

Problem Posing

Bringing Logic to Problem Solving for At-Risk Algebra Students

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Session 274

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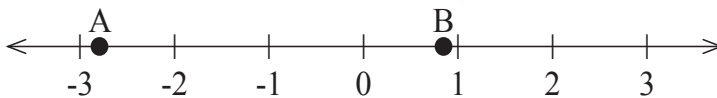
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Accompanying slides can be found at: ttalgebra.edc.org/resources

Focus: Given Information – *What can I deduce?*

“Tail-less” problems

- I have 17¢ in my hand.
- The sum of three consecutive numbers is 63.
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- Rodney is starting a horse-grooming business. His initial expense will be a one-time cost of \$200 for equipment. His earnings will be \$40 per horse groomed. (MCAS 2007 Grade 10 #17)
- A whole number has been separated into two parts. One of those parts is three times the other.
- My sister was born on the very day I turned eight and a half! Today the sum of our ages is exactly 37 years.
- Your younger brother has the same birthday as you! You're in high school now. In one year, you'll be exactly three times as old as your brother.
- Helena is five times as old as Abby. Abby is eight years younger than Lisa. Lisa is twice Abby's age.
- On a trip along a straight road, we pass cities A, B, C, and D in that order. We know the distance from A to D is 286 miles, and the distance from A to C is 143 miles. From B to D is 200 miles exactly.
- There are about 235 million egg-laying hens in the United States. A laying hen produces roughly 250 to 300 eggs per year. On April 3, 2014, the population of the United States was estimated to be about 317 million people.

What If Not? (The Art of Problem Posing, Brown & Walter, 2005)

- I have 17¢ in my hand.
- Pythagorean Equation $a^2 + b^2 = c^2$
- Calculate the area of a rectangle given that the width is 2 meters and the length is 3 meters.
- Here's a number pattern:
 - 1 • 3 = 3
 - 2 • 4 = 8
 - 3 • 5 = 15
 - 4 • 6 = 24
 - 5 • 7 = 35
- Fibonacci Sequence: 1, 1, 2, 3, 5, 8, 13, 21, 34, 44, 89, ...

Focus: Question – *What information do I need?*

“Headless” problems

- How long will it take Mary to drive to Chicago?
- Can I afford this car?
- A math club is planning to sell candles to pay for the cost of attending the regional math competition... How many candles does the club need to sell? (TAKS 2009 Grade 10 #24)

Problems Without Figures (Gillan, 1909)

- If you know how many pickets are in a fence that surrounds a square garden, what two things must you know besides, and what will you do to find how many square feet are in the garden?
- How can I find how many times a wagon wheel will turn in going three miles?
- A boy bought oranges, apples, and grapes. The oranges cost twice as much as the grapes. If you know the cost of the apples and the total cost, how will you find the cost of the oranges?
- John has a certain number of cents, Henry the same number of dimes, Peter the same number of quarters; if they spend all their money for a lunch and share it equally among them, how much will each of the other boys owe Peter?
- The number of yards in the length of a floor equals the number of feet in its width; if you know the area in square feet, how can you find the length and the width?
- If you know three times plus five times plus seven times a number, how do you find the number?
- I know how much one-half of John’s money is and how much one-fourth of Ned’s money is. How can I find how much money they both have?
- One tree in an orchard bore three times as many apples as the average of all the other trees. If you are told how many bushels that one tree produced, what else must you know and what will you do to find how many bushels grew on the whole orchard?

Focus: A Potential Answer – *What process am I using to test it?*

- Alpie is one-third of the age of Betsy. In 14 years, Alpie will be half the age of Betsy. How old is Alpie now?
- Driving from Boston to New Orleans, we drove an average of 70 mph on the way down and 60 mph on the way back up. Our return trip took 3.5 hours longer. How far away is Boston from New Orleans?

Guess-Check-Generalize

