Standards Alignment and Assessment Outcomes
TOPS Physics labs are designed for students to learn that “scientific progress is made by asking meaningful questions and conducting careful investigation” as specified by the California State Science Standards. The TOPS experiments are designed to integrate into Los Angeles area teacher’s current curriculum and align with the California State Science Standards. The experiments utilize modern technology including computer-driven instruments and commercially available data analysis software.

Wave Motion: Four Labs
1. Relationship between velocity, frequency, and wavelength.
2. Single slit diffraction and effect of slit width and frequency
3. Two point source interference pattern experiment
4. Young’s Double Slit Diffraction Experiment: Relationship between wavelength and wave refraction and effect of frequency

Waves Standards 4a, 4b*, 4c*, 4f*
Investigation and Experimentation Standards: 1a, 1b*, 1c*, 1d, 1e, 1j*, 1l


Assessment of TOPS Wave Motion Labs for 2008-2012
Direct assessment using release questions drawn largely from the California Standards Test (CST Physics 2005 & 2009) shows the following effect on student conceptual understanding of topics associated with the hands-on activity:
Topic: Velocity, Frequency, and Wavelength
Number of participating students: 400
Change in score: 7% increase (post-pre)
Analysis of variance shows this change is highly statistically significant (F (1,399) = 24.7, p < 0.001, η² = 0.059) with a medium effect size of the activity on the student’s scores.