WHY FORMATIVE ASSESSMENT?

Formative assessment, often largely overlooked, has come into its own, and great strides have been made in its design and delivery (Furtak, 2009). The power of formative assessment lies in its ability to reveal student thinking in a way that offers teachers opportunities for midcourse corrections. Summative assessments, which are designed to evaluate students' grasps of domain-specific content, do not always help teachers recognize to what degree students understand material. Under typical summative assessment procedures, students receive feedback at the end of a learning cycle, leaving no opportunity to revisit material and no time to make instructional changes. In formative assessment, feedback keeps the learning going-- it informs the next step. So, summative assessments are assessments of learning already achieved, while formative assessments are assessments informing the learning still to come. There is solid evidence that good formative assessment promotes learning and leads to higher student achievement (Black and Wiliam, 1998; Black, Harrison, Lee, Marshall, and Wiliam 2002; Fennema, Carpenter, Franke, Levi, Jacobs, and Empson, 1996).

TRY IT!

Exploiting the opportunities for formative assessment embedded in the *Foundation Science: Biology* Learning Experiences takes planning and keeping track on your part. Here are some major opportunities in Learning Experience 4:

I. In the *Brainstorming Discussion*, students' answers to open-ended questions shared during partner talk reveal their ideas about chromosomal structure and what might happen if there is a chromosomal aberration.

II. Students' written responses to the *Think About It* questions in *Activity 1,* particularly why these proteins should be placed near the marks on the DNA? how do the different chromosomes in organisms differ from one another? and what kinds of errors might occur during DNA replication and chromosome duplication? provide insight into students' understanding of chromosome structure, function, and duplication. In *Activity 2,* student responses regarding can the chromosome composition of one egg be different

from that of another egg? and their descriptions of meosis 1 and meosis 2 reveal their understandings about segregation, assortment and the origins of genetic variation derived from modeling meosis. In *Activity 3*, when students construct a karyotype and determine whether it is normal or abnormal, their responses will tell you whether they understand how chromosomal aberrations occur based on their understanding of meosis. These demonstrated understandings should indicate individual student's readiness to undertake the challenge project.

III. In the *Class Presentation*, students' grasp of the structure and function of chromosomes, their overviews of gamete formation and description of karyotyping and its significance should be demonstrated

IV. The summative multiple-choice *Assessment Questions* at the end of the LE can be used formatively as well. Assign several questions to each table group and have them debate the alternative answers until consensus is reached.