

Formula Sheet – Pre-Calculus 11

Linear Functions

Calculating Slope

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

y-intercept Form

$$y = mx + b$$

Sketching Method:

- Identify the slope m and the y-intercept b .
- Plot the y-intercept at $(0, b)$.
- Use the slope $m = \frac{\text{rise}}{\text{run}}$ to plot a second point.
- Draw the line through the points.

Slope-Point Form

$$y - y_1 = m(x - x_1)$$

Sketching Method:

- Identify the point (x_1, y_1) and the slope m .
- Plot the point on the graph.
- Use the slope $m = \frac{\text{rise}}{\text{run}}$ to plot a second point.
- Draw the line through the points.

General Form

$$Ax + By = C$$

Sketching Method:

- Find the y-intercept: set $x = 0$ and calculate y .
- Find the x-intercept: set $y = 0$ and solve for x .
- Plot both intercepts.
- Draw the line connecting them.

Quadratic Functions

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Discriminant: $b^2 - 4ac$

General Form

$$y = ax^2 + bx + c$$

Sketching Method

- Find the **axis of symmetry** using $x = -\frac{b}{2a}$
- Find the **vertex** by substituting the axis of symmetry value into the equation.
- Find the **y-intercept**: set $x = 0$ and calculate.

Sketching Method 2

- Identify a , b , and c .
- Identify the **x-intercepts**: solve for x using
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
- Find the **axis of symmetry** by averaging the x-intercepts.
- Find the **vertex** by substituting the axis of symmetry value into the general form.

Standard (Vertex) Form

$$y = a(x - p)^2 + q$$

Sketching Method 1

- Read the vertex (h, k) .
- Draw the axis of symmetry, vertically through the vertex.
- Find the **y-intercept**: set $x = 0$, calculate, and plot.

Factored Form

$$y = a(x - r_1)(x - r_2)$$

Sketching Method

- Identify the **x-intercepts** by solving for x in each of the binomials.
- Find the **axis of symmetry** by averaging the intercepts, the middle of the x-intercepts.

Find the **vertex** by substituting the axis of symmetry value into the equation.

Exponents

Laws of Exponents

$$a^x a^y = a^{x+y}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

$$a^y b^y = (ab)^y$$

Radical Properties

$$\sqrt{ab} = \sqrt{a}\sqrt{b}$$

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

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

Sequences

Arithmetic Sequences

$$t_n = t_1 + (n - 1)d$$

$$S_n = \frac{n(t_1 + t_n)}{2}$$

Geometric Sequences

$$t_n = ar^{n-1}$$

$$r = \frac{t_2}{t_1}$$

Compound Interest

$$A = P \left(1 + \frac{r}{n}\right)^{nt}$$

Rational Expressions

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$$

Trigonometry

Calculator must be in **DEGREE** mode

Right Triangles

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

Right Triangle Ratios

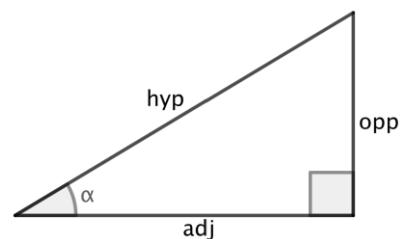
$$\sin \theta = \frac{o}{h}$$

$$\cos \theta = \frac{a}{h}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\text{area} = \frac{1}{2}bh$$

SOH-CAH-TOA



Angles in Standard Position

Vertex at origin & Initial arm on positive x -axis

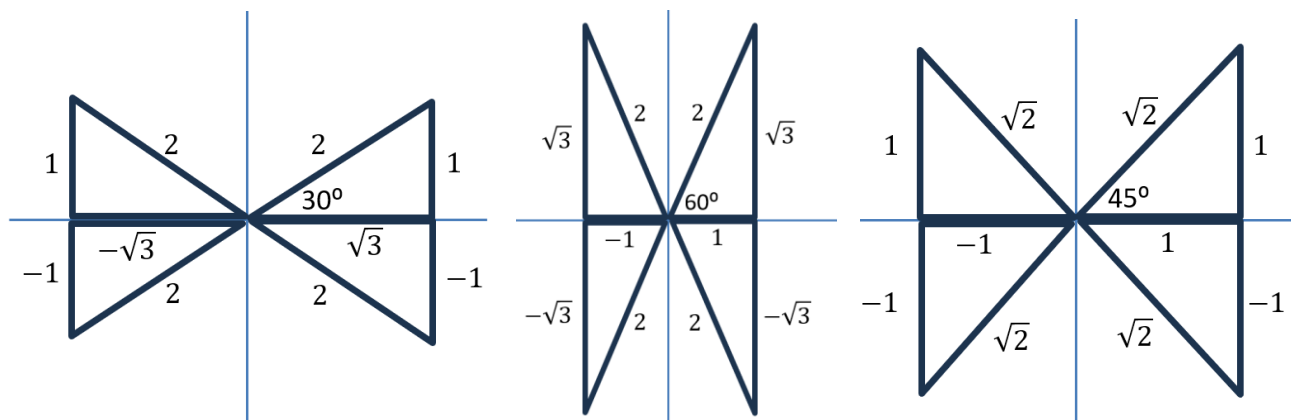
Reference Angle

Acute angle between terminal arm and x -axis

Coterminal Angles

$$\theta = \theta + 360^\circ k$$

Special Triangles & Bowties



Cosine Law

$$c^2 = a^2 + b^2 - 2ab \cos C$$

Sine Law

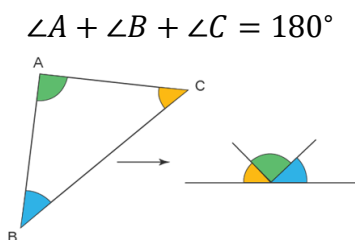
$$a \sin B = b \sin A$$

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

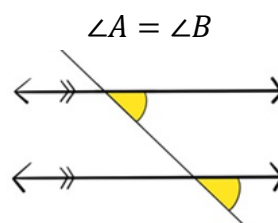
$$\frac{\sin A}{a} = \frac{\sin B}{b}$$

Common Angle Relationships

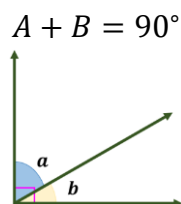
Triangle Angle Sum



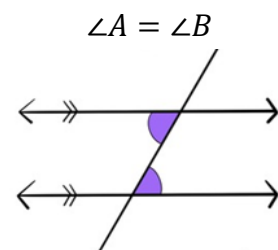
Corresponding Angles



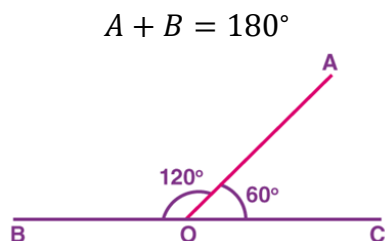
Complementary Angles



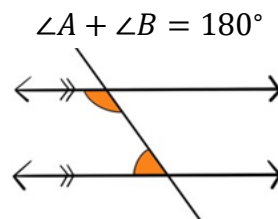
Alternate Interior Angles



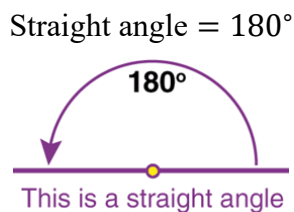
Supplementary Angles



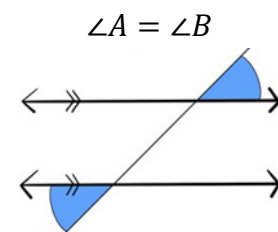
Co-Interior Angles



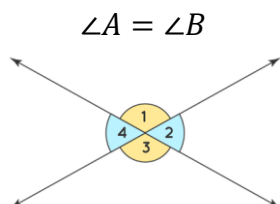
Straight Angles



Alternate Exterior Angles



Vertically Opposite Angles



Co-Exterior Angles

