DSA

Alternate Base Systems
for Cross-Curricular Fun & Engineering Applications

LESSON PLAN FOR CLASSROOM USE

LEARNING OBJECTIVES:

1. Inspire interest in STEM
2. Understand bases underlying STEM, via group work with various alternate-base systems useful for different purposes in engineering applications, math, technology and science.
3. Learn multicultural, historical cross-curricular tie-ins during hands-on alternate-base work
4. Apply general ideas, materials, and experiences to individual interests and special needs
5. Collaborate with others to gain more vigorous, useful applications of math, & EST via more flexible and optimal frameworks of thought and practical application

OVERVIEW: Hands-on activities and interactive exercises

1. Individual work completed during short lecture-portion of the workshop using handouts as basis for thoughtful processing, reflection, and creative thinking and drawing
2. Group work in which participants verbally and visually share their individual work and evaluate and synthesize the work of every other into a strong product which their group will present to the whole
3. Each group presents their findings or conclusions or creative products to the whole and participants get a chance to process, synthesize, and evaluate what they hear individually (via feedback forms), in their small groups (via group feedback forms) and as a whole (via questions for the facilitator/s).

CONTENT:

10-20 min.

1. INTRODUCTION: Present short 10-minute introduction on Alternate Bases, then present (or hand out as extra credit homework) information on each of the "Alternate Base Systems" including but not limited to: Binary, Octal, Decimal, Dozenal, Hexadecimal, Base-20 Mayan System, Base-60 Babylonian System, and William Lauritzen's "Future Base 12" system.

   The introduction will take one 90-minute class or two 50-minute classes.

   You could spend one day a week for five weeks, or five days of one week, on each of the Alternate Bases:

   DAY 1: Decimal (used for measuring, math, science)
   DAY 2: Binary, Octal, Hexadecimal (used in computer programming & engineering)
   DAY 3: Dozenal, and William Lauritzen's "Future Base 12" system
   DAY 4: Mayan Base-20 (alternate base of past used by early human civilization & calendar whose "great cycle" just ended in December 2012.
   DAY 5: Babylonian Base-60 (alternate base of the past linked to early human civilizations)

5-10 min.

2. INDIVIDUAL WORK: Each participant develops his or her own answers to the questions on their handout while Leader is presenting lecture, or for 5-10 minutes afterward.

20 min.

3. GROUP WORK: Participants are put randomly into groups and each shares his or her individual work. Participants discuss and decide what their group's final product will be, who will present the costs and benefits of their specific product, and what their evidence or justification will be for implementation. Each group fills in their group worksheet.

_____Can make break here if you want students to do work at home_____

10 min. if five groups

4. PRESENTATION: Each group has 2 minutes to present their product, costs/benefits, and evidence/justification.

10-20 min. in groups or as whole-class with Leader as facilitator

5. DISCUSSION

   A. In their groups students discuss and fill in their group voting form

   B. Leader acts as facilitator and then all the groups discuss the different presentations and vote on which product the class should choose, with or without modifications. Each group fills in or submits their voting form.

5 -15 min.

6. CONCLUSION: Leader tallies votes publicly and notes modifications or qualifications. Group/s with winning product are presented with some tangible prize, points, or benefit they can redeem later.

7. FEEDBACK: Leader can use "Feedback" form to assess how the participants felt about the content and other aspects of the presentation.

LEADER NOTES ON HOW THE LESSON/S WENT FOR FUTURE: