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Contacts: Sara Frueh, Media Relations Officer
Alison Burnette, Media Relations Assistant
Office of News and Public Information
202-334-2138; e-mail <news@nas.edu>

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**REPORT CALLS FOR NEW NATIONAL INITIATIVE TO IMPROVE
MATHEMATICS EDUCATION FOR PRESCHOOLERS**

WASHINGTON — To ensure that all children enter elementary school with the foundation they need for success, a major national initiative is needed to improve early childhood mathematics education, says a new report from the National Research Council. Opportunities for preschoolers to learn mathematics are currently inadequate, particularly for those in low-income groups, says the report, which is intended to inform the efforts of Head Start, state-funded preschool programs, curriculum developers, and teachers.

"Young children have a keen interest in learning about everything in their environment. That naturally translates into becoming competent in mathematics, but right now most children's potential is not being realized because we have not given parents, educators and care givers the tools that they need to build on that interest," said Christopher T. Cross, chair of the committee that wrote the report, and chairman of Cross & Joftus, LLC, an education-policy consulting firm. "Evidence shows that early success in math is linked to later success in both math and reading. Given the increasing importance of science and technology in everyday life and for gaining entry into many careers, it's crucial that we give all children a strong foundation in math and that we start many years before they enter formal schooling."

Historically mathematics has been viewed by many early-childhood educators as unimportant or developmentally inappropriate for young children, but research indicates otherwise, the report says. As early as infancy, children are able to think about their world in mathematical ways; by 10 months of age babies can distinguish a set of two items from a set of three. Young children continue to expand their competence in informal, spontaneous ways -- by counting toys, for example, or pointing out shapes. Adult support in a positive learning environment is crucial to helping children expand their knowledge and see the mathematical aspects of everyday situations, the committee said.

The amount of time devoted to and focused on mathematics needs to be increased in all public and private preschool settings, the report says. Currently mathematics activities are often embedded in other lessons and secondary to other learning goals. But emerging research indicates that learning experiences in which mathematics is the secondary rather than the primary goal are less effective for promoting math learning.

Drawing on available evidence, the report recommends that mathematics instruction in early childhood settings concentrate on two major content areas. The first area -- and the one to

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which the most time should be devoted -- is "number," the concept used by mathematics educators to encompass counting, determining relative quantities (less and more), and basic computational operations such as adding and subtracting. The second area is geometry, spatial thinking, and measurement. Within those areas, children should reflect on and discuss the mathematical reasoning used to solve problems. For example, children might practice measuring various objects using a wooden block and then discuss why it is important to use a standard unit of measure in determining whether one object is longer or taller than another.

For each content area the report describes "teaching-learning paths" -- sequences of learning experiences in which one idea lays the foundation for the next. Research has shown these pathways to be effective ways for children to build knowledge and competence in mathematics, said the committee. For example, a child might be shown many examples of shapes to learn what aspects are mathematically relevant to determining shape -- for example, that a square must have four sides -- and what factors are not, such as size or orientation. After a child learns basic shapes, he or she can learn to combine them to create new shapes.

The teaching-learning paths outlined in the report should be the basis of classroom instruction, the committee said, and states should develop or revise their early childhood learning standards to reflect these paths. Curriculum developers also should base their materials on these learning pathways.

A key component of the new national initiative would be providing teachers with professional development about the mathematics teaching-learning paths and how to implement a strong mathematics curriculum, the report says. And any serious effort to improve early childhood math instruction will need to include licensure and accreditation processes that assess teachers' and programs' competence in teaching math.

Opportunities to receive high-quality math instruction are especially important for low-income children, the committee said, urging implementation of the report's recommendations by Head Start and other publicly funded programs. Children from low-income families, on average, demonstrate lower levels of competence in math prior to entering school, and these gaps persist or widen as schooling continues. Providing these children with high-quality mathematics instruction early on can provide a foundation for later learning in math and can help address long-term systematic inequities in educational outcomes.

The report was sponsored by the Office of Head Start and Office of Planning, Research and Evaluation at U.S. Department of Health and Human Services, the Ewing Marion Kauffman Foundation, and the National Institute of Child Health and Human Development. The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council make up the National Academies. They are independent, nonprofit institutions that provide science, technology, and health policy advice under an 1863 congressional charter. A committee roster follows.

Copies of ***Mathematics Learning in Early Childhood: Paths Toward Excellence and Equity*** are available from the National Academies Press; tel. 202-334-3313 or 1-800-624-6242 or on the Internet at <http://www.nap.edu>. Reporters may obtain a copy from the Office of News and Public Information (contacts listed above).

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