

# PROBLEM-SOLVING STRATEGY

1. How many **things** are there? (write them down)
2. What are the **is-sentences**? (write them down)
3. Which **is-sentence** will be used for the **open sentence**? (save it)
4. How will we **represent** the things? (use the remaining **is-sentences**, letting something be "x")
5. What is the open-sentence? (translate and solve)


**“One number is three times another number.  
The sum of the numbers is 24.  
What are the numbers?”**

④		①		②
3x		one number (larger)		larger is 3 times smaller
x		another number (smaller)		sum is 24

	⑤			
		$3x + x$	$=$	24
C.L.T.		$4x$	$=$	24
Mult. $\frac{1}{4}$		$\frac{1}{4}(4x)$	$=$	$\frac{1}{4}(24)$
		$1x$	$=$	$\frac{24}{4}$ or 6 ✓
So,		$3x$	$=$	18 ✓

# “NUMBER” PROBLEMS

“Five more than three times a number is ten less than six times the number.”

④	①		②	
$x = \text{the number}$				5 more than 3 times a number is 10 less than 6 times the number
				 ③

	⑤		
		$5 + 3x$	$= 6x - 10$
Add $-3x$		$5 + 3x + -3x$	$= 6x - 10 + -3x$
		$5$	$= 3x - 10$
Add 10		$5 + 10$	$= 3x - 10 + 10$
		$15$	$= 3x$
Mult. $\frac{1}{3}$		$\frac{1}{3}(15)$	$= \frac{1}{3}(3x)$
		$\frac{15}{3}$ or 5	$= x \quad \checkmark$

The number is 5.

# “NUMBER” PROBLEMS

“When you add two numbers, you get 34.  
The larger number is six more than three times  
the smaller number. What are the numbers?”

④	①	②
$6 + 3n$ $n$	<p>– larger number</p> <p>– smaller number</p>	<p>sum is 34 ←</p> <p>larger is 6 more than 3 times smaller</p>
		③

⑤

	$6 + 3n + n$	$= 34$
C.L.T.	$6 + 4n$	$= 34$
Add $-6$	$6 + 4n + ^-6$	$= 34 + ^-6$
	$4n$	$= 28$
Mult. $\frac{1}{4}$	$\frac{1}{4}(4n)$	$= \frac{1}{4}(28)$
	$1n$	$= \frac{28}{4}$ or 7
So,	$6 + 3n$	$= 27 \checkmark$

# “NUMBER” PROBLEMS

“When you add two numbers, you get 34.  
The larger number is six more than three times  
the smaller number. What are the numbers?”

④

$$\begin{array}{l} n \\ 34 - n \end{array}$$

①  
larger number  
smaller number

②

sum is 34  
larger is 6 more than  
3 times smaller

③

⑤

$$\begin{array}{l} n \\ \text{Dist.} \quad n \\ \text{C.L.T.} \quad n \\ \text{Add } 3n \\ \quad \quad 4n \\ \text{Mult. } \frac{1}{4} \quad \frac{1}{4}(4n) \\ \quad \quad \quad 1n \\ \text{So,} \quad \quad 34 - n \end{array} \quad = \quad \begin{array}{l} 6 + 3(34 - n) \\ = 6 + 102 - 3n \\ = 108 - 3n \\ = 108 - 3n + 3n \\ = 108 \\ = \frac{1}{4}(108) \\ = \frac{108}{4} \text{ or } 27 \checkmark \\ = 7 \checkmark \end{array}$$

# “CONSECUTIVE INTEGER” PROBLEMS

“Find three consecutive odd integers,  
such that 4 times the first is 7 less than  
5 times the third.”

<p>④</p> <p><math>x</math></p> <p><math>x + 2</math></p> <p><math>x + 4</math></p>	<p>①</p> <p>– 1st odd integer</p> <p>– 2nd odd integer</p> <p>– 3rd odd integer</p>	<p style="text-align: center;">②</p> <p>4 times 1st is 7 less than 5 times 3rd ←</p> <p>2nd is 2 more than 1st</p> <p>3rd is 2 more than 2nd</p> <p style="text-align: right;">③</p>
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	<p>⑤</p> <p><math>4x</math></p>	<p><math>= 5(x + 4) - 7</math></p>
Dist.	$4x$	$= 5x + 20 - 7$
C.L.T.	$4x$	$= 5x + 13$
Add $-4x$	$4x + -4x$	$= 5x + 13 + -4x$
	$0$	$= 1x + 13$
Add $-13$	$0 + -13$	$= x + 13 + -13$
	$-13$	$= x \quad \checkmark$
So,	$-11$	$= x + 2 \quad \checkmark$
So,	$-9$	$= x + 4 \quad \checkmark$

# “AGE” PROBLEMS

“Tanicka is 8 years older than Sam. 5 times Sam’s age 4 years ago is the same as 2 times Tanicka’s age 6 years from now.  
Find the ages of Sam and Tanicka.”

<p>④</p> <p><math>n</math> Sam’s age</p> <p><math>n + 8</math> <u>Tanicka’s age</u></p> <p><math>n - 4</math> Sam (4 yrs. ago)</p> <p><math>n + 4</math> <u>Tanicka (4 yrs. ago)</u></p> <p><math>n + 6</math> Sam (6 years from now)</p> <p><math>n + 14</math> Tanicka (6 years from now)</p>	<p>①</p> <p>Tanicka’s age is 8 more than Sam’s age</p> <p>5 times Sam (4 yrs. ago) is 2 times Tanicka (6 yrs. from now)</p> <p>③</p>
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⑤

$$5(n - 4) = 2(n + 14)$$

Dist.  $5n - 20 = 2n + 28$

Add  $-2n$   $5n - 20 + -2n = 2n + 28 + -2n$

$$3n - 20 = 28$$

Add 20  $3n - 20 + 20 = 28 + 20$

$$3n = 48$$

Mult.  $\frac{1}{3}$   $\frac{1}{3}(3n) = \frac{1}{3}(48)$

$$1n = \frac{48}{3} \text{ or } 16 \text{ yrs. } \checkmark$$

So,  $n + 8 = 24 \text{ yrs. } \checkmark$

## “GEOMETRIC FIGURE” PROBLEMS

“The measure of the first angle of a triangle is 5 times as large as the measure of the second angle. The measure of the third angle is 2 degrees less than that of the second angle. Find the measures of all three angles.”

④		①		②
5x	-	1st angle measure		1st is 5 times 2nd
x	-	2nd angle measure		3rd is 2 less than 2nd
x - 2	-	3rd angle measure		sum is 180

⑤  $5x + x + (x - 2) = 180$

Dist.  $5x + x + x - 2 = 180$

C.L.T.  $7x - 2 = 180$

Add 2  $7x - 2 + 2 = 180 + 2$

$7x = 182$

Mult.  $\frac{1}{7} \cdot \frac{1}{7}(7x) = \frac{1}{7}(182)$

$1x = \frac{182}{7} \text{ or } 26^\circ \checkmark$

So,  $5x = 130^\circ \checkmark$

So,  $x - 2 = 24^\circ \checkmark$

# “MOTION” PROBLEMS

“A car leaves Sioux City traveling west at a constant speed of 60 kph. Two hours later, another car leaves Sioux City, traveling in the same direction at a constant speed of 75 kph. How long will it take for the faster car to catch the slower one?”

①

slow distance  
fast distance  
slow rate  
fast rate  
slow time  
fast time

②

slow distance is fast distance  
slow rate is 60  
fast rate is 75  
slow time is 2 more than fast time  
distance is rate times time (slow)  
distance is rate times time (fast)

③

	distance	rate	time
④ Slow	$60(T+2)$	60	$T+2$
Fast	$75T$	75	$T$

⑤

$$\begin{aligned}
 & 60(T + 2) & = & 75T \\
 \text{Dist.} & \quad \quad \quad \curvearrowright & & \\
 & 60T + 120 & = & 75T \\
 \text{Add } -60T & & & \\
 & 60T + 120 + ^-60T & = & 75T + ^-60T \\
 & \quad \quad \quad 120 & = & 15T \\
 \text{Mult. } \frac{1}{15} & & & \\
 & \frac{1}{15}(120) & = & \frac{1}{15}(15T) \\
 & \frac{120}{15} \text{ or } 8 \text{ hrs.} & = & 1T \quad \checkmark \\
 \text{So,} & \quad \quad \quad 10 \text{ hrs.} & = & 1T + 2 \quad \checkmark
 \end{aligned}$$