

INTEGRATING MULTIPLE CONCEPTS IN A MATHEMATICAL TASK

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WHAT ARE THE MATH CONCEPTS AND MATHEMATICAL PRACTICES INVOLVED?



- **DETERMINE THE PLANE'S ALTITUDE IN FEET - TERMINAL VELOCITY IS 120 MPH. A SPEED OF 50% OF TERMINAL VELOCITY IS REACHED AFTER ONLY 3 SECONDS, WHILE IT TAKES 15 SECONDS TO REACH 80%, 15 SECONDS TO REACH 90%, AND THEN 100%. ONCE THE PARACHUTE, XXX'S VELOCITY SLOWS BY 50% EVERY 5 SECONDS.**

- **A FREE-FALLING OBJECT ACHIEVES ITS TERMINAL VELOCITY WHEN THE DOWNWARD FORCE OF **GRAVITY** (F_g) EQUALS THE UPWARD FORCE OF **DRAG** (F_d)**

1. **Making sense & perseverance**
2. **Reason abstractly**
3. **Construct arguments**
4. **Model**
5. **Use tools**
6. **Attend to precision**
7. **Make use of structures**
8. **Express regularity**

$$\frac{60mi}{3600s}(3s) + \frac{96mi}{3600s}(15s) + \frac{108mi}{3600s}(15s) + \frac{120mi}{3600s}(6s) + \frac{60mi}{3600s}(5s) + \frac{30mi}{3600s}(5s) + \frac{15mi}{3600s}(5s) + \frac{7.5mi}{3600s}(5s)$$

$$= \frac{180mi}{3600} + \frac{1440mi}{3600} + \frac{1620mi}{3600} + \frac{720mi}{3600} + \frac{300mi}{3600} + \frac{150mi}{3600} + \frac{75mi}{3600} + \frac{37.5mi}{3600}$$

$$= \frac{4522.5mi}{3600} = \mathbf{1.25625 \text{ mi}}$$

5280 feet in a mile

The altitude of the plane is 6,633 feet.

WHAT ARE THE MATH CONCEPTS AND MATHEMATICAL PRACTICES INVOLVED?



- LIGHTS CAMERA PROPORTIONS
- WORKSHEET

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[HTTP://WWW.CCD.RPI.EDU/EGLASH/CSDT/AFRICAN.HTML](http://www.ccd.rpi.edu/EGLASH/CSDT/AFRICAN.HTML)

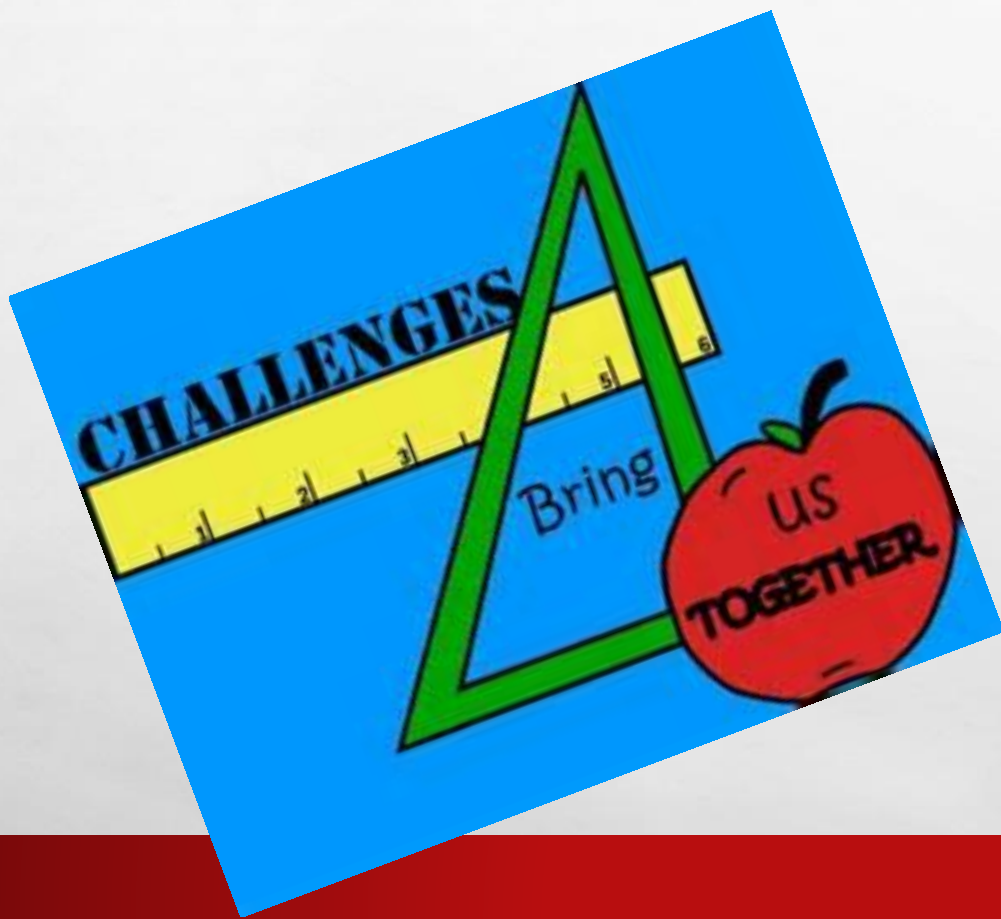
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WHAT ARE THE BENEFITS?



WHAT ARE THE CHALLENGES?



HOW CAN WE PROMOTE PRODUCTIVE CONCEPT INTEGRATION?

- **ESTABLISH MATHEMATICAL GOALS**
- **IMPLEMENT TASKS THE PROMOTE REASONING AND PROBLEM SOLVING**
- **USE AND CONNECT MATHEMATICAL REPRESENTATION**
- **FACILITATE MEANINGFUL MATHEMATICAL DISCOURSE**
- **POSE PURPOSEFUL QUESTIONS**
- **BUILD PROCEDURAL FLUENCY FROM CONCEPTUAL UNDERSTANDING**
- **SUPPORT PRODUCTIVE STRUGGLE**
- **ELICIT AND USE EVIDENCE OF STUDENT THINKING**

THAT'S RIGHT....BY USING THE MATHEMATICAL TEACHING PRACTICES!!



Questions
are
guaranteed in
life;
Answers
aren't.

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