Integrated Math 2 (High School)

Major Learning Targets for This Course

Rational Exponents and Complex Numbers

Students will extend their knowledge of number systems to include complex numbers and discover how the irrational and complex number systems are related to the integers.

"I can convert between radical form and rational exponents, and I can multiply and divide powers with rational exponents." (*E.g.* $\sqrt[3]{8} = 8^{\frac{1}{3}}$)	"I can add, subtract and multiply polynomials." (*Polynomials are numbers represented with many terms, like* $3x^2 + 4x - 1$.)	"I can add, subtract, and multiply complex numbers." *(Complex numbers are written as* $a + bi$ *where* a *and* b *are real numbers and* i *is the imaginary unit)*

Example Tasks:

Find some possible expressions in the form of $(a+bi)+(a+bi)$ and $(a+bi)-(a+bi)$ that would result in $3-4i$.

Polynomials	Complex Numbers
$(x-5)(2x+1)$	$(-5+i)(1+2i)$
Explain the similarities and differences in the steps for multiplying each expression.	

Quadratic Functions

Students will learn to graph quadratic functions, use them to model real situations, and solve quadratic equations. *(A quadratic function is written as* $f(x) = ax^2 + bx + c$ *whose graph is a parabola)*

"I can explain the differences among linear, exponential, and quadratic equations."	"I can recognize different forms of quadratic equations and can change between them."	"I can identify key features of a parabola and use this information to model quadratic situations and solve problems."

Example Task:

A frog is about to hop from the bank of a creek. The path of the jump can be modeled by the equation $h(x) = -x^2 + 4x + 1$, where $h(x)$ is the frog's height above the water and x is the number of seconds since the frog jumped. A fly is cruising at a height of 5 feet above the water. Is it possible for the frog to catch the fly, given the equation of the frog's jump?

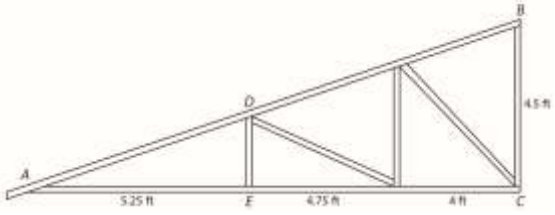
Geometry

Students will become experts in similarity, learn to prove geometry statements, and study the geometry of circles.

"I can prove or disprove that one triangle is similar to another (has the same angles and proportional side lengths)."	"I can find the sine and cosine of angles in right triangles."	"I can use the properties of circles to solve for angle measures and segment lengths."

Example Task:

A mono truss is a type of building support structure that is in the shape of a right triangle. Contractors often use mono trusses when building roofs for small structures such as garages and sheds. The vertical pieces of this truss form 90° angles with the horizontal pieces in order to maximize the stability. Observe the diagram of a mono truss below. Is $\triangle ABC$ similar to $\triangle ADE$? Explain your reasoning. Is it possible to determine the length of $\overline{DE}$ from the given information? If so, calculate the length.



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Expected Behaviors in Math Class

Students will…

- Make predictions and estimations
- Decide if their answer is reasonable
- Use examples and counterexamples to justify a conclusion
- Explain their thinking and their process to solving a problem
- Apply mathematics to solve problems in everyday life
- Consider available tools to help them solve problems (including hands-on tools and technology)
- Use technology to explore and deepen their understanding
- Communicate ideas clearly verbally and in writing, using math vocabulary when appropriate
- Look for patterns and shortcuts

How Can I Support My Student in This Course?

1. Ask Questions

- When your student is stuck, ask him/her questions like:
  - "How do you know?"
  - "Have you seen a similar problem like this before?"
  - "Does your answer make sense?"
  - "What is the problem asking you?"
  - "What information do you need to solve this question?"

2. Encourage Your Student to Ask Questions

- You don't need to be able to answer every question that students may come up with; encourage your student to write down his/her question to bring to a teacher or peer the next day

3. Ask Your Student to Draw the Math Problem

- All mathematics can be represented visually; visual representations help students understand the concepts
- Encourage color coding

4. Encourage Multiple Representations of the Problem

- Ask your student to solve the problem in a different way, and to make connections between the different representations

5. Value Mistakes

- Students are learning when they are making mistakes; create an environment where your student feels comfortable making a mistake and learning from it

6. Don't Simply Tell Them the Right Answer

- Once students are aware that their answer is right, they are more likely to stop thinking about the math
- Instead of telling them the right answer, ask them a question (see #1) or have them draw a picture

7. Praise Effort

- When your student gets a right answer, acknowledge how hard they must have worked and practiced
- When your student is stuck, acknowledge that sometimes math is challenging and that if they continue to practice and work hard, they will improve

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