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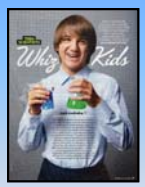
Understanding and Providing for the G/T Secondary Math Student

Presenters: Judy O'Neal
Debbie Sheridan

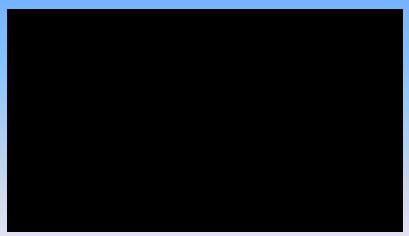
Goals for Today

- Understand the unique characteristics of the gifted math student.
- Provide mathematical extensions to increase rigor, depth and relevancy.

Profoundly Gifted



People
April 14, 2014



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G/T Characteristics

- See things differently
- Learn differently
- Focused on an interest
- Self-motivated learners
- Supported by adult mentors
- Passionate about learning
- Intense emotions

Gifted Math Student

Learns mathematical ideas quickly

Uses multiple strategies for solving problems

Sustains concentration and shows great tenacity in pursuing problems

Operates easily with symbols and spatial concepts

Quickly recognizes similarities, differences, and patterns

Prefers to present information through charts, tables, and graphs

Adapted from How the Gifted Brain Learns, David A Sousa

What do you do for a gifted math student?

- Provide inquiry-based, discovery learning approaches that emphasize open ended complex multistep problems.
- Asking higher level questioning to justify problem solving.
- Provide challenges that go beyond the normal curriculum that connect math to the real world and are of interest to the student.

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State Goal for the Services for Gifted Students

Students who participate in services for gifted students will demonstrate skills in self-directed learning, thinking, research, and communication as evidenced by the developmental of innovative products and performances that reflect individuality and creativity and are advanced in relation to students of similar age, experience, or environment. High school graduates who have participated in services for gifted students will have produced products and performances of professional quality as part of their program services.

Mathematical Process Standards

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(A) apply mathematics to problems arising in everyday life, society, and the workplace;

(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;

(C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;

(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;

(E) create and use representations to organize, record, and communicate mathematical ideas;

(F) analyze mathematical relationships to connect and communicate mathematical ideas; and

(G) display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

Gifted Math Student Characteristics

Advantages	Disadvantages
• Can finish work quickly • See patterns that no one else sees • Symbolic thinkers • Create outside the box solutions	• Make careless errors • Can't explain the process • Easily bored • Tune out when they can't see the relevancy in math

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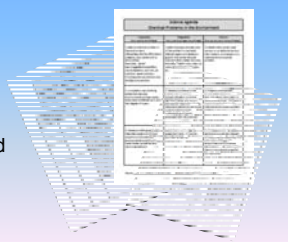
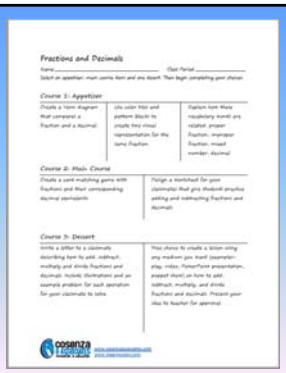
Strategies

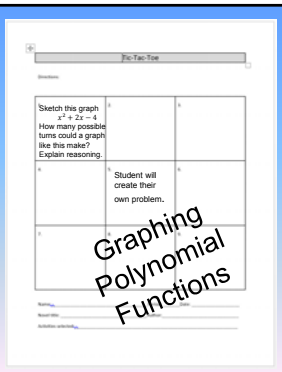
- Menus/Cubing
- Compacting
- Independent ongoing thinking exercises posted in classroom
- Giving students time to learn how to communicate to others on how they solved a problem
- Relevant independent study

Menus

Menus give students an opportunity to choose activities that are more aligned with their learning styles and readiness levels.







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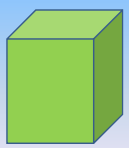
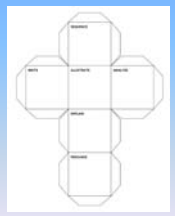
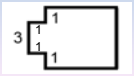
Cubing

Persuade

Student A
- Persuade another student that if the perimeter of the figure below is 24 units, the missing dimensions are 5 units, 6 units, and 6 units.



Student B
- Persuade another student that 2 geometric figures can have the same perimeter but not the same area.

Visual Imagery

Picture found on www.byrdseed.com

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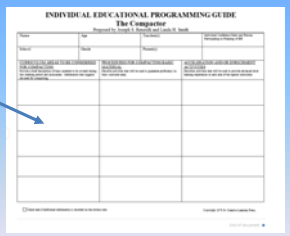
Compact the Curriculum


INDIVIDUAL EDUCATIONAL PROGRAMMING GUIDE
The Compactor

Pre-assessment in Math must be computational and conceptual.

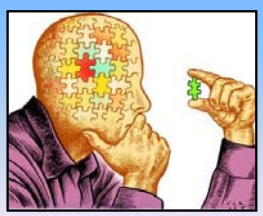
Compacting

- A three step instructional strategy that includes:
  - Pre-assessment
  - Documentation, and
  - Enrichment/Acceleration

It allows students to learn new content.

Ongoing Thinking Exercises

- Pico, Fermi, Bagel
- Questions That
- Mystery Numbers
- Visual Imagery



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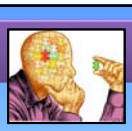
Pico, Fermi, Bagel



Pico - One digit is correct, but in wrong place
Fermi - One digit is correct, but in correct place
Bagel - Is no digit is correct

571 - P
371 - F
372 - F
392 - F
364 - PF
346 - FF
345 - Correct answer!!

How can you get to this answer?

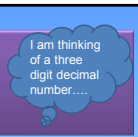
The answer is 21.

Constraints-

1-Use three steps
2-Use a decimal point.
3-Use a square root.

Adapted from Byrdseed.com

Mystery Number?



____ . ____ ____

Clue 1-The tenths digit is neither prime nor composite and has value.

Clue 2- The ones digit is odd and prime and is less than 5.

Clue 3-The hundredths digit is three more than the tenths digit.

Problem from Melanie Montgomery's book, *Mystery Numbers*. www.jtayloreducation.com

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Ongoing Thinking Exercises

- Other Internet resources
  - www.brydseed.com (go to Math)
  - www.hoagiesgifted.org (go to Kids and Teens Links-Math)
  - www.ohiorc.org/for/math/problem_corner/
  - www.mathcounts.org/resources/problem-of-the-week

Teaching Kids to Explain Thinking

The table shows the relationship between the age of a mature cat and its corresponding age in human years.

Age of a Mature Cat	Age of cat in Human years
2	24
3	28
4	32
5	36
6	40

Based on the information in the table, what would be an approximate human age for a cat that is 13 years old?

Plan activities to have students communicate their thinking.

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Formulate and Test Conjectures

- Sometimes True?
- Always True?
- Never True?

$\frac{x+6}{2} = x+3$

$6+2x = 8x$

Sometimes True? Always True? Never True?

$\frac{x+6}{2} = x+3$

$(x-6)^2 = (6-x)^2$

Relate Math to the Real World





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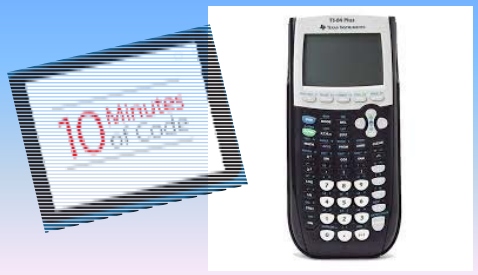
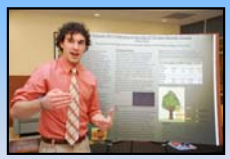
Fun with Calculators



Independent Study

- Working with mathematicians in the workplace
- Solving real life problems



Texas Performance Standards Project

- Independent Study
  - Researching a real life problem of interest and finding solutions using math.

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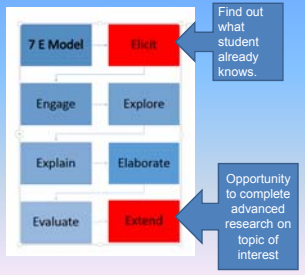
7E model



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