# Student Misconceptions

Students have difficulty…

**-using multiple representations to solve a problem.**

**-setting up / interpreting graph/chart.**

**-discerning between important and unnecessary information in problem.**

**-with problem solving strategies.**

# Student Misconceptions

Students have difficulty…

**-turning words into mathematical concepts/ideas.**

**-going from concrete to abstract ideas.**

**-seeing / understanding patterns.**

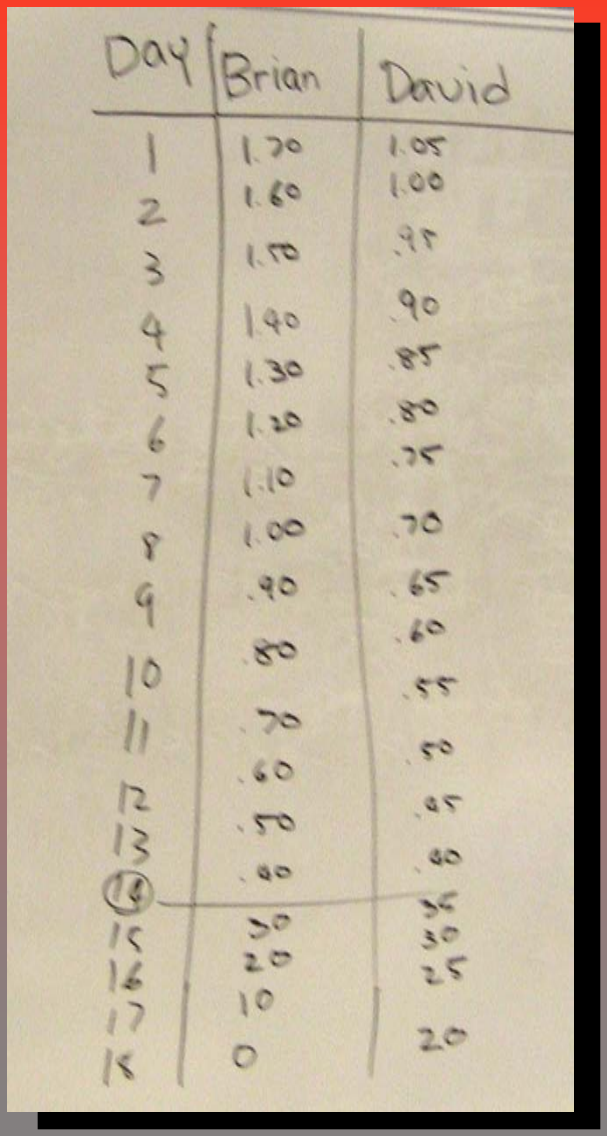
**-turning a pattern into a rule.**

# Justification

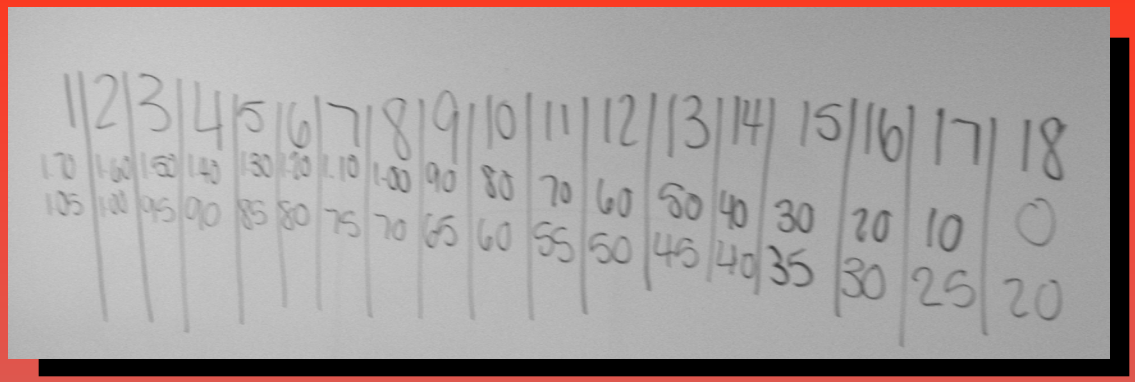
- Problem solving or modeling based approach to algebra can improve students' attitudes towards math and increase their confidence in their mathematical abilities.
- "A modeling-based approach to college algebra."(Virginia Commonwealth University's educational program). Aimee J. Ellington. ***Academic Exchange Quarterly*** 9.3 (Fall 2005): p131(5).

- A curriculum that focuses on algebra as more than symbolic manipulation and that considers functions, modeling, and representations as key components can provide students with a solid understanding in a fundamental area of algebra.
- "Middle grades students' algebraic understanding in a reform curriculum." Angela S. Krebs. ***School Science and Mathematics*** 103.5 (May 2003): p233(13).

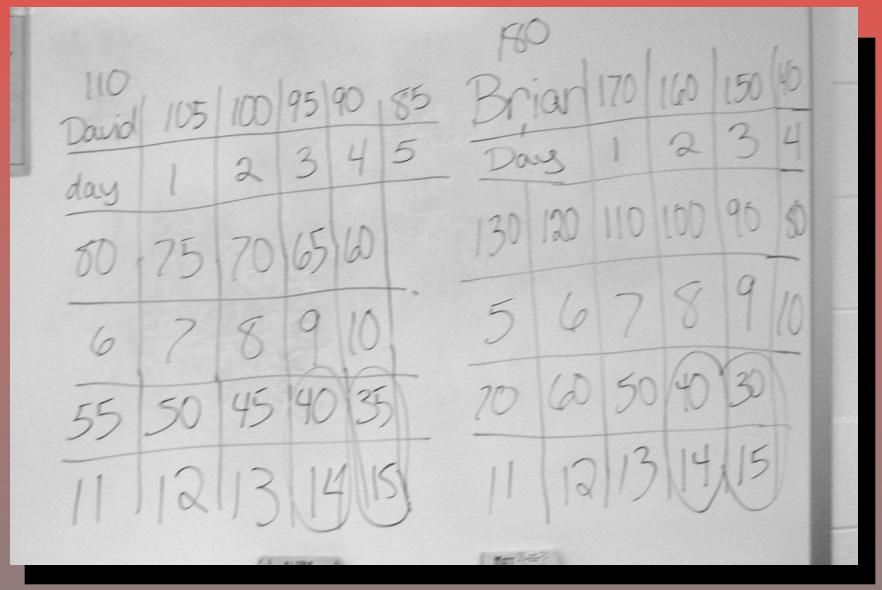
# Awesome Results....



| Day | Brian | David |
|---|---|---|
| 1 | 1.70 | 1.05 |
| 2 | 1.60 | 1.00 |
| 3 | 1.50 | .95 |
| 4 | 1.40 | .90 |
| 5 | 1.30 | .85 |
| 6 | 1.20 | .80 |
| 7 | 1.10 | .75 |
| 8 | 1.00 | .70 |
| 9 | .90 | .65 |
| 10 | .80 | .60 |
| 11 | .70 | .55 |
| 12 | .60 | .50 |
| 13 | .50 | .45 |
| 14 | .40 | .40 |
| 15 | .30 | .35 |
| 16 | .20 | .30 |
| 17 | .10 | .25 |
| 18 | 0 | .20 |



| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.70 | 1.60 | 1.50 | 1.40 | 1.30 | 1.20 | 1.10 | 1.00 | .90 | .80 | .70 | .60 | .50 | .40 | .30 | .20 | .10 | 0 |
| | 1.05 | 1.00 | .95 | .90 | .85 | .80 | .75 | .70 | .65 | .60 | .55 | .50 | .45 | .40 | .35 | .30 | .25 | .20 |

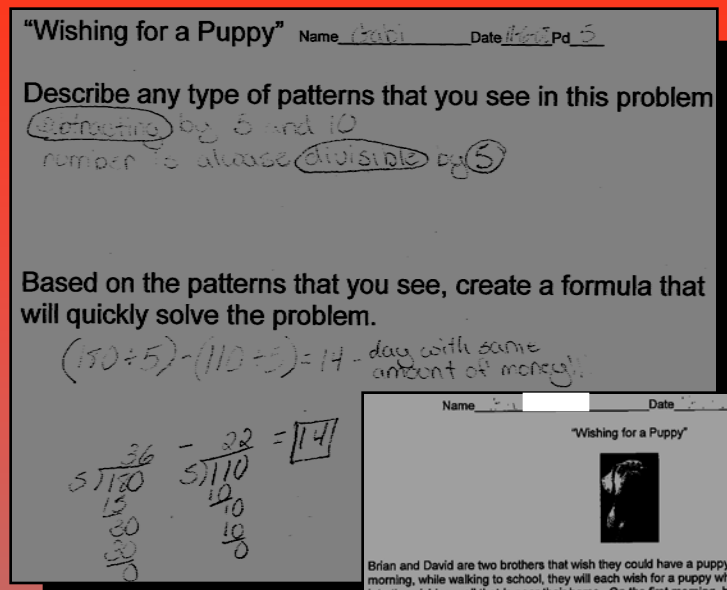


| David | 105 | 100 | 95 | 90 | 85 |
|---|---|---|---|---|---|
| day | 1 | 2 | 3 | 4 | 5 |
| | 75 | 70 | 65 | 60 | |
| | 6 | 7 | 8 | 9 | 10 |
| | 50 | 45 | 40 | 35 | |
| | 11 | 12 | 13 | 14 | 15 |

| Brian | 170 | 160 | 150 | 140 |
|---|---|---|---|---|
| Days | 1 | 2 | 3 | 4 |
| | 130 | 120 | 110 | 100 | 90 | 80 |
| | 5 | 6 | 7 | 8 | 9 | 10 |
| | 70 | 60 | 50 | 40 | 30 | |
| | 11 | 12 | 13 | 14 | 15 | |

*Tables, tables, everywhere!*

# Student samples...


"Wishing for a Puppy" Name Gabi Date [illegible] Pd 5

Describe any type of patterns that you see in this problem

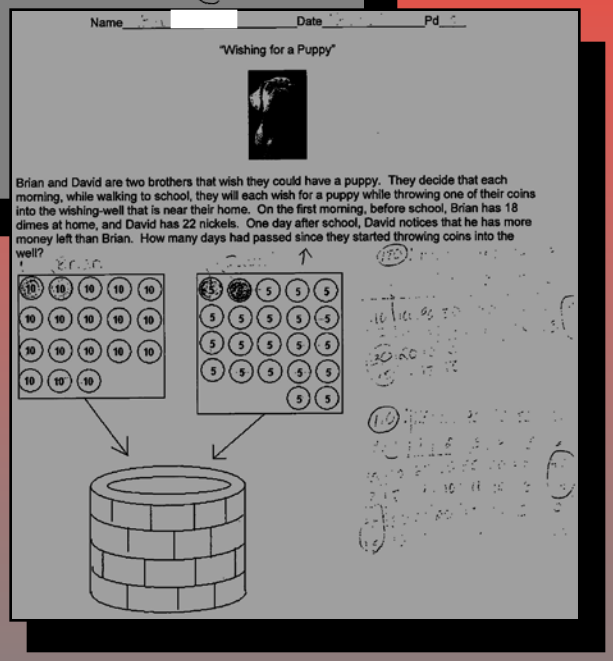
Subtracting by 5 and 10

number to choose divisible by 5

Based on the patterns that you see, create a formula that will quickly solve the problem.

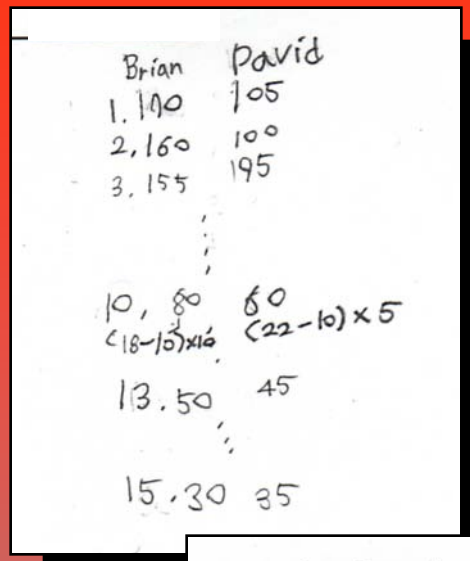
(180÷5)-(110÷5)=14 - day with same amount of money

26 5)180 15 30 30 0 − 22 5)110 10 10 10 0 = 14


Name [illegible] Date [illegible] Pd [illegible]

"Wishing for a Puppy"

Brian and David are two brothers that wish they could have a puppy. They decide that each morning, while walking to school, they will each wish for a puppy while throwing one of their coins into the wishing-well that is near their home. On the first morning, before school, Brian has 18 dimes at home, and David has 22 nickels. One day after school, David notices that he has more money left than Brian. How many days had passed since they started throwing coins into the well?


Brian David

1. 100 105

2. 160 100

3. 155 195

10. 80 60

(18-10)x10 (22-10)x5

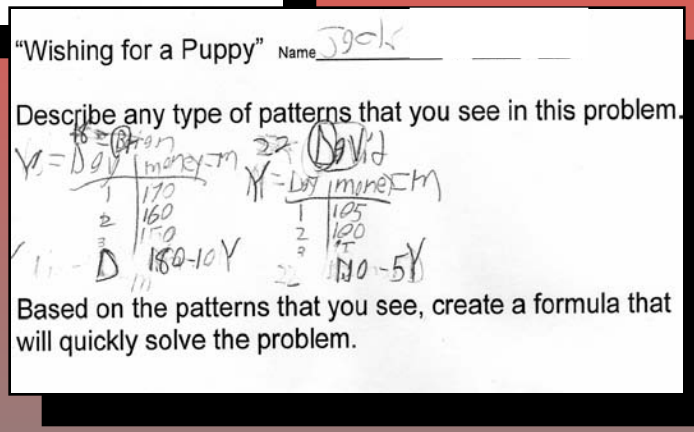
13. 50 45

15. 30 35

Kun Ho's formulas:

(18 – 10) x 10

(22 - 10) x 5


"Wishing for a Puppy" Name Jack

Describe any type of patterns that you see in this problem.

Brian: Y = Day | money=m; 1 | 170; 2 | 160; 3 | 150; D | 180-10Y

David: Y = Day | money=m; 1 | 105; 2 | 100; 3 | [illegible]; 22 | 110-5Y

Based on the patterns that you see, create a formula that will quickly solve the problem.

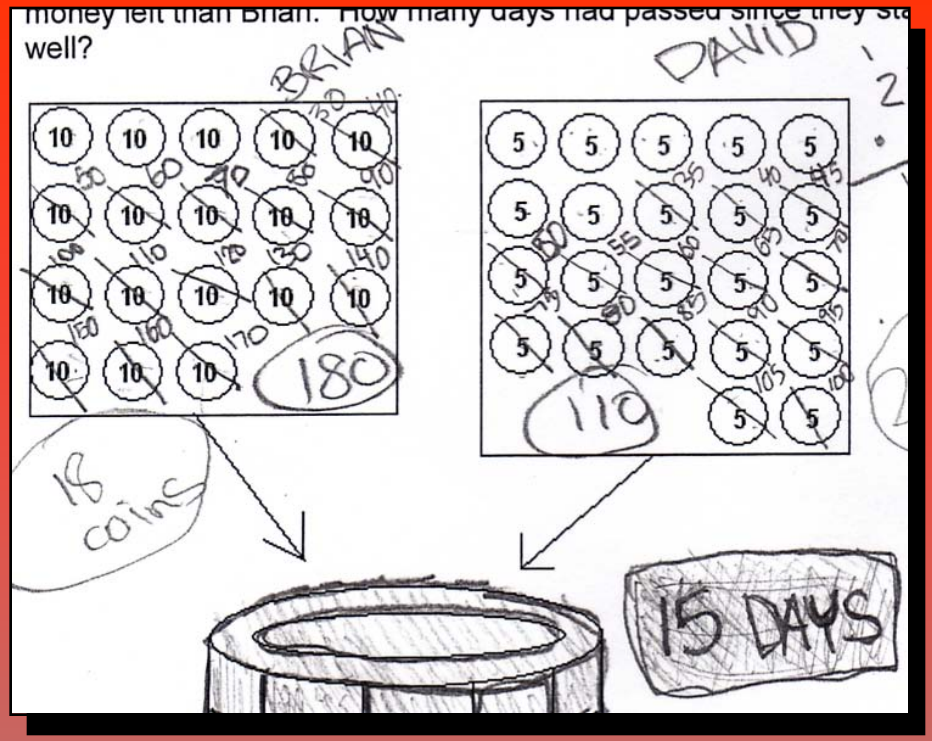
Jack's formulas: B = 1.80 – 10y

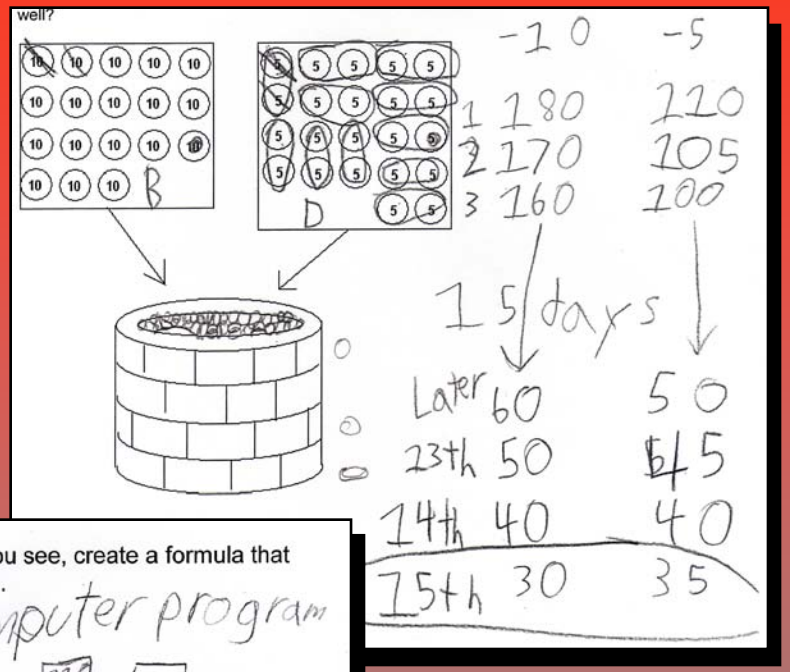
D = 1.10 – 5y

Gabi's formula: (180/5) – (110/5) = 14

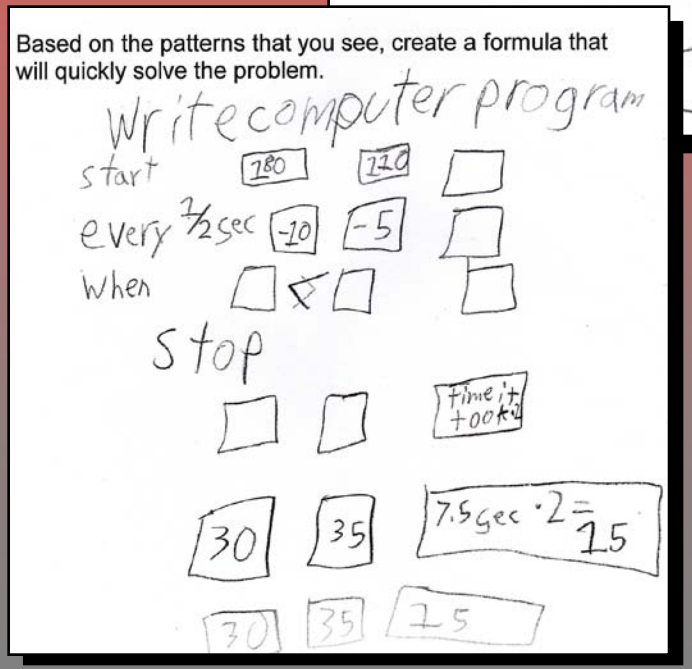
The day they had the same amount of money.

# Working really hard...




Way to use your Pictures, Sofia!




Shane the Future Computer Programmer?

# Lesson Enhancement "Wishing for a Puppy"

Have students with quick and efficient solutions visit other groups and share their answers. This will be less frightening to those who may not want to share with the entire class.

•Students who finish early come up with more efficient ways to solve the problem.

# Lesson Enhancement

- Have a few students echo/restate other strategies used by their classmates.

- Allow students time to discuss their strategies with their group members before writing the reflection piece.

# Student Difficulties

1. IDENTIFYING AND TESTING AN ALGORITHM THAT WORKS TO SOLVE A SPECIFIC PROBLEM.
2. DIFFICULT TO MOVE FROM AN ABSTRACT THOUGHT TO CONCRETE SOLUTION.

# STAND

1. If your favorite month is _____
2. If your favorite sport is _____
3. If your favorite color is _____
4. If you are wearing socks
5. If your favorite season is _____
6. If the subject you plan to have an A is science
7. If you traveled out of the country this summer