Study Mate

Geometry

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Angles & Triangles

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Different types of angles

Right Angle: A right angle is a 90 degree angle.

Right Angle
(90 degree)

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Acute Angle: A angle that is greater than 0° and less than 90°

Acute Angle

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Obtuse Angle: A angle that is greater than 90° and less than 180°

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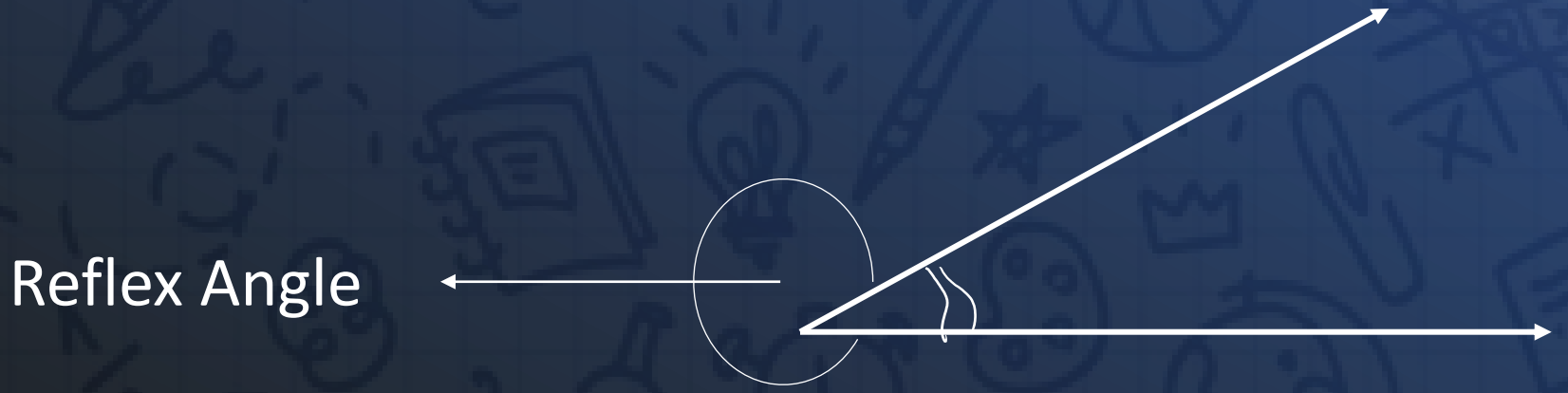
Reflex Angle: A angle that is greater than 180° and less than 360°



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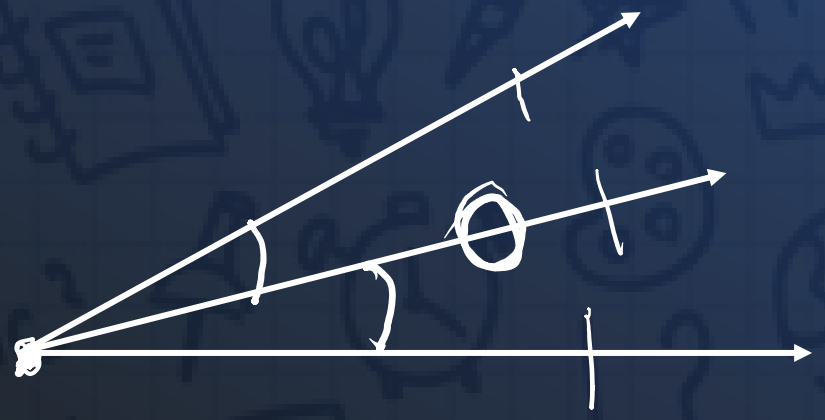
Adjacent Angle: If there is one common leg and one common vertex of two angles then one angle is another’s adjacent angle.



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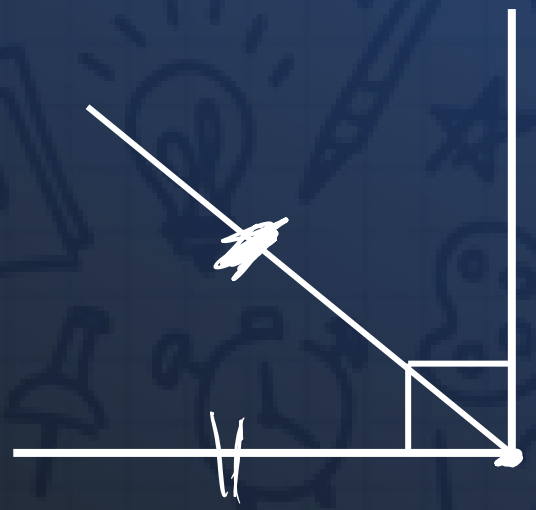
Complementary Angle: If the addition of two adjacent angles is 90° then one angle is another's complementary angle.



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Supplementary Angle: If the addition of two adjacent angles is $180°$ then one angle is another's supplementary angle.

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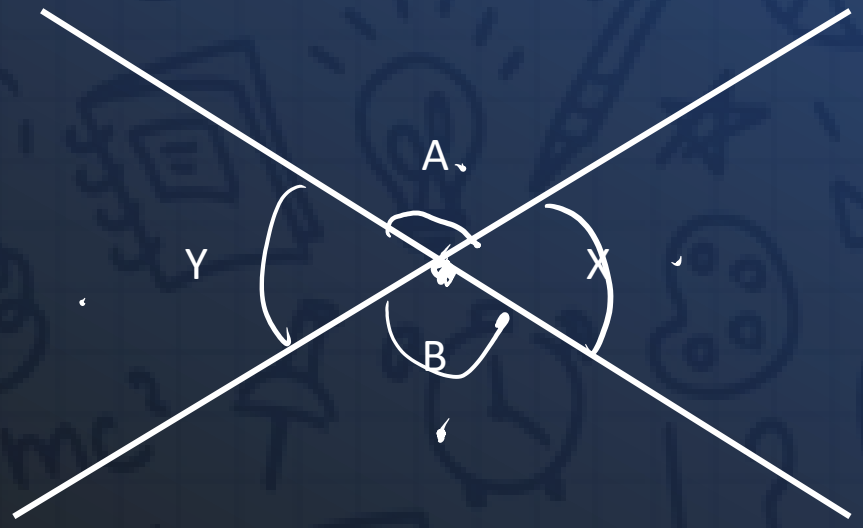
Vertical Angle: If two line intersects then we get 2 pair of vertical angle in the intersect point.



X=Y

A=B

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Fred's Theorem

Vertical Angle, Corresponding angles, Alternative Angles:

4 = 6

3 = 5

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Rules of Triangle: (Angle)

1. Addition of 3 angles of a Triangle is 180 degree
2. Addition of 2 sides of a triangle is greater than 3rd side.
3. Exterior angle is equal to the total length of opposite two interior angles.
4. The total of three ~~interior~~ angles of three different vertexes is 360 degree

Exterior

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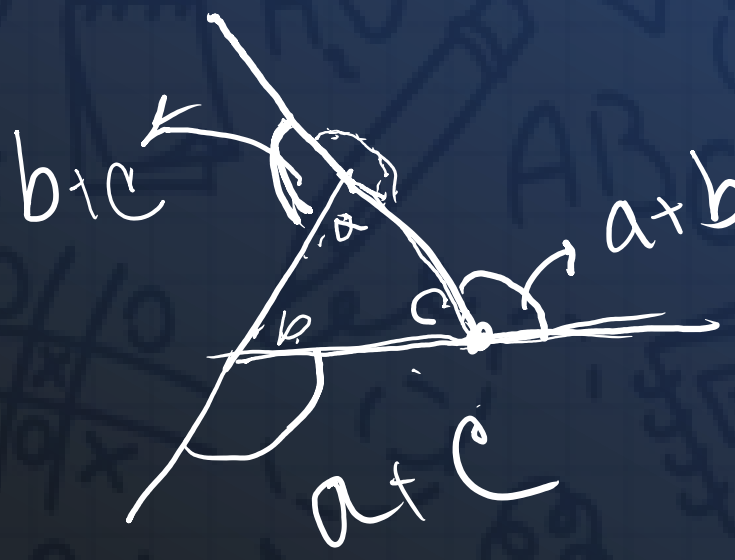

$$a+b+b+c+a+c$$

$$= 2(a+b+c)$$

$$= 2 \times 180^\circ$$

$$= 360^\circ$$

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Rules of Triangle: (Angle-Side Relation)

1. The opposite angle of the larger side is greater than the opposite angle of the smaller side.
2. The opposite side of the greater angle is greater than the opposite side of the smaller angle.
3. All the sides and angle of an equilateral triangle is the same.
4. Two sides and angles are equal of the Isosceles Triangle

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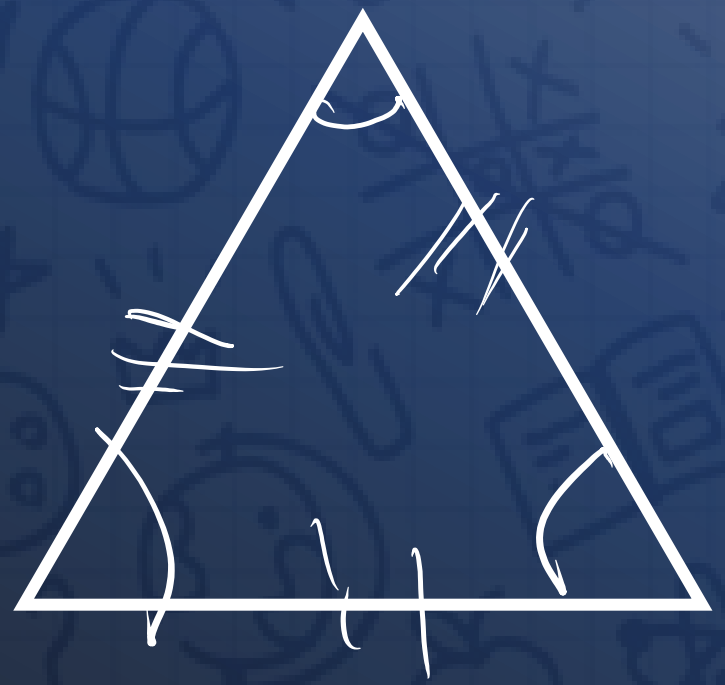
Different Types of Triangle

Equilateral Triangle:

- 3 sides are equal.
- Each angle is 60 degrees.

$$\text{Area} = \frac{\sqrt{3}}{4} n^2$$



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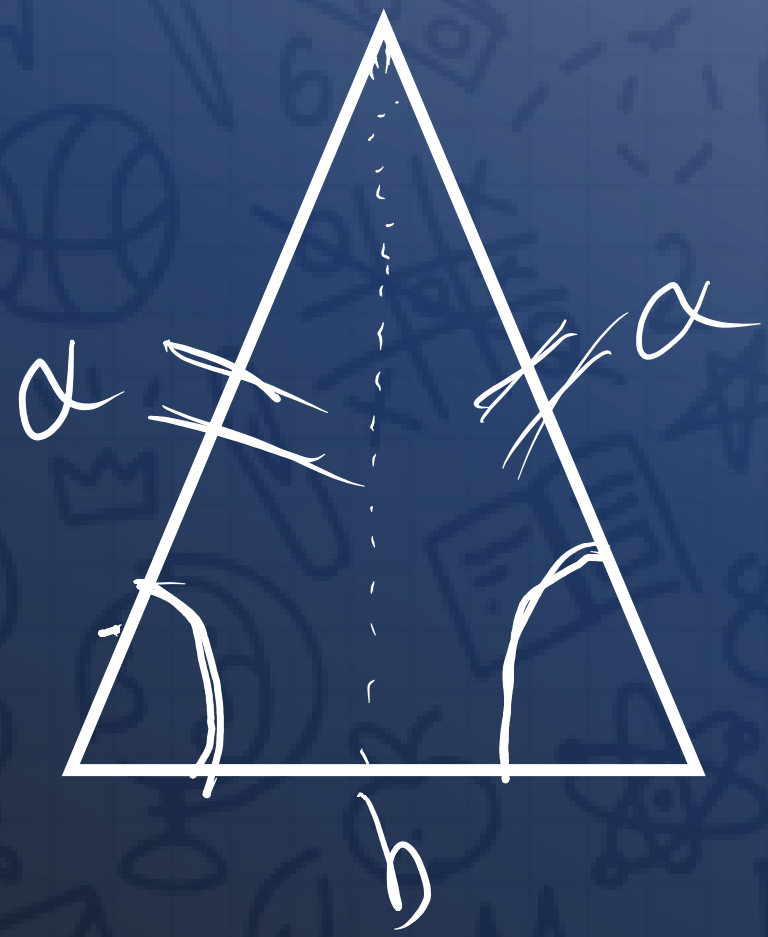
Different Types of Triangle

Isosceles Triangle:

- 2 sides are equal.
- Alternat Angles of Equal sides are equal.

$$\text{Area} = \frac{b}{2}\sqrt{a^2 - \frac{b^2}{4}}$$



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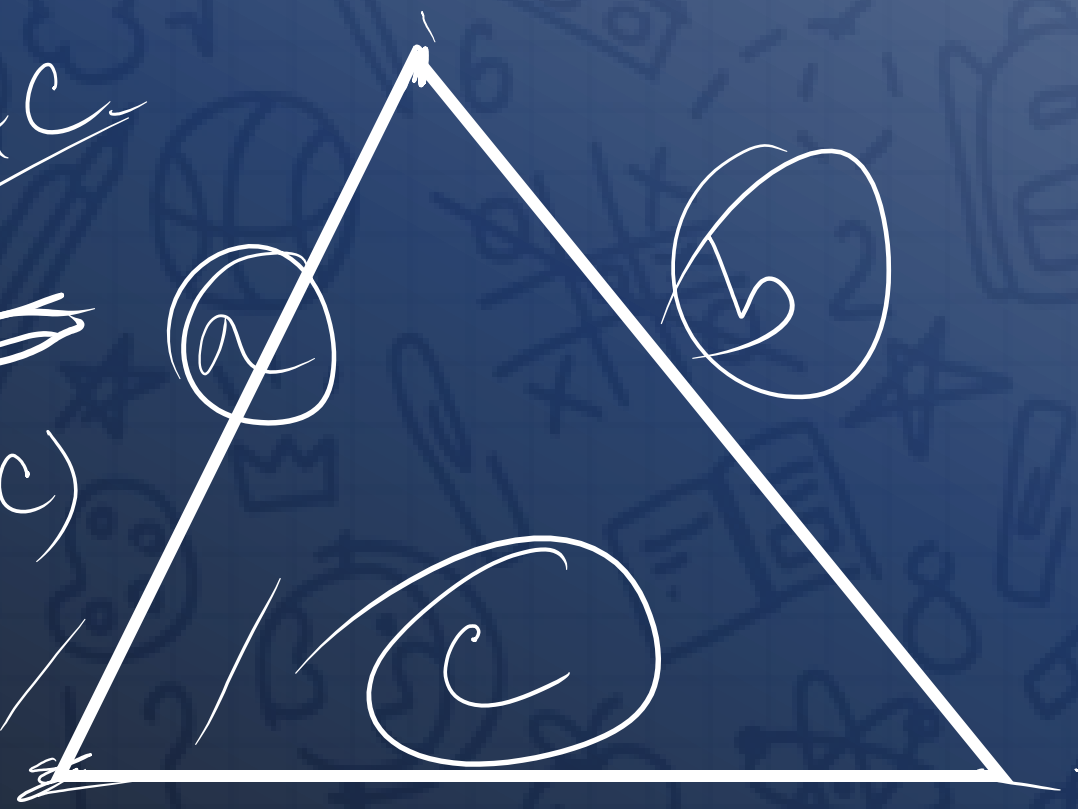
Different Types of Triangle

Scalene Triangle:

- Each side is different in length.
- Each angle is different.

$$s = \frac{a+b+c}{2}$$

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$



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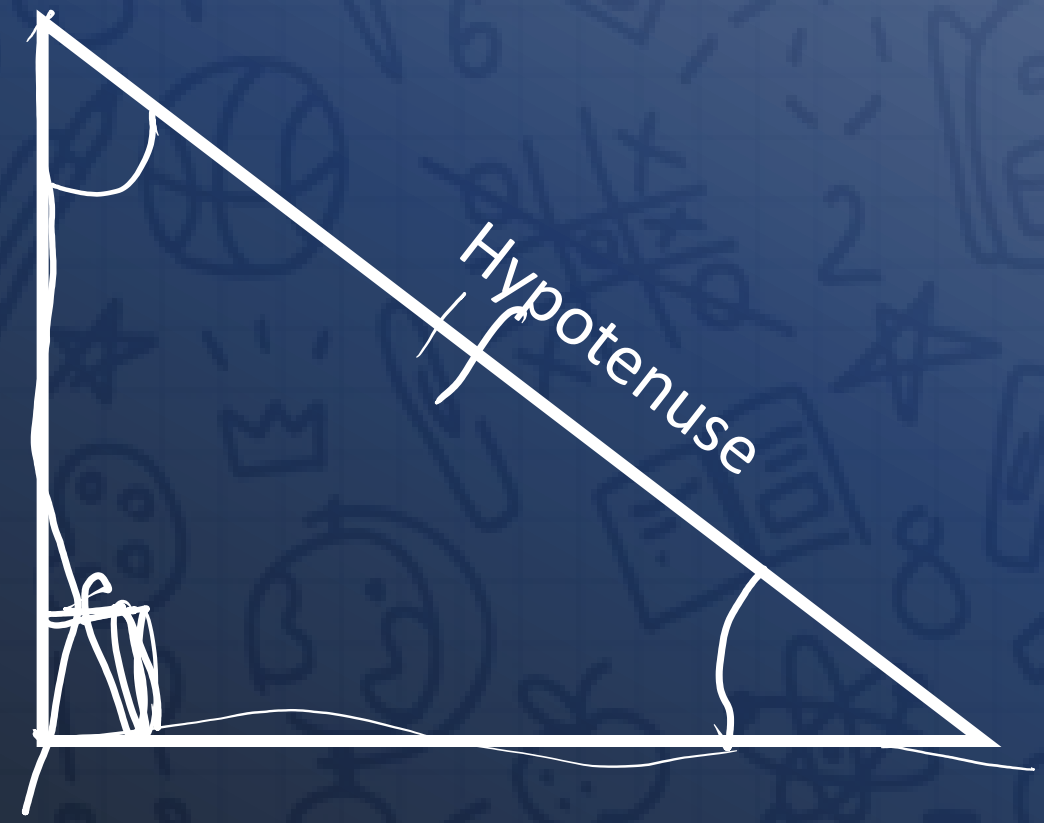
Different Types of Triangle

Right-angle Triangle:

- One angle is right angle.
- Others are less than 90°

$$\frac{1}{2} \times b \times h$$



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Circles

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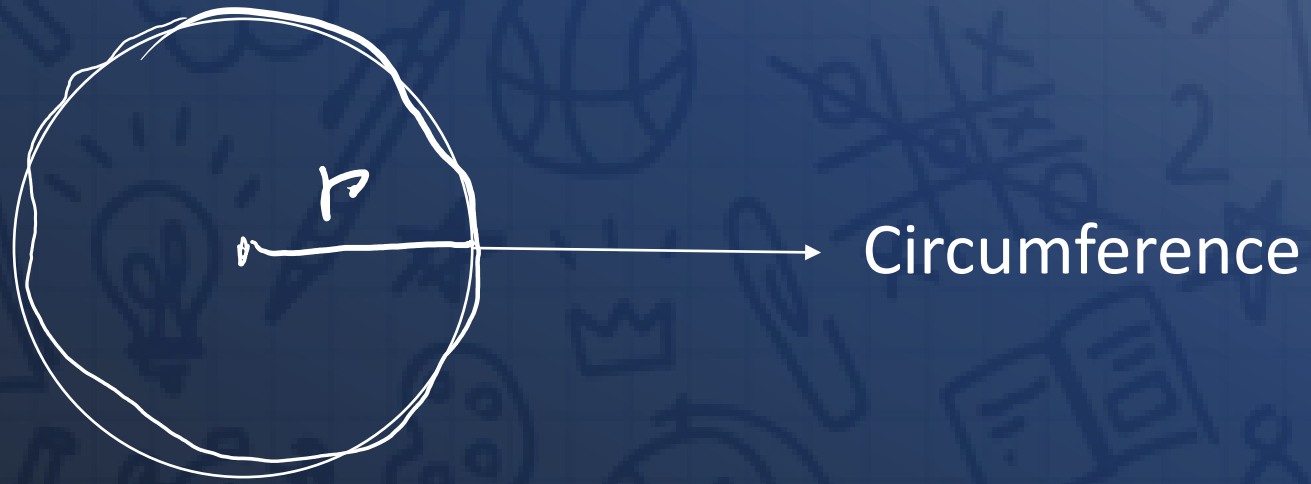
Circles

Circumference:

The perimeter of a circle is called the circumference.

Circumference = $2\pi r$



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Circles

Diameter: The straight line that intersects the center point and two opposite points of the circumference is called Diameter.

Radius: The straight line that connects the center point and a point of the circumference is called the Radius.

Cord: The straight line that connects two points of the circumference is called the Cord.

chord

chord

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Circles

Cord

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Some rules of Circles

- The line that connects the center and the middle point of a cord is perpendicular to the cord.
- The distance from the center of the equal cords is equal.
- The larger cord is near to the center and the smaller cord is far from the center.
- Diameter is the largest cord of a circle.
- Area = πr^2
- Circumference = $2\pi r$

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Central and Inscribed Angle

Central Angle: The angle between the two radius of a circle is known as a central angle

$$\frac{CA}{360} = \frac{AB}{2\pi r}$$

$$\text{Central Angle} = \frac{Arc\ length \times 360°}{2\pi r}$$

Central Angle

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Central and Inscribed Angle

Inscribe Angle: The angle between the two cords of a circle is known as a inscribe angle.

$$\text{Inscribe Angle} = \frac{Central\ angle}{2}$$

Inscribe Angle

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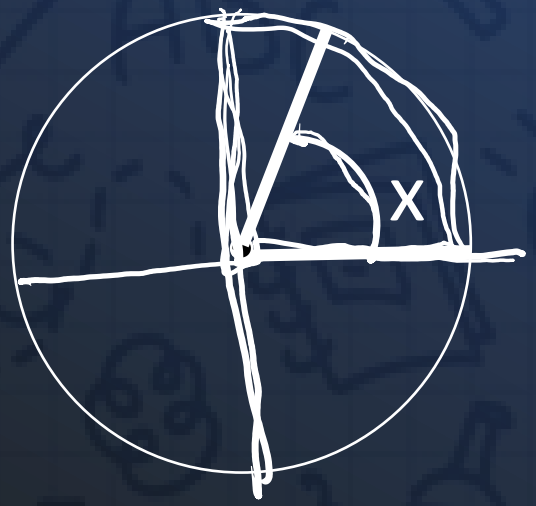
Area of Pie

$$\frac{\text{Central angle}}{360^\circ} = \frac{\text{Arc}}{\text{Circumf}} = \frac{\text{Area of Pie}}{\text{Area}}$$



$$\text{Area of Pie} = \pi r^2 \times \frac{\text{Central angle}}{360}$$

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$$\frac{90^\circ}{360} = \frac{1}{4}$$

$$\frac{\text{Area of Pie}}{\text{Total Area}} = \frac{A}{\pi r^2}$$

$$= \frac{1}{4}$$

$$\frac{\text{Arc}}{\text{Cir}} = \frac{\theta}{2\pi r}$$

$$= \frac{1}{4}$$

$$\pi r^2 * \frac{CA}{360^\circ}$$

$$4\pi \times \frac{1}{4}$$

$$\frac{CA \times 2\pi r}{360}$$

$$= \frac{1}{4} \times 2 \times \pi \times 2$$

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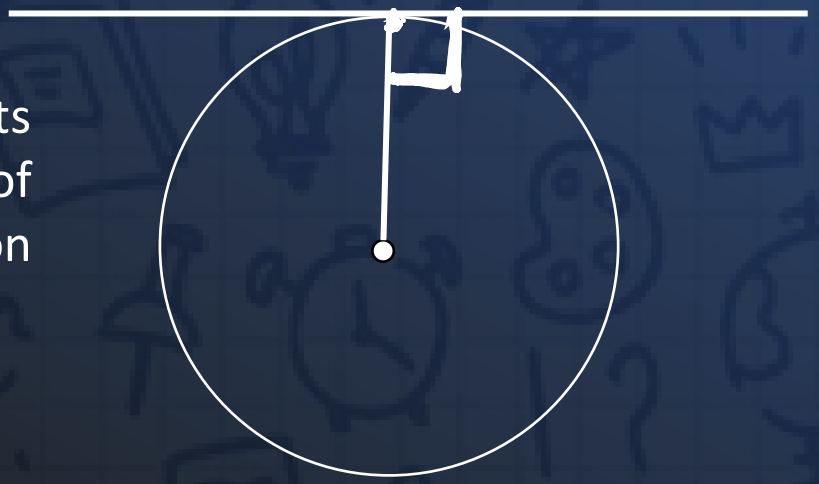
Tangent

Tangent: Tangent is an external line of a circle which touch a single point of the circumference.

- The straight line which connects the center and the point of tangency is perpendicular on the tangent.



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Clock Math

1. To get the angle between = $\left|30H - \frac{11}{2}M\right|$

10:00.

$30 \times 10 - \frac{11}{2} \times 0$

$= 300°$

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Quadrilaterals and Polygon

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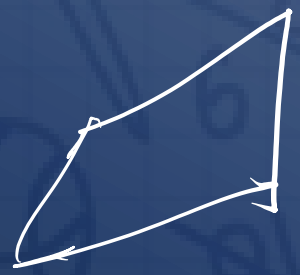
Quadrilaterals

- Has 4 sides.
- Has 4 interior angles.
- Has 2 diagonal.
- The sum of it’s interior angles are 360.



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Quadrilaterals

- Square
- Rhombus
- Rectangle
- Parallelogram
- Trapezoid

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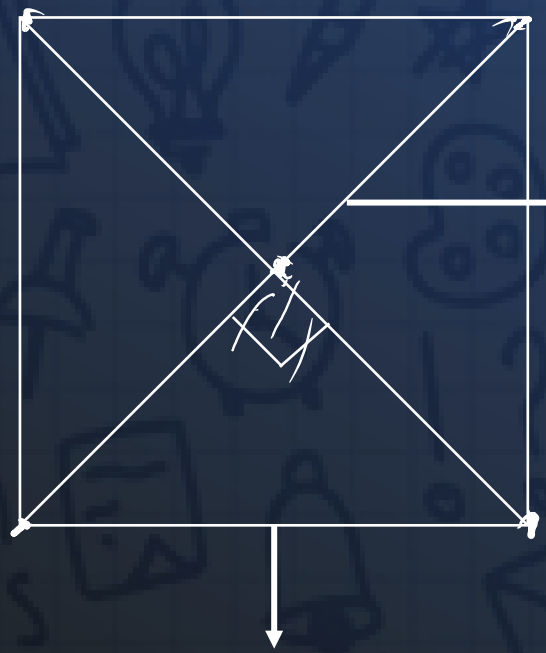
Square

- Has 4 equal sides.
- Has 4 interior angles. And each interior angles are 90 degrees.
- Has 2 equal diagonal. Each diagonal creates 90 degrees in the intersecting point and intersects equally.
- The sum of its interior angles is 360.

$$\text{Area} = x^2 = \frac{1}{2}d^2$$

$$\text{Perimeter} = 4x$$



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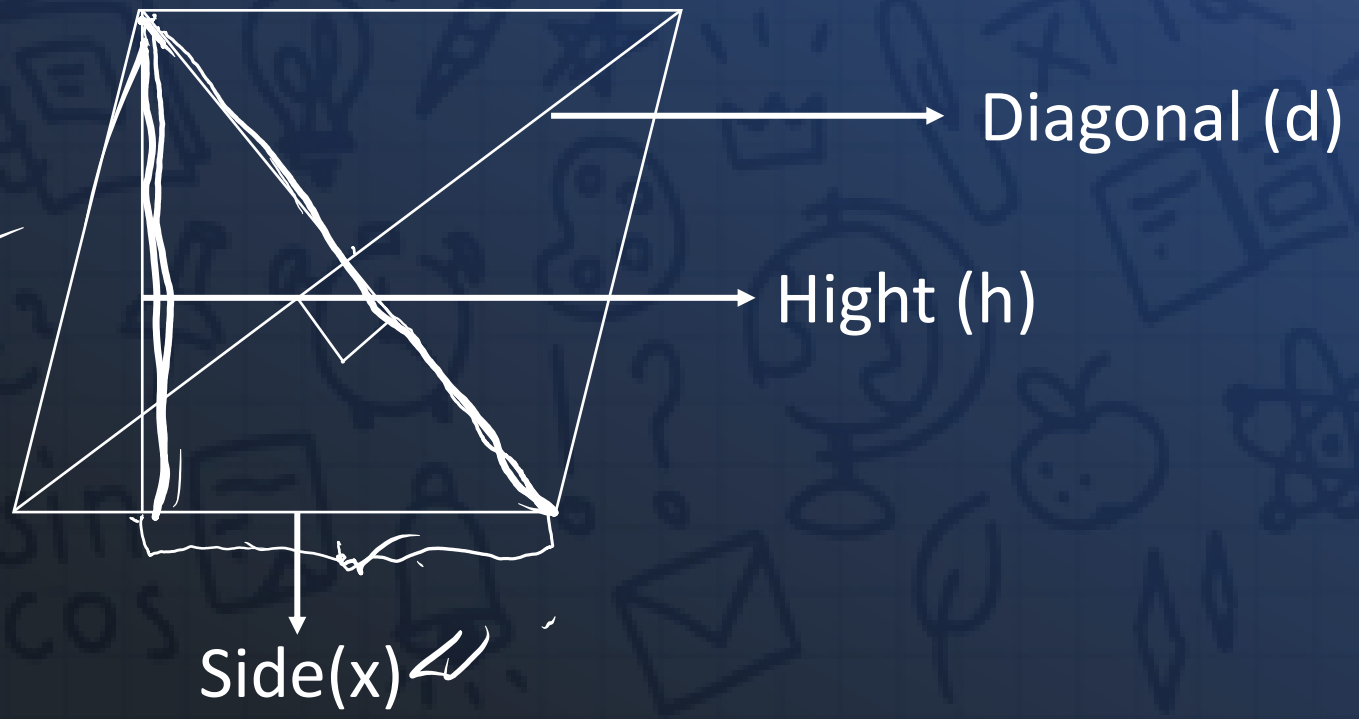
Rhombus

- Has 4 equal sides.
- Has 4 interior angles.
- Has 2 diagonal. Each diagonal creates 90 degrees in the intersecting point and intersects equally.
- The sum of its interior angles is 360.

$$\text{Area} = x \times h = \frac{1}{2} d_1 \times d_2$$

$$\text{Perimeter} = 4x$$



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Rectangle

- Has 4 sides. Opposite sides are equal and parallel.
- Has 4 interior angles. And each interior angles are 90 degrees.
- Has 2 equal diagonal.
- The sum of its interior angles is 360.

$$\text{Area} = l \times w$$
$$\text{Perimeter} = 2(l + w)$$

Width (w)

Length(l)

$$\sqrt{l^2 + w^2}$$

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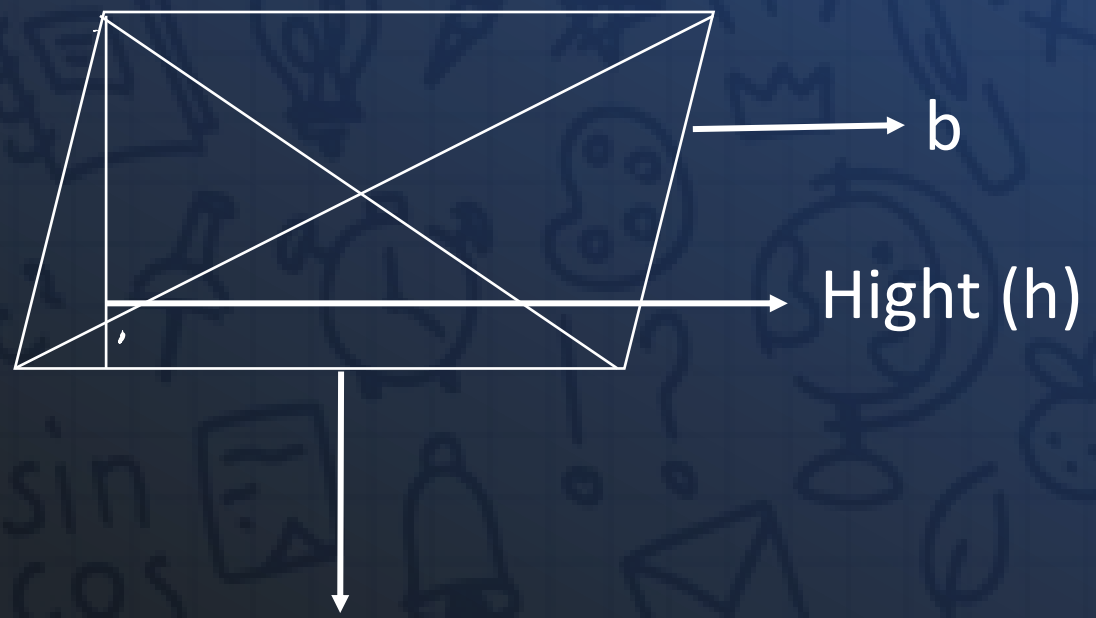
Parallelogram

- Has 4 ~~equal~~ sides. Opposite sides are equal and parallel.
- Has 4 interior angles.
- Has 2 diagonal.
- The sum of its interior angles is 360.

$$\text{Area} = \text{a} \times h$$
$$\text{Perim}eter = 2(a + b)$$

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Polygons

Polygons means multiple sides. A polygon has more than 2 sides.

No of Sides	Name	Total interior angle= (n-2) x 180
3	Triangle	180
4	Quadrilateral	360
5	Pentagon	540
6	Hexagon	720
7	Heptagon	900
8	Octagon	1080
9	Nonagon	1260
10	Decagon	1440

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Regular Polygons

- When the sides of a polygon are equal that is called a regular polygon.
- All the interior angles of a regular polygon is equal.
- Angle of a regular polygons = $\frac{(n-2)\times 180^\circ}{n}$

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Pythagorean Theorem

The Pythagorean theorem states that in a right-angled triangle, area of the square of the length of the hypotenuse (the side opposite the right angle) is equal to the sum of the area of the squares of the lengths of the other two sides


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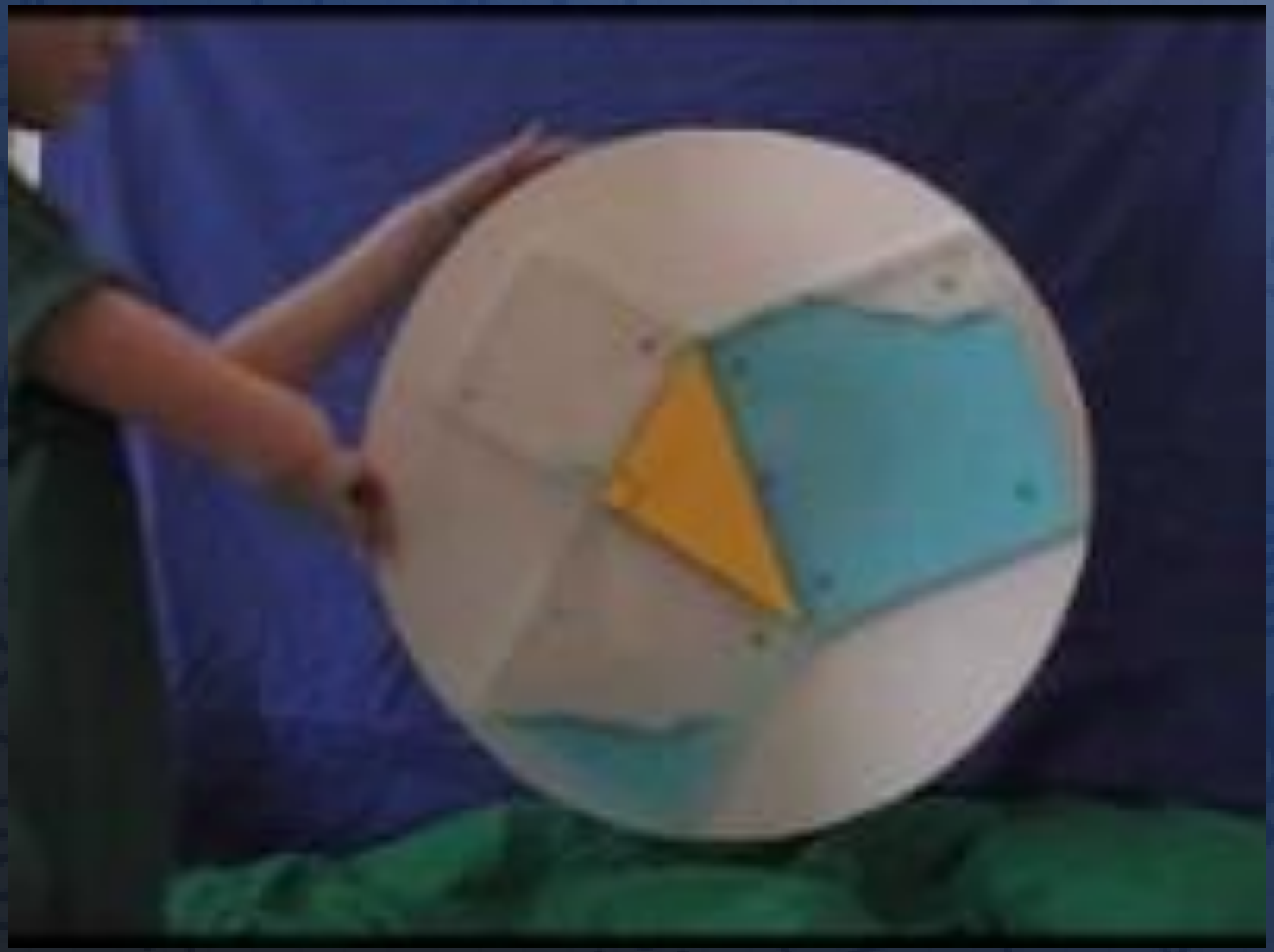

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Brainstorm

We measure water as volume, but how does it prove the Pythagorean theorem, as it uses area?