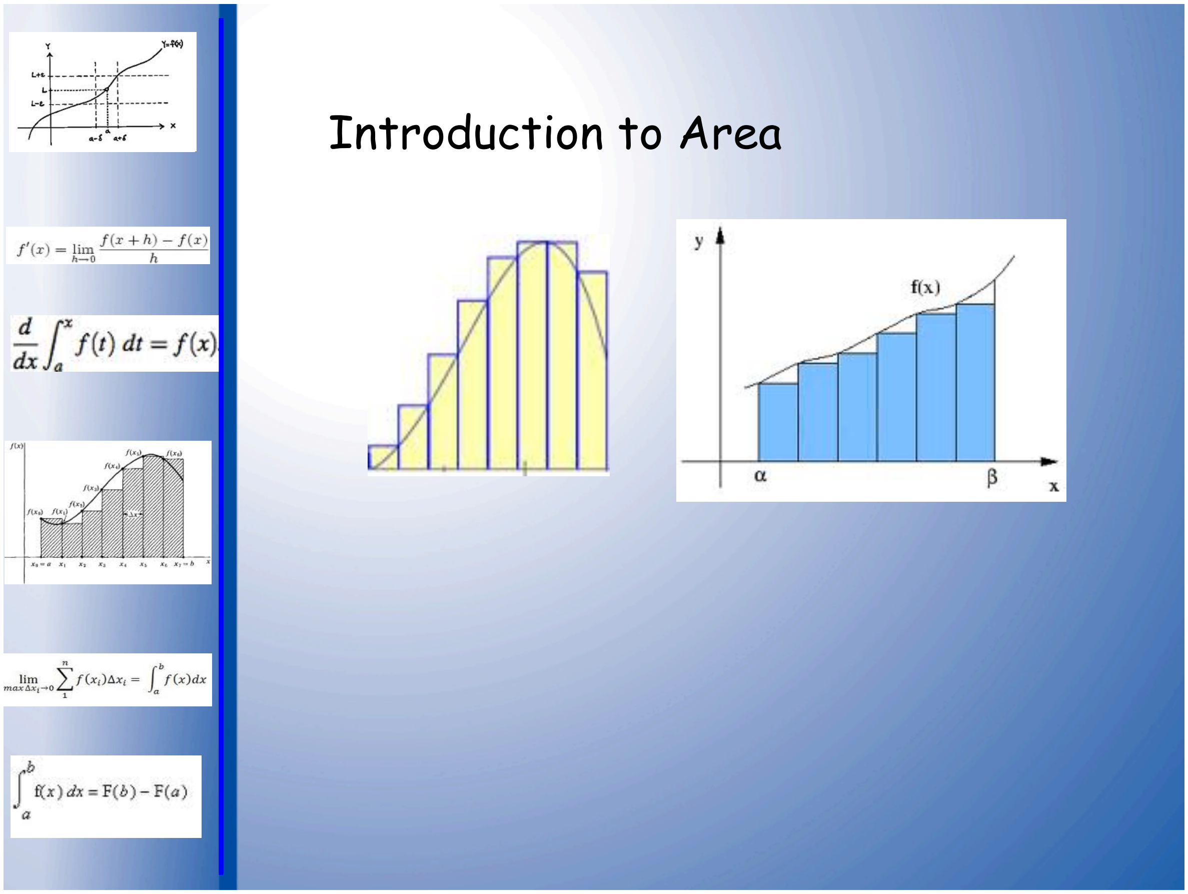
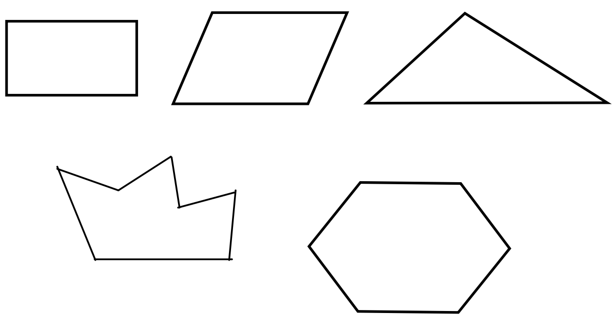
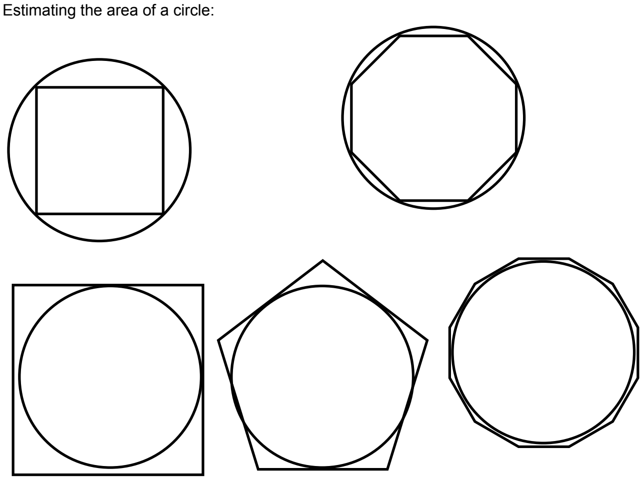
24 Introduction to Area



Area of a Polygon:



Estimating the area of a circle:



24 Introduction to Area

Sums and Sigma Notation

1+2+3+4+...+ 100 =

2+4+6+8+....+ 1000 =

1+4+9+16+....+ 625=

$\sum$ = Sigma, the capitol Greek letter called "sigma";
It means summation. i = index

$\sum_{j=1}^{n} \frac{1}{j} =$

$\sum_{i=1}^{n} c =$

Linearity of $\sum$

Let $\{a_i\}$ *and* $\{b_i\}$ denote two sequences and *c* is a real number.

(i) $\sum_{i=1}^{n} ca_i = c\sum_{i=1}^{n} a_i$

(ii) $\sum_{i=1}^{n} a_i \pm b_i = \sum_{i=1}^{n} a_i \pm \sum_{i=1}^{n} b_i$

Special Sum Formulas

$$\sum_{i=1}^{n} i = 1 + 2 + 3 + \ldots + n = \frac{n(n+1)}{2}$$

$$\sum_{i=1}^{n} i^2 = 1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

$$\sum_{i=1}^{n} i^3 = 1^3 + 2^3 + 3^3 + \ldots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$$

$$\sum_{i=1}^{n} i^4 = 1^4 + 2^4 + 3^4 + \ldots + n^4 = \frac{n(n+1)(6n^3 + 9n^2 + n - 1)}{30}$$

EX 1 $\sum_{i=1}^{10}[(i-1)(4i+3)]$

EX 2 $\sum_{j=1}^{n}(2j-3)^2$

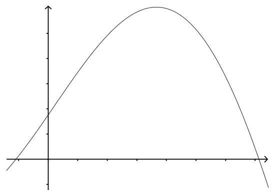
EX 5 Change the variable in the index to start at 1. $\sum_{k=5}^{14}k2^{k-4}$

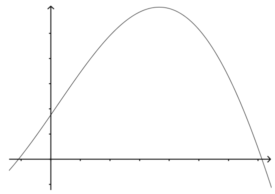
<u>Collapsing Sum</u> $\sum_{i=1}^{n}(a_{i+1}-a_i)=a_{n+1}-a_1$

EX 3 $\sum_{k=1}^{10}(2^k-2^{k-1})$

EX 4 $\sum_{k=3}^{m+1}(a_k-a_{k-1})$

We will estimate the area under a curve using inscribed or circumscribed rectangles.





EX 6 For $f(x)=3x-1$, divide the interval [1,3] into 4 equal subintervals.
Calculate the area of the circumscribed rectangles.