MATH SKILLS

ALGEBRA

Quadratic Equation: If $ax^2 + bx + c = 0$, then $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Equations of a Line: (m = slope; b = y intercept)

Slope - Intercept Form:
$y = mx + b$

Slope of a Line:
$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Point - Slope Form:
$(y_2 - y_1) = m(x_2 - x_1)$

Variation Models:
For variables x, y, and z, where k is a positive constant called the constant of variation:

Direct Variation: $y = kx$ or $y/x = k$
Inverse Variation: $y = k/x$ or $xy = k$
Joint Variation: $z = kxy$



Law of Exponents:
If a, b ∈ R, a, b ≠ 0, and p, q, r, s are ∈ Q, then:

1. $a^r a^s = a^{r+s}$
2. $a^r / a^s = a^{r-s}$
3. $(a^r)^s = a^{rs}$
4. $(ab)^r = a^r b^r$
5. $(a/b)^r = a^r / b^r$ $(b \neq 0)$
6. $a^0 = 1$ $(a \neq 0)$
7. $a^{-r} = 1/a^r$ $(a \neq 0)$
8. $a^{1/b} = \sqrt[b]{a^r} = (\sqrt[b]{a})^r$ $\quad a^{1/2} = \sqrt{a}$ $\quad a^{1/3} = \sqrt[3]{a}$

Logarithms:
$\log x^r = r \log x$
$\log (xy) = \log x + \log y$
$\log (x/y) = \log x - \log y$
$\log x = n \leftrightarrow x = 10^n$ (Common log)
$\log_a x = n \leftrightarrow x = a^n$ (Log to the base a)
$\ln x = n \leftrightarrow x = e^n$ (Natural log)
$\pi \approx 3.14159265$
$e \approx 2.71828183$

Special Products:
$(a - b)^2 = a^2 - 2ab + b^2$
$(a + b)^2 = a^2 + 2ab + b^2$
$(a - b)(a + b) = a^2 - b^2$
$a(b + c) = ab + ac$
$(a + b)(c + d) = ac + ad + bc + bd$
$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
$(a + b)(a + c) = a^2 + ac + ab + bc$
$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

GEOMETRY

Triangles & Angles: The three angles of a triangle add up to 180°.

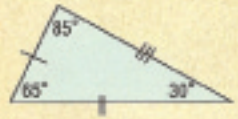
Equilateral triangle: all sides of equal length; all angles of equal degrees



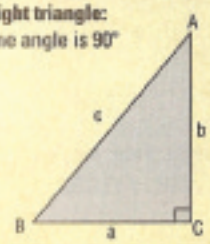
Isosceles triangle: two sides of equal length; two angles of equal degrees



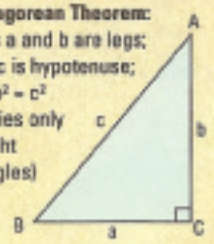
Scalene triangle: no sides equal; no angles equal



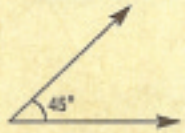
Right triangle: one angle is 90°



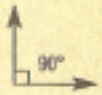
Pythagorean Theorem: sides a and b are legs; side c is hypotenuse; $a^2 + b^2 = c^2$ (applies only to right triangles)



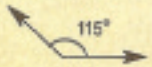
Acute angle: less than 90°



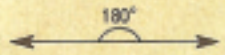
Right angle: equals 90°



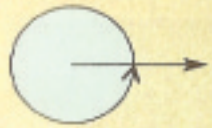
Obtuse angle: greater than 90° but less than 180°



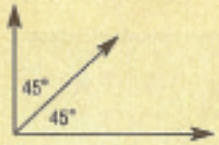
Straight angle: equals 180°



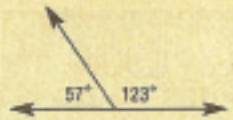
Complete angle rotation: equals 360°



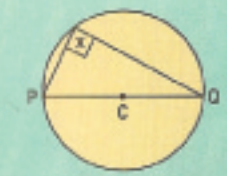
Complementary angles: two angles add up to 90°



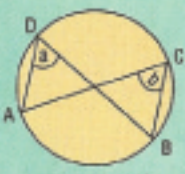
Supplementary angles: two angles add up to 180°



CIRCLE THEOREMS



$\angle x = 90°$ PQ is a diameter



$\angle a = \angle b$ angles subtended on the same arc AB



C is the center of the circle