

Algebra - Problem Solving
Mathematics and Millennials – 6th

Word Problems

Word Problems **or** Word Sentences need
a visual representation for easy solutions.

Suggestions for **Abstract to Concrete!**

If a Problem has 2 parts use: -----|-----

If a Problem has 3 part use: -----|-----|-----

Symbolic letters **above** Board & Solve!

A B X Y Z
-----|----- = 10 -----|-----|----- = 18

Word Problems

A valuable piece of information for Word Problems:
Many times, it is OK to **replace (than)** with **(and)**!

Weight 1 is 3ft less **than** twice Weight Two!
Weight 1 is 3ft less **and** twice Weight Two! $2W - 3 = W$

Height 1 is 5ft more **than** half Height Two!
Height 1 is 5ft more **and** half Height Two! $H + 5 = 2H$

Geometry PS - 1

Two **Complementary** Angles are such that one is ten more than $\frac{1}{3}$ the other. How many degrees is each?

$$\begin{array}{r} x+10 \\ \hline x+x+x \end{array} \quad \text{90 Degrees}$$

$$(4x)+10 = 90^\circ \quad 4x = 80^\circ \quad x = 20^\circ \quad \text{Check!}$$

$$\text{First: } 20+10=30 \quad \text{Second: } 20+20+20=60$$

Geometry PS - 2

Two **Supplementary** Angles are such that one is thirty less than twice the other. How many degrees each?

$$\begin{array}{r} x+x-30 \\ \hline x \end{array} \quad \text{180 Degrees}$$

$$(3x) - 30 = 180^\circ \quad 3x = 210^\circ \quad x = 70^\circ \quad \text{Check!}$$

$$\text{First: } 70+70-30=110 \quad \text{Second: } 70 = 70$$

Geometry PS - 3

If Base Angles of an **Isosceles Triangle** are 20 less than $\frac{1}{2}$ the third angle! How many degrees is each angle?

$$\begin{array}{r} x - 20 \quad x+x \quad x - 20 \\ \hline \end{array} \quad \text{180 Degrees}$$

$$(4x) - 40 = 180^\circ \quad 4x = 220^\circ \quad x = 55^\circ \quad \text{Check!}$$

$$\text{Base As: } 55 - 20 = 35 \quad \text{Top Angle: } 55 + 55 = 110$$

Geometry PS - 4

One Angle of a **Scalene Triangle** is 1/2 another! A third is 20 less than first angle. How many degrees is each?

$$\begin{array}{ccc|c} x & x+x & x-20 & \\ \hline & & & 180 \text{ Degrees} \end{array}$$

$(4x) - 20 = 180^\circ$ $4x = 200^\circ$ $x = 50^\circ$ **Check!**

A1: $50 = 50$ A2: $50+50 = 100$ A3: $50-20 = 30$

Geometry PS - 5

Perimeter of a **Isosceles Triangle** is 48 feet. Base is twice Length of Sides. How long is each side & base?

$$\begin{array}{ccc|c} x & x+x & x & \\ \hline & & & 48 \text{ feet} \end{array}$$

$(4x) = 48\text{ft}$ $x = 12\text{ft}$ **Check!**

S1: = 12ft Base: $12+12=24\text{ft}$ S2: = 12ft P = 48ft

Geometry PS - 6

Perimeter of a **Scalene Triangle** is 41 ft. One Side is 1/2 another! A third is 5 more than first. How long is each?

$$\begin{array}{ccc|c} x & x+x & x+5 & \\ \hline & & & 41 \text{ feet} \end{array}$$

$(4x)+5 = 41\text{ft}$ $4x = 36\text{ft}$ $x = 9\text{ft}$ **Check!**

Side1 = 9ft Side2 = 18ft Side3 = 14ft P = 41ft

Geometry PS - 7

Perimeter of Rectangle is 42 feet. Length is twice Width.
How long are the width(s) and the length(s)?

$$\begin{array}{cccc} x+x & x & x+x & x \\ \hline & & & 42 \text{ feet} \end{array}$$

$(6x) = 42\text{ft}$ $x = 7\text{ft}$ **Check!**
Lengths: $7+7 = 14\text{ft}$ Widths: $= 7\text{ft}$ $P=14+7+14+7=42\text{ft}$

Geometry PS - 8

Perimeter of a Rectangle is 26 ft. W is 3 less than L.
How long are the width(s) and the length(s)?

$$\begin{array}{cccc} x-3 & x & x-3 & x \\ \hline & & & 26 \text{ feet} \end{array}$$

$(4x) - 6 = 26\text{ft}$ $4x = 32\text{ft}$ $x=8\text{ft}$ **Check!**
Widths: $8 - 3 = 5\text{ft}$ Lengths: $8 = 8\text{ft}$ $P=5+8+5+8=26\text{ft}$

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Word Problems

Many Problems have specific Formulas for solution!
It is critical to know Formulas for the given Problem!

Gross Pay = Rate x Time $GP = R \times T$
P of Inc = |Diff|/O.Price P of Dec = |Diff|/O.Price

Distance = Rate x Time $D = R \times T$
Interest = Principal x Rate x Time $I = P \times R \times T$

Real World PS - 1

Busboy makes \$18 in 3 hours. $GP = Rate \times Time!$
What is Rate of Pay! How much is made in 8 hours?

$18 = R \times 3$ $GP = R \times T$
-----|-----|----- What is Rate?

What R times 3=18? Rate = \$6/hr **Check!**
 $\$18 = \$6 /hour \times 3 \text{ hours}$ $\$48 = \$6 /hour \times 8 \text{ hours}$

Real World PS - 2

Waitress makes \$24 at \$6 per hour. $GP = Rate \times Time!$
What is Time for \$24.00! What is time for \$120.00?

$24 = 6 \times T$ $GP = R \times T$
-----|-----|----- What is Time?

What T times 6 = 24? T = 4hrs **Check!**
 $\$24 = \$6 /hr \times 4 \text{ hours}$ $\$120 = \$6/hr \times 20 \text{ hours}$

Real World PS - 3

Baseball Glove costs \$60 retail. On Sale, it costs \$40.

What is **Percent of Dec** = $|\text{Difference}| / \text{Original Price}$?

$$\begin{array}{r} \$60 \quad \$40 \quad \text{Difference} = \$20 \\ \text{-----|-----} \quad \text{Decrease in Price} \end{array}$$

P of D = $|20|/60 \quad 20/60 = 1/3 = 33 \frac{1}{3}\%$ **Check!**

Be careful: $33 \frac{1}{3}\%$ of \$60 = \$20

Real World PS - 4

Party dress has retail price \$100. Wholesale was \$60.

What is **Percent of Inc** = $|\text{Difference}| / \text{Original Price}$?

$$\begin{array}{r} \$60 \quad \$100 \quad \text{Difference} = -\$40 \\ \text{-----|-----} \quad \text{Increase in Price} \end{array}$$

P of I = $|-40|/60 \quad 40 / 60 = 2/3 = 66 \frac{2}{3}\%$ **Check!**

Be Careful: $66 \frac{2}{3}\%$ of \$60 = \$40

Real World PS - 5

Sports Car travels 150miles in 3 hours. **D = R x T**

What is Average Rate? How far did Car go in 5 hours?

$$\begin{array}{r} 150 = R \times 3 \quad D = R \times T \\ \text{-----|-----} \quad \text{What is Rate?} \end{array}$$

What R times 3 = 150? $R = 50\text{m/h}$ **Check!**

$150 \text{ m} = 50 \text{ mph} \times 3 \text{ hrs}$ $250 \text{ m} = 50 \text{ mph} \times 5 \text{ hrs}$

Real World PS - 6

Weekend Hiker travels 24miles at 4 mph. $D = R \times T$

What is Time for Trip? How far did Hiker go in 8 hrs?

$$24 = 4 \times T \quad D = R \times T$$

-----|-----|----- What is Time?

What T times 4 = 24? $T = 6$ **Check!**

$24 \text{ m} = 4 \text{ mph} \times 6 \text{ hrs}$ $32 \text{ m} = 4 \text{ mph} \times 8 \text{ hrs}$

Real World PS - 7

How much Interest will an Investment of \$5000 yield in 10 years at an annual Rate of 4%? $I = P \times R \times T$

$$I = \$5000 \times .04 \times 10\text{yrs} \quad I = P \times R \times T$$

-----|-----|----- What is Interest?

$I = \$5000 \times .04 \times 10\text{yrs}$ $I = \$2000$ **Check!**

Checks: $\$2000 = \$5000 \times .04 \times 10\text{yrs}$

Real World PS - 8

An Investment of \$2000 yields an Interest = \$600 in a Time of 15yrs! What is Rate? $I = P \times R \times T$

$$\$600 = \$2000 \times R \times 15\text{yrs} \quad I = P \times R \times T$$

-----|-----|----- What is Time?

What R x 30000 = 600? $R = .02$ $R = 2\%$ **Check!**

Checks: $\$600 = \$2000 \times .02 \times 15\text{yrs}$


