$	Slope of a line $m = \frac{y_2 - y_1}{x_2 - x_1}$
Slope-Intercept Form $y = mx + b$	Perimeter of Square $P = 4s$
Perimeter of Rectangle $P = 2l + 2w$	Volume of Rectangular Prism $V = lwh$
Volume of Cube $V = s^3$	Area of Square $A = s^2$
Area of Rectangle $A = bh$	Area of Triangle $A = \frac{bh}{2}$
Area of Circle $A = \pi r^2$	Area of Trapezoid $A = \frac{1}{2}h(b_1 + b_2)$
Circumference of Circle $C = \pi d$	

Name	Figure	Perimeter	Area
Rectangle		2 (a + b)	ab
Square		4a	a^2
Triangle		a + b + c = 2s	$1 = \frac{1}{2} \times b \times h$ $2 = \sqrt{s(s-a)(s-b)(s-c)}$
Right triangle		b + h + d	$\frac{1}{2}$ bh
Equilateral triangle		3a	1. $\frac{1}{2}$ ah 2. $\frac{\sqrt{3}}{4} a^2$
Isosceles right triangle		2a + d	$\frac{1}{2} a^2$
Parallelogram		2 (a + b)	ah
Rhombus		4a	$\frac{1}{2} d_1 d_2$
Trapezium		Sum of its four sides	$\frac{1}{2}$ h (a + b)
Circle		$2\pi r$	πr^2
Semicircle		$\pi r + 2r$	$\frac{1}{2} \pi r^2$
Ring (shaded region)		----	$\pi (R^2 - r^2)$
Sector of a circle		l + 2r where l = (θ/360) × 2πr	$\theta/360° \times \pi r^2$

GEOMETRIC FORMULAS

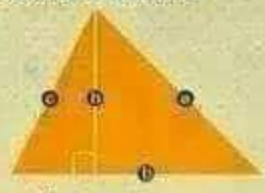
A = Area P = Perimeter V = Volume

RIGHT TRIANGLE



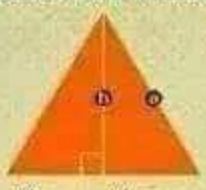
Pythagorean Theorem $a^2 + b^2 = c^2$

SCALENE TRIANGLE



$A = \frac{1}{2}bh \quad P = a+b+c$

EQUILATERAL TRIANGLE



$A = \frac{\sqrt{3}}{4}a^2 \quad h = \frac{\sqrt{3}}{2}a \quad P = 3a$

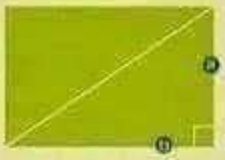
CIRCLE

$A = \pi r^2 \quad P = 2\pi r$

SQUARE

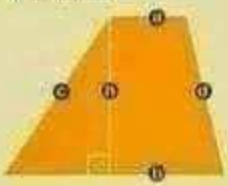
$A = a^2 \quad c = \sqrt{2}a \quad P = 4a$

RECTANGLE



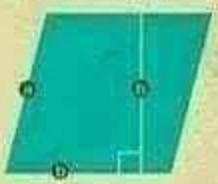
$A = ab \quad P = 2a + 2b$

TRAPEZOID



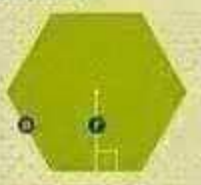
$A = \frac{1}{2}(a+b)h \quad P = a+b+c+d$

PARALLELOGRAM



$A = bh \quad P = 2a + 2b$

HEXAGON

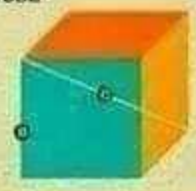


$A = \frac{1}{2}6ar \quad P = 6a$

PENTAGON

$A = \frac{1}{2}5ar \quad P = 5a$

CUBE

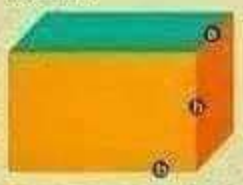


$A = 6a^2 \quad V = a^3 \quad c = \sqrt{3}a$

SPHERE

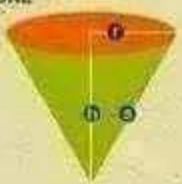
$A = 4\pi r^2 \quad V = \frac{4}{3}\pi r^3$

CUBOID



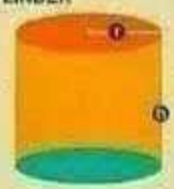
$A = 2ah + 2bh + 2ba \quad V = bah$

CONE



$A = \pi rs + \pi r^2 \quad V = \frac{1}{3}\pi r^2 h$

CYLINDER

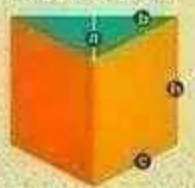


$A = 2\pi r^2 + 2\pi rh \quad V = \pi r^2 h$

FRUSTUM

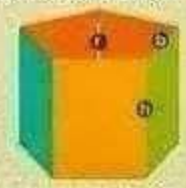
$A = \pi a(b + r) + \pi(b^2 + r^2)$

TRIANGULAR PRISM



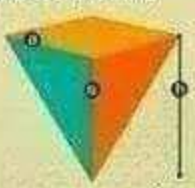
$A = ba + 2hc + hb \quad V = \frac{1}{2}bah$

PENTAGONAL PRISM



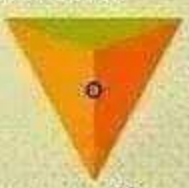
$A = 5rb + 5bh \quad V = \frac{5}{2}rbh$

SQUARE PYRAMID



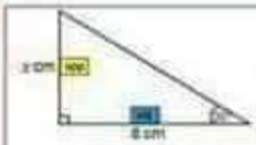
$A = a^2 + 2as \quad V = \frac{1}{3}a^2 h$

TETRAHEDRON



$A = \sqrt{3}a^2 \quad V = \frac{a^3}{6\sqrt{2}}$

Trigonometry



Finding a side

$\tan A = \frac{opp}{adj}$

$\tan 35^\circ = \frac{x}{8}$

$8 \times \tan 35^\circ = x$

$5.6016603 = x$

$5.6cm = x$

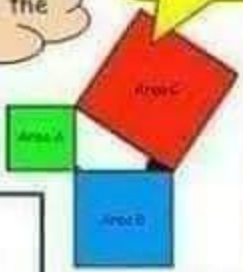
$\sin A = \frac{opp}{hyp}$

$\sin 36^\circ = \frac{11}{x}$

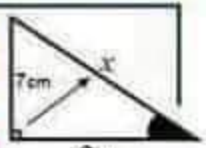
$x = \frac{11}{\sin 36^\circ}$

label the sides of the triangle

$A^2 + B^2 = C^2$



Pythagoras' Theorem



$x^2 = 9^2 + 7^2$

$x^2 = 81 + 49$

$x^2 = 130$

$x = \sqrt{130} = 11.4$

hypotenuse - ADD!
shorter side - SUBTRACT!

$\sin = \frac{opp}{hyp}$

$\cos = \frac{adj}{hyp}$

$\tan = \frac{opp}{adj}$

Finding an angle

$\tan x = \frac{opp}{adj}$

$\tan x = \frac{3}{8} = 0.375$

$x = \tan^{-1} 0.375$

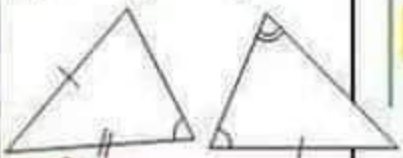
$x = 20.556045$

$x = 20.6^\circ$

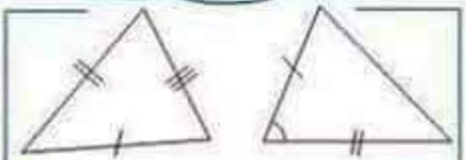
The Sine Rule

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ sides

$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ angles



The Cosine Rule

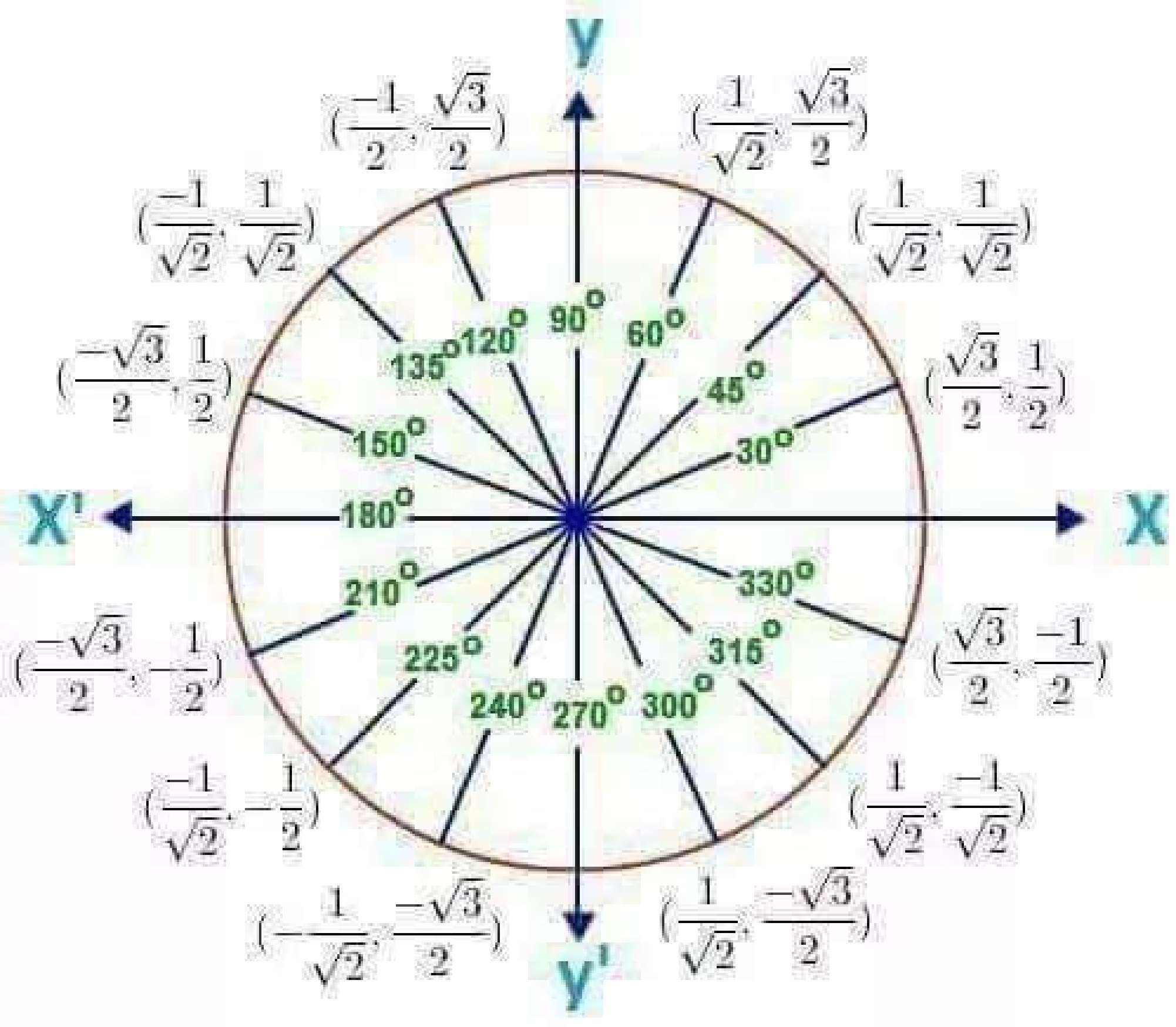


$a^2 = b^2 + c^2 - 2bc \cos A$ sides

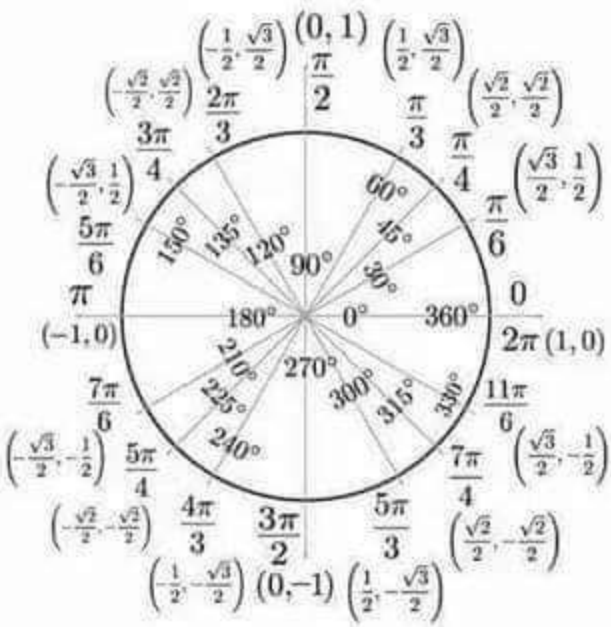
angles $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Remember to use the formula page on your exam paper!

Area of a triangle = ½ ab sinC


y
$(\frac{-1}{2}, \frac{\sqrt{3}}{2})$
$(\frac{1}{\sqrt{2}}, \frac{\sqrt{3}}{2})$
$(\frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}})$
$(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}})$
$(\frac{-\sqrt{3}}{2}, \frac{1}{2})$
$(\frac{\sqrt{3}}{2}, \frac{1}{2})$
135°
120°
90°
60°
45°
150°
30°
X'
180°
X
210°
330°
$(\frac{-\sqrt{3}}{2}, \frac{-1}{2})$
$(\frac{\sqrt{3}}{2}, \frac{-1}{2})$
225°
315°
240°
270°
300°
$(\frac{-1}{\sqrt{2}}, \frac{-1}{2})$
$(\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}})$
$(\frac{1}{-\sqrt{2}}, \frac{-\sqrt{3}}{2})$
$(\frac{1}{\sqrt{2}}, \frac{-\sqrt{3}}{2})$
y'

Unit Circle



Unit Circle Table

Degree	cos	sin	tan	sec	csc	cot
0°	1	0	0	1	undefined	undefined
30°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{3}$	$\frac{2\sqrt{3}}{3}$	2	$\sqrt{3}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	$\sqrt{2}$	$\sqrt{2}$	1
60°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\sqrt{3}$	2	$\frac{2\sqrt{3}}{3}$	$\frac{\sqrt{3}}{3}$
90°	0	1	undefined	undefined	1	0
120°	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$-\sqrt{3}$	-2	$\frac{2\sqrt{3}}{3}$	$-\frac{\sqrt{3}}{3}$
135°	$-\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	-1	$-\sqrt{2}$	$\sqrt{2}$	-1
150°	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{3}$	$-\frac{2\sqrt{3}}{3}$	2	$-\sqrt{3}$
180°	-1	0	0	-1	undefined	undefined
210°	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$\frac{\sqrt{3}}{3}$	$-\frac{2\sqrt{3}}{3}$	-2	$\sqrt{3}$
225°	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	1	$-\sqrt{2}$	$-\sqrt{2}$	1
240°	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$\sqrt{3}$	-2	$-\frac{2\sqrt{3}}{3}$	$\frac{\sqrt{3}}{3}$
270°	0	-1	undefined	undefined	-1	0
300°	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$-\sqrt{3}$	2	$\frac{2\sqrt{3}}{3}$	$-\frac{\sqrt{3}}{3}$
315°	$\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	-1	$\sqrt{2}$	$-\sqrt{2}$	-1
330°	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{3}$	$\frac{2\sqrt{3}}{3}$	-2	$-\sqrt{3}$
360°	1	0	0	1	undefined	undefined