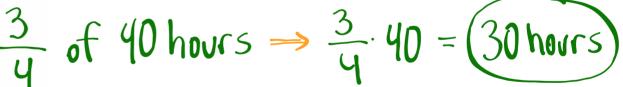# PRINCIPLES - LESSON 2A
VARIABLES & EXPRESSIONS

¾ of this policeman's time is spent patrolling.

¼ of his time is spent at the station.

ex1) This week, he worked 40 hours.
How much time did he spend patrolling?

$$\frac{3}{4} \text{ of } 40 \text{ hours} \implies \frac{3}{4} \cdot 40 = \boxed{30 \text{ hours}}$$

How much time did he spend at the station?

$$\frac{1}{4} \text{ of } 40 \text{ hours} \implies \frac{1}{4} \cdot 40 = \boxed{10 \text{ hours}}$$

VARIABLES

¾ of the policeman's time is spent patrolling.

¼ of his time is spent at the station.

The hours worked per week may change, but the fraction of time spent patrolling the neighborhood is always 3/4 times the number of hours worked.

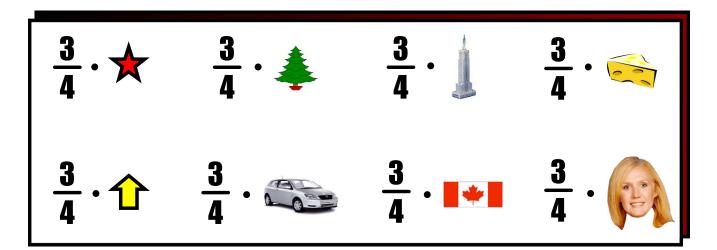Since the hours worked per week can vary, we can use a <u>variable</u> to represent that number.

ex2) Last week, he worked 60 hours.
How much time did he spend patrolling?

$$\frac{3}{4} \text{ of 60 hours} \implies \frac{3}{4} \cdot 60 = \boxed{45 \text{ hours}}$$

How much time did he spend at the station?

$$\frac{1}{4} \text{ of 60 hours} \implies \frac{1}{4} \cdot 60 = \boxed{15 \text{ hours}}$$

WHAT IS A VARIABLE?

VARIABLE: a symbol used to represent a number
(usually a letter is used as the symbol)

The time that the policeman spent patrolling can be expressed as:

$$\frac{3}{4} \cdot h \, ,$$ where h is the number of hours worked in the week.

WHY LETTERS FOR VARIABLES?

Instead of using h for hours in the algebraic expression $\frac{3}{4} \cdot h \ldots$

Why use letters instead of these symbols for variables?
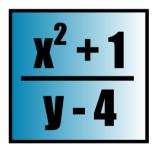
Letters are symbols that everyone knows and can draw.

ALGEBRAIC EXPRESSIONS

ALGEBRAIC EXPRESSION: a number, a variable, or a combination of numbers, variables, and operators $(+, -, \times, \div)$
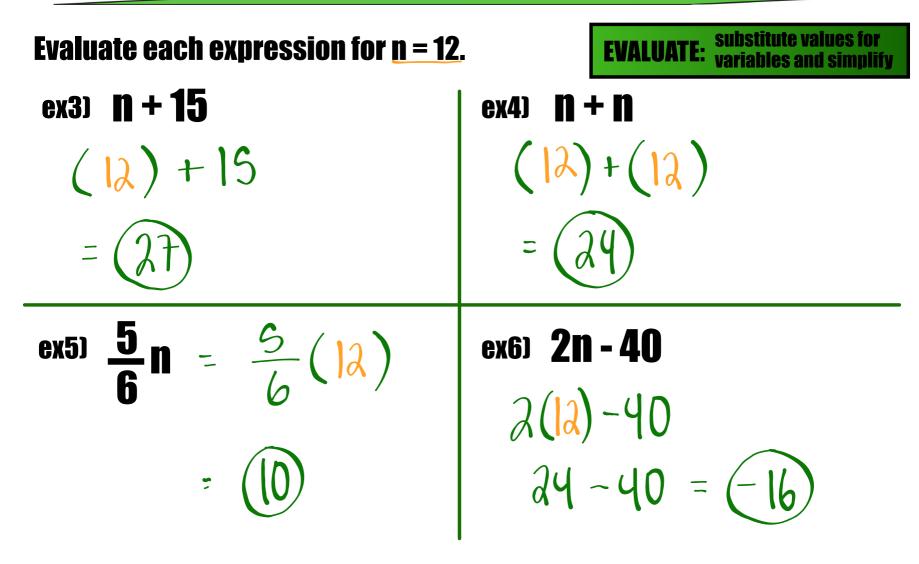
Some examples of algebraic expressions:

$x + 4$

$\dfrac{1}{2}r$

$-2abc$

$\dfrac{x^2 + 1}{y - 4}$

$y - 10$

$3w - 7$

EVALUATING EXPRESSIONS

Evaluate each expression for <u>n = 12</u>.

ex3) $n + 15$

$(12) + 15$

$= \boxed{27}$

ex4) $n + n$

$(12) + (12)$

$= \boxed{24}$

ex5) $\dfrac{5}{6}n = \dfrac{5}{6}(12)$

$= \boxed{10}$

ex6) $2n - 40$

$2(12) - 40$

$24 - 40 = \boxed{-16}$

EVALUATING EXPRESSIONS

Evaluate if a = 15, b = 6, c = -3.

ex7) $$\frac{ab}{2c} = \frac{(15)(6)}{2(-3)} = \frac{90}{-6}$$

$$= \boxed{-15}$$

EVALUATING EXPRESSIONS

Evaluate if a = 15, b = 6, c = -3.

ex8) $\dfrac{abc}{25}$ = $\dfrac{(15)(6)(-3)}{25}$ = $\dfrac{-270}{25}$

$$= \boxed{\dfrac{-54}{5}}$$

EVALUATING EXPRESSIONS

Evaluate if $b = 6$, $c = -3$.

ex9) $\dfrac{2}{3}b - c$ $= \dfrac{2}{3}(6) - (-3)$

$= 4 - (-3)$

$= 4 + 3$

$= \boxed{7}$