Riya Gandhi, 8E

Geometry Reference Sheet

★ Coordinate Plane

Distance Formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint Formula:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Slope:

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

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

Standard Form: ***Ax+By=C***

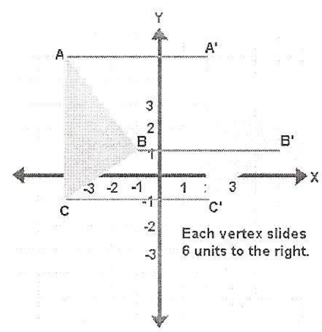
Point-Slope Form: $y - y_1 = m(x - x_1)$

★ Transformations

- Translation: a transformation of the plane that slides every point of a figure the same distance in the same direction.

  - Function Notation:

  $$T_{a,b}(x, y) = (x + a, y + b)$$



- Reflection: transformation in which each point of the original figure has an image that is the same distance from the line of reflection as the original point but is on the opposite side of the line.

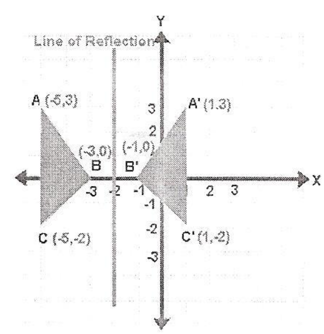
  - Function Notation:

  $$r_{x-axis}(x, y) = (x, -y)$$

  $$r_{y-axis}(x, y) = (-x, y)$$

  $$r_{y=x}(x, y) = (y, x)$$

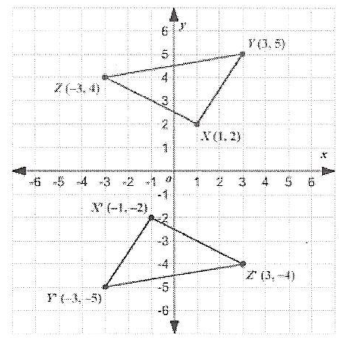
  $$r_{y=-x}(x, y) = (-y, -x)$$



- Rotation: transformation that turns a figure about a fixed point called the center of rotation

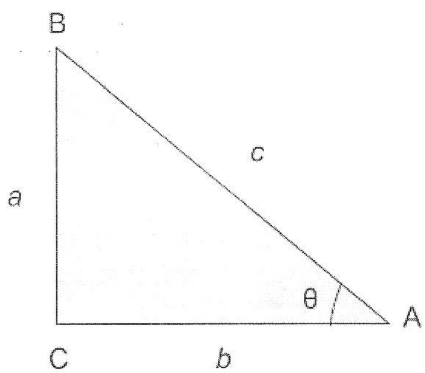
  - Function Notation:

$$R_{90^\circ}(x,y) = (-y,x)$$
$$R_{180^\circ}(x,y) = (-x,-y)$$
$$R_{270^\circ}(x,y) = (y,-x)$$



★ Trigonometry

- Ratios:



$$\sin\theta = \frac{opposite}{hypotenuse} = \frac{a}{c}$$

$$\cos\theta = \frac{adjacent}{hypotenuse} = \frac{b}{c}$$

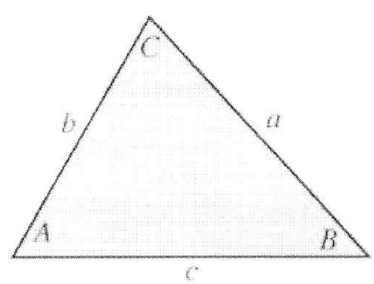
$$\tan\theta = \frac{opposite}{adjacent} = \frac{a}{b}$$

$$\text{cosec}\,\theta = \frac{1}{\sin\theta} = \frac{hypotenuse}{opposite} = \frac{c}{a}$$

$$\sec\theta = \frac{1}{\cos\theta} = \frac{hypotenuse}{adjacent} = \frac{c}{b}$$

$$\cot\theta = \frac{1}{\tan\theta} = \frac{adjacent}{opposite} = \frac{b}{a}$$

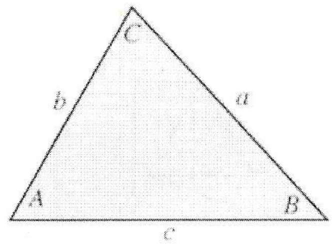
- Law of Sines:



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

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

- Law of Cosines:



$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$c^2 = a^2 + b^2 - 2ab\cos C$$

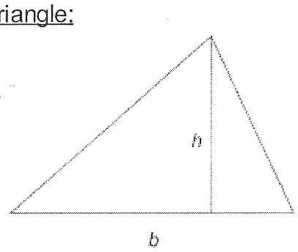
★ Angles in Polygons

- Interior Angle of a Polygon: $\frac{180(n-2)}{n}$
- Sum of the Interior Angles in a Polygon: *180(n-2)*
- Sum of the Exterior Angles in a Polygon: 360°

★ Areas of Polygons

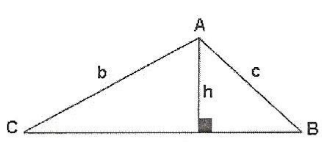
- Area of any regular polygon: $A = \frac{1}{2}pa$

Triangle:



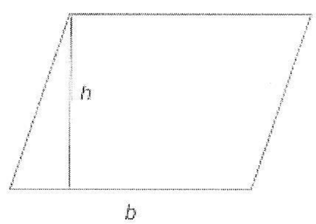
$$A = \frac{1}{2} \cdot b \cdot h$$

or



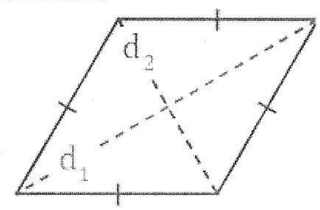
$$A_{\Delta} = \frac{1}{2}ab\sin C$$

Parallelogram:



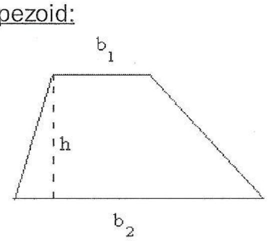
A = bh

Rhombus:



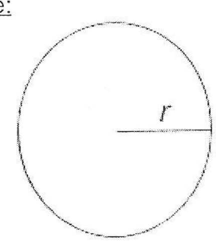
$$A = \frac{1}{2}d_1 d_2$$

Trapezoid:



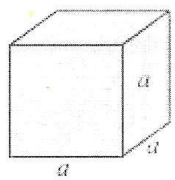
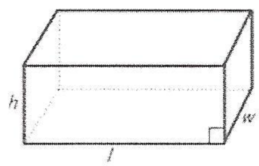
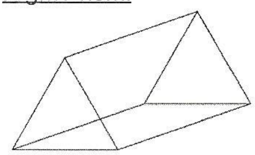
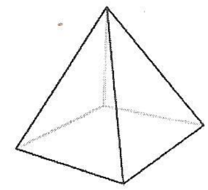
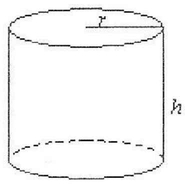
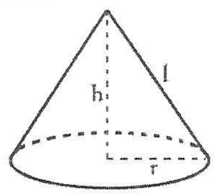
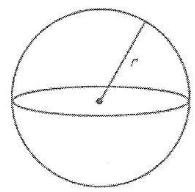
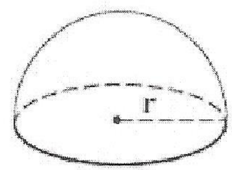
$$\text{Area} = \frac{(b_1 + b_2)}{2} \times h$$

Circle:

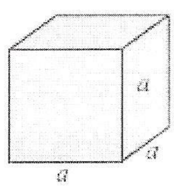
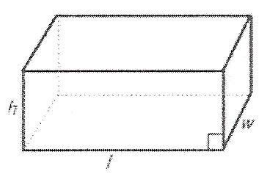
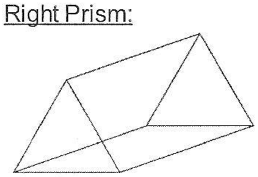
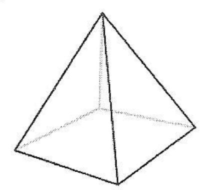
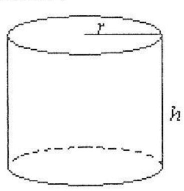
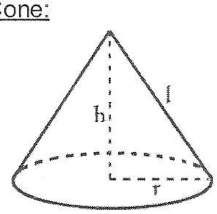
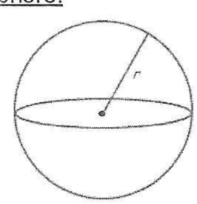
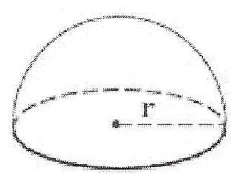


$$A = \pi r^2$$

★ Surface Areas

Cube:  $L.A. = 4a^2$ $S.A. = 6a^2$	Cuboid:  $L.A. = 2(lh+wh)$ $S.A. = 2(lw+wh+lh)$	Right Prism:  L.A. = perimeter of base x height $S.A. = L.A. + 2B$	Pyramid:  $L.A. = \frac{1}{2} pl$ $S.A. = L.A. + B$
Cylinder:  $L.A. = 2\pi rh$ $S.A. = 2\pi r (r + h)$	Cone:  $L.A. = \pi rl$ $S.A. = \pi r (r + l)$	Sphere:  $L.A. = 4 \pi r^2$ $S.A. = 4 \pi r^2$	Hemisphere:  $L.A. = 2\pi r^2$ $S.A. = 3 \pi r^2$

★ Volumes

Cube:  $V = a^3$	Cuboid:  $V = lwh$	Right Prism:  $V = Bh$	Pyramid:  $V = \frac{1}{3} Bh$
Cylinder:  $V = \pi r^2 h$	Cone:  $V = \frac{1}{3} \pi r^2 h$	Sphere:  $V = \frac{4}{3} \pi r^3$	Hemisphere:  $L.A. = \frac{2}{3} \pi r^3$