

The Art of Word Problem Solving

January 25, 2015

Today we're going to practice solving word problems.

Example: Joey goes over to his friend Dylan's house to play. He brings his coin collection. Joey and Dylan have a combined collection of 30 coins, but Dylan has four more coins than Joey. How many do each of the boys have?

Hint: Sometimes it helps to draw a picture!



The two boys have a common part which is represented by the long rectangle. The common part is the number of coins Joey owns, while for Dylan the common part plus 4 is equal to the number of coins he owns. This is shown by the four extra boxes. To find the common part, notice that if Dylan would give away his 4 extra coins, he and Joey would have the same number of coins.

$$30 - 4 = 26$$

$$26 \div 2 = 13$$

13 is the common part. Thus, Joey has 13 coins and Dylan has $13 + 4 = 17$ coins.

1. The ages of two siblings add up to 53 years. The brother is 9 years older than the sister. How old is the brother?

(a) Start by drawing a picture similar to the picture in the example above.

(b) How old is the sister? (This is the common part on the picture)

(c) How old is the brother?

2. Sarah and Mackenzie were comparing the number of books they had in their rooms. They found that if they put their collection together, they would have 242 books. However, Mackenzie realized that she had 10 less books than Sarah. How many books does Mackenzie have?

(a) Start by drawing a picture similar to the example.

(b) What is the common part? Show your work.

(c) How many books does Mackenzie have?

3. CHALLENGE: Jim, Bob, Tom, and Siegfried are four hungry trolls who took part in a rock-eating contest. Jim gobbled down 1 less rock than Bob; Bob ate 1 less than Tom, and Tom ate 1 less than Siegfried. How many rocks did each troll eat if together they consumed 2010 rocks?

(a) Start by drawing a picture similar to the example.

(b) What is the common part? Show your work.

(c) How many rocks did each troll eat?

4. Max eats up a jar of strawberry jam in 15 days, and Bella does the same in 10 days.
- (a) What is the smallest number of days in which Max eats a whole number of jars and Bella eats a whole number of jars? (Hint: this number should be the smallest number which is divisible by 10 and by 15.)
- (b) How many jars of jam will each of them eat during this period?
- (c) How many jars of jam will they eat together in this time period?
- (d) How long does it take them to finish 1 jar of strawberry jam? (Hint: use your answer from part b.)

5. While visiting the Knights and Liars Island, you meet five local girls: Alice, Britney, Cindy, Debby and Elizabeth.

- Debby announces that all the girls in the group are knights;
- Alice says that if you add two even numbers, you will always get an even number;
- Cindy announces that the sum of two even numbers can never be odd;
- Elizabeth claims that if you add two odd numbers, you will always get an odd number;
- Britney declares that it is possible to find two odd numbers that add up to an even number;
- Decide which girls are liars and knights. Justify your answer.

Knights:

Liars:

6. Three brothers received the following inheritances from their father: 7 full chests of gold, 7 half-full chests of gold, and 7 empty chests. How can they divide this inheritance in such a way that each brother receives the same amount of gold and the same number of chests. (Transferring gold between chests is NOT allowed.)
- (a) First, find out how many chests are there? How many chests should each brother get? (Not worrying about the amount of gold.)
- (b) How much gold are there all together? (Remember that 2 half chests make a whole chest). How much gold should each brother get?
- (c) Draw a picture.
- (d) How can the brothers successfully divide the inheritance?

7. (Math Kangaroo, 2010) Matthew and Clara live in a skyscraper. Clara lives 12 floors above Matthew. One day Matthew went to visit Clara, and he took the stairs up from his apartment to Clara's apartment. Half-way up he was on the 8th floor. On what floor does Clara live?

Make a picture to solve the problem.

8. (Math Kangaroo, 2010) Adam and Tom are walking in the same direction around a circular table and counting chairs. They begin counting with different chairs. Tom's twelfth chair is Adam's third chair, while Tom's fifth chair is Adam's eighteenth chair. How many chairs are there at the table?