Algebra Word Problems — Answer Key

10) Sarah earns three times as much as an engineer as she does as a writer. Her total income is $40,000 more than that of her brother. He earns half as much as Sarah does as an engineer. What is Sarah's salary as an actuary/engineer?

Writer: x = \$16,000	Engineer: $3x$ = \$48,000	Brother: $1.5x$ = \$24,000
Total: $4x$ = \$64,000	Equation: $4x = 1.5x + 40{,}000$	**Answer: \$48,000**

11) A roll of carpet 9 ft wide is 30 ft longer than a roll of carpet 15 ft wide. Both rolls have the same area. Make a sketch of the unrolled carpets and find the dimensions of each.

Roll 1 (15ft): Length = x	Area 1 = $15x$	Equation: $15x = 9(x + 30)$
Roll 2 (9ft): Length = $x + 30$	Area 2 = $9(x + 30)$	**Answer: 45 ft & 75 ft**

12) Leo's garden, which is 6 m wide, has the same area as Jen's garden, which is 8 m wide. Find the lengths of the two rectangular gardens if Leo's garden is 3 m longer than Jen's garden. First make a sketch.

Jen's Garden: Length = x	Area = $8x$	Equation: $8x = 6(x + 3)$
Leo's Garden: Length = $x + 3$	Area = $6(x + 3)$	**Answer: Jen: 9m, Leo: 12m**

14) In one basketball game Maria scored three times as many points as Holly. In the next game, Maria scored 7 fewer points than she did in the first game, while Holly scored 9 more points than she did in the first game. If they scored the same number of points in the second game, how many points did each score in the first game?

Game 1: Holly = x, Maria = $3x$	Game 2: Holly = $x + 9$	Equation: $3x - 7 = x + 9$
Game 2: Maria = $3x - 7$	Solving: $2x = 16 \rightarrow x = 8$	**Answer: Holly: 8, Maria: 24**

15) Paula mixed 2 cups of sunflower seeds and 3 cups of raisins to make a snack for a hike. She figured that the mixture would provide her with 2900 Cal of food energy. Find the number of Cal per cup of raisins if it is 400 less than the number of Cal per cup of sunflower seeds.

Sunflower: 2 cups @ x Cal	Total Cal: $2x + 3(x - 400)$	Equation: $5x - 1200 = 2900$
Raisins: 3 cups @ $x - 400$ Cal	Solving: $5x = 4100 \rightarrow x = 820$	**Answer: Raisins: 420 Cal/cup**

16) The Eiffel Tower is 497 ft taller than the Washington Monument. If each of the monuments were 58 ft shorter, the Eiffel Tower would be twice as tall as the Washington Monument. How tall is each?

Wash. Mon.: $x \rightarrow$ New: $x - 58$	Eiffel: $x + 497 \rightarrow$ New: $x + 439$	Equation: $x + 439 = 2(x - 58)$
Solving: $x + 439 = 2x - 116$	x = 555 ft	**Answer: Wash: 555 ft, Eiffel: 1,052 ft**

17) The upper Angel Falls, the highest waterfall on Earth, are 750 m higher than Niagara Falls. If each of the falls were 7 m lower, the upper Angel Falls would be 16 times as high as Niagara Falls. How high is each waterfall?

Niagara: $x \rightarrow$ New: $x - 7$	Angel: $x + 750 \rightarrow$ New: $x + 743$	Equation: $x + 743 = 16(x - 7)$
Solving: $x + 743 = 16x - 112$	$15x = 855 \rightarrow x = 57$ m	**Answer: Niagara: 57m, Angel: 807m**

18) Nine cartons of juice cost the same as 5 fruit cups. Also, one fruit cup costs 50 cents more than one bowl of soup, while one bowl of soup costs 50 cents more than one carton of juice. What would be the cost of each item: a carton of juice, a fruit cup, and a bowl of soup?

Juice: x	Fruit Cup: $x + 100$	Equation: $9x = 5(x + 100)$
Soup: $x + 50$	Solving: $4x = 500 \rightarrow x = 125$	Juice = 125¢ (\$1.25)
Soup = 175¢ (\$1.75)	Fruit Cup = 225¢ (\$2.25)	**Answer: J:\$1.25, S:\$1.75, F:\$2.25**