THE OHIO STATE UNIVERSITY

Bridging the Gap: Math Skill Building

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SASSO Learning Specialists

Math Bootcamp

- Program for first-year student-athletes who have tested into **Math 1050 or Math 1075**
- Two, hour-long weekly sessions over a 10 week period
- Review mathematical concepts through the development of each individual student's **metacognition and vocabulary**.

Topics Covered

Math 1050 and 1075 curriculum

- *Order of Operations*
- *Geometry*
- *Linear Functions through word problems*
- *Fractions*
- *Simplification*
- *Number sense/Logic*
- *Systems of Equations*

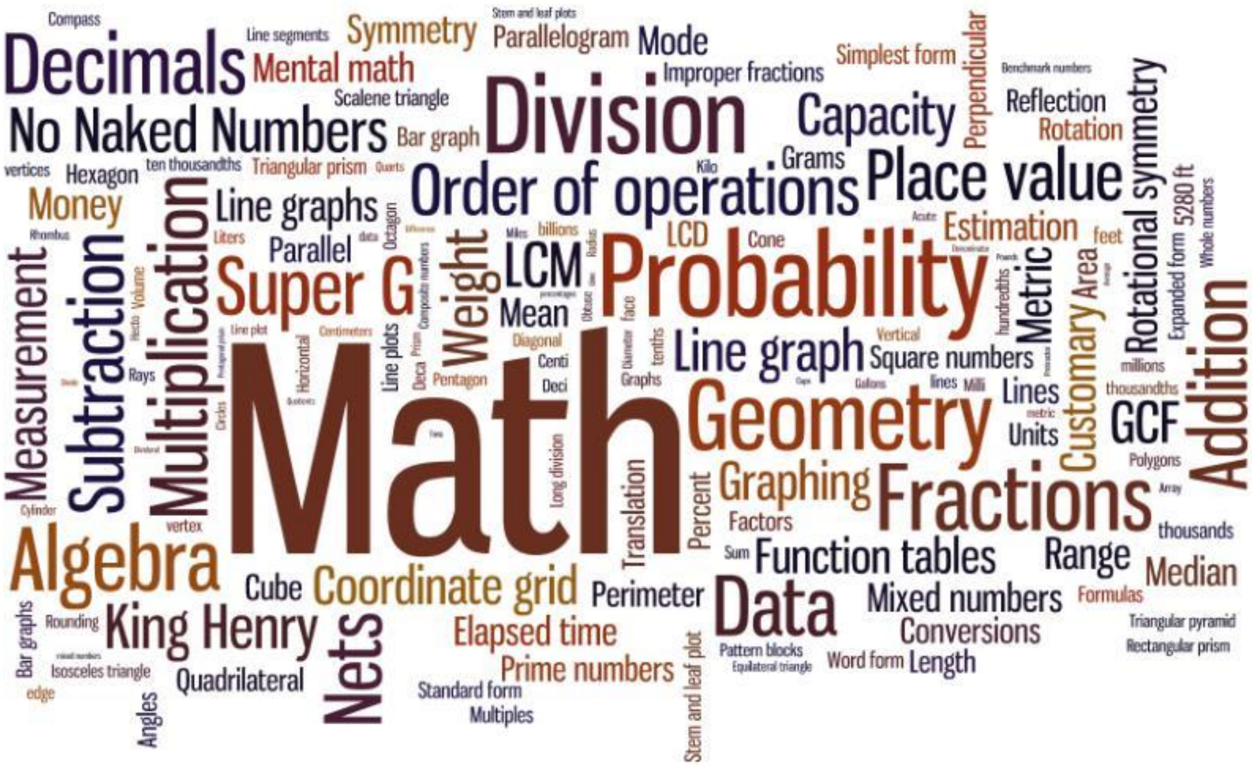
Learning Goals

- Maintain and develop previously learned math skills
- Foster a cross-curriculum, multisensory approach to mathematics with particular focus on word problems
- Demonstrate identifiable growth from start to finish of programming

Pre-Test – Math 1050 Final Exam

Name	Pre-test (Exam out of 18 possible points)
Student 1	4.0
Student 2	2.0
Student 3	2.5
Student 4	3.5
Student 5	6.0
Student 6	3.0
Student 7	10.5
Student 8	7.0
Student 9	0.0
Student 10	3.5
Student 11	5.0
Average Score	**4.27**

Language


Compass
Decimals
Line segments
Symmetry
Stem and leaf plots
Parallelogram
Mode
Simplest form
Perpendicular
Mental math
Improper fractions
Scalene triangle
Division
Capacity
Reflection
Rotation
No Naked Numbers
Bar graph
Grams
Rotational symmetry
vertices
Hexagon
ten thousandths
Triangular prism
Order of operations
Place value
Money
Line graphs
Estimation
feet
5280 ft
Liters
Parallel
LCD
Cone
Measurement
Subtraction
Multiplication
Super G
Weight
LCM
Probability
Metric
Area
Expanded form
Mean
Line graph
Square numbers
Customary
Addition
Diagonal
Centi
Deci
Graphs
Vertical
millions
Math
Pentagon
Geometry
Lines
Units
GCF
thousandths
Polygons
Graphing
Fractions
Translation
Percent
Factors
thousands
Algebra
Function tables
Range
Median
Cube
Coordinate grid
Perimeter
Data
Mixed numbers
Formulas
King Henry
Nets
Elapsed time
Conversions
Triangular pyramid
Rectangular prism
Bar graphs
Rounding
Prime numbers
Pattern blocks
Word form
Length
Isosceles triangle
Quadrilateral
Standard form
Multiples
edge
Angles
Stem and leaf plot

"Most researchers agree that memory, language, attention, temporal-sequential ordering, higher-order cognition, and spatial ordering are among the neurodevelopmental functions that play a role when children think with numbers"

(Misunderstood Minds, 2002)

"Children's ability to understand the language found in word problems greatly influences their proficiency at solving them"

Language & Math
(Misunderstood Minds, 2002)

Students do anywhere from 10-30 percent worse on word problems than when the same problem is presented in mathematical form.

J. Kintsch, *Understanding Word Problems*

A student with language problems in math may have difficulty with:

- the vocabulary of math language
- decoding relevant information
- sequencing information
- learning or recalling abstract terms
- understanding directions
- explaining and communicating about math
  - asking and answering questions
- reading texts to direct their own learning
- remembering assigned values or definitions in specific problems

Application - Our tenets for Word Problems

- Preparation for word problems must be constant
- Repetition is necessary
- Use multiple avenues of instruction and review
- Keep the specific word problem strategy simple, understandable, and repeatable

Common Terms

NAME:_____

Mathematical Term	Definition in your own words....	Example...
Least common multiple		
Lowest common denominator		
Variable		
Order of operations		
Average		
Consecutive		
Simple Interest		
Compound Interest		
Integers		
Polynomial		
Monomial		
Binomial		
Trinomial		
Scientific Notation		
Constant Rate of Change		
Slope		

NAME:_____ DATE:_____

Draw a line from the following terms to their definitions:

Circle	A 2-dimensional shape with 3 sides and three angles, with a sum of 180°.
Square	A 2-dimensional shape that has 4 equal sides and every angle is a right angle (90°).
Rectangle	A 2-dimensional shape made by drawing a curve that is always the same distance from a center.
Triangle	The distance around a circle.
Area	The size of the surface of a 2-dimensional shape.
Perimeter	The distance from the center to the circumference of a circle.
Circumference	The distance around a 2-dimensional shape.
Radius	A 2-dimensional shape with 4 straight sides where all interior angles are right angles (90°).

Match the terms with their matching formulas:

___Circumference of a circle

___Area of circle

___Perimeter of a triangle

___Area of a triangle

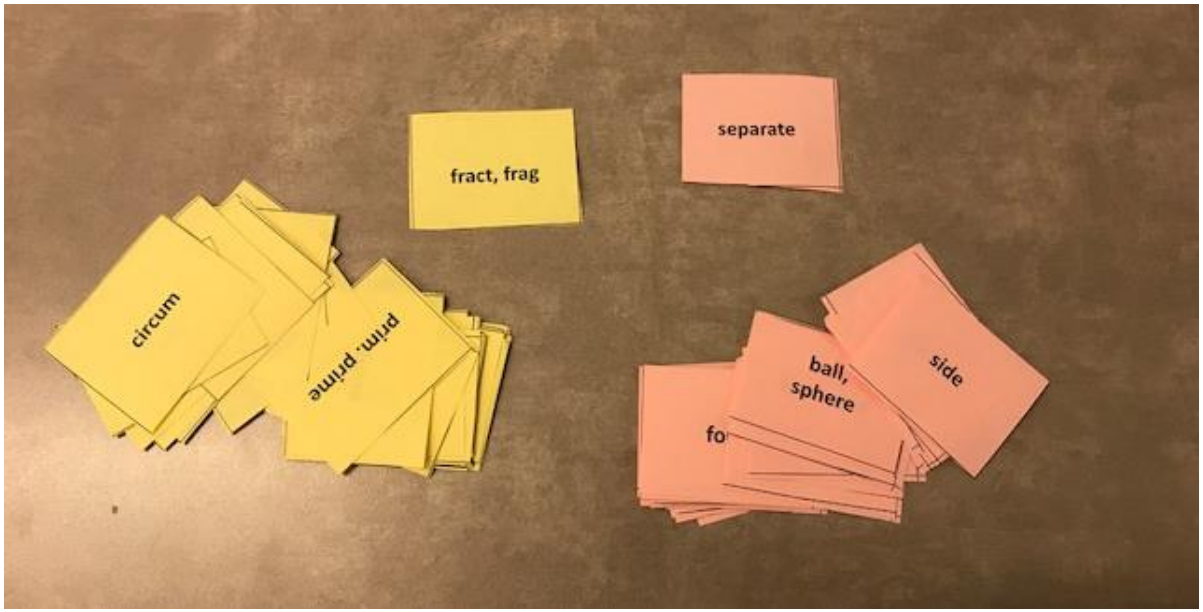
___Perimeter of a rectangle/square

___Area of a rectangle/square

1) $A = lw$
2) $A = \pi r^2$
3) $A = \frac{1}{2}bh$
4) $P = 2l + 2w$
5) $C = 2\pi r$
6) $P = side + base + side$

Glossary

- The glossary terms were turned into notecards and word sorts to drill and practice vocabulary



Multiple Avenues

Crossword

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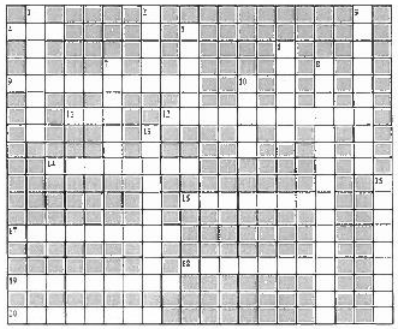
Name: _____

Math Crossword Puzzle



ACROSS

4. answer to an addition problem
5. answer to a subtraction problem
11. 3, 19, 37, and 131 are all __ numbers
12. bottom number of a fraction
14. polygon with five sides
16. straight lines that never cross
17. having the same size and shape
18. shape of a soup can
19. distance around a figure
20. graph that uses bars to show information

DOWN

1. answer to a division problem
2. twelve
3. graph that uses pictures or symbols to show information
5. shape of a tennis ball
6. number added to another number to find a sum
7. answer to a multiplication problem
8. shape of a cereal box
10. nine __ seven equals 63
13. 90 degree angle
15. top number of a fraction

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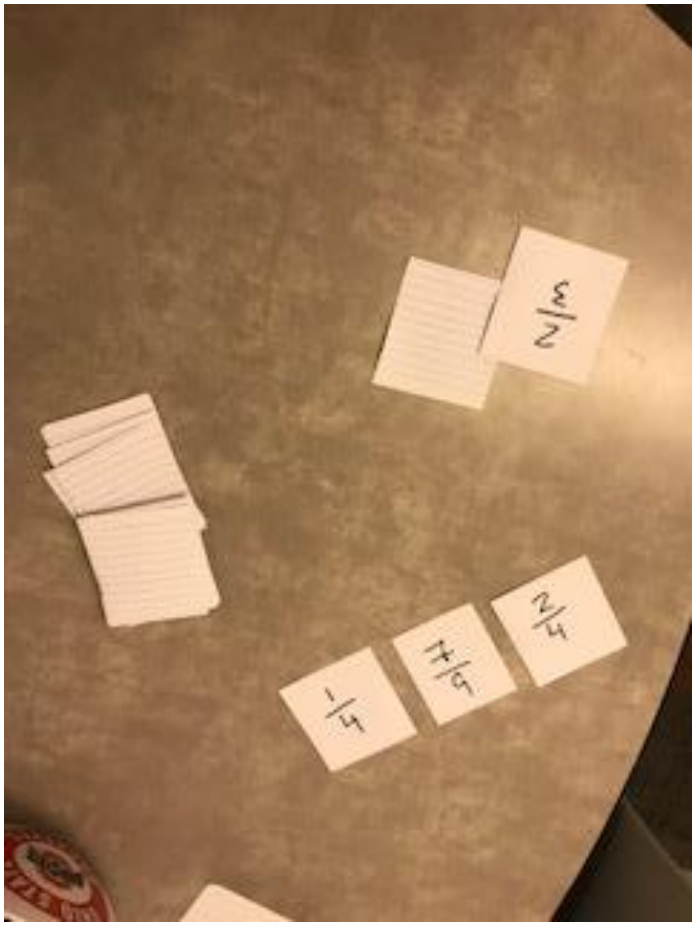
Fraction Blackjack



Multiple Avenues

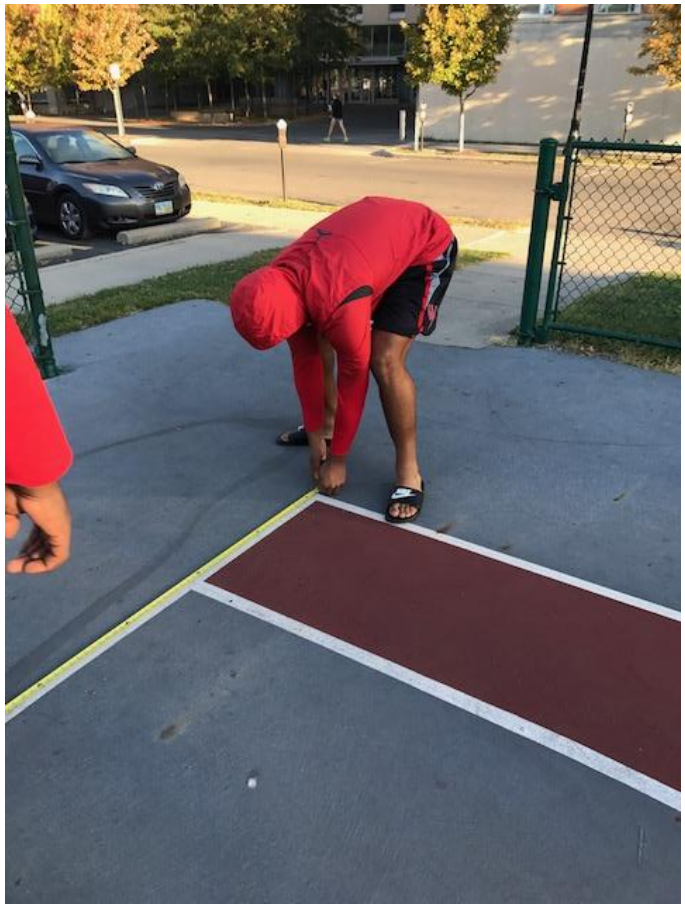
Math Bingo

MATH BINGO

-1/3	2	6	1/2
-7	11/6	10	-1
-2	24	8	4/7
5/4	-3	5	1

myfreebingocards.com

Full-Court Classroom



Multiple Avenues Logic Puzzle

NAME: _____

Five neighborhood children went trick or treating together. Each wore different costumes, carried a different bag for candy and had a different favorite candy. From the clues can you figure out who wore which costume, the type of bag he/she carried and his/her favorite candy?

The Children:
Three girls: Abby, Leah & Xarina
Two boys: Logan & Tyler

Costumes:
Hobo
Kitten
Pirate
Princess
Punk Rocker

Candy Bags:
Black Plastic Trash Bag (Black)
Blue Pillowcase (Blue)
Decorated Grocery Sack (Grocery)
Plastic Pumpkin (Pumpkin)
Yellow Pillowcase (Yellow)

Favorite Candy:
Bubblegum (Bubble)
Chocolate (Choc)
Lemon-drops (Lemon)
Peanut Butter Pieces (PB)
Taffy

1. Of the punk rocker & the hobo: One of the girls had decorated a grocery sack and the other absolutely loves chocolate.

2. Neither of the boys carried the plastic pumpkin or the blue pillowcase.

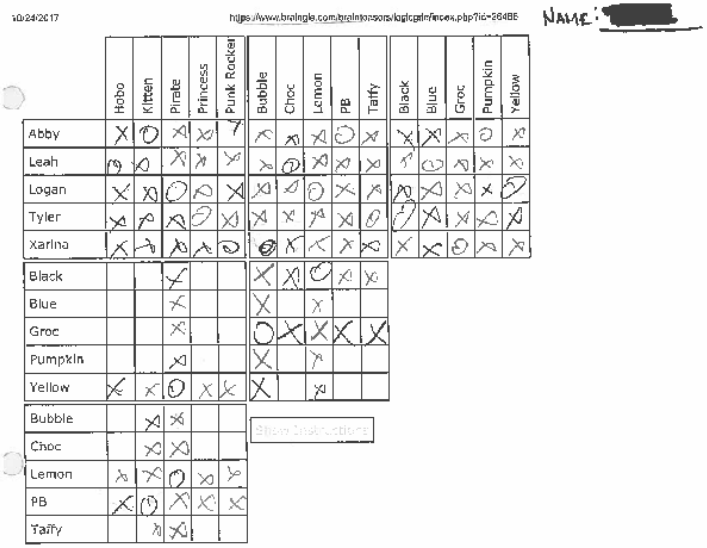
3. The five children were: the boy with the black plastic bag, the one who loves lemondrops, Xarina, the chocolate lover, and the girl dressed as a kitten (who loves peanut butter).

4. The pirate (whose favorite candy is not bubblegum or taffy) carried the yellow pillowcase.

5. The pirate's sister, Abby, was going to carry a blue one, but changed her mind at the last minute.

6. Tyler doesn't chew bubblegum so he gave his to the girl with the grocery bag (it's her favorite).

7. Again (not necessarily in the same order), the children are: the girl with the plastic pumpkin, the Hobo, the princess, Logan and the one who loves bubblegum.



Attacking the Problem

Carefully read the problem

Locate the question to be answered

Underline important terms and information

Think the problem through (use pictures, mind maps etc.)

Create an equation or chart to solve for the answer

Hard work your way to a solution

Example 1

1050:

Comparing Services:

EZ&Z, a cell phone service provider, has a data plan that charges a flat fee of $14 per month. At the same time, an alternative data plan charges a fee of $3 per month plus $0.20 for each MB used.

How many MBs must a person use the alternative plan to exceed $14?

last sentence

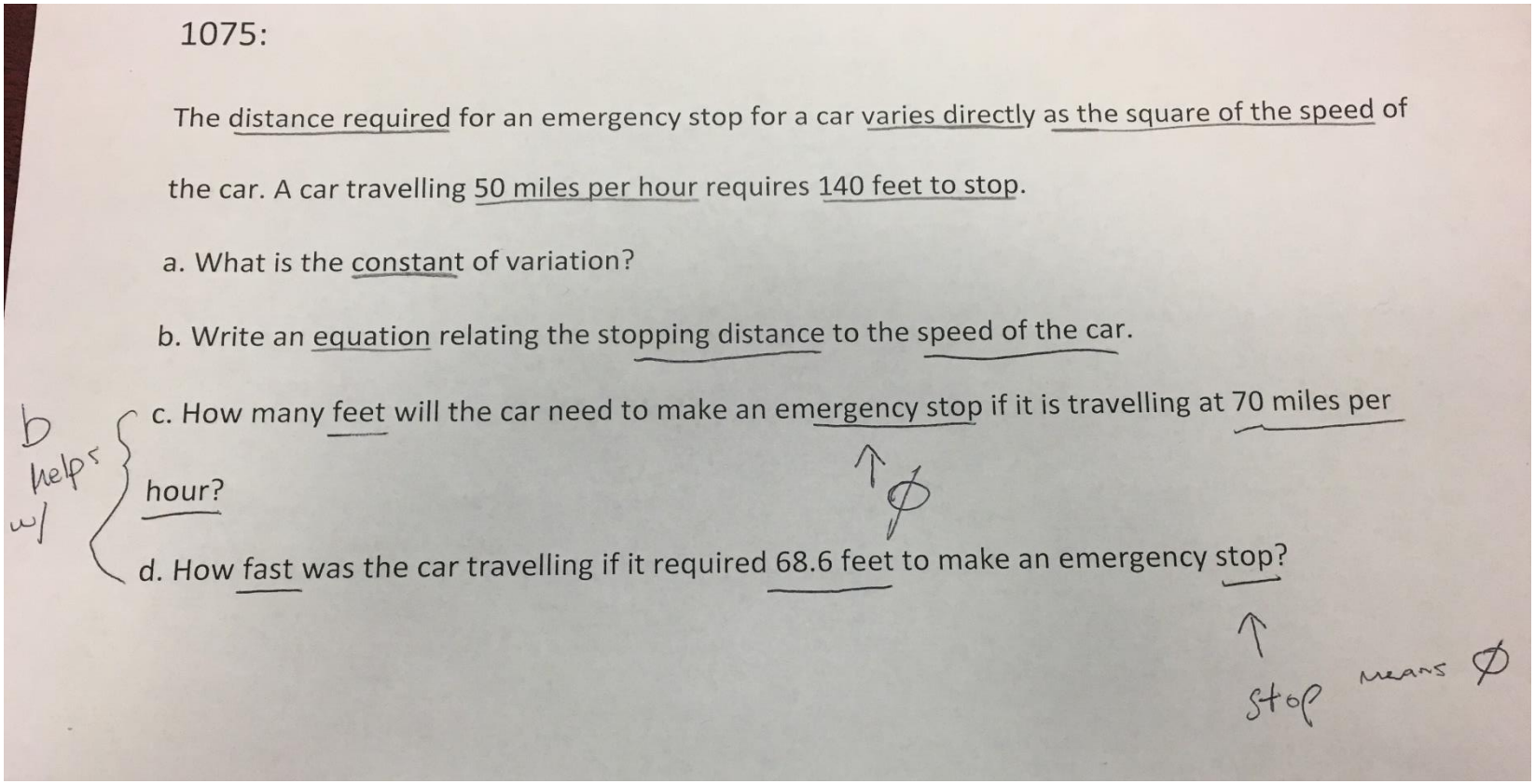
Plan 1	Plan
$14	$3

$3+(.20 \cdot x) = 14$

1. last sentence
2.

$3+(.20 \cdot x) = 14$

Example 2



1075:

The distance required for an emergency stop for a car varies directly as the square of the speed of the car. A car travelling 50 miles per hour requires 140 feet to stop.

a. What is the constant of variation?

b. Write an equation relating the stopping distance to the speed of the car.

b helps w/

c. How many feet will the car need to make an emergency stop if it is travelling at 70 miles per hour?

↑ ∅

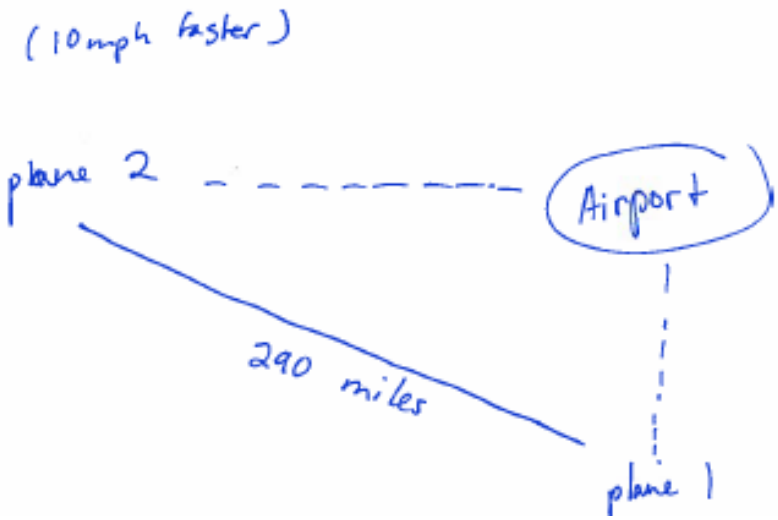
d. How fast was the car travelling if it required 68.6 feet to make an emergency stop?

↑ stop means ∅

Example 3

1075:

Two airplanes leave the same airport at the same time. One airplane flies due south, while the other flies due west 10 mph faster than the first plane. After 1 hour the airplanes are 290 miles apart. Find the speed of each airplane.



Post Test (1050 Final)

Name	Pre-test (18)	Post-test (18)	Net Change
Student 1	4.0	4.0	0
Student 2	2.0	9.0	7
Student 3	2.5	6.0	3.5
Student 4	3.5	5.5	2.0
Student 5	6.0	12.5	6.5
Student 6	3.0	6.5	3.5
Student 7	10.5	15.0	4.5
Student 8	7.0	10.0	3.0
Student 9	0.0	7.5	7.5
Student 10	3.5	6.5	3.0
Student 11	5.0	6.0	1.0
Average Scores	4.27	8.05	3.77

Test Score Analysis

- Paired t-test
- Mean = 3.77
- T = 5.17
- p-value = 0.000422
- The result is significant at $p \leq 0.05$

Learning Goals

- Maintain and develop previously learned math skills ✓
- Foster a cross-curriculum, multisensory approach to mathematics with particular focus on word problems ✓
- Demonstrate identifiable growth from start to finish of programming ✓

References

- "6 Traits of Writing | Professional Development by Smekens Education - Improve Comprehension of Math Word Problems." *Smekens Education Solutions, Inc.*, 13 Apr. 2015, www.smekenseducation.com/Improve-Comprehension-of-Math-W.html.
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- www.washoeschools.net/cms/lib/NV01912265/Centricity/Domain/310/images/2016-2017/Math/math.jpg.