

TOPIC: FORMULAS

Solve Applied Problems Using Formulas

◆ A **Formula** is an equation with _____ variables and a specific *application* (i.e. $A = l \cdot w$)

► To use a formula: 1) Identify **known** & **unknown** quantities, 2) **Plug in** known quantities, 3) **Solve** for unknown.

EXAMPLE

The distance formula is given by $d = st$ where d is the distance traveled, s is the speed of the moving object, and t is the travel time.

(A) A train travels 2.5 hrs at a speed of 60 km/h. Find the distance traveled.

$$d = \underline{\hspace{2cm}}$$

$$s = \underline{\hspace{2cm}}$$

$$t = \underline{\hspace{2cm}}$$

(B) Solve for t when:

$$d = 357 \text{ miles}$$

$$s = 85 \text{ mph}$$

$$t = \underline{\hspace{2cm}}$$

HOW TO: Solve Linear Eqns

1) Simplify both sides of eqn

2) Collect:

- *Variable terms* on one side
- *Constant terms* on other side

3) Isolate variable

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PRACTICE

A giant water tank takes the shape of a cylinder. It has a radius of 2 m and a height of 5 m. How much water can this tank hold? Round to the nearest tenth of a m³.

$$\text{Cylinder: } V = \pi r^2 h$$

PRACTICE

The weather forecast says it will be 95°F today. What is this temperature in °C?

$$C = \frac{5}{9}(F - 32)$$

PRACTICE

Solve the formula for P given $r = -0.05$, $r = 1.5$, and $A = 21$.

$$A = P(1 + rt)$$

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EXAMPLE

A team of geologists estimates the pressure on sediments at a certain depth using the formula

$$P = 0.5 + \frac{H - 50}{200}$$

...where P = pressure (in megapascals, MPa) and H = depth of sediment (in meters, m).

The geologists measure a sediment layer at a depth of 120 meters. Using the formula, determine the pressure on the sediment at this depth.

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Solve a Formula for a Specific Variable

- ◆ We can solve a general formula for a *specific variable* by following the same steps as solving a linear equation.

Recall	With <i>Given Values</i>	HOW TO: Solve Formulas	New	With <i>Only Variables</i>
	<p>Solve the formula for w when $h = 8$ and $l = 4$</p> $h = 3w - l$ $8 = 3w - 4$ $8 + 4 = 3w$ $12 = 3w$ $\frac{12}{3} = \frac{3}{3}w$ $4 = w$	<p>1) Simplify both sides of eqn</p> <p>2) Collect:</p> <ul style="list-style-type: none">• _____ <i>variable terms</i> on one side• _____ <i>terms</i> on other side <p>3) Isolate _____ variable</p>		<p>(A) Solve the formula for w</p> $h = 3w - l$ <p>(B) Find w when $h = 4$ and $l = 5$</p>

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EXAMPLE

Solve the formula for b .

$$A = \frac{1}{2}(B + b)h$$

PRACTICE

Rearrange the formula to solve for the indicated variable.

(A)

$$S = 2(x + xz + yz)$$

Solve for y .

(B)

$$T = 50 + \frac{N - 40}{4}$$

Solve for N .

EXAMPLE

A meteorologist is recording the daily high temperatures for a city over 5 days, for which the average temperature is 79°F . The recorded temperatures for the first four days are $a = 75^{\circ}\text{F}$, $b = 82^{\circ}\text{F}$, $c = 80^{\circ}\text{F}$, and $d = 79^{\circ}\text{F}$.

$$\text{Average} = \frac{a + b + c + d + e}{5}$$

What is the temperature on the fifth day?

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Topic Resource: Common Formulas

Formulas	Meaning
$A = lw$	Area of a rectangle = length • width
$I = PRT$	Simple interest = principal • rate • time
$P = a + b + c$	Perimeter of a triangle = side a + side b + side c
$d = rt$	distance = rate • time
$V = lwh$	Volume of rectangular solid = length • width • height
$F = 1.8C + 32$	degrees Fahrenheit = 1.8 • degrees Celsius + 32