## 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.

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

$d =$ _____

$s =$ _____

$t =$ _____

($\boldsymbol{B}$) Solve for $t$ when:

$d = 357$ miles

$s = 85$ mph

$t =$ _____

**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

## TOPIC: FORMULAS

### 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 $m^3$.

*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 $A = 21$.

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

## TOPIC: FORMULAS

### 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.

### EXAMPLE

When is °F numerically equal to twice °C?

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

## TOPIC: FORMULAS

### 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 *Given Values*** | **HOW TO: Solve Formulas** | New **With *Only Variables*** |
|---|---|---|
| Solve the formula for $w$ when $h = 8$ and $l = 4$<br>$h = 3w - l$<br>$8 = 3w - 4$<br>$8 + 4 = 3w$<br>$12 = 3w$<br>$\frac{12}{3} = \frac{3}{3}w$<br>$4 = w$ | **1) Simplify** both sides of eqn<br><br>**2) Collect:**<br>• _____ *variable terms* on one side<br>• _____ *terms* on other side<br><br>**3) Isolate** _____ variable | $(\boldsymbol{A})$ Solve the formula for $w$<br>$h = 3w - l$<br><br>$(\boldsymbol{B})$ Find $w$ when $h = 4$ and $l = 5$ |

## TOPIC: FORMULAS

**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 $\mathrm{a} = 75°\mathrm{F}$, $\mathrm{b} = 82°\mathrm{F}$, $\mathrm{c} = 80°\mathrm{F}$, and $\mathrm{d} = 79°\mathrm{F}$.

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

What is the temperature on the fifth day?

**TOPIC: FORMULAS**

**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 + $32$ |