



DSA
Alternate Base Systems
for Cross-Curricular Fun & Engineering Applications

LESSON PLAN FOR ADULTS
60-90 MINUTE SESSION

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 to Alternate Bases including bases of the past, 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.

5-10 min.

2. **INDIVIDUAL WORK:** Participants are split into groups. If parents, split them by age-level of their child. 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.

10-20 min.

3. **GROUP WORK:** Each participant in a group 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.

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 the different presentations and vote on which product the class should choose, with or without modifications then fill in their group voting form in order to select their group's choice/s for winning engineering design & justification of the product. Group give Leader their voting form.

- OR

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

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 SESSION WENT FOR FUTURE: