Cross-Age Tutoring
Phase II—An Experiment

Leslie Cairo, III
Jim Craig

December 2005

Appalachia Educational Laboratory (AEL)
at
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ABSTRACT

Peer tutoring and cross-age tutoring are two student-to-student tutoring methods. Peer tutoring occurs when tutors and tutees are of the same age. Cross-age tutoring refers to older students tutoring younger students. Studies of cross-age tutoring have reported improved academic performance for both tutors and tutees. The present study was conducted to determine the extent to which cross-age tutoring employed in a rural setting would produce outcomes similar to those reported in urban settings and in other countries. A between/within repeated measures experimental design was used to gauge the effects of cross-age tutoring on learning and retaining knowledge of fraction manipulations. Participating students were randomly assigned to one of four groups: tutors, tutees, nontutors, and nontutees. Tutors and nontutors were seventh- and eighth-grade students at one of two small elementary schools in the same rural district. Tutees and nontutees were third-, fourth-, or fifth-grade students attending the same rural elementary school. Analyses of both knowledge gain and retention scores revealed no significant differences in knowledge of fraction manipulations between tutors and nontutors, tutors and tutees, or tutees and nontutees. Lessons learned and study limitations are discussed.

INTRODUCTION

Two primary types of student-to-student tutoring methods are cited in the tutoring research literature: peer tutoring and cross-age tutoring. In general, peer tutoring refers to the use of same-age peers as the tutors of students who are having difficulty in a subject area. The focus of the strategy is typically to improve the academic performance of the tutee. Cross-age tutoring refers to the use of an older student, usually one who is two or three grades older, to tutor a younger child. With cross-age tutoring, the intent is typically to improve the academic performance of both the tutor and the tutee (Gaustad, 1993; Kalkowski, 2001; & Thomas, 1993).

While some researchers have found no significant improvement in academic performance associated with cross-age tutoring (e.g., Dean, 2000; Jenkins, Jewell, Leicester, Jenkins, & Troutner, 1991), other researchers have reported findings that indicate positive learning outcomes for both the tutor and the tutee (e.g., Cohen, Kulik, & Kulik, 1982). The research findings summarized below discuss the learning benefits to the tutor and the tutee.

Benefit to the Tutor

One finding associated with cross-age tutoring reported by researchers is that, in the process of tutoring, tutors reinforce their own knowledge base and skills. That is, tutors learn the material thoroughly and in a way that is more easily remembered (Fitz-Gibbon, 1975, 1978). As Cohen et al. (1982) point out in their meta-analysis of 52 cross-age tutoring studies, tutors generally exhibited a small but significant improvement in academic performance; they found the average effect size for the tutors to be .33.

In a study of cross-age tutoring conducted by Fitz-Gibbon (1975), students from four low-achieving ninth-grade general math classes and students from three fourth-grade classes were randomly assigned to experimental and control groups. In the experimental groups, 40 ninth-grade students tutored 68 fourth-grade tutees, one-on-one, in fractions. The tutees were randomly assigned to tutors, with no preference given to gender or ability. Achievement was measured by an objective test developed by the researcher to assess students' abilities to conduct fraction operations (e.g., to add fractions). By comparing pretest scores gathered before tutoring began to posttest scores collected after the tutoring had been completed, Fitz-Gibbon found that both the tutors and the tutees registered larger gains from pretest to posttest, in comparison to the control group that remained in the regular classroom setting. Fitz-Gibbon also found that the tutors had higher retention rates, as indicated by scores on a second posttest of fraction operations, in relation to the first posttest.

Another study that examined cross-age tutoring in mathematics had 76 fifth- and sixth-grade students tutor 76 second- and third-grade students on a one-on-one basis for 30 minutes per day, four days per week, for 20 days (Sharpley, Irvine, & Sharpley, 1983). The researchers employed two control groups of 158 randomly selected students from the same grade levels, such that one control group was at the experimental school and the other was at a different school. All students were given a mathematics achievement test constructed for the appropriate grade level, with questions selected from the *Yardsticks Criterion-Referenced Tests in*

Mathematics (Sharpley et al.). Based on the assessment results, the tutors were identified as being high achieving or low achieving. The researchers found that the tutees' test scores significantly increased not only in the areas tutored, $F(1,139) = 29.85$, $p<.04$, but also in related but non-tutored areas of mathematics, $F(1,139) = 18.69$, $p<.01$. In addition, they found the tutees' test scores increased significantly, $p<.01$, regardless of whether they were tutored by high-achieving tutors or by low-achieving tutors.

A related study was conducted by Kennedy (1990). In this experiment in a British secondary school, the researcher used fourth- and fifth-year low-achieving students to tutor reading comprehension to low achievers in the first and second year. Fifteen tutors and 22 tutees were randomly assigned to tutor and tutee experimental and control groups; each group was administered a pre-post group reading test. There was no significant difference, $p>.05$, in pretest scores between the tutors and their control group, nor was there a significant difference, $p>.05$, between the tutees and their control group. Analyses of variance conducted on the posttest results showed that the tutors' increase over their controls was significant, $F(1,13) = 5.70$, $p< 0.05$. The means of the tutors increased by an average of 6.5 points, from a mean of 16.17 at pretest to 22.67 at post-test. The control group did not change significantly, $p>.05$, from a pretest mean of 18.56 to a posttest mean of 17.56.

In a study of cross-age tutoring with at-risk elementary students who were performing below grade level in math and language arts, Mieux (1993) found that none of the 27 fourth-grade students who were to tutor second-grade at-risk students could pass the mathematics numbers pretests of grade-appropriate basic skills. Before the daily program of tutoring began, the tutors experienced minilessons designed to assist the tutors in learning effective tutoring techniques (e.g., how to relate to tutoring partners). An assortment of mathematics board games and hands-on manipulatives, such as math tiles and charts, were used by the tutors. Computer technology with a variety of math software was also used during tutoring sessions. At the conclusion of the seven-month study, Mieux found that 20 of the 27 tutors had improved their grades in mathematics from unsatisfactory to satisfactory and that 12 of the 27 passed the posttest on a teacher-made numbers test on mathematics.

Benefit to the Tutee

Typically, the primary reason for implementing tutoring is to assist the tutee in learning. The tutoring arrangement provides the tutee the benefit of receiving immediate feedback and clarification on the topics covered during the one-on-one instruction with the tutor (Webb, 1987). The achievement of tutees has typically been found to improve more in structured programs of shorter duration with tutoring sessions limited to 20 to30 minutes and when lower-level math and reading skills are addressed and evaluated on teacher-developed examinations rather than solely on standardized tests (Kalkowski, 2001).

An example of a study on the effects of cross-age tutoring on tutees is one conducted by Vacc and Cannon (1991). The researchers employed cross-age tutoring where sixth-grade students tutored moderately mentally impaired elementary students in mathematics. The program was designed to examine changes following 6 weeks of tutoring in basic mathematical skills of the moderately mentally impaired students, who were in a self-contained classroom. Twelve students volunteered to tutor four moderately mentally impaired students; four students were selected to be tutors, based on their availability at the planned tutoring time. The tutors met at the same time each day, across the 6-week period, for 30-minute tutoring sessions that addressed mathematical skills such as counting by rote, counting objects, identifying number words, telling time using month and day, and naming the day of week. Vacc and Cannon found that following the 6 weeks of tutoring, there was an increase in basic skills and a maintenance of these skills for all four of the moderately mentally impaired students. A two-year follow-up study compared the subjects' previous performance levels with those assessed 2 years later. The mean number of correct responses improved for three of the four tutees; the overall average increased from 6.64 to 7.11. It was also reported that tutees demonstrated retention of what they had learned in the skill areas of telling time, counting by rote, counting objects, and identifying number words. No data were reported regarding the changes in mathematics achievement for the tutors.

In the Los Angeles Fractions Project (Fitz-Gibbon, 1990), the 40 tutors were ninth-grade students (14-year-olds), and the 68 tutees were fourth-grade students (8-year-olds) randomly selected from neighboring schools. Tutoring on fractions was conducted for 3 weeks. Immediate posttest results favored tutees over the nontutored fourth graders; but perhaps more important, retention tests administered 3 months after the experiment revealed significantly higher average achievement scores for tutees, $t(66)=2.68$, $p<.05$, Cohen's $d=.81$.

Cohen et al. (1982) reported that their meta-analysis of 52 studies of cross-age tutoring revealed a moderate effect on the achievement of the tutees (i.e., the average effect size was .40). This implies that tutoring raised the performance of the students by .4 of a standard deviation, or from the 50th percentile to the 66th percentile. Cohen et al. concluded that this finding also implies that 66% of the students from these classrooms outperformed the control group students.

The Current Study

In 2005, Edvantia initiated a research project to examine the effectiveness of cross-age tutoring as an instructional strategy in mathematics. The primary objective of the study was to determine whether the positive effects associated with using cross-age tutoring to tutor mathematics observed in urban settings and in other countries could be demonstrated with students in a rural setting in the United States. The secondary objective of this research was to determine whether upper-elementary students serving as tutors in the content area of fractions, over the course of a 3-week period, would (1) improve tutee learning and (2) learn and retain the knowledge of fraction operations. The following nine fraction operations were examined:

1. addition
2. subtraction
3. multiplication
4. expansion
5. simplification
6. expression of area as fractions
7. comparisons
8. conversion to decimals and vice versa
9. conversion to percentages and vice versa

RESEARCH QUESTIONS

The basic research question centered on whether the tutoring experience produced learning gains for both tutors and tutees. Of secondary interest was whether these gains, if observed, would last for a three-month period. Three questions were specifically addressed by examining pretutoring and posttutoring achievement test scores for tutors, nontutors, tutees, and nontutees:

1. Are there differences in fraction operation knowledge gains and retention for tutors and nontutors?

2. Are there differences in fraction operation knowledge gains and retention for tutors and tutees?

3. Are there differences in fraction operation knowledge gains and retention for tutees and nontutees?

METHODOLOGY

For inclusion in this study, a parent and/or legal guardian of each of the children participating signed an Informed Consent form, which stated the child's rights as a research subject and listed contact information for researchers and the Internal Review Board (IRB) at Edvantia. Parents and/or legal guardians were instructed to contact researchers for answers to questions regarding the study or if they decided to discontinue their child's participation in it. Parents and/or legal guardians were also instructed to contact the Edvantia IRB if they had questions about their children's rights as research subjects. After a parent and/or legal guardian gave consent for the child to participate in the study by signing the Informed Consent form, the study was explained, by school officials, to the participating children in language they could understand. Participation in the study was completely voluntary.

Participants

Edvantia researchers invited a number of elementary schools located in rural communities in Kentucky, Tennessee, Virginia, and West Virginia to take part in this study. Ultimately, two small Title I K-8 elementary schools, located in the Appalachian region of West Virginia, agreed to participate.

The two schools from the same district are located in the same general isolated area of the state, serving students who share virtually the same demographics: almost all students are White and low SES. School A served fewer than 200 students during the 2004-2005 school-year, and school B served fewer than 120 students during the same school year. Initially, 33 of the seventh- and eighth-grade students from the two schools (i.e., 25 from School A and 8 from School B) were randomly selected to be tutors (i.e., the experimental group), and an additional 41 students from the same grades (i.e., 25 from school A and 16 from school B) were randomly selected to served as a comparison group of nontutors.* Thirty-three third-, fourth-, and fifth-grade students were randomly selected to be tutees (i.e., 25 from School A and 8 from School B) and were randomly assigned to a tutor. Each tutor-tutee pair remained the same during the 3-week tutoring process. Another group of 33 students from the third, fourth, and fifth grades from the two schools (i.e., 25 from School A and 8 from School B) served as a nontutee control group.

Design

A between/within repeated measures experimental design (Winer, Brown, & Michels, 1991) was used in this study. The *within* factor/repeated measure of the design consisted of a pretest knowledge assessment of fraction manipulations and two posttests that assessed knowledge of fraction manipulations (see the appendix for a copy of the knowledge test). The *between* factors consisted of comparisons of (1) tutors and nontutors, (2) tutors and tutees, and (3) tutees and nontutees.

(1)	(2)	(3)	Pre-Test	Tutoring	First Post-Test	Final Post-Test
Tutors	Tutors	Tutees	O_1	X	O_3	O_5
Nontutors	Tutees	Nontutees	O_2		O_4	O_6

Procedure

School administrators were asked to identify certified teachers to serve as local coordinators of the tutoring project; to assist the researchers in identifying tutors, nontutors, tutees and nontutees; to assign student identification numbers; to facilitate tutoring sessions; to log students' tutoring time; and to administer the fraction knowledge pretest, first posttest, and final posttest.

Study participants learned fraction operations during their "normal" course of study, as required by their schools' curricula. After a review of the operations to be tutored, tutors tutored tutees in fractions while nontutors and nontutees continued to review or learn the same fraction operations conventionally. Tutoring was conducted one-on-one, with the tutor-tutee pairs remaining the same throughout the 3-week tutoring period. All tutoring activities took place in a regular classroom during the school day, with both tutoring and instruction of nontutors and nontutees taking place at the same time. Certified teachers, who were chosen by each school's principal to facilitate the study, were present at all times at each school in order to teach nontutors and nontutees, monitor the tutoring sessions, and answer tutors' questions regarding the tutoring process.

During the 15-day tutoring period, tutees received a total of 7.5 hours of one-on-one tutoring by tutors while the nontutors and nontutees received a total of 7.5 hours of instruction provided by a certified teacher. A typical tutoring session lasted 50 minutes. Before each tutoring

* School B is a very small school, and the principal wanted to include all students in the seventh and eighth grades in the study: 8 as tutors and 16 as nontutors.

session began, tutors met with the teacher for approximately 10 minutes to discuss their tutoring assignments for that day. Next, tutors provided one-on-one instruction to tutees on fraction operations for 30 minutes per session. Finally, after each session, tutors debriefed with the facilitating teacher for up to 10 minutes to discuss the tutoring experience. A time log was kept to account for the time students participated in the study.

Knowledge Test of Fraction Manipulations

The knowledge test of fraction manipulations was a paper copy of a computer-based assessment developed by Fitz-Gibbon and her colleagues to determine students' knowledge of fraction operations (C. Wheadon, personal communication, October 11, 2002).

Most study participants were tested four times using the same 60-item paper-and-pencil fraction manipulations test. First, the participants were administered a pretest prior to the start of tutoring in April of 2005. Second, the students were given the first posttest immediately after the 15-day tutoring intervention. Next, most students completed a second posttest before the close of school for the year. The second posttest was discarded and not included in the analysis because of the late start of the tutoring process (i.e., the scores would not provide sufficient time lapse to assess retention). Therefore, a final post-test was administered by an Edvantia researcher shortly after the start of the 2005-2006 school-year—meaning that more than 3 months had elapsed after the tutoring intervention ended.

All but three of the students who participated in this study completed the final posttest in the cafeteria at their respective schools on the same day. Of the three students who were not tested on that day, one was an elementary student who is considered academically advanced and who took the test on a different day at a local high school the student was attending. The other two students attended the middle school and were absent the day the final posttest was administered. The middle school counselor administered the final posttest to these students in the counselor's office approximately one week later and sent the completed tests to the researchers for analysis.

Data Analysis

For a student's fraction knowledge test results to be included in this study, each participant must have attempted to complete the pretest, the first posttest, and the final posttest. Participants' test scores reflected the number of questions answered correctly on each test. The pretest and the first posttests were mailed by the participating school to Edvantia for analysis. All tests were scored by Edvantia staff, and SPSS data files were created.

The test scores were used to calculate a gain score and a retention score. A gain score was calculated by subtracting the pretest score from the first posttest score. A retention (loss) score was calculated by subtracting the first posttest score from the final posttest score.

Analyses of the gain and retention scores were conducted using standard analysis of variance procedures, in accordance with the general guidelines for analyzing knowledge gain (or loss) scores, as set forth by Cook and Campbell (1979), Reichardt (1979), and Kenney (1975).

RESULTS

A total of 111 students from two schools were included in the formal data analysis. Differences in knowledge gains and retention of fraction operations were calculated for their "sets" of participants: tutors and nontutors, tutors and tutees, and tutees and nontutees.

Attrition

Student participation in the study was not constant for all groups across the 5-plus-month time span of the study. Between the administration of the pretest in April and the final posttest in September, three students dropped out of the study: (a) one student from School A who had been randomly assigned to be a tutor moved out of the school district during the tutoring phase of the study and (b) two students from School A who declined to participate after the study began and withdrew. Another 26 students were dropped from the study by the Edvantia researcher due to their failure to complete the pretest. Various reasons were given regarding why students did not complete pretests, with the primary one being lack of interest. These numbers are summarized in Table 1.

Table 1. Numbers of Students Randomly Assigned to Groups, Dropped, and Included in the Analysis

School	Group	Number Randomly Assigned	Number Dropped	Number Included in Analysis	Total per Group
A	Tutor	25	8	17	24 Tutors
B	Tutor	8	1	7	
A	Nontutor	25	9	16	27 Nontutors
B	Nontutor	16	5	11	
A	Tutee	25	4	21	29* Tutees
B	Tutee	8	0	8	
A	Non-Tutee	25	2	23	31 Nontutees
B	Non-Tutee	8	0	8	
Total		140	29	111	

Achievement Data

Research Question 1: Are there differences in knowledge gains and retention of fraction operations for tutors and nontutors?

Data analysis of the gain scores observed for the tutor and nontutor groups of middle school students revealed no significant difference between the two groups, $F(1,49)=.850$, $p>.05$,

* The number of tutors and tutees do not match because five of the tutors did not complete pretests and, therefore, were not included in the analysis but were allowed to tutor.

R^2=.017. While the mean gains for the two groups were quite different (i.e., 4.17 for the tutors versus 1.89 for the nontutors), the variances within each group were quite large and overlapped (i.e., *SD*=7.53 for tutors versus *SD*=9.79 for nontutors). For the retention scores, there was not a significant difference between the tutor and non-tutor groups, $F(1,49)=.064$, $p>.05$, R^2=.001. The analysis of the retention scores revealed that the tutor group showed a mean loss of .38, while the nontutor group recorded a mean gain of .44. The variances of the retention scores within the two groups were quite large and overlapping (i.e., *SD*=10.66 for the tutor group versus *SD*=12.34 for the nontutor group).

Research Question 2: Are there differences in knowledge gains and retention of fraction operations for tutors and tutees?

The gain score analysis for the tutors versus tutees comparison detected no significant difference in gains for the two groups, $F(1,51)=3.66$, $p>.05$, R^2=.067. The tutor group showed a mean gain of 4.17, while the tutees recorded a mean loss of .55. Again, considerable variance in gain scores within each group was observed, coupled with large overlap (i.e., *SD*=7.53 for tutors versus *SD*=9.94 for nontutors). For the retention score, there was not a significant difference between the tutor and tutee groups, $F(1,51)=2.00$, $p>.05$, R^2=.038. As with other analyses, there were large differences in the mean retention scores for the two groups but with associated large overlapping variances (i.e., a mean loss of .38 and a *SD*=10.66 for tutors compared to a mean gain of 4.38 and a *SD*=13.33 for tutees).

Research Question 3: Are there differences in knowledge gains and retention of fraction operations for tutees and nontutees?

The analysis gain scores for the tutee versus the nontutee groups detected no significant difference between the two groups, $F(1,58)=.233$, $p>.05$, R^2=.004. The tutee group showed a mean gain of .55 while the nontutees recorded a mean gain of .68. The variances were large for each group and overlapped (i.e., tutee *SD*=9.94 versus non-tutee *SD*=9.77). For the retention score, there was not a significant difference between the tutee and non-tutee groups, $F(1,58)=.001$, $p>.05$, R^2=.000. The analysis revealed that the means were virtually identical for the tutee and nontutee groups (i.e., 4.38 versus 4.45 respectively) and that the variances were large and overlapping (i.e., the tutee *SD*=13.33 while the non-tutee *SD*=10.51).

CONCLUSIONS

The outcome of the study will be examined first in terms of the learning data as reflected by the gain and retention scores and second in terms of study limitations.

Analysis of Learning Gains

Based on the findings of other researchers (e.g., Fitz-Gibbon, 1975, 1990), it was expected that the tutoring experience would produce learning gains for tutors and tutees and that these gains would be equal to or greater than those registered by nontutors and nontutees who received the "normal" classroom instruction provided by their schools. The data analyses did reveal that both tutors and tutees recorded positive gain scores on the average, though there was considerable variation among the gain scores for both groups. However, when tutors' gains are compared to the gains found for nontutors and nontutees, no statistical evidence was found to indicate that the tutoring process produced larger learning gains for those students who took part than for those students who did not. In short, there is no statistical evidence that the tutoring process facilitated learning gains any larger than would have been normally expected for these students.

Analysis of Learning Retention

Given the logic of the experimental design employed and the research findings reported by others (e.g., Mieux, 1993), it was expected that tutors would have higher retention scores than nontutors. The rationale was that if the tutoring experience provided a learning situation in which the tutors learn the material thoroughly and in a way that is more easily remembered, their test scores would reflect a higher rate of retention than that observed for nontutors. The analyses of retention scores did not provide support for that interpretation. This study produced no evidence that being a tutor produced any greater retention of fraction operation knowledge than did not being a tutor.

Study Limitations

There are two primary limitations associated with the study both associated with the isolated location of the schools. First, the researchers were not present on a daily basis to monitor the operation of the tutoring process. While teachers reported that it was focused and occurred daily for 3 weeks, the isolated location of the school did allow Edvantia researchers to be present on a daily basis to objectively assess the fidelity of the implementation of the tutoring. Second, due to scheduling conflicts and the isolated location of the schools, the researchers did not travel to the schools to administer either the pretest or the first posttest. The testing in these two instances was conducted using the testing materials and procedures provided by the researchers. The final posttest was administered by an Edvantia researcher. The extent to which teachers administering the pretest and the first posttest differed from those employed by Edvantia researchers is not known and could be a source of confounding.

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Appendix

Cross-Age Tutoring
Fractions Pretest, First Posttest, and Final Posttest

Student Identification Number___________________

Multiply (Put your answer in the box.)

$3\times5=$	$7\times8=$
$2\times6=$	$8\times4=$
$6\times8=$	

Simplify (Put your answer in the box.)

$\frac{30}{5}=$	$\frac{42}{6}=$
$\frac{28}{7}=$	$\frac{49}{7}=$
$\frac{56}{8}=$	$\frac{56}{7}=$
$\frac{35}{4}=$	$\frac{47}{7}=$
$\frac{12}{5}=$	$\frac{54}{7}=$

Convert To Decimals (Put your answer in the box.)

$6\frac{2}{3} =$	$2\frac{4}{5} =$
$6\frac{2}{5} =$	$8\frac{1}{6} =$
$3\frac{2}{5} =$	

Add (Put your answer in the box.)

$\frac{3}{12}+\frac{4}{12}=$	$\frac{4}{9}+\frac{1}{9}=$
$\frac{2}{5}+\frac{1}{5}=$	$\frac{5}{9}+\frac{3}{9}=$
$\frac{1}{3}+\frac{1}{3}=$	$\frac{1}{3}+\frac{1}{12}=$
$\frac{1}{9}+\frac{1}{3}=$	$\frac{2}{5}+\frac{3}{10}=$
$\frac{3}{4}+\frac{1}{8}=$	$\frac{1}{6}+\frac{5}{12}=$
$\frac{1}{3}+\frac{3}{5}=$	$\frac{1}{2}+\frac{1}{3}=$
$2\frac{2}{5}+1\frac{1}{8}=$	$3\frac{1}{4}+4\frac{2}{5}=$
$4\frac{1}{2}+1\frac{1}{4}$	$3\frac{1}{4}+5\frac{1}{8}$
$7\frac{3}{8}+1\frac{2}{8}$	

Multiply (Put your answer in the box.)

$\frac{5}{8}\times\frac{7}{9}=$	$\frac{2}{3}\times\frac{4}{5}=$
$\frac{1}{8}\times\frac{1}{7}=$	$\frac{5}{8}\times\frac{1}{4}=$
$\frac{1}{8}\times\frac{7}{9}=$	$\frac{6}{7}\times\frac{5}{6}=$
$\frac{1}{2}\times\frac{2}{7}=$	$\frac{5}{8}\times\frac{4}{9}=$
$\frac{4}{9}\times\frac{3}{8}=$	$\frac{3}{10}\times\frac{6}{7}=$
$\frac{1}{5}\times 10=$	$\frac{1}{2}\times 4=$
$12\times\frac{5}{6}=$	$9\times\frac{2}{3}=$
$\frac{4}{5}\times 10=$	

Simplify (Put your answer in the box.)

$5-\frac{1}{3}=$	$\frac{3}{8}\times 2\frac{1}{4}=$
$\frac{1}{3}+\frac{3}{4}+\frac{1}{12}=$	$1-\frac{7}{8}+2\frac{3}{4}=$
$3\frac{2}{3}\times 4\frac{1}{9}\times 1\frac{1}{11}=$	$\frac{5}{7}\times\frac{2}{3}\times\frac{9}{10}=$
$2\frac{3}{4}-\frac{1}{4}=$	$7\frac{1}{5}-\frac{4}{5}=$