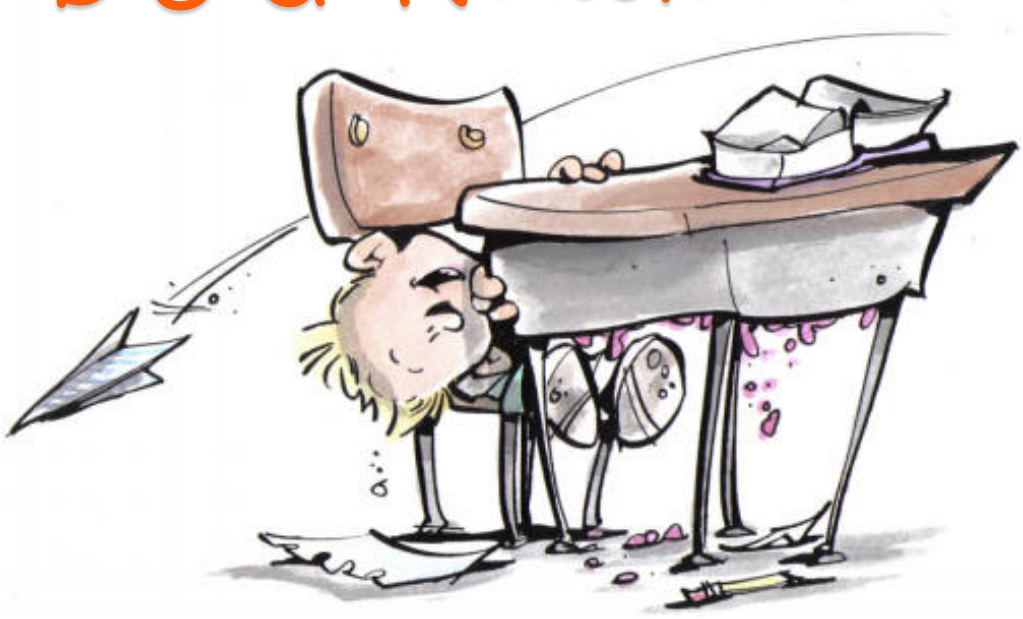
B.U.G. Newsletter



September 2014

THIS NEWSLETTER IS A SERVICE THAT WAS FUNDED BY "NO CHILD LEFT BEHIND" TITLE II PART A HIGHER EDUCATION IMPROVING TEACHER QUALITY HIGHER EDUCATION GRANT ADMINISTERED THROUGH THE UNIVERSITY OF GEORGIA.

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Full Steam Ahead!

by Jennifer L. Brown

And the horses are off… I am sure that your school year and classroom is in full swing by now. Since the school year begins so early, your students are nearly to the end of Unit 1. For this month, I am focusing on Unit 2 within each of the CCGPS courses. Unit 1 in Coordinate Algebra focuses on reasoning with equations and inequalities. The activity for this month utilizes basketball statistics. I once had a ninth grade class with a lot of boys, and they absolutely loved basketball. When I discovered this interest in basketball, I used basketball statistics and professional player names as much as possible to keep them engaged. This system of equations activity could easily be adapted for baseball or football if you do not have a class similar to mine. It is a great application for system of equations. For Analytic Geometry, Unit 2 covers right triangle trigonometry. When I taught this content, the material was fairly straight, especially when the formulas are given to me. I tried to show the real world application for the concepts; however, I did find that the students struggled with locating the short leg and long leg within the special triangles, hence the activities for this month. In the classroom, I tended to use a lot of puzzles and game-like activities to provide on-going guided and independent practice. The Special Triangle Puzzle Activity has a tiered approach. The teacher who created it said she did not give the students detailed directions. Basically, the students are grouped in pairs, and they cut out the squares and matched up the appropriate sides to form a 3 by 3 grid. When the pair of students finished Activity One, you give them Activity Two and so on. If the pair completes Activity Three, then you give them the blank grid to create their own puzzle. The other activity for this unit is a great idea for ticket out the door. It helps the students practice finding the short and long legs of 30-60-90 triangles. The next unit in Advanced Algebra focuses on polynomial functions. First, there is the SOAP acronym, which stands for **S**ame **O**pposite **A**lways **P**ositive. It is handy for remembering how to factor the sum and difference of cubes. Second, I included a foldable for the operations with polynomials.

- *Dr. Brown* ☺

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Prior Knowledge

Units 1 & 2 in Coordinate Algebra

- Using the Pythagorean Theorem
- Understanding slope as a rate of change of one quantity in relation to another quantity
- Interpreting a graph
- Creating a table of values
- Working with functions
- Writing a linear equation
- Using inverse operations to isolate variables and solve equations
- Maintaining order of operations
- Understanding notation for inequalities
- Being able to read and write inequality symbols
- Graphing equations and inequalities on the coordinate plane
- Understanding and using properties of exponents
- Graphing points
- Choosing appropriate scales and labeling a graph

Unit 2 in Analytic Geometry

- number sense
- computation with whole numbers, integers and irrational numbers, including application of order of operations
- operations with algebraic expressions
- simplification of radicals
- basic geometric constructions
- properties of parallel and perpendicular lines
- applications of Pythagorean Theorem
- properties of triangles, quadrilaterals, and other polygons
- ratios and properties of similar figures
- properties of triangles

FOR MORE IDEAS AND ACTIVITIES

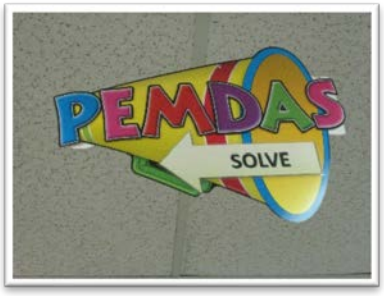
www.bugforteachers.com/crmc.html

Unit 2 in Advanced Algebra

- combining like terms and simplifying expressions
- long division
- distributive property
- zero property
- properties of exponents
- simplifying radicals with positive and negative radicands
- factoring quadratic expressions
- solving quadratic equations by factoring, taking square roots, using the quadratic formula and utilizing graphing calculator technology to finding zeros/*x* intercepts
- observing symmetry, end behaviors, and turning points (relative maxima and relative minima) on graphs
- writing explicit and recursive formulas for geometric sequences

Common Student Misconceptions

by Jennifer L. Brown



Coordinate Algebra. This unit involves solving equations and inequalities. From my experience, students really struggle with solving for x. I would encourage you to use order of operations in reverse, whether PEMDAS or GEMS, to help the students. Another issue that I have found is student fail to perform the same operation on both sides. I would tell my students that every little kid wants a piece of candy and, if you do not give everyone a piece of candy, that kid will be very unhappy with you! Lastly, the inequality signs gives students a great deal of trouble, especially when they are multiplying or dividing by a negative. You may want to show graphic examples to illustrate the impact of a negative sign on the inequality sign.

Analytic Geometry. With triangles, students need to be reminded that order matters when you are naming them. For example, ▲ABC may or may not be similar to ▲DFE. Another issue with right triangles is student think the triangles have to be positioned a certain way. During guided and independent practice sessions, I would give my students triangles turned and flipped in various directions to overcome this misconception; however, I encouraged them to rotation the paper if needed to visualize the specific components.

Advanced Algebra. I am sure that many of you have seen this misconception. When subtracting polynomials, the students distribute the negative to the first term but forget the others. Again, I used the every little kid wants candy analogy. Another issue is the properties of exponents and the concept of like terms. Honestly, every year, I had to review those concepts to remind the students there is a difference between x^3 and x. Last, but not least, when multiplying polynomials, I encouraged my students to use the box method to make sure each term was multiplied and "got the candy". See the common misconceptions under Coordinate Algebra, too. Those issues apply to this unit as well.

Name:_____

Basketball statistics and systems of equations

Deron Williams and Chris Paul have been compared to each other their entire careers in the NBA. Deron Williams was drafted by the Utah Jazz with the third pick of the 2005 NBA Draft. Chris Paul was drafted one spot later by the New Orleans Hornets. Both players have comparable statistics from their three seasons in the league, both have played in the NBA All-Star team, and both were part of the gold medal winning 2008 United States Olympic Basketball Team.

In basketball, a free throw is worth 1 point and a field goal is ether 2 points or 3 points. In the 2007-2008 season, Chris Paul scored a total of 1684 points. The total number of 2-point and 3-point field goals he made was 630 and the total number of free throws he made was 332. Using a system of equations, determine how many 2-point field goals and 3-point field goals Chris Paul made in the 2006-2007 season.

In the 2007-2008 season, Deron Williams scored a total of 1545 points. The total number of 2-point field goals and free throws he made was 813 and the total number of 3-point field goals he made was 83. Using a system of equations, determine how many 2-point field goals and free throws Deron Williams made in the 2006-2007 season.

(MCC.9-12.A.REI.5; MCC.9-12.A.REI.6; MCC9-12.A.CED.2)

In basketball a field goal is defined as a shot that is worth 2 points or 3 points. What was Chris Paul's field goal percentage if he attempted 1291 field goals?

What was Deron Williams' field goal percentage if he attempted 1117 field goals?

What was Chris Paul's 3-point percentage if he attempted 249 3-point field goals?

What was Deron Williams' 3-point percentage if he attempted 210 3-point field goals?

During the 2007-2008 season, Chris Paul played in 80 games. How many field goals did Chris Paul make per game during the 2007-2008 season?

During the 2007-2008 season, Deron Williams played in 82 games. How many field goals did Deron Williams make per game during the 2007-2008 season?

Online Research: What are the current statistics for Chris Paul and other players? Visit espn.go.com to learn more.

Bonus: By using online resources, find Chris Paul's percent increase/decrease from one season to the next.

Retrieved from Debbie Brooks, Peggy Dickey, and Jan Sullivan (http://www.learnnc.org/lp/editions/careerstart-grade8/5722)
(MCC.9-12.A.REI.5; MCC.9-12.A.REI.6; MCC9-12.A.CED.2)

Basketball statistics and systems of equations

Answer key

Deron Williams and Chris Paul have been compared to each other their entire careers in the NBA. Deron Williams was drafted by the Utah Jazz with the third pick of the 2005 NBA Draft. Chris Paul was drafted one spot later by the New Orleans Hornets. Both players have comparable statistics from their three seasons in the league, both have played in the NBA All-Star team, and both were part of the gold medal winning 2008 United States Olympic Basketball Team.

In basketball, a free throw is worth 1 point and a field goal is ether 2 points or 3 points. In the 2007-2008 season, Chris Paul scored a total of 1684 points. The total number of 2 point and 3 point field goals he made was 630 and the total number of free throws he made was 332. Using a system of equations, determine how many 2-point field goals and 3-point field goals Chris Paul made in the 2006-2007 season?

Free throws + 2-point field goals + 3-point field goals = 1684

$332 + 2x + 3y = 1684$

$x + y = 630 \rightarrow y = 630 - x$

$332 + 2x + 3(630-x) = 1684$
$332 + 2x + 1890 - 3x = 1684$
$2222 - x = 1684$
$-x = -538$
$x = 538$ (the number of 2-point field goals)

$x + y = 630$
$538 + y = 630$
$y = 92$ (the number of 3-point field goals)

In the 2007-2008 season, Deron Williams scored a total of 1545 points. The total number of 2 point field goals and free throws he made was 813 and the total number of 3-point field goals he made was 83. Using a system of equations, determine how many 2-point field goals and free throws did Deron Williams made in the 2006-2007 season?

Free throws + 2-point field goals + 3-point field goals = 1545

$x + 2y + 83(3) = 1545$

$x + 2y + 249 = 1545$

$x + y = 813 \rightarrow y = 813 - x$

$x + 2(813 - x) + 249 = 1545$
$x + 1626 - 2x + 249 = 1545$

-x + 1875 = 1545
-x = -330
x = 330 (the number of free throws)

x + y = 813
330 + y = 813
y = 483 (the number of 2-point field goals)

In basketball a field goal is defined as a shot that is worth 2 points or 3 points. What was Chris Paul's field goal percentage if he attempted 1291 field goals?

$\frac{630}{1291}$ = Approximately 49%

What was Deron Williams' field goal percentage if he attempted 1117 field goals?

$\frac{566}{1117}$ = Approximately 51%

What was Chris Paul's 3-point percentage if he attempted 249 3-point field goals?

$\frac{92}{249}$ = Approximately 37%

What was Deron Williams' 3-point percentage if he attempted 210 3-point field goals?

$\frac{83}{210}$ = Approximately 40%

During the 2007-2008 season, Chris Paul played in 80 games. How many field goals did Chris Paul make per game during the 2007-2008 season?

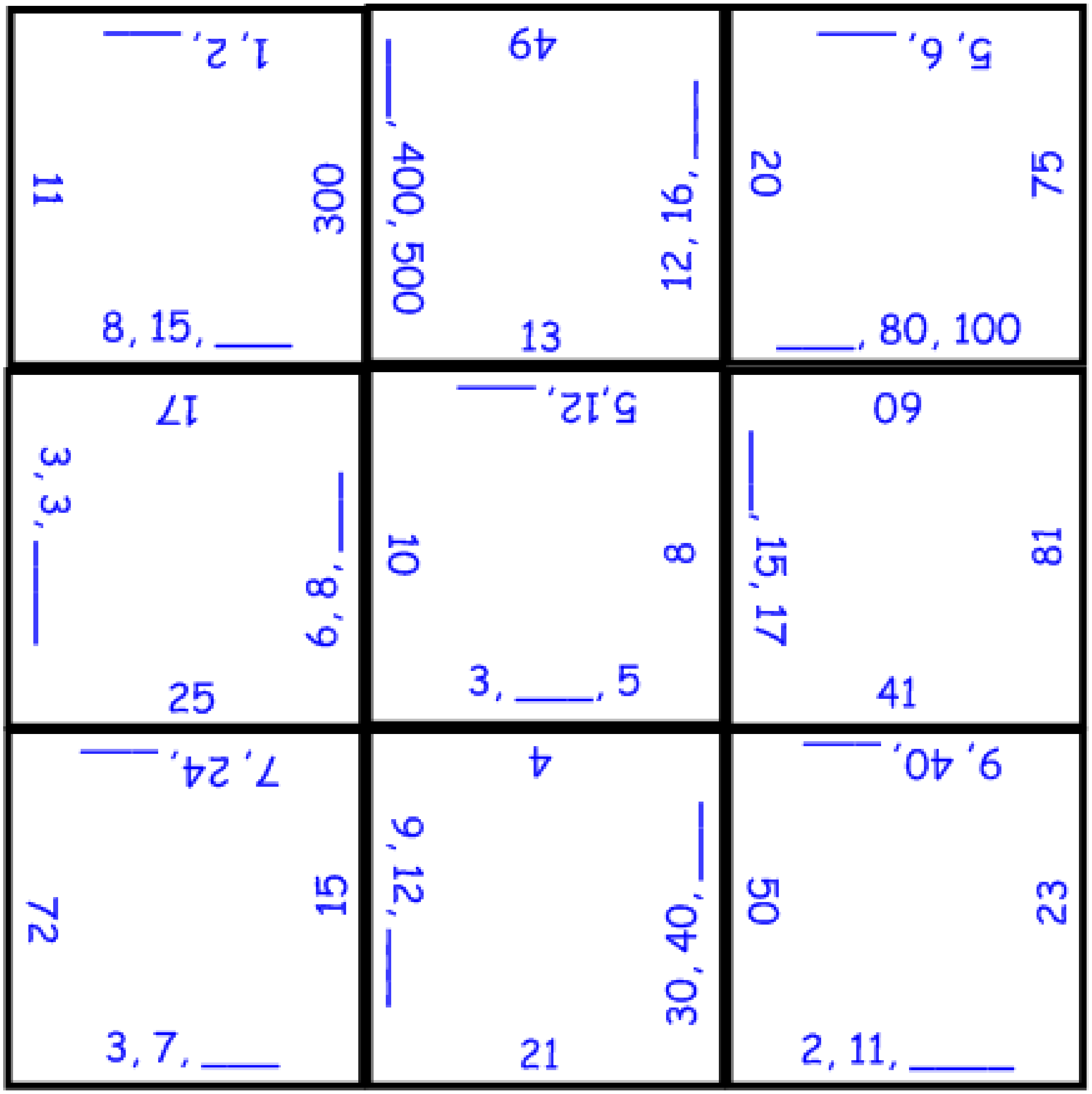
$\frac{630}{80}$ = 7.9 field goals made per game

During the 2007-2008 season, Deron Williams played in 82 games. How many field goals did Deron Williams make per game during the 2007-2008 season?

$\frac{566}{82}$ = 6.9 field goals made per game

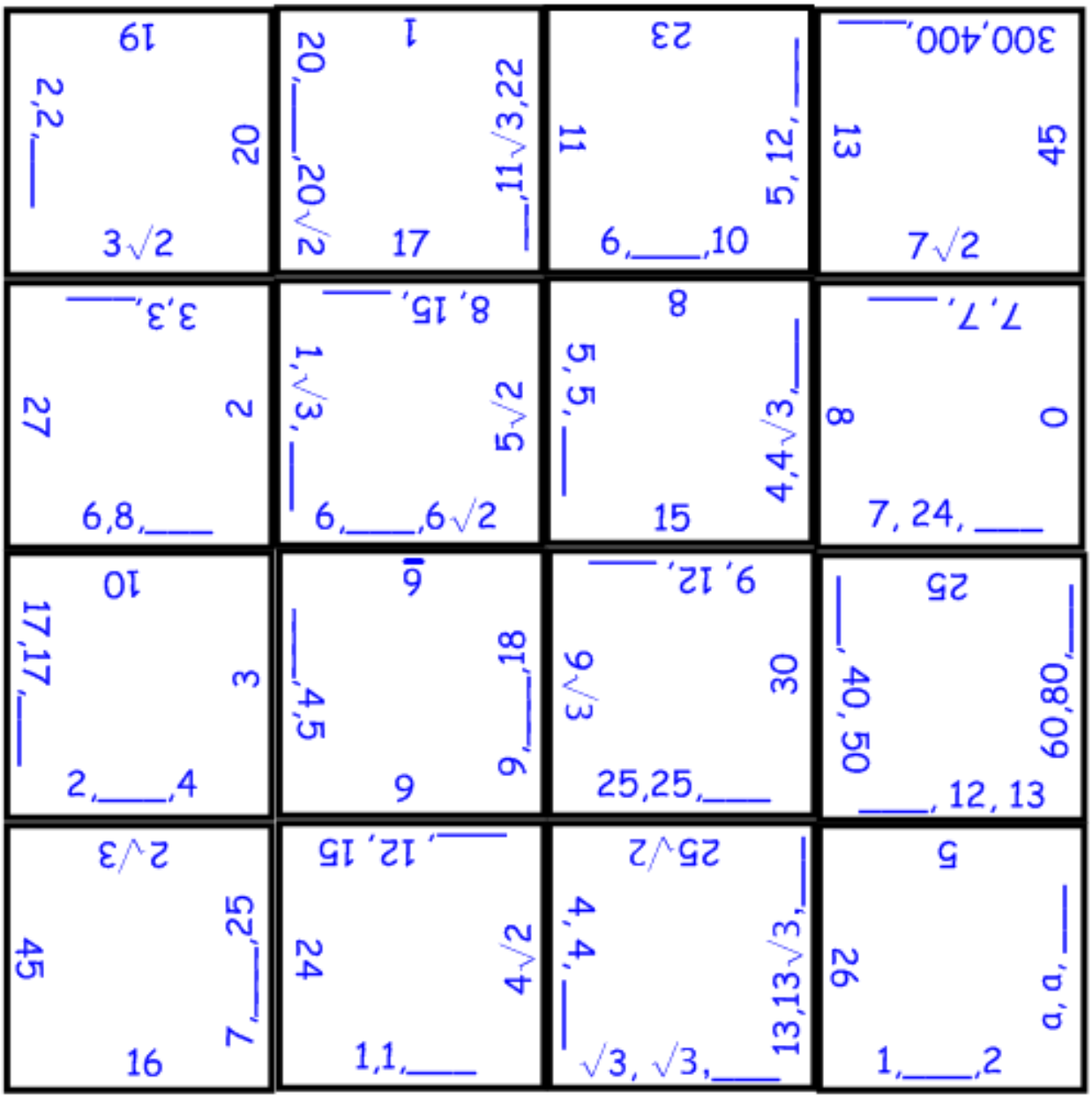
Online Research: What are the current statistics for Chris Paul and other players? Visit espn.go.com to learn more.

Bonus: By using online resources find Chris Paul's percent increase/decrease from one season to the next.

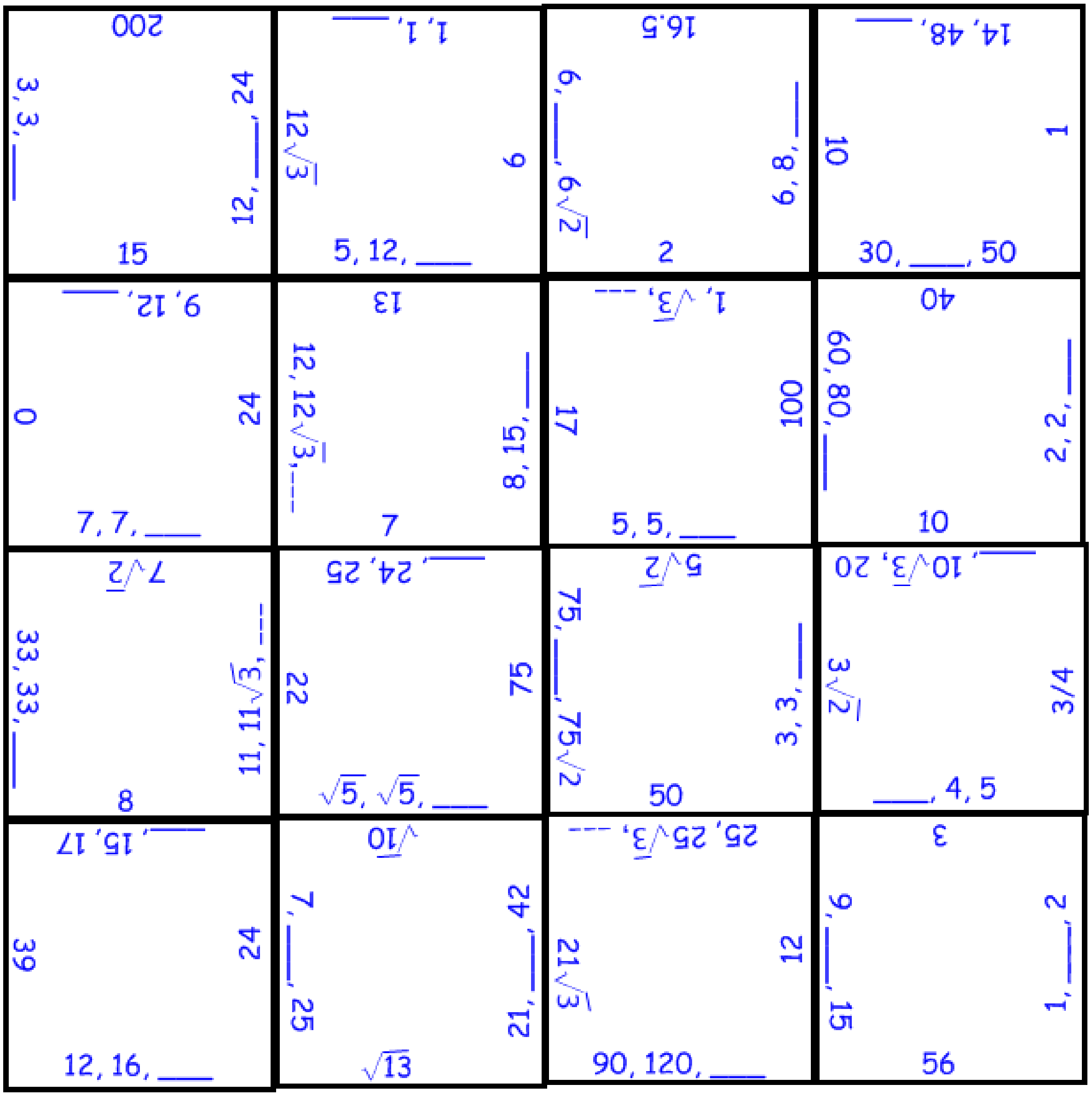


ACTIVITY ONE

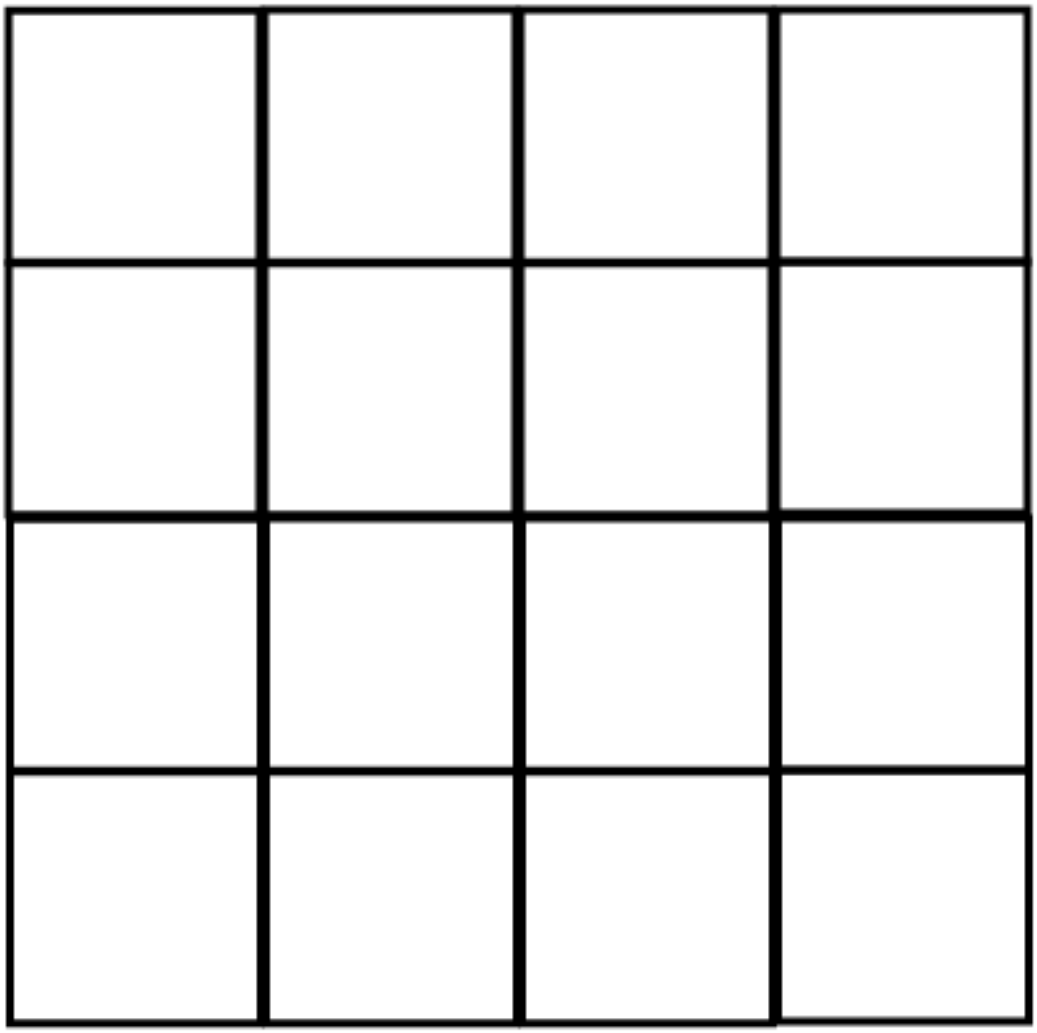
Retrieved from Beth Menzie (http://betterlesson.com/lesson/448035/special-right-triangles-puzzle-activity)
(MCC.9-12.G.SRT.6)



ACTIVITY TWO



ACTIVITY THREE

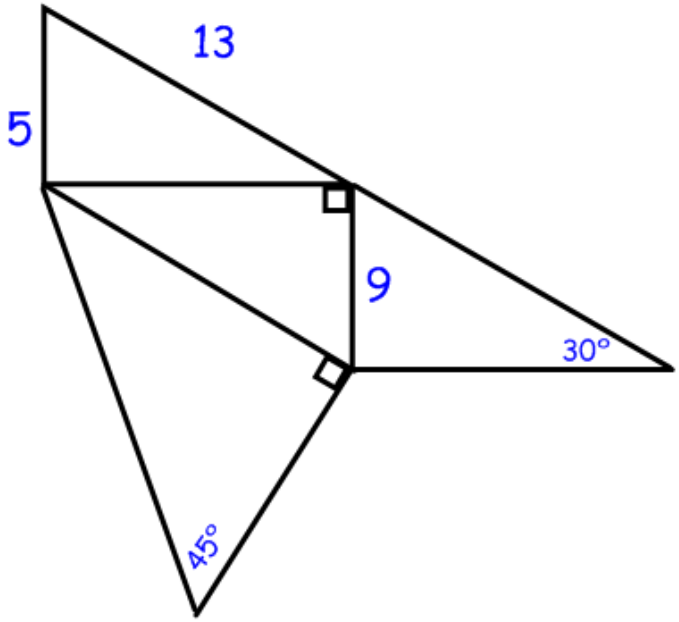


BLANK TEMPLATE

Retrieved from Beth Menzie (http://betterlesson.com/lesson/448035/special-right-triangles-puzzle-activity)
(MCC.9-12.G.SRT.6)

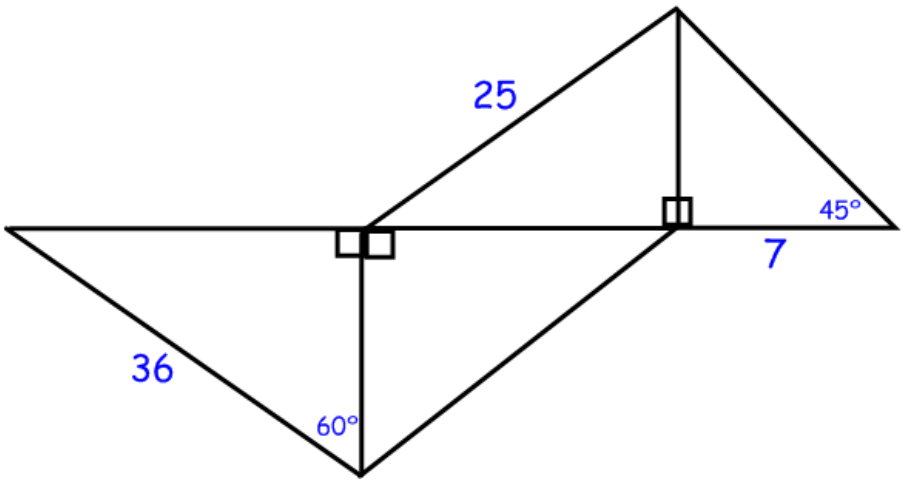
Name _____

Fill in the lengths of the missing sides:



Name _____

Fill in the lengths of the missing sides:



Name _____

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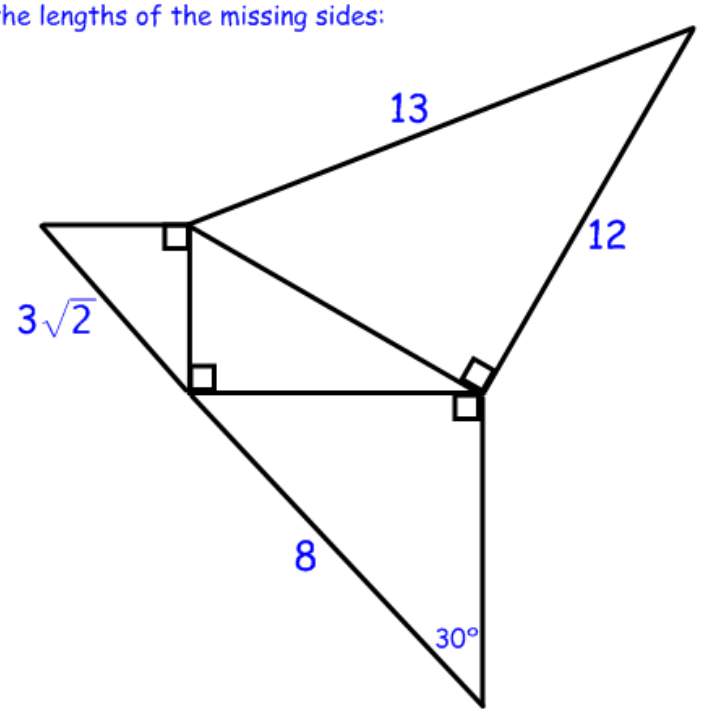
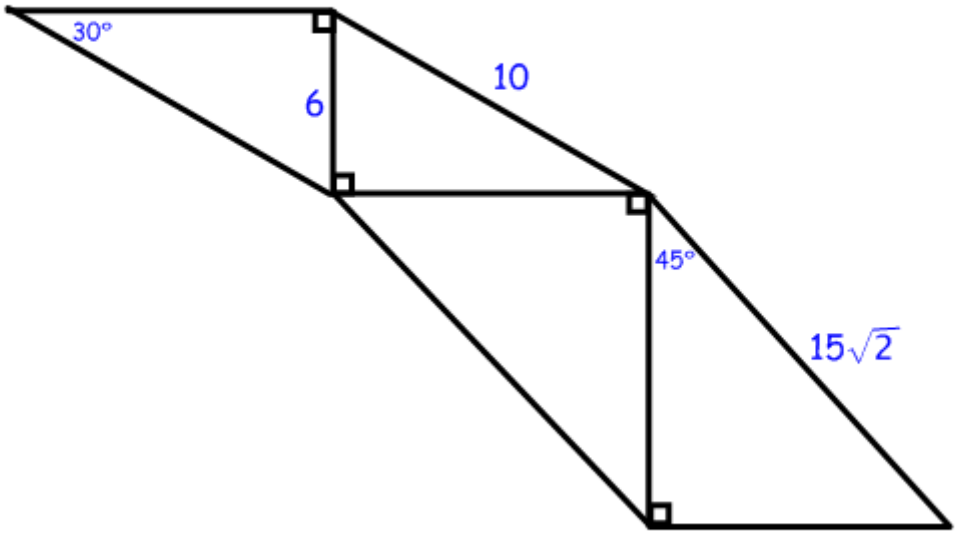


Name _____

Fill in the lengths of the missing sides:



Factoring a SUM of Cubes

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Remember SOAP for the signs

Same **O**pposite **A**lways **P**ositive

Example: $x^3 + 8$

$$(x+2)(x^2-2x+4)$$

 (MCC.9-12.A.APR.3) Original Author: Meriam P. Freeman

Factoring a DIFFERENCE of Cubes

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Remember SOAP for the signs

Same **O**pposite **A**lways **P**ositive

Example: $27x^3 - 1$

$$(3x - 1)(9x^2 + 3x + 1)$$

 (MCC.9-12.A.APR.3) Original Author: Meriam P. Freeman

- Combine like terms.
- Do NOT change exponents on the variables.
- Be careful of negative signs!

Examples

$(3x^2 + 4x) + (-6x^2 + x) =$

$(5x^2 – 8) + (2x^2 – 3x + 1)=$

Examples

$(3x^2 + 4x) – (6x^2 + x) =$

$(5x^2 – 8) – (2x^2 – 3x + 1)=$

- Change subtract to add and change the sign on every term in the 2nd polynomial.
- Follow the rules of adding.

- Distribute monomial to each term in the polynomial.
- For 2 binomials, FOIL or box.
- Remember to multiply coefficients and add exponents.

Examples

$3x^2 (4x^4 – 2x^2 + x) =$

$(x + 3)(x – 7)=$

Examples

$\frac{36x^5-24x^4+12x^3}{12x^3} =$

$\frac{15x^2y^2-35xy}{5x} =$

- Divide <u>each</u> term by the divisor.
- Remember to divide coefficients and subtract exponents.
- Do NOT “cancel” any terms.

Subtract Polynomials

–

Add Polynomials

+

Operations with Polynomials

Review

Divide Polynomials

÷

Multiply Polynomials

●

Retrieved from http://www.aldenschools.org (MCC9-12.A.SSE.1a; MCC9-12.A.APR.1; MCC9-12.A.APR.6)