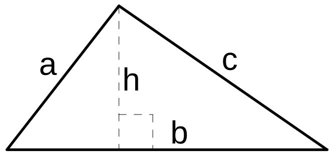
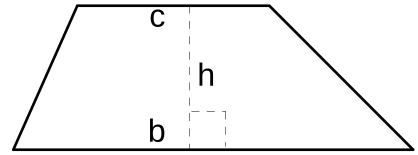
FORMULAS I

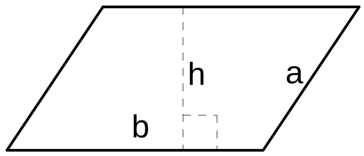
Triangle:



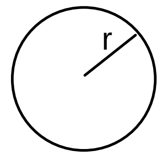
Trapezoid:



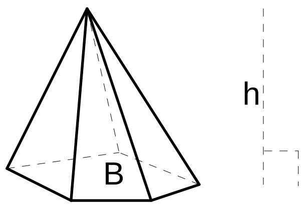
Parallelogram:



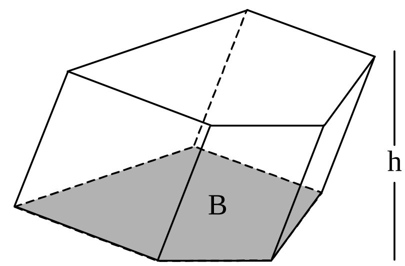
Circle:



Pyramid:



Cylinder:



$\pi \cong \frac{22}{7} \cong 3.14$

PERIMETER

Triangle: $P = a + b + c$

Circle: $P = 2\pi r$

AREA

Triangle: $A = \frac{1}{2}bh$

Circle: $A = \pi r^2$

Parallelogram: $A = bh$

Trapezoid: $A = \frac{1}{2}(b + c)h$

Sphere: $A = 4\pi r^2$

VOLUME

Cylinder: $V = Bh$

Pyramid: $V = \frac{1}{3}Bh$

Sphere: $V = \frac{4}{3}\pi r^3$

FORMULAS II

SERIES

Arithmetic Series: Sum of numbers differing by a constant difference: for n terms

$$a+(a+d)+(a+2d)+(a+3d)+\ldots+\left[a+(n-1)d\right]=\tfrac{1}{2}n(a+\ell)=\tfrac{1}{2}n\left[a+a+(n-1)d\right] \text{ where } \ell=a+(n-1)d$$

Ex: $17+24+31+38+45=\tfrac{1}{2}\bullet 5[17+45]=\tfrac{5}{2}\bullet 62=155$. Notice that the difference between any two consecutive terms is 7.

Special Cases: $1+2+3+4+\ldots+n=\tfrac{1}{2}n(n+1)$ $\quad 1+3+5+7+\ldots+(2n-1)=n^2$

Ex:

$$16+20+24+\ldots+48=4(4+5+6+\ldots+12)=4\left[(1+2+3+\ldots+12)-(1+2+3)\right]=4\left[\tfrac{1}{2}\bullet 12\bullet 13-\tfrac{1}{2}\bullet 3\bullet 4\right]$$
$$=4[78-6]=4[72]=288$$

Ex:

$$17+24+31+38+45=(10+7)+(10+14)+(10+21)+(10+28)+(10+35)=5\bullet 10+7[1+2+3+4+5]$$
$$=50+7\left[\tfrac{1}{2}\bullet 5\bullet 6\right]=50+7\bullet\tfrac{30}{2}=50+\tfrac{210}{2}=50+105=155$$

The last example shows how any arithmetic series can be written in terms of a sum of n consecutive integers starting with 1.

Sum Of Squares: $1^2+2^2+3^2+\ldots+n^2=\tfrac{1}{6}n(n+1)(2n+1)$

Sum Of Cubes: $1^3+2^3+3^3+\ldots+n^3=\left[\tfrac{1}{2}n(n+1)\right]^2$

Geometric Series: Sum of numbers differing by a constant ratio: For n terms, with the ratio being r

$$a+ar+ar^2+ar^3+\ldots+ar^{n-1}=\frac{a(1-r^n)}{1-r} \qquad a+ar+ar^2+ar^3+\ldots=\frac{a}{1-r}$$

Ex: $625+125+25+5=625\left(1+\tfrac{1}{5}+\tfrac{1}{5^2}+\tfrac{1}{5^3}\right)=\dfrac{5^4\left(1-\tfrac{1}{5^4}\right)}{1-\tfrac{1}{5}}=\tfrac{5^4-1}{4/5}=\tfrac{5}{4}\bullet 624=5\bullet 156=780$

Ex: $9+\tfrac{9}{4}+\tfrac{9}{16}+\tfrac{9}{64}+\ldots=9\bullet\left(1+\tfrac{1}{4}+\tfrac{1}{16}+\tfrac{1}{64}+\ldots\right)=\dfrac{9}{1-\tfrac{1}{4}}=\dfrac{9}{3/4}=\tfrac{4}{3}\bullet 9=12$

Notice that in the last example there are an infinite number of terms hidden in the … . Even so, all these terms can still be added to give the answer shown.