

# Math

# Fact Fluency





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# Why Math Fact Fluency?

## What is Math Fact Fluency?

SkillsTutor Math Fact Fluency is an on-line instructional and practice aide that helps students achieve automaticity in the basic facts of addition, subtraction, multiplication and division. Because it is internet-based, students can practice at home or at school and all work is recorded and viewable by the teacher.

Math Fact Fluency is modern, personalized and fully adaptive. Based on students' actual performance, it provides practice where it helps most. It tracks multiple practice sessions and determines which facts are mastered. A fact is mastered when it is performed correctly and within a certain time threshold multiple times. Reports that provide an overview of each student's performance on all math facts are handy for Parent Teacher conferences, end-of-quarter reports, etc.

Math Fact Fluency is not intended to teach conceptual understanding of basic math facts. It is a product intended to help students instantly recall basic facts from long-term memory.

Salend (1994) recommended that new math concepts be introduced through everyday situations as opposed to worksheets. With everyday situations as motivators, students are more likely to recognize the importance and relevance of a concept. Carpenter, Fennema, Peterson, Chiang & Loef (1989) further this. Contextualizing instruction can make seemingly mundane computation exercises fascinating to children. In response to this, at the beginning of each lesson is an authentic, "real-world" scenario in which a student would actually use basic math facts.

## The Call For Math Fact Fluency

Math Fact Fluency was designed in response to the National Council of Teachers of Mathematics' (NCTM) Curriculum Focal Points, which outlines three key skills each student should master at each grade level. In each of grades 1 through 4, the Focal Points define critical skills in all four basic operations, including the ability to instantly recall those basic facts.

The National Math Panel was created in 2006. Supporting much of the research that has existed regarding automaticity of basic facts, the Panel also found that automatic recall of facts is paramount to student success in mathematics:

A focused, coherent progression of mathematics learning, with an emphasis on proficiency with key topics, should become the norm in elementary and middle school mathematics curricula...By the term "proficiency," the Panel means that students should understand key concepts, achieve automaticity as appropriate (e.g., with addition and related subtraction facts), develop flexible, accurate, and automatic execution of the standard algorithms, and use these competencies to solve problems...

Computational proficiency with whole number operations is dependent on sufficient and appropriate practice to develop automatic recall of addition and related subtraction facts, and of multiplication and related division facts.... It also requires a solid understanding of core concepts, such as the commutative, distributive, and associative properties.”

## Learning and Memory

The rationale behind our approach to fact memorization is derived from the information processing model of the human brain. It is familiar to most people in the concepts of short-term memory (i.e., working memory) and long-term memory.

When first exposed to a new fact, the data is called into working memory. The Oxford Dictionary defines working memory as “temporary storage of information while one is working with it or attending to it.” Working memory has limited storage capacity, with material being retained only as long as it is being consciously practiced.

Conversely, long-term memory is intended to store information for a long period of time. A study by Semb, Ellis & Araujo (1993) showed content studied for four months or eleven *months* will be well-retained for about one year after the last practice, with most of the content forgotten by end of three or four years without further practice. Bahrck (1984) and Bahrck & Hall (1991) found that if material is studied for three or four *years*, the information may be retained for as long as 50 years after the last practice. The key component in the long-term retention in the Bahrck study is the **additional practice** completed by the student.

There are two memory systems in long-term memory: declarative knowledge and procedural knowledge. Declarative knowledge can be thought of as “knowing that,” and procedural knowledge can be thought of as “knowing how.” If a student is asked, “What is  $8 \times 7$ ,” the difference lies between responding immediately with “56” (declarative), or thinking “8 groups of 7 items” (procedural). When a student is able to quickly and accurately retrieve the answer to a math fact, the student has a strong declarative knowledge system for that fact.

With Math Fact Fluency, students practice basic number facts over many sessions to build and reinforce their declarative understanding of those facts. It is through repeated exposure that math facts are stored and automatically recalled. Facts are considered memorized only when they can be recalled instantly.

- Bahrck, H. P. (1984). Semantic memory content in permastore: Fifty years of memory for Spanish learning in school. *Journal of Experiment Psychology: General*, 113, 1-29.
- Bahrck, H. P. & Hall, L. K. (1991). Lifetime maintenance of high school mathematics content. *Journal of Experiment Psychology: General*, 120, 20-33.
- Carpenter, T., Fennema, E., Peterson, P., Chiang, C. & Loef, M. (1989). Using knowledge of children’s mathematics thinking in classroom teaching: An experimental study. *American Educational Research Journal*, 26 (4), 499–531.
- Rea, C. & Modigliani, V. (1985). The effect of expanded vs. massed practice on the retention of multiplication facts and spelling lists. *Human Learning: Journal of Practical Research & Applications*, 4, 11-18.
- Salend, S. (1994). *Effective mainstreaming: Creating inclusive classrooms*. New York: Macmillan Publishing Co.
- Semb, G., Ellis, J., & Araujo, J. (1993) Long-term memory for knowledge learned in school. *Journal of Educational Psychology*, 85, 305-316.
- The National Council of Teachers of Mathematics. (2007). Research brief: What are the characteristics of students with learning difficulties in mathematics?

# Activities

In all, there are seven types of activities that can be recommended:

- Welcome Activity
- Placement Test
- Pretest and Posttest
- Lesson
- Review Lesson
- Benchmark Test
- Final Test


Login as a student at [myskillstutor.com](http://myskillstutor.com) and select a class to view the subjects created for that class.



Select a subject to view activities in that subject area. In this case, the student clicked Math Fact Fluency: Addition.



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 The very first time students use Math Fact Fluency, the Welcome Lesson is the only activity students will see .


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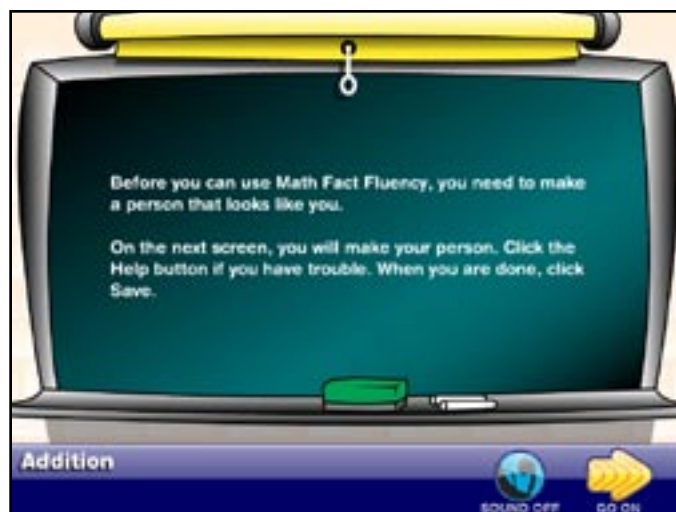
## Welcome Lesson

In the *Welcome Lesson*, each student creates a character. Although it is not a requirement, students might be encouraged to approximate their appearance and interests. The character is shown on screens throughout each activity, but it will never appear where it might pose a distraction and be a detriment to student performance.

Click Welcome Lesson: Addition, and click past the title screen. The two welcome screens appear.

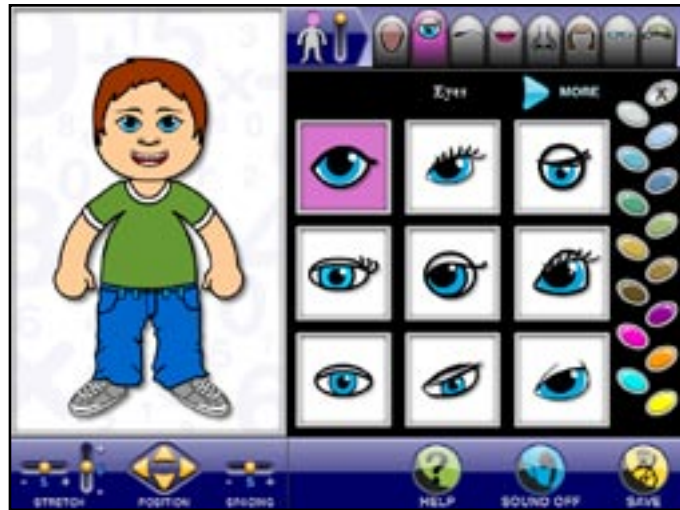


 The character will never appear where it might pose a distraction and be a detriment to student performance.



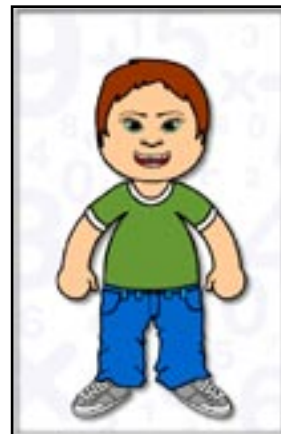


Click **Go On** to reveal the Character Maker.



There are six areas of the Character Maker screen:

1: The character is on the left side of the screen.



2: To the right and at the top of the screen are tabs for selecting features, clothes and accessories to the head or body.



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Click the yellow slider to switch from the head tabs to the body tabs.

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- 3: To the left of the tabs is a slider. Use the slider to toggle between the head tabs and the body tabs. Toggle back and forth from head to body to see the associated tabs change.



- 4: Below the tab for a selected body part are the options students have to choose from for that body part.



- 5: To the right of the body part features is a coloring palette that can be used to shade portions of that selected feature (e.g., eyes).



Use the **X** at the top, right of the color palette to “undo” the last color change and return the shade to its previous color.

- 6: Below the character are controls for manipulating the size and orientation of the features. Only the controls that are applicable to a specific feature will be shown below the character.



## Head

The default tab is the *Head* tab, but students can alter the parts of the character's head in any order they like. To alter the shape of the head, click one of the three head shapes. In this case, the shape round head is selected.



To alter the eyes, click the *Eye* tab at the top of the screen, and select an eye shape.



To see more eye types, Click **More** above the current list of eye types.

Use the palette on the right of the screen to select the color of the eyes. Use the controls below the character to shift the eyes right or left, up or down, and closer or further apart.

To select eyebrows, click the *Eyebrow* tab at the top of the screen and select an eyebrow type. As the student clicks on each eyebrow type, the eyebrow changes on the character.



As with the eyes, use the palette on the right of the screen to select the eyebrow color and the controls beneath the character to alter the orientation of the eyebrows.

Click the *Mouths* tab to select and alter the shape, color and orientation of the lips in the same way as the other facial parts.



Click the *Nose* tab. Here, a new shape and orientation of the nose has been selected. Notice the controls below the character indicate the nose is narrower than its original size.



Similarly, select a new style, color, and orientation of the character's hair.



Glasses or “facial marks” can also be added to the character. The size and location can be adjusted using the controls below the character.



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Students may not add both glasses and another facial feature.

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Only one feature may be added from the list of features under the *Glasses* tab. Students may not add both glasses *and* another facial feature.

Click the *Accessories* tab to select from a among a variety of accessories to adorn the character’s head.



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Students can click the Back or More buttons to see all the items available for a particular feature/tab.

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Students can click the **Back** or **More** buttons to see all the items available for a particular feature/tab.

For Glasses and Accessories, an **X** is one of the first nine items students can select. If an item in this feature has been added, use the **X** to remove the item from the character.

## Body

To alter body features, click-and-drag the yellow slider to switch focus from the head to the body. The tabs along the top of the screen will change. The body tabs allow the student to alter the character's shirts, pants, hats, and more accessories. The default body tab is *Shirts & Dresses*.



There are a variety of shirts to choose from. Some have special features. Click a jersey with a number on it. Click-and-drag the yellow slider that is below the character to select a meaningful number between 0 and 99.



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Students can select any meaningful number from 0 to 99 to display on their Avatar's jersey.

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Click **More** to see more shirts. Click a shirt with a logo on it. Use the + and - below the character to click through and select from a variety of logos.

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 On some shirts students can select their own logo.

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Click **More** to see even more shirts. In this case, the character is wearing a shirt selected from among the third set of shirts and dresses. The shirt has been shaded purple.





Next, click the *Pants* tab. Select from among a variety of pants and skirts.



Click **More** to see more pants and skirts to choose from.


Click the *Shoes* tab to choose shoes.



Additional accessories are available to accent the character.



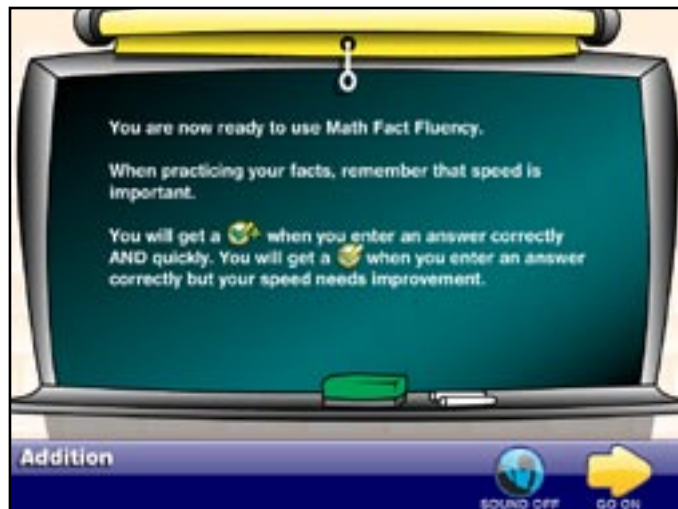
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 Students will have opportunities to their Avatars after any lesson. .

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Students will take the *Welcome Activity* only one time. After completing the activity, students will never be prompted to create a character in any other Math Fact Fluency subject. However, opportunities to modify their characters are available at the end of any Lesson or the Review Lesson.

Upon completing the character, click **Save** to save the character and see a quick overview about practicing math facts with speed.



## The Math Fact Matrix

The Math Fact Matrix provides an overview of students' performance on individual math facts. Students will see the matrix at the end of every activity.



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Students must be exposed to a math fact for at least three sessions, a minimum of nine instances, for their performance to be displayed on the Math Fact Matrix.

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Performance on a specific math fact is only displayed on the Math Fact Matrix if students have been presented with the math fact over *at least* 3 sessions. A session consists of exposure to the same math fact at least three times. The three sessions do not include the lesson in which the math fact is first presented.

The Math Fact Matrix uses complex algorithms to present students performance on individual math facts. Performance on individual math facts is weighted based on speed, frequency and other indicators of proficiency. The data is presented using a simple three color scheme that allows teachers and students to identify problem areas at a glance.

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The Math Fact Matrix is constantly being updated, incorporating the most recent data.

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The Math Fact Matrix is constantly being updated, incorporating the most recent data. If students begin to struggle with math facts it appeared they had already mastered, then the cell that represents that math fact might change from green to yellow. Similarly, as students improve their performance on specific math facts, the associated cell in the matrix might change from red to yellow or green.

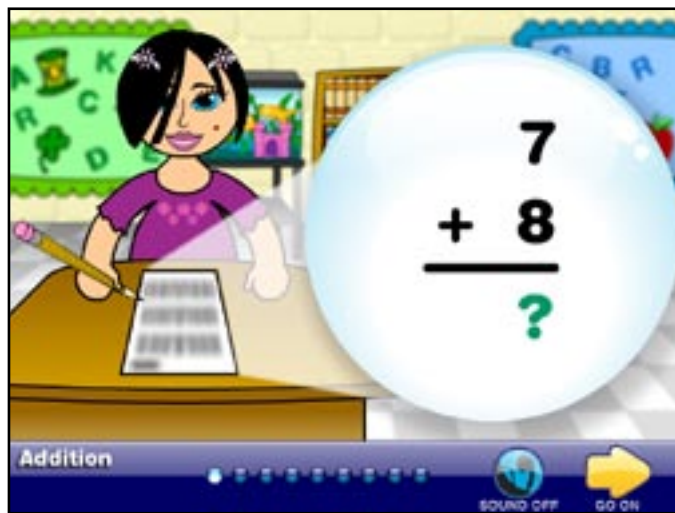
Teachers can also use the Reports link to see the report. The teacher's view of the report provides more features that allow teachers to customize mastery time for each student. With the report, teachers can also view the matrix for each operation assigned to any individual student.

## Placement Test

The Placement Test is the initial assessment of where the students should be placed within the scope and sequence of *Math Fact Fluency*. It is a timed test and may be taken only one time; however, students who quit the test before it ends can retake the test from the beginning.

Teachers must specifically assign the Placement Test for it to appear in the list of activities. It is a good idea to assign only the Placement Test and allow it to prescribe pretests.

After closing the Welcome Activity, the student returns to the *Select an activity screen*. Click Placement Test: Addition, and then click **Go On** until presented with the first question in the test.



The Placement Test poses approximately 100 questions. During the test students will *not* know if they have answered a question correctly or incorrectly. The test ends the moment the student performs below the Mastery percentage for a given unit.

The Mastery percentage is the percentage of total questions in a math fact unit that the student must answer correctly to “test out” of that unit. The default Mastery % is 80. When logged in as a teacher, teachers can navigate to *Classes>Class Properties>Modify Assignment* to change the default *Mastery %* for an assignment. It may be changed at anytime.

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✎ It is a good idea to assign only the Placement Test and allow it to prescribe lessons..

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✎ The Placement Test is a timed test and may be taken only one time.


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✎ The test ends the moment the student performs below the Mastery percentage for a given unit. .

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 The default mastery time for completing a math fact is 2 seconds. Teachers set Mastery Time in the Fact Matrix Report.

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Test questions are determined to be correct if they are answered correctly *and* within the allotted Mastery Time. Mastery time is different from Mastery percent. Students who consistently complete a math fact within the mastery time frame are considered able to recall the math fact with automaticity. Teachers can set Mastery Time in the Fact Matrix Report (p. 49).

Both questions that are mathematically incorrect and questions that are not answered within the preset Mastery Time (but that might be mathematically correct) are considered incorrect.

Math facts are presented by unit. If more than 10 facts are presented for a given unit, then they are divided into multiple groups (e.g., 2 groups of 6). There is a pause after each group of math facts has been completed.

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 Math facts are presented by unit.

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Click **Go On** to continue the test. The test ends as soon as a student demonstrates a lack of proficiency with a given fact unit. In this case, the test ended after only 48 questions.



Click **Go On** to see the Math Fact Matrix. (See page 52.) With the *Placement Test* students “place out of” entire units they have mastered. For each unit a student masters, all corresponding math facts are also considered mastered and their corresponding cells are colored green in the Math Fact Matrix.



For each unit a student masters, all corresponding math facts are also considered mastered.

The Placement Test will not prescribe individual lessons. Instead it recommends the pretest of the math fact unit that is a good starting point for the student. Students are only prescribed Pretests of units they have not mastered. For example, if a student demonstrates mastery of basic addition facts with 0, then the Pretest for that unit will not be prescribed.

The Placement Test will not override a teacher’s assignment.

It is also important to note that the Placement Test will not override a teacher’s assignment. Students who “test out” of a particular unit may still need to complete an activity in that unit if the teacher has specifically assigned the activity.

Click **Go On** to return to the *Select an Activity* screen.



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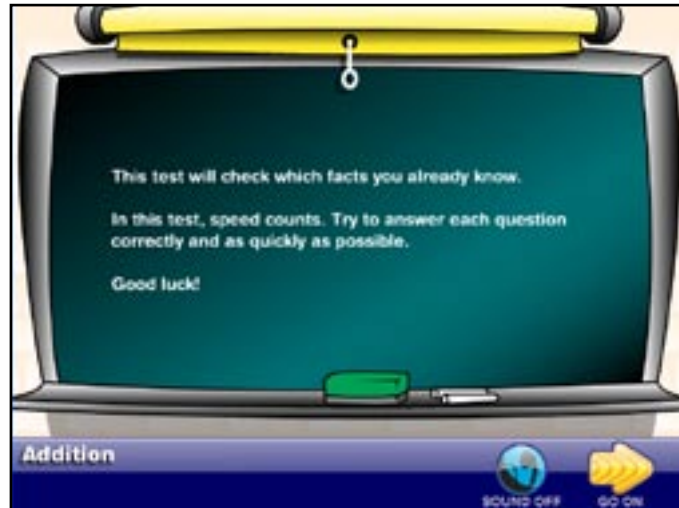
Individual lessons in a unit are prescribed based on performance on related questions in the Pretest for that unit..

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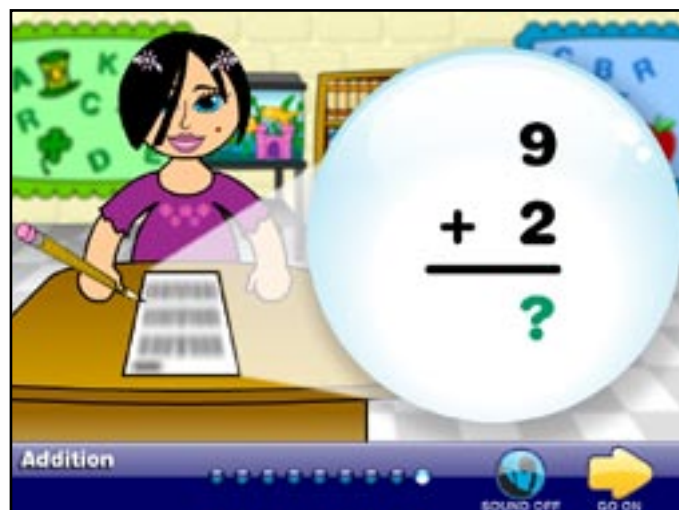
## Pretest

Unless otherwise assigned by the teacher, a *Pretest* is the next recommended activity after the *Placement Test*. *Pretests* assess students' proficiency in an entire unit of math facts. Individual lessons in the unit are prescribed based on performance on related questions in the *Pretest*.

In this case, the next recommended activity is Adding 1 and Adding 2 Pretest. Click the *Pretest*, and click through the title screens to get to the introductory screen.



This *Pretest* assesses all math facts in the Adding 1 and Adding 2 unit. As with the *Placement Test*, after the countdown, students step through sets of questions. Here, the student is on the tenth of the first 10 questions in the *Pretest*.




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There is no feedback of any form during the course of a Pretest.

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At their own pace, students can continue to the next set of questions. There is no audio or visual feedback that indicates if questions are correct or incorrect or if math facts were completed quickly enough.

Contrary to the *Placement Test*, students must complete every math fact in the *Pretest* regardless of their performance. In this unit, 18 math facts are addressed. Each fact is presented three times. This is known as a session. A score screen displays the overall results for the 18 sessions.

 Students must complete all questions in the *Pretest* regardless of their performance.



The Math Fact Matrix is displayed after completing the *Pretest*. (See page 56.) There is no difference between this matrix and the state it was in after the *Placement Test*. Recall that a math fact must be presented a cumulative total of at least nine times (3 sessions) to be represented in the Math Fact Matrix. Including the *Placement Test*, to this point, the student has not been exposed to any individual math facts enough times to affect the matrix.





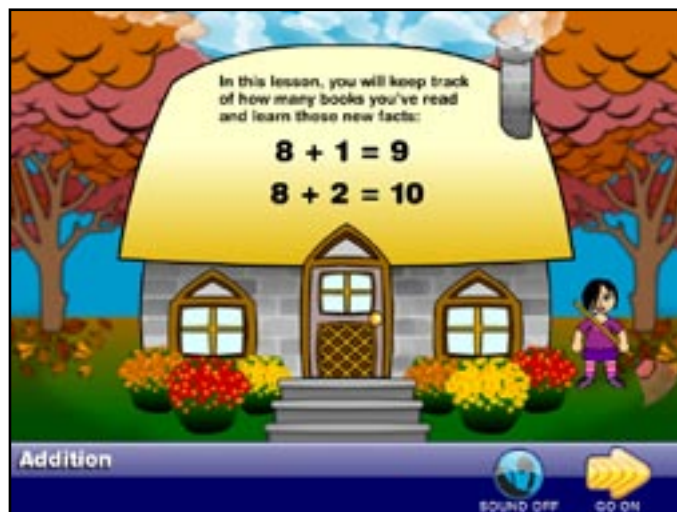
## Lessons

From the Math Fact Matrix, click **Go On**. Based on pretest results, deficiencies are diagnosed and lessons are prescribed accordingly. If a teacher has already assigned a lesson, the lesson will appear even if the student has “tested out” of it. Therefore, it is a good idea to assign only the Placement Test and allow it to diagnose and prescribe the activities students need most.

Based on pretest results, deficiencies are diagnosed and lessons are prescribed accordingly..



Click the next recommended activity (in this case, 8+1 and 8+2), and then click through the title screens to get to the introductory screen.



Lessons have five basic segments:

- 1: *New Facts*
- 2: *Commutative Property* (where applicable)
- 3: *Practice of Recent Facts*
- 4: *Quiz*
- 5: *Scoring*

### New Facts

Click **Go On**. Each lesson presents two *new* facts in a multi-screen real-world scenario. Each scenario is specially designed to present values in real, age-appropriate scenarios. In this lesson, students explore the  $8+1$  and  $8+2$  math facts.

- 
- Each scenario is specially designed to present real values in real, age-appropriate scenarios.
- 



Screen 1



Screen 2



Screen 3

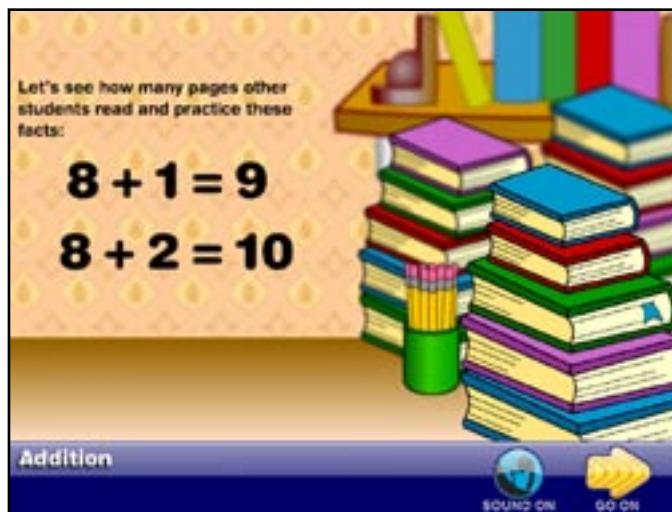


Screen 4

### New Fact Practice

Click **Go On**. Following the real-world observation, students practice one session (three questions) of each *new* fact.

- 
- The  $0+0$  through  $0+9$  lesson is the only lesson that presents a general rule rather than two unique math facts in a lesson.
- 



Speed is monitored during practice and is indicated to the student, but session data is not incorporated into the Math Fact Matrix.

Every practice exercise provides three forms of feedback:

*Correct Answer—Quick:* Students completing math facts correctly and below the mastery time will see a ✓+. The default mastery time for completing a math fact is two seconds. It can be changed in the *Math Fact Fluency Report* (p. 49).

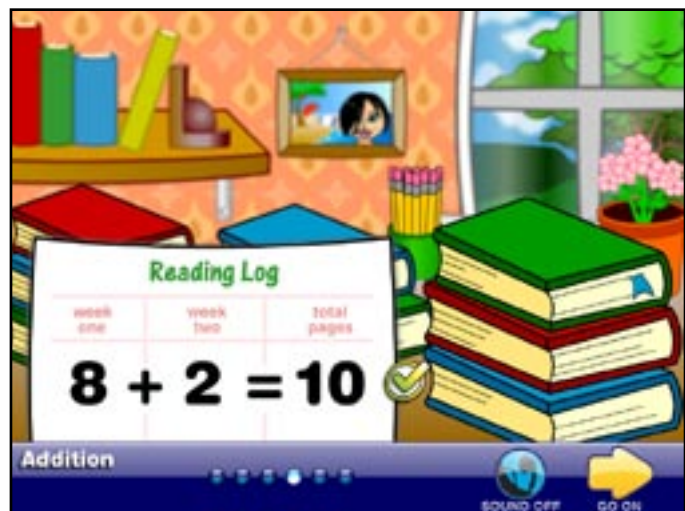
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✎ The default mastery time for completing a math fact is two seconds and can be changed in the Math Fact Report (p.57).

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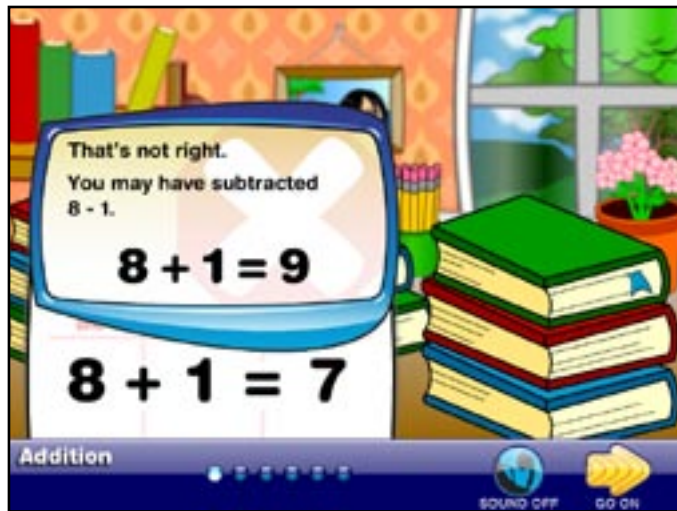
*Correct Answer—Slow:* Correct answers not answered within the mastery tolerance, receive a ✓.



*Incorrect Response:* Generic incorrect response feedback lists the correct number sentence in a pop-up region above the incorrect response. This provides students the opportunity to compare their responses to the correct answer. A faint red X is displayed in the background of the incorrect response feedback.

For reinforcement, audio feedback restates the math fact.

*Incorrect Response—Common Error:* Specific feedback is provided when students make a common error. In this case, the feedback addresses the common error and presents the correct math fact both visually and audibly.



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Students who recall a math fact within three seconds will hear only the sum read aloud before continuing to the next fact.

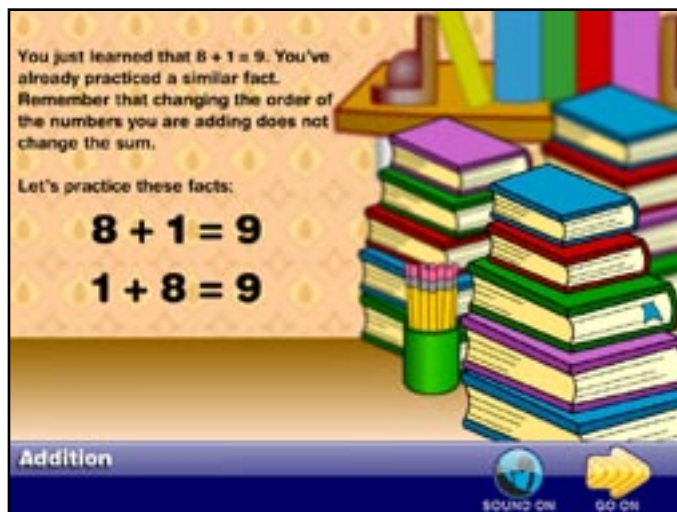
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### *3-Second Audio Rule*

The 3-second audio rule provides math fact reinforcement when needed most. Students who recall a math fact within three seconds will hear only the sum read aloud before continuing to the next math fact. Students requiring more than three seconds to recall the math fact will hear the entire number sentence before advancing to the next practice item. The extended audio is provided to reinforce the math skill.

### **The Commutative Property**

In Window 2, students might see the two *new* math facts *and* the commutative form of those math facts.



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Students are exposed to the commutative form of a math fact only if they already have seen it in an earlier lesson

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Students are exposed to the commutative form of a math fact only if they already have seen it in an earlier lesson. The commutative form of  $8+1=9$  is presented in

lesson  $8+1$  and  $8+2$  because the student has already been exposed to it ( $1+8=9$ ) in an earlier lesson.

If they have seen the commutative form of only one *new* math fact (as in this lesson), the lesson presents two instances of that math fact, two instances of its commutative form and four instances of the remaining *new* fact. If students have seen commutative forms of BOTH *new* facts, they will see two of each *new* math fact and two of each commutative form.

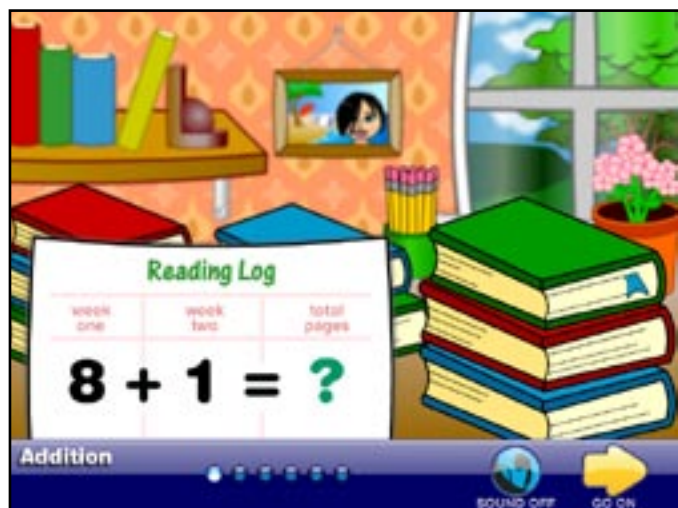
To get a sense of their speed and accuracy after completing each math fact, students will see a ✓ or ✓+, or a faint X displayed in the background of the incorrect response feedback. This information is not recorded in the Math Fact Matrix.

### Practice of Recent Facts

A transition screen separates the Commutative Window from the Practice Window.



The Practice Screen provides students the opportunity to practice the two *new* math facts from the current lesson and the math facts presented in the two previous lessons.




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During practice, students practice both the *new* facts and the facts from the previous two lessons.

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 A maximum of 18 questions (six sessions) are presented during Practice.

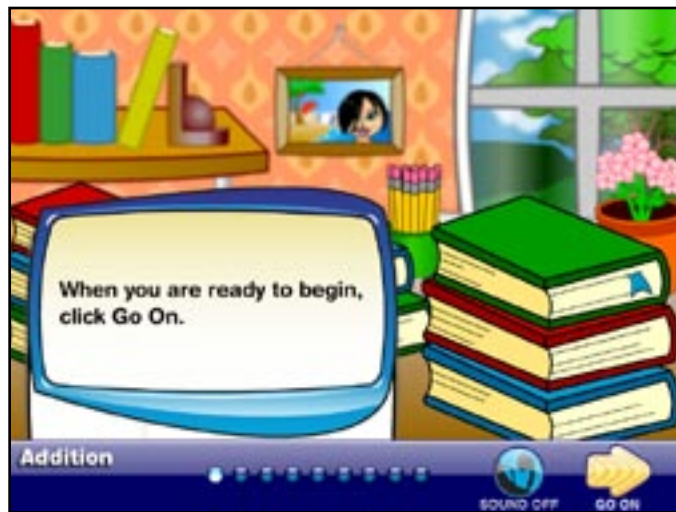
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A maximum of 18 questions is presented during *Practice of Recent Facts*, one session (3 questions) for each math fact. Two facts are from each lesson. Session questions are interleaved such that students will not be exposed to the same questions three times in succession.


Speed is not recorded for any practice session. Incorrect responses are incorrect and correct responses are correct, regardless of speed. As they practice, students will still receive a ✓ or ✓+, or a faint X displayed in the background of the incorrect response feedback. This gives them a get a sense of their speed and accuracy, but the information is not included in the Math Fact Matrix.

### The Quiz

Another transition screen separates the *Practice* from the *Quiz*.



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 The *Quiz* assesses the two *new* math facts and nine previously learned math facts.

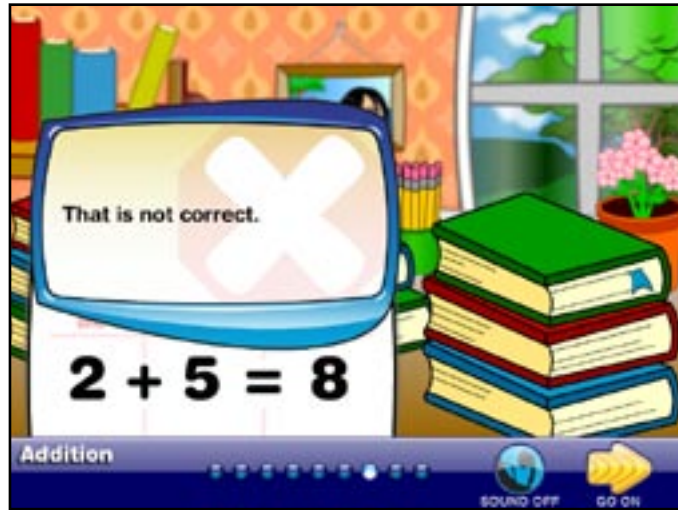
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In the *Quiz* speed and accuracy are monitored. The *Quiz* assesses the two *new* math facts and nine previously learned math facts. One session of each math fact is tested in a quiz for a total of 33 questions.

The nine facts that are tested are prioritized based on:

- The facts that reflect the student's worst performance.
- Facts for which not enough data has been collected
- The facts students have not been exposed to in a long time.
- Recently studied facts, a spiral back to facts presented in recent lessons.

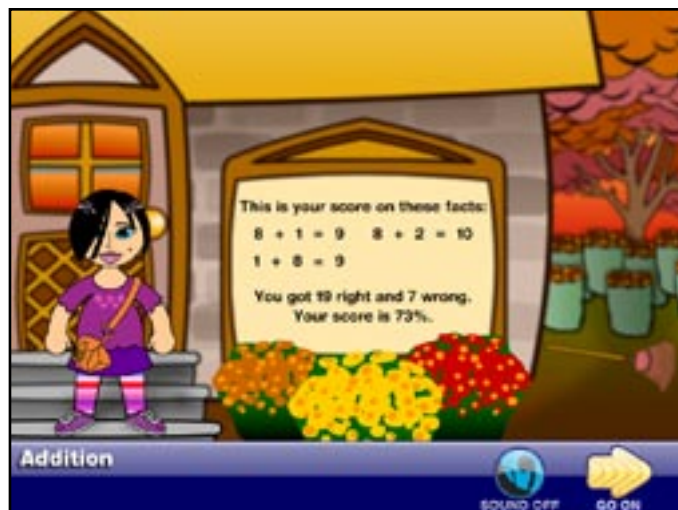
Generic feedback is provided during the *Quiz*. Click **Go On** to dismiss the feedback and advance to the next question.



### Scoring

In each lesson students are repeatedly exposed to two *new* math facts and nine previously learned math facts. In this lesson, the two *new* math facts were  $8+1=9$  and  $8+2=10$ . The likelihood of proficiently completing these *new* facts during the quiz is very high. It is difficult, however, to determine if the math fact is being recalled from long-term memory or if it is simply “left over” in working memory earlier practice in the lesson. Therefore students are presented with two score screens.

After the *Quiz* is complete, the first screen shows students’ performance on *only* the *new* math facts and their commutative forms. (In this case, only the commutative form of  $8+1=9$  is shown because the student has not seen the commutative form of  $8+2=10$ ) The results on this screen are provided for the students benefit only. The data is not written to the Math Fact Matrix.



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✎ Performance on *new* facts in a lesson is *not* included in the overall Math Fact Matrix.

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Because Quiz results for *new* math facts from a given lesson can skew the presentation of data in the Math Fact Matrix, no data about the *new* facts are recorded in the Math Fact Matrix.

Click **Go On** to see the Math Fact Matrix.



Quiz data about performance on *new* math facts is not included in the data used in the Math Fact Matrix.

Though the data on the two new math facts is limited to the first score screen, all data about the nine previously-learned facts that were addressed in the *Quiz* are recorded in the Math Fact Matrix.

### Posttest

Each unit has a *Posttest*. Students take the *Posttest* to measure advances in their proficiency with the math facts that are presented in the unit.



The *Posttest* has the same structure and functionality as the *Pretest* (pp. 19-20).



Unlike the *Pretest*, with the exception of the new facts introduced in the lesson, performance on all questions is assessed based on speed and accuracy and is incorporated into the overall Math Fact Matrix (pp. 49-50). Notice how the matrix has changed from its state after the lesson (p. 28).



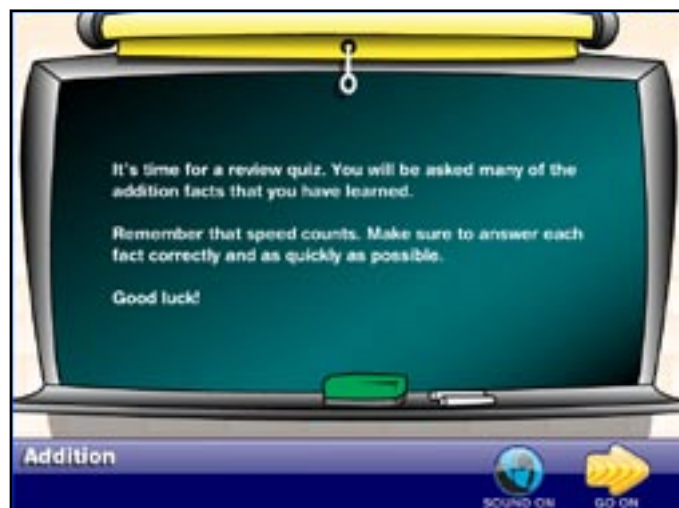

---

 *Posttest* results are recorded in the Math Fact Matrix.

---

## Review Lesson

The *Review Lesson* is available at the end of each subject (e.g., Addition, Subtraction, etc.). It is similar to the Quiz that appears at the end of a lesson. It presents recently-learned facts on which students have had little practice and facts that proved difficult for the student. It presents 9 sessions of math facts (27 questions) and is intended to help fill the gaps in the Math Fact Matrix. The *Review Lesson* contains no *new* facts.

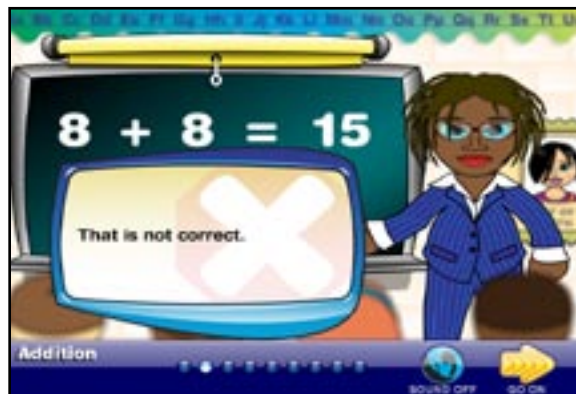
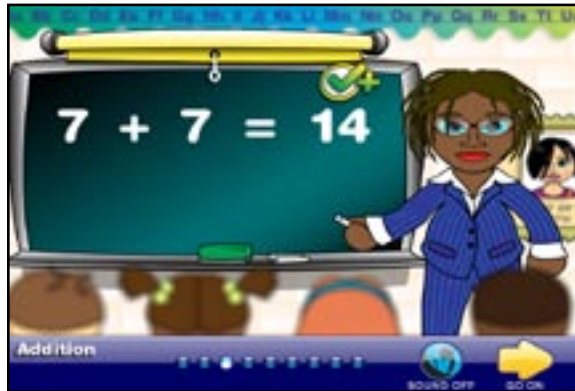



---

 The *Review Lesson* contains no *new* facts.

---

Feedback is provided at the end of each question in the same way it is for lesson quizzes. Based on their performance, students receive a ✓, ✓+, or a faint X displayed in the background of the incorrect response feedback.



---

✎ Performance on all questions in the Review Lesson is assessed based on speed and accuracy.

---

The *Review Lesson* does not prescribe activities, but performance on all questions is assessed based on speed and accuracy and is represented in the overall Math Fact Matrix (pp. 49-50). Upon completing the *Review Lesson*, students have the option of going to the *Arcade* (pp. 35-48).

## Benchmark Tests

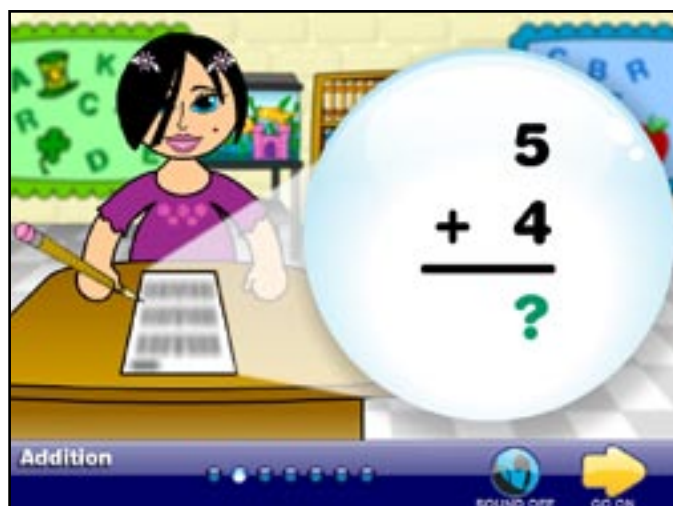
*Benchmark Tests* are useful tools that provide a snap shot of students' progress at different points throughout the year. Teachers can assign *Benchmark Tests* for any month or months they choose. Some teachers might track progress every month and others near the end of a marking period or before parent/teacher conferences. *Benchmark Tests* do not prescribe activities.

Students who are assigned a *Benchmark Test* for a particular month will be prompted to take the test the first time they login that month.



Click [August Addition Benchmark](#) to launch the test. Each *Benchmark Test* has approximately 100 math facts.

Click **Go On** through each screen to reach the first question of the test. Math facts are presented by unit. If more than 10 facts are presented for a given unit, then they are divided into multiple groups (e.g., 2 groups of 6).



Click **Go On** after each question to continue to the next one.

The test ends as soon as a student fails to master the facts from a math fact unit. The default mastery level is 80 percent. The results screen is presented at the end of *Benchmark Test*. In this case, the student completed 48 math facts.

The test ends as soon as a student fails to master the facts from a math fact unit.



All math facts that are completed incorrectly or that are not completed within the mastery time are counted as incorrect. Of the math facts that were presented, this student completed every math fact correctly. Six questions, however, were answered too slowly to be considered correct. Because each of the six questions were from the same unit, the student's mastery level for that unit fell below 80 percent.

Data from *Benchmark Tests* is not recorded in the Math Fact Matrix.

Click **Go On** to view the Math Fact Matrix. It is important to note that data from the *Benchmark Test* is not recorded in the Math Fact Matrix. After reviewing the Math Fact Matrix, click **Go On** to return to the *Select an activity* screen.

| Activity                     | Mastery Percentage |
|------------------------------|--------------------|
| Placement Test: Addition     | 70%                |
| Placement Test: Addition     | 70%                |
| Adding 0                     | 100%               |
| Adding 0 to ten              | 100%               |
| Adding 1 and adding 2        | 100%               |
| Adding 1 and adding 2 to ten | 100%               |
| Adding 1 and adding 2 to ten | 100%               |
| Adding 1 and adding 2 to ten | 100%               |
| Adding 1                     | 100%               |
| Adding 1 to ten              | 100%               |
| Adding 2                     | 100%               |
| Adding 2 to ten              | 100%               |
| Adding 2 to ten              | 100%               |
| Adding 2 to ten              | 100%               |

## Final Test

The *Final Test* is much like the *Placement* and *Benchmark Tests* and has the same functionality as the quiz at the end of a lesson.

The *Final Test* assesses performance on ALL math facts in a subject. It has approximately 100 questions. Students must answer all questions in the test. The test does not end if a student demonstrates a lack of mastery of a particular unit.

Scroll down to and click [Final Test: Addition](#).

---

The *Final Test* assesses performance on ALL math facts in a subject.

---



If more than 10 facts are presented for a given unit, then they are divided into multiple groups (e.g., 2 groups of 6). After completing the *Final Test*, students will see their overall score.

---


📎 Students must complete all math facts in the *Final Test*. It does not end if a student demonstrates a lack of mastery of a unit..

---



Click **Go On** to see the Math Fact Matrix. Performance on all questions is assessed based on speed and accuracy and is incorporated into the overall Math Fact Matrix (pp. 49-50).

---

 Speed and Accuracy are recorded for ALL math facts presented in the *Final Test*.

---



If the student has completed all activities for a given subject/operation, then every cell in the matrix should be filled. If the student has not completed all the activities before taking the *Final Test*, then it is likely some cells will not be colored.

To reinforce their skills, students may retake any activity except for the *Placement Test*. Or, students might choose to move on to the *Placement Test* for another subject/operation.

# The Arcade

Regardless of performance, the *Arcade* serves as a reward for completing a *Lesson*. It reinforces math facts and provides an opportunity to relax before the next activity. No data from the *Arcade* games are recorded. All math facts are provided solely for reinforcement.

---

 Students go to the Arcade anytime they complete a *Lesson* or a *Review Lesson*.

---



There are six options at the Arcade:

- Random Game
- Character Maker
- Number Splash
- Math-jong
- Learning Links
- Shutterbug

The bottom of the screen in each game has some combination of the following buttons and displays:

*Time Left*—Students have five minutes to play at the *Arcade*. In that time, they may play as many games as they like. View the clock in the lower left of the window to monitor much time remains at the *Arcade*.

*Score*—View the overall score across all games played in the five-minute session.

*Games*—At any point, click **Games** to leave the current game and return to the Arcade's Main Screen.

*Help*—Click **Help** for game instructions.

*Sound On/Off*—Click *Sound On* or *Sound Off* to turn sound on and off.

*Go On*—Click **Go On** to advance from the *Arcade's* main screen to a game's title screen and to launch a game from its title screen.

## Random Game

When a student clicks *Random Game*, one of the five games is chosen at random.

## Character Maker

Students can modify their character with the *Character Maker*. The *Character Maker* has all the same features and functionality as are available in the *Welcome Activity*. On the main Arcade screen, click **Character Maker** and then click **Go On**.



---

✎ Students can modify their Avatar with the *Character Maker*.

---

If time remains after students have finished using the *Character Maker*, they can return to the *Arcade* to select another option.

## Number Splash


*Number Splash* is an exciting game that integrates practice with math facts. On the main *Arcade* screen, click **Number Splash** and then click **Go On**.





Click on a level (Easy, Medium, or Hard), then click **Go On** to begin the game.

---

 The object of *Number Splash* is to throw balloons at the numbers that complete five math facts..

---




An incomplete math fact is shown at the top of the screen. A clock in the upper, right portion of the screen allows students approximately one minute to complete the game. The clock in the lower, left indicates the time the student has remaining in the *Arcade*. Both clocks begin when the student clicks **Go On** from the title screen.

Various items flip up along two rows in the middle portion of the screen. Each item displays a number. One of the numbers completes the math fact. The numbers are displayed only briefly before they flip down.

There are seven balloons. The object is to throw a balloon at the number that completes the math fact. If a number flips down too quickly, wait for it to flip back up in a different location. There are seven balloons to complete five math facts. For each correct “hit,” one star at the top of the screen lights up.

Click on an item to throw the balloon. Depending on the level, students score 10, 20 or 30 points. No star lights up and no points are awarded for an incorrect response.

---

 The stars along the top of the yellow marquee indicate how many facts are complete.

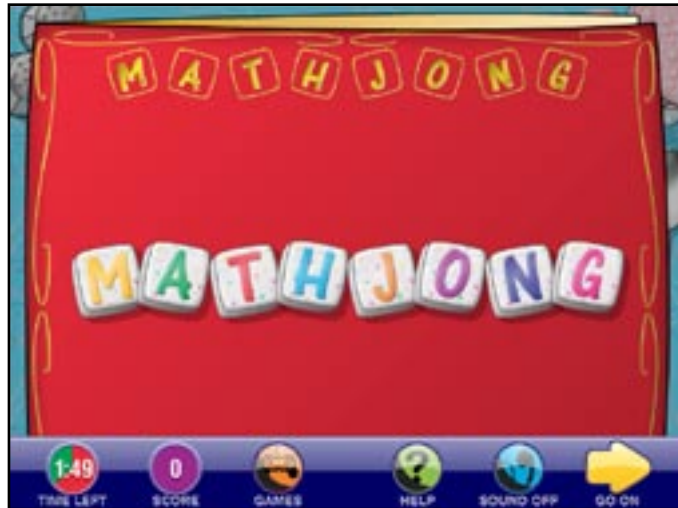
---



At the end of the game, students can click **Play Again** to play the game again at the same level. At any point during *Number Splash*, students may click **Games** to return to the *Arcade*. If they decide to return to *Number Splash*, they will have to restart the game from the beginning.

## Math-jong

*Math-jong* is a solitaire game that uses tiles.




There are three *Math-jong* levels. Each level has six games. Click either of the two games in any column, or click the yellow arrow at the bottom of a column to see more games at that level.



The object of the game is to clear the playing area of tiles by matching and removing pairs of tiles. Only tiles that have at least one side (left or right) free and no other tiles are placed on top can be paired. In *Math-jong* students pair tiles that match identical characters or that complete a math fact.



---

 In *Math-jong* students pair tiles that match characters or that complete a math fact.

---

In this screen, the two dark gray tiles on the left portion of the screen (the  $8+1$  tile and the 9 tile) were matched because they complete a math fact. If a match is correct, the tiles disappear from the board and the score increases by 30.

---

 It is possible to get a gameboard that is unsolvable.

---

Because the playing areas are randomly generated, it is possible to get a game board that is unsolvable. Most often, however, the playing area can be cleared if the proper tiles are paired in the proper sequence.

### Hint

At any point during the game, students may ask for a hint. The hint matches and removes two tiles. This usually opens up options that the student may not have otherwise seen in the playing area.

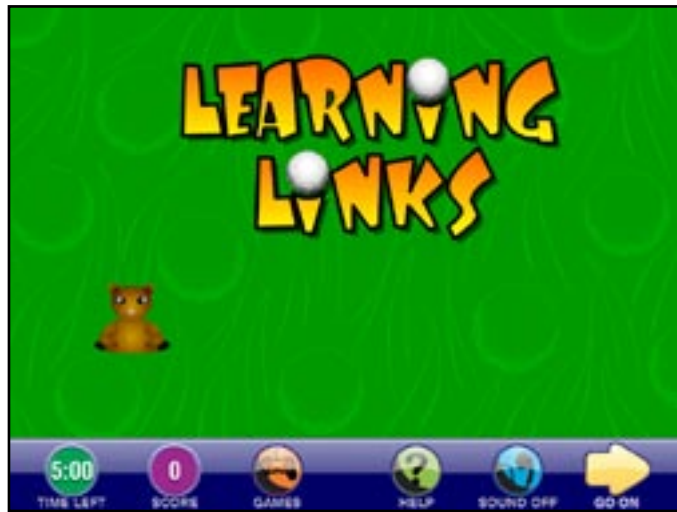
### Undo

Click **Undo** to undo matches of one or more pairings in the reverse sequence that they were matched. This is especially important in the Hard Level where particular pairings and sequences may lead students to a dead end. Clicking **Undo** and taking a different sequence may lead them to completing the board.

The game is over when all tiles are cleared from the board, the *Arcade* time runs out or the student clicks **Games** to leave *Math-jong*.

## Learning Links


Learning Links is a computerized miniature golf course. Click **Go On** at the main screen of the *Arcade*.



Click **Go On** to see the three levels of difficulty.



---

 Students may play holes as many times they like and in any order.

---

Each level has 6 distinct holes of golf. Use the yellow arrow below each column to see other holes within a given level. Students may play holes in any order and as many times as they like. Some students might prefer choosing one hole and mastering it before moving on. Others might want to complete each hole one at a time and in order, while others might prefer to randomly work choose the holes they want to play.

### Par

The object of the game is to get the ball into the hole with as few “strokes” (shots) as possible. Each hole has a Par. Par is the number of strokes the average skilled player takes to “sink” the ball in the hole.

Certain terms are used based on the number of strokes under par or over par that a golfer takes. It might be helpful to know the terms used in the feedback at the end of a hole.

*Hole in one*—sinking a shot in one stroke

*Eagle*—completing the hole in two strokes fewer than par

*Birdie*—completing the hole in one stroke fewer than par

*Bogey*—completing the hole in one stroke more than par

*Double Bogey*—completing the hole in two strokes more than par

Every hole has these common elements.

*Putting Green*—every putting green has:

*Tee*—represented by a gray rectangle, the starting area of the first stroke

*Arrows*—indicate the “lie,” or slope of the putting green.

*Hole*—represented by a black circle, the golfer’s goal to sink the ball into the hole with as few strokes as possible.


*Power Meter*—indicates how hard to hit the ball.

*Scoreboard*—displays the level and number of a given hole, the par for the whole and the overall score the student accumulated for the hole.

To take a shot, slide the mouse pointer over the ball and click. Holding the mouse down, slowly drag it away from the ball. As the mouse pointer moves further from the ball, a yellow line stretches in the opposite direction. This indicates the direction the ball will begin to travel.



---

 To take a shot, slide the mouse pointer over the ball, click-and-drag the mouse and release the mouse button.

---


The length of the yellow line is also a rough indicator of how hard the ball will be hit. The Power Meter in the lower, left of the screen should also be used for this purpose.

Once the power and direction are set, release the mouse button to “strike” the ball. The starting direction, the power, and the lie of the green all affect the path of the ball.

The “lie” of the green is indicated by yellow arrows. Arrows always point toward a lower elevation. This significantly affects the path of a shot. What might seem like a straight shot may not be if it is on a skewed slope. Compensations must be made to account for the lie of the course (pages 50-55).

After each shot students must complete a math fact they have already been exposed to. Students can only progress to the next shot of the hole by answering the math fact correctly.

---

 The “lie” of the green is indicated by yellow arrows.

---



---

 Students must complete a math fact after each shot.

---

When the ball is hit into the hole, a transition screen appears that sums up the student’s performance on the hole.



The message students receive varies based on students' performance with respect to par.



After seeing the feedback, students return to the list of holes. They may select another hole or return to the Arcade.


### Levels

#### *Easy*

An Easy hole is Par 2 or Par 3 with no slopes on the putting green. Notice that there are no arrows on this putting green.



---

 In the *Easy* level, there are no slopes in the lie of the green.

---

### Medium

A Medium hole ranges from Par 2 to Par 4. In this hole, all the arrows point away from the hole. This indicates the area all around the hole slopes down. The hole is on a mound.

In the *Medium* level, the yellow arrows help students understand the “lie” of the putting green.



To be successful at this hole, hit with a little more force than it would require if the hole were on level ground. If the ball is not hit hard enough, it will simply roll back down the mound.

On this hole, the top and bottom portions of the green have arrows pointing in opposite directions. The right portion of the green has arrows point inward towards each other. This indicates there is a hill. The arrows at the right point towards a lower elevation, forming a trough.






### Hard

In the *Hard* level, holes will range from Par 3 to Par 5 and the slopes are much more challenging than for Medium-level holes. Slopes may rise or fall in multiple directions at one time.

This screen is tricky. A trough is directly in front of the tee. The entire corner slopes down toward the water, and the area to the left of the hole has a flat region and also slopes down toward the water. These slopes from varying angles will affect the course of the ball in ways different from easy- or medium-level holes.

In this screen, the direction and power of the ball would likely send the ball up the hill and back down into the water.

---

 In the *Hard* level, slopes may rise or fall in multiple directions at one time.

---




In this case, the student used high power to take a shot straight along the lower portion of the green near the water. The ball moved across the lower portion, the higher region towards the upper left corner and avoiding the river. The ball then traveled up the hill above the river and ricocheted to the right onto the flat portion near the hole.



This level 3 hole is Par 5. The difficulty is in control over the power and angle of the shots rather than in playing the slopes. Every bridge has an upward slope, and it is important to hit the ball with power. If too much power is used, the ball will bounce off the wall into the water. One way to avoid this is to angle the shot to the left with the proper amount of power. The ball will travel farther, slowing down and stopping instead of falling into the water.

From there, position the ball so all shots can be made to go diagonally from one corner of a bridge to the opposite corner of the bridge.

---

 In some holes, the difficulty is in controlling the power and angle of shots rather than in playing the lie of the green.

---



The student is prompted when Arcade time has run out.



The screen will close and the *Select an activity* screen will appear.

## Shutterbug

The object of *Shutterbug* is to find the five differences between two seemingly identical photos as quickly as possible.

The object of *Shutterbug* is to find the five differences between two seemingly identical photos as quickly as possible.



Click **Go On** to view a pair of photos.



Below the photos are the time bar and six unique ovals:

*Time bar* – Students start with approximately 60 seconds. After the starting the game, the time bar drops steadily. Students must locate all differences between the pictures before time runs out. Students gain an extra point for every five seconds that remain on the time bar.

*Round* – This indicates the current round of *Shutterbug*.

*Spots* – This indicates the number of differences the student has spotted between the pictures. Students score 30 points for each spot.

*Freebies* – Each student has up to 4 free “spots.” No points are scored for a *Freebie*. After each free spot, student’s maximum potential points drops.

*Clocks* –

*Bonus counter* – 15 points are awarded for making all five spots, 10 points for four spots, and 5 points for three spots. No bonus points are awarded for two spots or one spot.

*Score* – View the cumulative total of points for spots, bonus points and points for time remaining.

### *Gold Coins*

Occasionally a gold coin randomly appears on the photos. For extra points, click on the coin before it disappears.

Students click regions of the photo where they identify differences. A rectangle appears around each region that is correct. A rectangle also appears around the exact same region of the corresponding photo. (This is to avoid confusion regarding what regions have already been selected.) The game is over when all items have been identified or when time has run out.



# Reports

In addition to the traditional reports offered on *SkillsTutor.com*, there are three additional reports that are unique to Math Fact Fluency: Fact Matrix Report, Math Fact Assessment Report, Calendar Report.

## Fact Matrix Report

The Math Fact Matrix provides an overview of students' performance on individual math facts. Students will see only the matrix at the end of every activity. The teacher's view of the report provides more features. It allows teachers to customize each student's mastery time for recalling math facts and to immediately view individual student performance on math facts by subject/operation.

| Student Name   | Mastery Time   | View         |
|----------------|--|--------------|
| adams, alan    | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Barbara | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Coltric | 2.25 <input type="text"/> <input type="checkbox"/> Untimed | + - x ÷ View |
| adams, Debra   | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| adams, Ernest  | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Fred    | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Greg    | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Greg    | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Hillary | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Ingrid  | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Janice  | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Kyle    | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Lyndee  | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Mary    | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Nancy   | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Orpheus | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |
| Adams, Parnell | 2 <input type="text"/> <input type="checkbox"/> Untimed    | + - x ÷ View |

### Mastery Time

**Slide Bars**—Mastery Time is the time students have to complete a math fact. The default setting for all students is two seconds. Use the slide bars at the top of the *Mastery Time* column to change the *Mastery Time* for ALL students (except those students with a red lock beside them). Or, use the slide bars beside individual students to change the Mastery times for those individual students.

**Untimed Checkbox**—Some students do not perform well under pressure. Click the *Untimed* checkbox to turn off *Mastery Time* for individual students or for all students.

**Locks**—Click to lock and unlock *Mastery Time* for individual students. When *Mastery Time* is locked, it may not be altered individually or globally. A student record must be unlocked to make a change.

The *View Pane* is on the right side of the screen. For each student, there are +, −, ×, ÷, and **View** buttons in the *View Pane*. Click either +, −, ×, ÷, and then click **View** to view students' performance on math facts for that subject/operation. The Math Fact Matrix that students see at the end of lessons and tests will open (p. 50).

Click **Restore Settings** to restore settings to the original defaults. Click **Save Settings** to save changes to the report settings.

## Math Fact Matrix (cont.)

The Math Fact Matrix uses complex algorithms to present students performance on individual math facts. Performance on individual math facts is weighted based on speed, frequency and other indicators of proficiency. The data is presented using a simple three color scheme that allows teachers and students to identify problem areas at a glance. The color key is at the top of the report:

Green: Excellent

Yellow: Good

Red: Needs Work

The Math Fact Matrix is constantly being updated, incorporating the most recent data. If students begin to struggle with math facts it appeared they had already mastered, then the cell that represents that math fact might change from green to yellow. Similarly, as students improve their performance on specific math facts, the associated cell in the matrix might change from red to yellow or green.



Every basic math fact for a given operation is displayed in matrix form. Performance on a specific math fact is only displayed on the Math Fact Matrix if students have been presented with the math fact over *at least 3* sessions. A session consists of exposure to the same math fact at least three times. The three sessions do not include the lesson in which the math fact is first presented.

# Math Fact Assessment

With the *Math Fact Assessment Report*, teachers can view results of student performance on the Placement Test. Student names are listed down the left column. The units that are assessed in the Placement Test are listed along the gray top row.

Recall the Placement Test ends as soon as a student demonstrates a lack of proficiency in a unit. Proficiency is based on an 80% mastery. Data is displayed for each unit that each student has demonstrated proficiency. In this report, Brian mastered every unit up to *Sums 12 to 13*. Rupert, however, failed to demonstrate proficiency in the first unit, *Adding 0*. The *Placement Test* ended there.

| Math Fact Assessment                      |               |             |          |                |          |         |             |              |                |                 |
|---|---------------|-------------|----------|----------------|----------|---------|-------------|--------------|----------------|-----------------|
| <b>Site:</b> ATI 01 Test Site             |               |             |          |                |          |         |             |              |                | Page 1          |
| <b>Teacher:</b> Mrs. Lois Griffin         |               |             |          |                |          |         |             |              |                | August 11, 2008 |
| <b>Class:</b> MFF Class                   |               |             |          |                |          |         |             |              |                |                 |
| <b>Activity:</b> Placement Test: Addition |               |             |          |                |          |         |             |              |                |                 |
| Student Name                              | Activity Date | Total Score | Adding 0 | Adding 1 and 2 | Adding 5 | Doubles | Doubles + 1 | Sums 9 to 11 | Sums 12 and 13 | Sums 14 to 17   |
| Griffin, Brian                            | 08/08/08      | 100         | 100      | 100            | 100      | 100     | 100         | 100          | 100            |                 |
| Griffin, Rupert                           | 07/29/08      | 30          | 30       |                |          |         |             |              |                |                 |
| Griffin, Stewie                           | 07/23/08      | 92          | 100      | 94             | 100      | 100     | 100         | 71           |                |                 |

Each unit score indicates the mastery of facts within the unit. Mastery is based on both speed and accuracy. If a score is not given for all units in a Placement or Benchmark test, the program stopped the test based on student performance.

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# Calendar Report

With the *Calendar Report* teachers can view how much work individual students have completed in a given month. Only one month at a time may be viewed.

| Activity Calendar for August 2008 |        |                       |                        |          |                       |                 |
|-----------------------------------|--------|-----------------------|------------------------|----------|-----------------------|-----------------|
| Site: Math Fact Fluency           |        |                       |                        |          |                       | Page 2          |
| Class: Basic Math                 |        |                       |                        |          |                       | August 29, 2008 |
| Teacher: Mr. Paul Kronmeyer       |        |                       |                        |          |                       |                 |
| Student: Washington, Tammie       |        |                       |                        |          |                       |                 |
| Sunday                            | Monday | Tuesday               | Wednesday              | Thursday | Friday                | Saturday        |
|                                   |        |                       |                        |          | 1                     | 2               |
| 3                                 | 4      | 5                     | 6                      | 7        | 8                     | 9               |
| 10                                | 11     | 12                    | 13                     | 14       | 15                    | 16              |
| 17                                | 18     | 19                    | 20                     | 21       | 22<br>9 act<br>87 min | 23              |
| 24                                | 25     | 26<br>1 act<br>21 min | 27<br>4 act<br>108 min | 28       | 29<br>1 act<br>71 min | 30              |
| 31                                |        |                       |                        |          |                       |                 |

Act - Daily total of activities completed by student  
Min - Daily total of minutes completed by student

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A calendar for the selected month is displayed for each student. For each day, the number of activities completed and the total amount of time on task is displayed on each day. Time playing in the Arcade is not included in the total time on task.

If a student did no work on a given day, then no information is displayed on that day of the calendar. For example, there is no information in the cells for August 25<sup>th</sup> or 28<sup>th</sup> or for any weekend.



# Scope and Sequence

## Addition

### PLACEMENT TEST: ADDITION

#### LESSONS

##### Adding 0

- T1: Adding 0 Pretest
- Lesson 1:  $0 + 0$  through  $9 + 0$
- T2: Adding 0 Posttest

- Lesson 3:  $3 + 6$  and  $8 + 3$
- Lesson 4:  $3 + 7$  and  $3 + 8$
- Lesson 5:  $4 + 6$  and  $4 + 7$
- Lesson 6:  $6 + 3$  and  $6 + 4$
- Lesson 7:  $7 + 3$  and  $7 + 4$

##### Adding 1 and Adding 2

- T1: Adding 1 and Adding 2 Pretest
- Lesson 1:  $1 + 1$  and  $1 + 2$
- Lesson 2:  $2 + 1$  and  $2 + 2$
- Lesson 3:  $3 + 1$  and  $3 + 2$
- Lesson 4:  $4 + 1$  and  $4 + 2$
- Lesson 5:  $5 + 1$  and  $5 + 2$
- Lesson 6:  $6 + 1$  and  $6 + 2$
- Lesson 7:  $7 + 1$  and  $7 + 2$
- Lesson 8:  $8 + 1$  and  $8 + 2$
- Lesson 9:  $9 + 1$  and  $9 + 2$
- T2: Adding 1 and Adding 2 Posttest

- T2: Final Facts I: Sums 9 to 11 Posttest

##### Final Facts II: Sums 12 and 13

- T1: Final Facts II: Sums 12 and 13 Pretest
- Lesson 1:  $3 + 9$  and  $6 + 7$
- Lesson 2:  $4 + 8$  and  $4 + 9$
- Lesson 3:  $5 + 7$  and  $5 + 8$
- Lesson 4:  $8 + 4$  and  $8 + 5$
- Lesson 5:  $9 + 3$  and  $9 + 4$
- Lesson 6:  $7 + 5$  and  $7 + 6$
- T2: Final Facts II: Sums 12 and 13 Posttest

##### Adding 5

- T1: Adding 5 Pretest
- Lesson 1:  $5 + 0$  and  $5 + 1$
- Lesson 2:  $5 + 2$  and  $5 + 3$
- Lesson 3:  $5 + 4$  and  $5 + 5$
- T2: Adding 5 Posttest

##### Final Facts III: Sums 14 to 17

- T1: Final Facts III: Sums 14 to 17 Pretest
- Lesson 1:  $5 + 9$  and  $7 + 9$
- Lesson 2:  $6 + 8$  and  $6 + 9$
- Lesson 3:  $8 + 6$  and  $8 + 7$
- Lesson 4:  $9 + 5$  and  $9 + 6$
- Lesson 5:  $9 + 7$  and  $9 + 8$
- T2: Final Facts III: Sums 14 to 17 Posttest

##### Doubles

- T1: Doubles Pretest
- Lesson 1:  $2 + 2$  and  $4 + 4$
- Lesson 2:  $3 + 3$  and  $6 + 6$
- Lesson 3:  $5 + 5$  and  $7 + 7$
- Lesson 4:  $8 + 8$  and  $9 + 9$
- T2: Doubles Posttest

##### REVIEW ADDITION

- Lesson 1: Review: Addition

##### Doubles + 1

- T1: Near Doubles Pretest
- Lesson 1:  $1 + 2$  and  $2 + 3$
- Lesson 2:  $3 + 4$  and  $4 + 5$
- Lesson 3:  $5 + 6$  and  $6 + 7$
- Lesson 4:  $7 + 8$  and  $8 + 9$
- T2: Near Doubles Posttest

##### BENCHMARK TESTS

- B1: January Addition Benchmark
- B2: February Addition Benchmark
- B3: March Addition Benchmark
- B4: April Addition Benchmark
- B5: May Addition Benchmark
- B6: June Addition Benchmark
- B7: July Addition Benchmark
- B8: August Addition Benchmark
- B9: September Addition Benchmark
- B10: October Addition Benchmark
- B11: November Addition Benchmark
- B12: December Addition Benchmark

##### Final Facts I: Sums 9 to 11

- T1: Final Facts I: Sums 9 to 11 Pretest
- Lesson 1:  $2 + 7$  and  $6 + 5$
- Lesson 2:  $2 + 8$  and  $2 + 9$

##### FINAL TEST: ADDITION

# Subtraction

## PLACEMENT TEST: SUBTRACTION

### LESSONS

#### Subtraction with 0

- T1: Subtraction with 0 Pretest
- Lesson 1:  $0 - 0$  through  $9 - 0$  and  $1 - 1$  through  $9 - 9$
- T2: Subtraction with 0 Posttest

#### Subtract 1 and 2

- T1: Subtract 1 and 2 Pretest
- Lesson 1:  $2 - 1$  and  $2 - 2$
- Lesson 2:  $3 - 1$  and  $3 - 2$
- Lesson 3:  $4 - 1$  and  $4 - 2$
- Lesson 4:  $5 - 1$  and  $5 - 2$
- Lesson 5:  $6 - 1$  and  $6 - 2$
- Lesson 6:  $7 - 1$  and  $7 - 2$
- Lesson 7:  $8 - 1$  and  $8 - 2$
- Lesson 8:  $9 - 1$  and  $9 - 2$
- Lesson 9:  $10 - 1$  and  $10 - 2$
- Lesson 10:  $11 - 2$  and  $1 - 1$
- T2: Subtract 1 and 2 Posttest

#### Subtract Number Neighbors

- T1: Subtract Number Neighbors Pretest
- Lesson 1:  $3 - 1$  and  $3 - 2$
- Lesson 2:  $4 - 2$  and  $4 - 3$
- Lesson 3:  $5 - 3$  and  $5 - 4$
- Lesson 4:  $6 - 4$  and  $6 - 5$
- Lesson 5:  $7 - 5$  and  $7 - 6$
- Lesson 6:  $8 - 6$  and  $8 - 7$
- Lesson 7:  $9 - 7$  and  $9 - 8$
- Lesson 8:  $10 - 8$  and  $10 - 9$
- Lesson 9:  $11 - 9$  and  $2 - 1$
- T2: Subtract Number Neighbors Posttest

#### Subtracting with Doubles

- T1: Subtracting with Doubles Pretest
- Lesson 1:  $4 - 2$  and  $6 - 3$
- Lesson 2:  $8 - 4$  and  $10 - 5$
- Lesson 3:  $12 - 6$  and  $14 - 7$
- Lesson 4:  $16 - 8$  and  $18 - 9$
- T2: Subtracting with Doubles Posttest

#### Final Facts I: Differences 3 and 4

- T1: Final Facts I: Differences 3 and 4 Pretest
- Lesson 1:  $7 - 3$  and  $7 - 4$
- Lesson 2:  $8 - 5$  and  $10 - 6$
- Lesson 3:  $9 - 5$  and  $9 - 6$
- Lesson 4:  $11 - 7$  and  $11 - 8$
- Lesson 5:  $12 - 8$  and  $12 - 9$
- Lesson 6:  $10 - 7$  and  $13 - 9$
- T2: Final Facts I: Differences 3 and 4 Posttest

#### Final Facts II: Differences 5 through 7

- T1: Final Facts II: Differences 5 through 7 Pretest
- Lesson 1:  $8 - 3$  and  $9 - 3$
- Lesson 2:  $9 - 4$  and  $12 - 7$
- Lesson 3:  $10 - 3$  and  $10 - 4$
- Lesson 4:  $11 - 4$  and  $11 - 5$
- Lesson 5:  $11 - 6$  and  $12 - 5$
- Lesson 6:  $13 - 6$  and  $13 - 7$
- Lesson 7:  $13 - 8$  and  $14 - 8$
- Lesson 8:  $14 - 9$  and  $16 - 9$
- Lesson 9:  $15 - 8$  and  $15 - 9$
- T2: Final Facts II: Differences 5 through 7 Posttest

#### Final Facts III: Differences 8 and 9

- T1: Final Facts III: Differences 8 and 9 Pretest
- Lesson 1:  $11 - 3$  and  $16 - 7$
- Lesson 2:  $12 - 3$  and  $12 - 4$
- Lesson 3:  $13 - 4$  and  $13 - 5$
- Lesson 4:  $14 - 5$  and  $14 - 6$
- Lesson 5:  $15 - 6$  and  $15 - 7$
- Lesson 6:  $17 - 8$  and  $17 - 9$
- T2: Final Facts III: Differences 8 and 9 Posttest

## REVIEW: SUBTRACTION

- Lesson 1: Review: Subtraction

## BENCHMARK TESTS

- B1: January Subtraction Benchmark
- B2: February Subtraction Benchmark
- B3: March Subtraction Benchmark
- B4: April Subtraction Benchmark
- B5: May Subtraction Benchmark
- B6: June Subtraction Benchmark
- B7: July Subtraction Benchmark
- B8: August Subtraction Benchmark
- B9: September Subtraction Benchmark
- B10: October Subtraction Benchmark
- B11: November Subtraction Benchmark
- B12: December Subtraction Benchmark

## FINAL TEST: SUBTRACTION

# Multiplication

## PLACEMENT TEST: MULTIPLICATION

### LESSONS

#### Multiplying by 1 and 0

- T1: Multiplying by 1 and 0 Pretest
- Lesson 1:  $0 \times 1$  through  $12 \times 1$  and  $0 \times 0$  through  $12 \times 0$
- T2: Multiplying by 1 and 0 Posttest

#### Multiplying by 2

- T1: Multiplying by 2 Pretest
- Lesson 1:  $1 \times 2$  and  $2 \times 2$
- Lesson 2:  $3 \times 2$  and  $4 \times 2$
- Lesson 3:  $5 \times 2$  and  $6 \times 2$
- Lesson 4:  $7 \times 2$  and  $8 \times 2$
- Lesson 5:  $9 \times 2$  and  $10 \times 2$
- Lesson 6:  $11 \times 2$  and  $12 \times 2$
- T2: Multiplying by 2 Posttest

#### Multiplying by 5

- T1: Multiplying by 5 Pretest
- Lesson 1:  $1 \times 5$  and  $2 \times 5$
- Lesson 2:  $3 \times 5$  and  $4 \times 5$
- Lesson 3:  $5 \times 5$  and  $6 \times 5$
- Lesson 4:  $7 \times 5$  and  $8 \times 5$
- Lesson 5:  $9 \times 5$  and  $10 \times 5$
- Lesson 6:  $11 \times 5$  and  $12 \times 5$
- T2: Multiplying by 5 Posttest

#### Multiplying by 10

- T1: Multiplying by 10 Pretest
- Lesson 1:  $1 \times 10$  and  $2 \times 10$
- Lesson 2:  $3 \times 10$  and  $4 \times 10$
- Lesson 3:  $5 \times 10$  and  $6 \times 10$
- Lesson 4:  $7 \times 10$  and  $8 \times 10$
- Lesson 5:  $9 \times 10$  and  $10 \times 10$
- Lesson 6:  $11 \times 10$  and  $12 \times 10$
- T2: Multiplying by 10 Posttest

#### Multiplying by 4

- T1: Multiplying by 4 Pretest
- Lesson 1:  $1 \times 4$  and  $2 \times 4$
- Lesson 2:  $3 \times 4$  and  $4 \times 4$
- Lesson 3:  $5 \times 4$  and  $6 \times 4$
- Lesson 4:  $7 \times 4$  and  $8 \times 4$
- Lesson 5:  $9 \times 4$  and  $10 \times 4$
- Lesson 6:  $11 \times 4$  and  $12 \times 4$
- T2: Multiplying by 4 Posttest

#### Multiplying by 3

- T1: Multiplying by 3 Pretest
- Lesson 1:  $1 \times 3$  and  $2 \times 3$
- Lesson 2:  $3 \times 3$  and  $4 \times 3$
- Lesson 3:  $5 \times 3$  and  $6 \times 3$
- Lesson 4:  $7 \times 3$  and  $8 \times 3$
- Lesson 5:  $9 \times 3$  and  $10 \times 3$
- Lesson 6:  $11 \times 3$  and  $12 \times 3$
- T2: Multiplying by 3 Posttest

#### Multiplying by 9

- T1: Multiplying by 9 Pretest
- Lesson 1:  $1 \times 9$  and  $2 \times 9$
- Lesson 2:  $3 \times 9$  and  $4 \times 9$
- Lesson 3:  $5 \times 9$  and  $6 \times 9$
- Lesson 4:  $7 \times 9$  and  $8 \times 9$
- Lesson 5:  $9 \times 9$  and  $10 \times 9$
- Lesson 6:  $11 \times 9$  and  $12 \times 9$
- T2: Multiplying by 9 Posttest

#### Multiplying by 6

- T1: Multiplying by 6 Pretest
- Lesson 1:  $1 \times 6$  and  $2 \times 6$
- Lesson 2:  $3 \times 6$  and  $4 \times 6$
- Lesson 3:  $5 \times 6$  and  $6 \times 6$
- Lesson 4:  $7 \times 6$  and  $8 \times 6$
- Lesson 5:  $9 \times 6$  and  $10 \times 6$
- Lesson 6:  $11 \times 6$  and  $12 \times 6$
- T2: Multiplying by 6 Posttest

#### Multiplying by 7

- T1: Multiplying by 7 Pretest
- Lesson 1:  $1 \times 7$  and  $2 \times 7$
- Lesson 2:  $3 \times 7$  and  $4 \times 7$
- Lesson 3:  $5 \times 7$  and  $6 \times 7$
- Lesson 4:  $7 \times 7$  and  $8 \times 7$
- Lesson 5:  $9 \times 7$  and  $10 \times 7$
- Lesson 6:  $11 \times 7$  and  $12 \times 7$
- T2: Multiplying by 7 Posttest

#### Multiplying by 8

- T1: Multiplying by 8 Pretest
- Lesson 1:  $1 \times 8$  and  $2 \times 8$
- Lesson 2:  $3 \times 8$  and  $4 \times 8$
- Lesson 3:  $5 \times 8$  and  $6 \times 8$
- Lesson 4:  $7 \times 8$  and  $8 \times 8$
- Lesson 5:  $9 \times 8$  and  $10 \times 8$
- Lesson 6:  $11 \times 8$  and  $12 \times 8$
- T2: Multiplying by 8 Posttest

#### Multiplying by 11

- T1: Multiplying by 11 Pretest
- Lesson 1:  $1 \times 11$  and  $2 \times 11$
- Lesson 2:  $3 \times 11$  and  $4 \times 11$
- Lesson 3:  $5 \times 11$  and  $6 \times 11$
- Lesson 4:  $7 \times 11$  and  $8 \times 11$
- Lesson 5:  $9 \times 11$  and  $10 \times 11$
- Lesson 6:  $11 \times 11$  and  $12 \times 11$
- T2: Multiplying by 11 Posttest

#### Multiplying by 12

- T1: Multiplying by 12 Pretest
- Lesson 1:  $1 \times 12$  and  $2 \times 12$
- Lesson 2:  $3 \times 12$  and  $4 \times 12$

## Multiplication (cont.)

Lesson 3:  $5 \times 12$  and  $6 \times 12$   
Lesson 4:  $7 \times 12$  and  $8 \times 12$   
Lesson 5:  $9 \times 12$  and  $10 \times 12$   
Lesson 6:  $11 \times 12$  and  $12 \times 12$   
T2: Multiplying by 12 Posttest

### REVIEW: MULTIPLICATION

Lesson 1: Review: Multiplication

### BENCHMARK TESTS: MULTIPLICATION

B1: January Multiplication Benchmark  
B2: February Multiplication Benchmark

B3: March Multiplication Benchmark  
B4: April Multiplication Benchmark  
B5: May Multiplication Benchmark  
B6: June Multiplication Benchmark  
B7: July Multiplication Benchmark  
B8: August Multiplication Benchmark  
B9: September Multiplication Benchmark  
B10: October Multiplication Benchmark  
B11: November Multiplication Benchmark  
B12: December Multiplication Benchmark

### FINAL TEST: MULTIPLICATION

## Division

### PLACEMENT TEST: DIVISION

#### LESSONS

##### Dividing by 1

T1: Dividing by 1 Pretest  
Lesson 1:  $1 \div 1$  through  $12 \div 1$   
T2: Dividing by 1 Posttest

##### Dividing by 2

T1: Dividing by 2 Pretest  
Lesson 1:  $2 \div 2$  and  $4 \div 2$   
Lesson 2:  $6 \div 2$  and  $8 \div 2$   
Lesson 3:  $10 \div 2$  and  $12 \div 2$   
Lesson 4:  $14 \div 2$  and  $16 \div 2$   
Lesson 5:  $18 \div 2$  and  $20 \div 2$   
Lesson 6:  $22 \div 2$  and  $24 \div 2$   
T2: Dividing by 2 Posttest

##### Dividing by 5

T1: Dividing by 5 Pretest  
Lesson 1:  $5 \div 5$  and  $10 \div 5$   
Lesson 2:  $15 \div 5$  and  $20 \div 5$   
Lesson 3:  $25 \div 5$  and  $30 \div 5$   
Lesson 4:  $35 \div 5$  and  $40 \div 5$   
Lesson 5:  $45 \div 5$  and  $50 \div 5$   
Lesson 6:  $55 \div 5$  and  $60 \div 5$   
T2: Dividing by 5 Posttest

##### Dividing by 10

T1: Dividing by 10 Pretest  
Lesson 1:  $10 \div 10$  and  $20 \div 10$   
Lesson 2:  $30 \div 10$  and  $40 \div 10$   
Lesson 3:  $50 \div 10$  and  $60 \div 10$   
Lesson 4:  $70 \div 10$  and  $80 \div 10$   
Lesson 5:  $90 \div 10$  and  $100 \div 10$   
Lesson 6:  $110 \div 10$  and  $120 \div 10$   
T2: Dividing by 10 Posttest

##### Dividing by 3

T1: Dividing by 3 Pretest  
Lesson 1:  $3 \div 3$  and  $6 \div 3$   
Lesson 2:  $9 \div 3$  and  $12 \div 3$   
Lesson 3:  $15 \div 3$  and  $18 \div 3$   
Lesson 4:  $21 \div 3$  and  $24 \div 3$   
Lesson 5:  $27 \div 3$  and  $30 \div 3$   
Lesson 6:  $33 \div 3$  and  $36 \div 3$   
T2: Dividing by 3 Posttest

##### Dividing by 4

T1: Dividing by 4 Pretest  
Lesson 1:  $4 \div 4$  and  $8 \div 4$   
Lesson 2:  $12 \div 4$  and  $16 \div 4$   
Lesson 3:  $20 \div 4$  and  $24 \div 4$   
Lesson 4:  $28 \div 4$  and  $32 \div 4$   
Lesson 5:  $36 \div 4$  and  $40 \div 4$   
Lesson 6:  $44 \div 4$  and  $48 \div 4$   
T2: Dividing by 4 Posttest

##### Dividing by 6

T1: Dividing by 6 Pretest  
Lesson 1:  $6 \div 6$  and  $12 \div 6$   
Lesson 2:  $18 \div 6$  and  $24 \div 6$   
Lesson 3:  $30 \div 6$  and  $36 \div 6$   
Lesson 4:  $42 \div 6$  and  $48 \div 6$   
Lesson 5:  $54 \div 6$  and  $60 \div 6$   
Lesson 6:  $66 \div 6$  and  $72 \div 6$   
T2: Dividing by 6 Posttest

##### Dividing by 7

T1: Dividing by 7 Pretest  
Lesson 1:  $7 \div 7$  and  $14 \div 7$   
Lesson 2:  $21 \div 7$  and  $28 \div 7$   
Lesson 3:  $35 \div 7$  and  $42 \div 7$

## Division (cont.)

Lesson 4:  $49 \div 7$  and  $56 \div 7$

Lesson 5:  $63 \div 7$  and  $70 \div 7$

Lesson 6:  $77 \div 7$  and  $84 \div 7$

T2: Dividing by 7 Posttest

### Dividing by 8

T1: Dividing by 8 Pretest

Lesson 1:  $8 \div 8$  and  $16 \div 8$

Lesson 2:  $24 \div 8$  and  $32 \div 8$

Lesson 3:  $40 \div 8$  and  $48 \div 8$

Lesson 4:  $56 \div 8$  and  $64 \div 8$

Lesson 5:  $72 \div 8$  and  $80 \div 8$

Lesson 6:  $88 \div 8$  and  $96 \div 8$

T2: Dividing by 9 Posttest

### Dividing by 9

T1: Dividing by 9 Pretest

Lesson 1:  $9 \div 9$  and  $18 \div 9$

Lesson 2:  $27 \div 9$  and  $36 \div 9$

Lesson 3:  $45 \div 9$  and  $54 \div 9$

Lesson 4:  $63 \div 9$  and  $72 \div 9$

Lesson 5:  $81 \div 9$  and  $90 \div 9$

Lesson 6:  $99 \div 9$  and  $108 \div 9$

T2: Dividing by 9 Posttest

### Dividing by 11

T1: Dividing by 11 Pretest

Lesson 1:  $11 \div 11$  and  $22 \div 11$

Lesson 2:  $33 \div 11$  and  $44 \div 11$

Lesson 3:  $55 \div 11$  and  $66 \div 11$

Lesson 4:  $77 \div 11$  and  $88 \div 11$

Lesson 5:  $99 \div 11$  and  $110 \div 11$

Lesson 6:  $121 \div 11$  and  $132 \div 11$

T2: Dividing by 11 Posttest

### Dividing by 12

T1: Dividing by 12 Pretest

Lesson 1:  $12 \div 12$  and  $24 \div 12$

Lesson 2:  $36 \div 12$  and  $48 \div 12$

Lesson 3:  $60 \div 12$  and  $72 \div 12$

Lesson 4:  $84 \div 12$  and  $96 \div 12$

Lesson 5:  $108 \div 12$  and  $120 \div 12$

Lesson 6:  $132 \div 12$  and  $144 \div 12$

T2: Dividing by 12 Posttest

### REVIEW: DIVISION

Lesson 1: Review: Division

### BOOKMARK TESTS

B1: January Division Benchmark

B2: February Division Benchmark

B3: March Division Benchmark

B4: April Division Benchmark

B5: May Division Benchmark

B6: June Division Benchmark

B7: July Division Benchmark

B8: August Division Benchmark

B9: September Division Benchmark

B10: October Division Benchmark

B11: November Division Benchmark

B12: December Division Benchmark

### FINAL TEST: DIVISION





# At-A-Glance

Use the *At-A-Glance* for a quick overview of the flow and functionality of Math Fact Fluency.

- 1: Set up a class
  - a. Create a faux student.
  - b. Create a faux class.
  - c. Enroll the student in the class.
  - d. Assign *Math Fact Fluency: Addition*
  - e. Give the student the assignment.

- 2: Login using the user name and password of the student.



- 3: Click Math Fact Fluency: Addition.



4. Click the next recommended activity: [Welcome Lesson: Addition](#).



5. Create a character that best expresses your appearance and personality.



- Click the next recommended activity. (See pages 16-34 for details about all activities.)



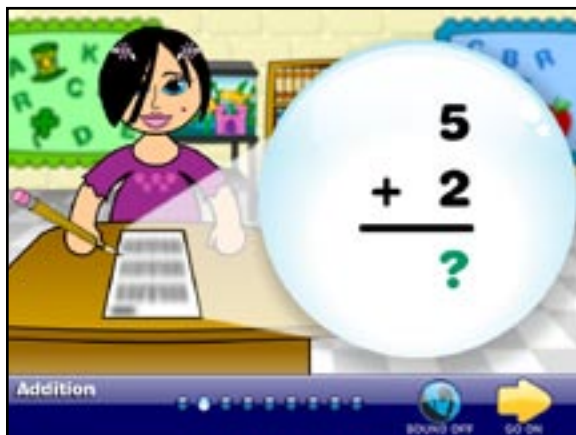
- A score screen is shown at the end of an activity. It is followed by the Math Fact Matrix Report.



8. Close the *Math Facts Matrix* and return to the *Select an activity* screen.



9. Select and complete a *Pretest* followed by any prescribed *Lesson*.



10. Explore the *Arcade* at the end of the lesson.



11. From the *select an activity* screen, select from among Review Lessons, Posttests and Benchmark Tests to preview as desired.

12. After reviewing all of the activities, click **Log Out** on the *select an activity* screen.

