Word problems

single variable

◦ Suppose you fly due west at 1000 mph (miles per hour). In six minutes how far will you go?

◦ Every year, each girl scout is expected to sell 100 boxes of cookies. Susie has already sold 59 boxes. How many more does she need to sell?

◦ A liter of water weighs one kilogram. You are going on a 2-day hike in the desert and one person needs about 3 liters per day. Your friend is carrying the tent, so you agree to carry water for both of you. How much weight do you have to carry for the water?

◦ My parents started a small farm after they retired. On their farm, they have chickens and pigs. In total, there are 40 animal legs among the chickens and the pigs, and there are 16 animal heads. How many chickens do my parents have?

◦ A football game was played between two teams, the Cougars and the Panthers. The two teams scored a total of 34 points, and the Cougars won by a margin of 14 points. How many points did each team score?

◦ Johnny is twice as old as Gina. Johnny is also 5 years older than Gina. How old is Johnny?

◦ The number 66 is written as the sum of two smaller numbers. One of these numbers is 3 more than twice the other number. Find the larger of the two numbers.

◦ There are 16 coins in my piggy bank. If the coins are all nickels and dimes and they total $1.05, how many nickels are there?

◦ (This question refers to the part of the year before any birthdays have occurred). Seven years ago, Ella was twice as old as Mina. When Mina was 1 year old, Ella was 4. How old is Mina this year?

◦ What is the value of x if 1 minus the reciprocal of $(1 - x)$ is equal to the reciprocal of $(1 - x)$?

◦ Solve for x:

$$3x + 5 = 11$$

$$3x + 5 = 11 + x$$

$$\frac{1}{x} = \frac{2}{4}$$

◦ Vasya has 2 sisters more than he has brothers. How many daughters more than sons do Vasya's parents have?

medium

◦ Masha was seven kopecks short to buy a first reading book, and Misha lacked one kopeck. They combined their money to buy one book to share, but even then they did not have enough. How much did the book cost?

◦ A brick weighs one pound and half the brick. How many pounds does the brick weigh?

◦ When three numbers are added two at a time, the sums are 29, 46 and 53. What is the sum of all three numbers?

◦ The units digit in a two-digit number is three times the tens digit. If the digits are reversed, the resulting number is 54 more than the original number. Find the original number.

◦ 3 green balls and 2 red balls together weigh 14 pounds, and 1 green ball and 4 red balls together weigh 8 pounds. If all red balls weigh the same amount and all green balls weigh the same, then what is the weight of 8 red and 8 green balls together?

◦ Dad took our new baby to the clinic to be weighed. But the baby would not stay still and caused the needle on the scales to wobble. So Dad held the baby still and stood on the scales, while nurse read off their combined weight: 78kg. Then nurse held the baby, while Dad read off their combined weight: 69kg. Finally Dad held the nurse, while the baby read off their combined weight: 137kg. How heavy was the baby?

◦ Tweedledum says, "The sum of your weight and twice mine is 361 pounds." Tweedledee says, "Contrariwise, the sum of your weight and twice mine is 362 pounds." If they are both correct, how much do Tweedledum and Tweedledee weigh together?

◦ The day of the week for any date advances by one day every year, and by one extra day in any leap year. If Ella's birthday was on a Thursday in 2021, on what day of the week was she was born in June, 2008? (Leap years are every four years starting with 2008).

◦ Marianna has only nickels and quarters in her piggy bank. Their combined value is \$9.15. Their combined weight is one pound. Ninety nickels weigh one pound. Eighty quarters weigh one pound. How many nickels does Mariana have in her piggy bank?

◦ A painting is 10 inches longer than it is wide. It a border 2 inches wide is added to the painting, the area of the border is 172 inches squared. That are the dimensions of the painting?

◦ Two successive odd numbers multiply to give 143. What are the two numbers?

◦ If a, b, c and d are constants, solve the equation $ax + b = c + dx$.

◦ Half of a sum of money is invested at 8%, one-third at 9%, and the remainder at 5%. If the annual interest is \$70.50, how much was invested?

◦ At a certain time, Janice notices that her digital watch reads m minutes after two o'clock. Fifteen minutes later, it reads n minutes after three o'clock. She is amused to note that m is six times n. What time was it when she looked at her watch for the second time?

◦ A car is traveling at 15 miles per hour. How many feet will it travel in 4 seconds?

rates

◦ One knight can storm a castle in 15 days. He and his partner can do it together in 10. How long would it take the partner to storm the same castle alone?

◦ Pipe A can fill a pool in 5 hours, while pipe B can fill it in four. How long will it take for both pipes, operating together, to fill the pool?

◦ Jack walked from his house to the park at 3 miles per hour. He got a ride home at 27 miles per hour. His total traveling time was 1 hour. How far away is the park and how long did it take him to walk there?

◦ Adam can paint a house in 10 days, while Brenda takes 15 days to do it. After Brenda works alone for 3 days, Adam and Brenda finish the job together. How many days does Adam work?

◦ Betty and Bob leave the same point driving in opposite directions. Betty drives 20 mph faster than Bob. After 2 hr, they are 240 miles apart. Find each driver's speed.

◦ A faucet can fill a sink in 8 minutes. The drain can empty the sink

in 10 minutes. If the faucet is turned on over an empty sink, and the drain is open, how long will it be before the sink overflows?

◦ A frog swims 1/2 mile downstream in a river in 2 hours. She returns upstream to the starting point in 14 hours. How fast does the frog stream in a pond where there is no current?

◦ You use a nail to punch a small hole in the bottom of a gallon of milk. Milk comes out of the hole at a constant rate of 1 ounce per second. If the rate is constant, how long will it take for the entire gallon to empty out of the hole? How long for the entire gallon if you punch two more holes before you start?

◦ Jim drives 40 miles per hour to his mother's house and 25 mph on the way back. Show that his average speed is 30 miles per hour, regardless of the distance to his mother's house.

◦ Two lab rats run in opposite directions (at different constant speeds) around a circular track of total length 100 feet. They meet after 10 seconds. If they start from the same point at the same time in the same direction, it takes 60 seconds for the faster rat to gain one lap on the slower one. How fast does the slower rat run?

◦ Two old ladies left from A to B and from B to A at dawn heading towards one another (along the same road). They met at noon, but did not stop, and each of them carried on walking with the same speed. The first lady came (to B) at 4 pm, and the second (to A) at 9 pm. What time was the dawn that day?

Note: for this last problem I can write three equations in four unknowns. Namely, let the speed of the woman headed toward B be u and the other be v. Let the time of dawn be t and the total distance be s. Then

$$u(t+4) = s \qquad u(t+9) = s \qquad (u+v)t = s$$

Since there are more unknowns than equations, there is no solution for all of the variables, which can also be seen by considering that doubling the distance *and* the velocities would yield the same times. Nevertheless, there is a solution for t.