

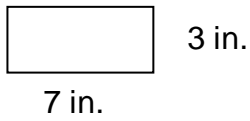
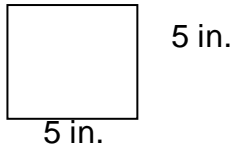
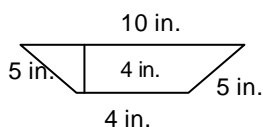
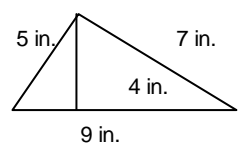
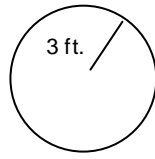
3-2-1 Formulas

Formulas appear in almost any profession. A formula is an expression where the variables and result have a specific meaning. In the formula $P=2w+2l$ the w and l are measurements and the result, P , is the perimeter of a rectangle with those measurements.

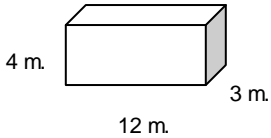

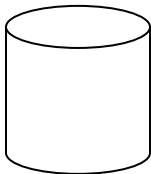
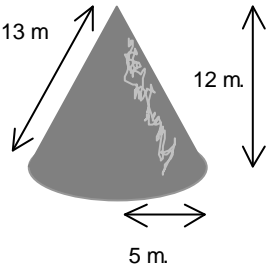
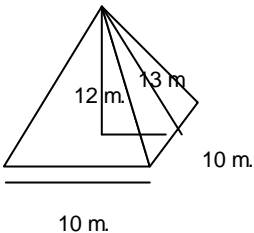
**Steps: Copy the pattern the formula makes.
Insert the known numbers for the variables.
Simplify.**

Look through the examples. Then work the problems that follow. Be careful with the order of operations as you simplify.

**List of formulas
Geometry -- 2 Dimensional**

	Perimeter		Area
Rectangle	$P=2w+2l$ where w is width and l is length Example: $P=2(3)+2(7)=20$ in.		$A=lw$ where w is width and l is length Example: $A=(7)(3)=21$ in ² .
Square	$P=4s$ where s is the length of a side. Example: $P=4(5)=20$ in		$A=s^2$ where s is the length of a side. Example: $A=(5)^2=25$ in ²
Trapezoid	$P=a+b+c+d$ where a, b, c and d are the lengths of the sides. Example: $P=5+10+4+5=24$ in.		$A= \frac{1}{2} h(b_1+b_2)$ where h is the perpendicular height between the bases and b_1 and b_2 are the bases. $A= \frac{1}{2} (4)(4+10)=28$ in ² .
Triangle	$P=a+b+c$ where $a, b,$ and c are the lengths of the sides of a triangle. Example: $P=5+9+7=21$ in		$A= \frac{1}{2} (bh)$ where b is the base and h is the height of the triangle. Example: $A=\frac{1}{2} (9)(4)=18$ in ²
Circle	$C=2\pi r$ where C is circumference, r is the radius and π is pi. (Use 3.14 for π) Example: $C=2\pi(3)=6\pi$ Approximately 18.85 ft		$A=\pi r^2$ where r is radius and π is pi. (Use 3.14 for π) Example: $A=\pi(3)^2=9\pi$ Approximately 28.27 in ²

Geometry -- 3 Dimensional

	Surface Area		Volume
Rectangular Solid	<p>$S=2lw+2wh+2lh$ where l is the length, w is width, and h is height.</p> <p>Example: $S=2(12)(3)+2(3)(4)+2(12)(4)=192 \text{ m}^2$</p>		<p>$V=lwh$ where l is the length, w is width, and h is height.</p> <p>Example: $V=(12)(3)(4)=144 \text{ m}^3$</p>
Sphere	<p>$SA=4\pi r^2$ where r is radius and π is pi.</p> <p>Example: $SA=4\pi(3)^2=36 \pi.113.9\text{mi.}$</p>		<p>$V=\frac{4}{3}\pi r^3$ where r is radius and π is pi.</p> <p>Example: $V=\frac{4}{3}\pi(3)^3=36 \pi=113.1 \text{ mi}^3.$</p>
Cylinder	<p>$SA=2\pi r^2+2\pi rh$ where r is radius, π is pi, and h is the height of the cylinder.</p> <p>Example: $SA=2\pi(4)^2+2\pi(4)(6)=80 \pi.251.33 \text{ cm}^2$</p>	<p>height of 6 cm and radius of 4cm</p> 	<p>$V=\pi r^2h$ where r is radius, π is pi, and h is the height of the cylinder.</p> <p>Example: $V=\pi(4)^2(6)=96 \pi.301.59 \text{ cm}^3$</p>
Cone	<p>$SA=\pi r^2+\pi rs$ where r is radius, π is pi, and s is the length of the slant of the cone.</p> <p>Example: $SA=\pi(5)^2+\pi(5)(13)=90\pi=282.74 \text{ m}^2$</p>		<p>$V=\frac{1}{3}\pi r^2h$ where r is radius, π is pi, and h is the height of the cone.</p> <p>Example: $V=\frac{1}{3}\pi(5)^2(12)=100 \pi.314.16 \text{ m}^3$</p>
Pyramid	<p>$SA=4(\frac{1}{2}bh)+b^2$ where b is one side of the square base and h is the height of the triangle face.</p> <p>Example: $SA=4(\frac{1}{2}(10)(13))+10^2=360 \text{ m}^2$</p>		<p>$V=\frac{1}{3}Bh$ where B is the area of the base and h is the height.</p> <p>Example: $B=10 \times 10=100$ $V=\frac{1}{3}Bh=\frac{1}{3}(100)(12)=400 \text{ m}^3$</p>

Finance

Retail price	$p=c+rc$ where p is the price, c is the wholesale cost and r is the rate of markup.	What is the retail cost of a sweater with a wholesale price of \$20 and a 75% markup? $p=20+.75(20)=$35$
Sale price	$p=c - rc$ where p is the price, c is the original cost and r is the rate of discount.	What is the sale price of a freezer originally costing \$450 on sale for 45% off? $p=450-(.45)450=$247.50$
Simple Interest	$I=Prt$ where I is interest, P is the principal, r is the annual rate, and t is the time in years.	A car is sold for \$15000 with simple interest at 12% for a period of 5 years. How much interest is paid? How much total is paid back? What is the monthly payment? $I=Prt=(15000)(.12)(5)=$9000$ (Write 12% as a decimal.) Total = $15000+9000=$24000$ (Add the principle to the interest.) Monthly Pmt. = $24000/60=$400$ (Divide the total by the number of months.)
Accumulated amount with compound interest	$A = P \left(1 + \frac{r}{m} \right)^{mt}$ Where A is the final amount after all the interest is added. r is the annual rate as a decimal. m is the number of times the interest is compounded a year, P is the principal, and t is the number of years.	What is the accumulated amount if Delores deposits \$5000 in her grandson's account at a rate of 5% compounded quarterly (4 times a year.) The money is in the account for 18 years. $A = 5000 \left(1 + \frac{.05}{4} \right)^{(4)(18)} = \12229.60 The rate is written as a decimal.

Distance	$d=rt$ where d is distance r is rate and t is time.	Jack drove for 5 hours at 60 miles per hour. How far did he go? $d=60(5)=300$ miles.
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Temperature

Celsius to Fahrenheit	$F = \frac{9C}{5} + 32$ Where C is the temperature in Celsius.	What is 80EC in Fahrenheit? $F = \frac{9(80)}{5} + 32 = 176^\circ F$
Fahrenheit to Celsius	$C = \frac{5(F - 32)}{9}$ Where F is the temperature in Fahrenheit.	What is 80EF in Celsius? $C = \frac{5(80 - 32)}{9} = 26.67^\circ C$ (Rounded)

Statistics

Mean or average	$A = \frac{x_1 + x_2 + \dots + x_n}{n}$ <p>Where n is the number of numbers to be averaged and $x_1, x_2, x_3 \dots$ are the numbers to be averaged.</p>	<p>Janet got a 458, 500, 482, 440, and 500 on her GED tests. What was her average score?</p> $A = \frac{458 + 500 + 482 + 440 + 500}{5}$ <p>A=476</p>
Standard Deviation	$s = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + (x_3 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n-1}}$ <p>Where n is the number of numbers to be averaged and x_1, x_2, x_3 and so on are the numbers to be averaged. \bar{x} is the average of the list.</p>	<p>The standard deviation of Janet's scores is</p> $s = \sqrt{\frac{(458 - 476)^2 + (500 - 476)^2 + (482 - 476)^2 + (440 - 476)^2 + (500 - 476)^2}{5-1}}$ <p>s=26.5</p>

Algebra

These are discussed in later chapters, but the formulas can be followed.

Slope	$m = \frac{y_2 - y_1}{x_2 - x_1}$ <p>where m is slope, (x_1, y_1) and (x_2, y_2) are two points</p>	<p>For (3,4) and (-4, 7) the slope is $m = \frac{4 - 7}{3 - (-4)} = \frac{-3}{7}$</p>
Distance	$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ <p>where d is the distance between two points.</p>	<p>Find the distance between (-2, -3) and (8,3).</p> $d = \sqrt{(-2 - 8)^2 + (-3 - 3)^2} = \sqrt{(-10)^2 + (-6)^2}$ $= \sqrt{100 + 36} = \sqrt{136} \approx 11.66$
Quadratic	<p>The solution for an equation $0=ax^2 + bx + c$ the solution is</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	<p>What are the solutions for: $0=2x^2-9x+10$ a =2, b=-9 and c=10</p> $x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(2)(10)}}{2(2)} = \frac{9 \pm \sqrt{81 - 4(2)(10)}}{4}$ $= \frac{9 \pm \sqrt{81 - 80}}{4} = \frac{9 \pm \sqrt{1}}{4} = \frac{9 \pm 1}{4}$ <p>$\rightarrow \frac{9+1}{4}$ and $\frac{9-1}{4}$ for $\frac{10}{4} = \frac{5}{2}$ and $\frac{8}{4} = 2$</p>

Practice: * indicates very challenging problems.

a) Find the area and perimeter (fringe edge) of a carpet that measures 14 feet by 12 feet.

b) Find the volume and surface area of a can that is 5 inches tall and has a radius of 3 inches.

c) Change the temperature 21EC to Fahrenheit.

d) What is the simple interest on \$4500 for 2 years at 15%?

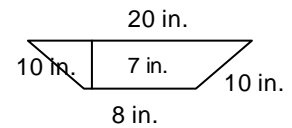
e)* What is the accumulated amount for a \$5000 loan compounded monthly for 3 years at 9%?

f) Find the mean of the following list of numbers.
4,5,3,6,4,8,5,6,5,4

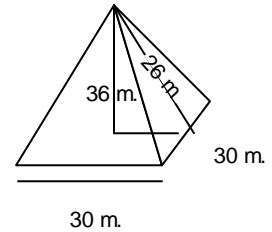
g) Find the area and circumference of a circle with a radius of 12 meters.

h) Find the retail price of a freezer with a wholesale price of \$350 that is marked up 75%.

Find the area and perimeter of the trapezoid.



Find the volume and surface area of the square pyramid.



Change the temperature 72EF to Celsius.

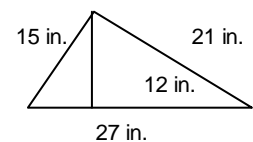
What is the simple interest on \$4500 for 6 months at 15%?
Note: 6 months is $\frac{1}{2}$ a year so t in the formula is $\frac{1}{2}$.

* What is the accumulated amount for a \$1000 loan compounded semiannually for 20 years at 15%?

Semiannually is 2 times a year so m is 2.

* Find the standard deviation of the list.

Find the area and perimeter of the triangle.



Find the retail price of a table with a wholesale price of \$50 that is marked up 175%. r is 1.75 in the formula.

- i) Find the sale price of the freezer in problem h) The store advertises a clearance sale of 40% off.
- Find the sale price of the table in problem h) The store advertises a clearance sale of 40% off.
- j) * Find the distance Joe flies at 300 miles per hour for 2 hours.
- * Find the distance a bug crawls at 10 feet per minute for 7 minutes. He is then squashed.
- k) Find the surface area and volume of a cone with a height of 20 cm and a radius of 12cm. The Slant height is 25 cm.
- Find the volume and surface area of a sphere with a radius of 14cm.
- l) * What is the accumulated amount for a \$800 loan compounded weekly for 5 years at 8%?
- * What is the accumulated amount for a \$100 loan compounded semi annually for 15 years at 12%
- m) The wholesale cost of a watch was \$85. What is the retail price with a mark up of 135% (r is 1.35)
- If the same table then goes on clearance and the store offers a 30% discount. (Start from the answer from the previous problem.) What is the new cost?
- n) The following are very challenging for the place we are in this text, but give them a try.
- * Find the slope and distance between the two points (3,4) and (10, 12)
- * Find the slope and distance between the two points (5, -8) and (8, -3)
- o) * Find the solution of $0 = x^2 - x - 20$ a=1, b= -1, and c =-20
- * Find the solution of $0 = x^2 - 9$ a=1, b=0, and c=-9