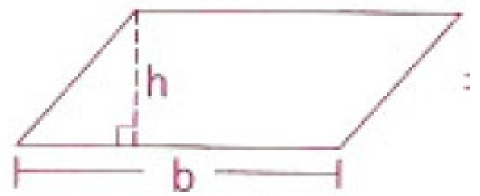
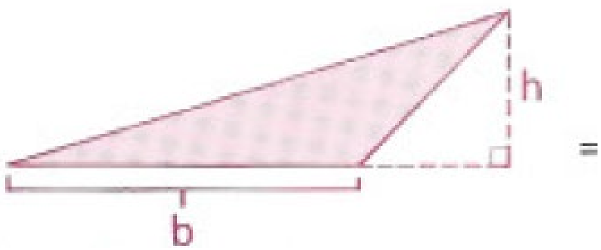
Chapter 11: Area Summary

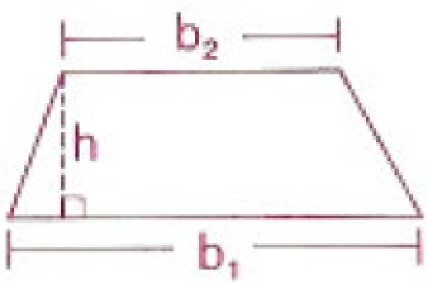
11.1) Break up figures into shapes of with known area formulas

Area of rectangle = (base)(height)

11.2) Parallelograms and Triangles

	**<u>Parallelogram</u>** The **height** must be perpendicular to a side The side to which the height is perpendicular is the **base** **Area = (base)(height)**
	**<u>Triangle</u>** The **height** must be perpendicular to the **line** through the **base**. You can choose any of the sides to be the base by rotating the triangle, as long as the height is perpendicular to it. **Area =** $\frac{1}{2}$ **(base)(height)**

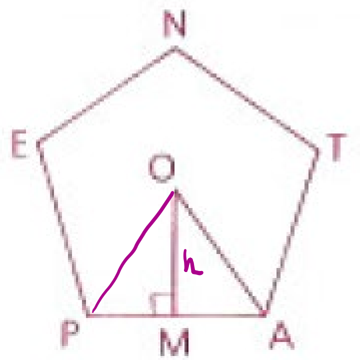
11.3) Trapezoids

	The **bases** are parallel the sides that are parallel to each other The **height** must be perpendicular to both bases. **Area = (average of bases)(height)** = $\frac{(\text{base1} + \text{base 2})}{2}$ **(height)** **= (median)(height)**

11.4) Kites

	Every kite is made up of two congruent isosceles triangles. The height of each triangle is ½ diagonal 2 The base of each triangle is diagonal 2 Each triangle has area ½ (½ diagonal 2)(diagonal 1) We multiply by 2 to get the area of the kite: **Area Kite = (½ diagonal 2)(diagonal 1)** **= half of product of diagonals**

11.5) Polygons



Regular Polygon Vocabulary

O - Center: The center of the circle going through all vertices of the polygon (circumscribed circle)

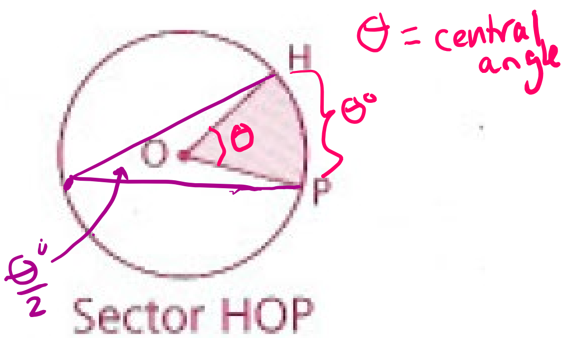
$\overline{OA}$ - **Radius:** The radius of the circumscribed circle, From the center to any vertex

$\overline{OM}$ - **Apothem:** The radius of the inscribed circle, From the center to the midpoint of any side

<u>**Note:**</u> The **apothem** is also the height of ΔAOP,
Area of ΔAOP = ½ (apothem)(AP)
There are *n* triangles congruent to ΔAOP, so we multiply by *n*.
Area of Polygon = n(½ apothem) (AP)
*n*AP = perimeter of polygon

Area of Polygon = ½ (apothem) (perimeter)

11.6) Areas of Sectors, Segments

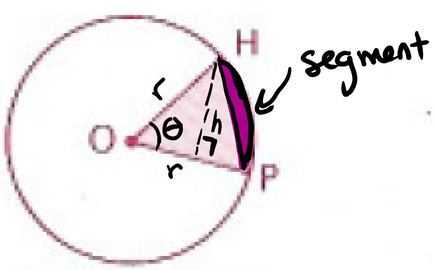


Area of circle = πr^2

Area of sector = (fraction of circle)(πr^2)

Fraction of circle = $\dfrac{\theta}{360^o} = \dfrac{\text{central angle}}{360^o}$

Area of sector = $\left(\dfrac{\theta}{360^o}\right)\pi r^2$



Segment: A sector of a circle (HOP) minus the isosceles triangle (ΔHOP).

Area of ΔHOP: ½ (base)(height)
We can see that there is a little right triangle in ΔHOP whose hypotenuse (OH) = *r*, and has height = *h*.

$$\sin(\theta) = \frac{h}{r} \quad \rightarrow \quad r\sin(\theta) = h$$

Since *h* is perpendicular to OP, then the base is OP, so base = *r*.

Area of ΔHOP = ½ (base)(height)

$$= \frac{1}{2}(r)(r\sin(\theta))$$
$$= \frac{1}{2}r^2\sin(\theta)$$

Area of Segment: Area of Sector – Area of ΔHOP

$$= \left(\frac{\theta}{360^o}\right)\pi r^2 - \frac{1}{2}r^2\sin(\theta)$$