Surface Area, Lateral Area, and Volume Formulas

In the table shown B is the area of the base, P is the perimeter of the base, h is the height of the object, l is the slant height of the object, r is the radius of the base if the base is a circle, C is the circumference of the base if it is a circle, S is the surface area of the object, L is the lateral area of the object, and V is the volume of the object.

Name	Lateral Area	Surface Area	Volume
Right Prism	$L=Ph$	$S=2B+L$ or $S=2B+Ph$	$V=Bh$
Right Cylinder	$L=Ch$ or $L=2\pi rh$	$S=2B+L$ or $S=2B+Ch$ or $S=2\pi r^2+2\pi rh$	$V=Bh$ or $V=\pi r^2 h$
Regular Pyramid	$L=\frac{1}{2}Pl$	$S=B+L$ or $S=B+\frac{1}{2}Pl$	$V=\frac{1}{3}Bh$
Right Cone	$L=\frac{1}{2}Cl$ Or $L=\pi rl$	$S=B+L$ or $S=B+\pi rl$ or $S=\pi r^2+\pi rl$	$V=\frac{1}{3}Bh$ or $V=\frac{1}{3}\pi r^2 h$
Sphere		$S=4\pi r^2$	$V=\frac{4}{3}\pi r^3$

Right Prism
Lateral area of a right prism: $L=Ph$ where L is the lateral area and Ph is the product of the perimeter of one of the bases and the height of the prism. Lateral area is the surface area minus the area of the bases. The lateral area consists of only the area of the lateral faces of a prism.
Surface area of a right prism: $S=2B+L$ or $S=2B+Ph$ where S is the total surface area, $2B$ is twice the area of one of the bases. The lateral area is L or Ph and is the product of the perimeter of one of the bases and the height of the prism.
Volume of a prism: $V=Bh$ where B is the area of the base and h is the height.

Right Cylinder
Lateral area of a right cylinder: $L=Ch$ where L is the lateral area and Ch is the product of the circumference of one of the bases and the height of the cylinder. Lateral area is the surface area minus the area of the bases. Think of a cylinder as a soup can. The lateral area is the label. If the label was removed and laid flat it would be a rectangle. The height of the rectangle is the same as the height of the cylinder and the length of the rectangle would be the circumference of the circle that is the base of the cylinder.

Surface area of a right cylinder: $S=2B+L$ or $S=2B+Ch$ or $S=2\pi r^2+2\pi rh$ where S is the total surface area, $2B$ is twice the area of one of the bases (the area of the circle $2\pi r^2$ that is the base in the case of a cylinder) and L or Ch is the lateral area. Ch is the product of the circumference of one of the circles and h the height of the cylinder.
Volume of a cylinder: $V=Bh$ or $V=\pi r^2 h$ where B is the area of the base (which is a circle and thus gives the second formula) and h is the height of the cylinder.

Regular Pyramid

Lateral area of a regular pyramid: $L=\frac{1}{2}Pl$ L is the lateral area, P is the perimeter of the base and l is the slant height of the pyramid.

Surface area of a regular pyramid: $S=B+L$ **or** $S=B+\frac{1}{2}Pl$ S is the surface area, B is the area of the base, L is the lateral area, P is the perimeter of the base and l is the slant height of the pyramid.

Volume of a regular pyramid: $V=\frac{1}{3}Bh$ where B is the area of the base and h is the height of the pyramid.

Right Cone

Lateral area of a right cone: $L=\frac{1}{2}Cl$ or $L=\pi rl$ In the first formula C is the circumference of the circle that is the base and l is the slant height of the cone. When the circumference is divided by 2 you get πr which is half the circumference which results in the second formula.
Surface area of a right cone: $S=B+L$ or $S=B+\pi rl$ or $S=\pi r^2+\pi rl.$ S is the surface area, B is the area of the base, L and πrl are the lateral area of the cone.

Volume of a right cone: $V=\frac{1}{3}Bh$ or $V=\frac{1}{3}\pi r^2 h$ where B is the area of the base and h is the height of the cone.

Sphere

Surface area of a sphere: $S=4\pi r^2$ Where S is the surface area of a sphere and r is the radius.

Volume of a sphere: $V=\frac{4}{3}\pi r^3$ Where V is the volume and r is the radius.