Ventura®
Educational Systems

Tools for Active Teaching and Active Learning

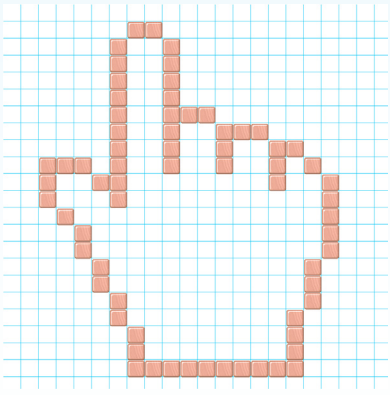
Hands-On Math

Interactive Number Sense

Explore Operations with

- ✔ Whole Numbers
- ✔ Fractions and
- ✔ Decimals

Instructor's Guide



Ventura Educational Systems

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Credits

App Design	Ventura Educational Systems
Instructional Technology and Programming	Fred Ventura, Ph.D. Ben Ventura Jon Ventura
Project Manager	Marne Ventura

Dr. Fred Ventura is an experienced classroom teacher and has taught elementary, secondary and college levels. He holds a doctorate in education from the University of California and presents workshops for educators on the instructional uses of technology.

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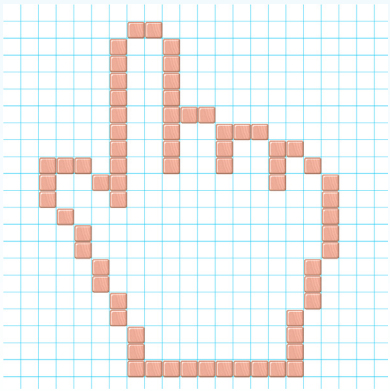
Ben Ventura is a systems administrator and programming expert. He attended Sonoma State University and works as a consultant to public agencies and private companies.

Jon Ventura is a Ph.D. candidate in the Department of Computer Science at the University of California, Santa Barbara.



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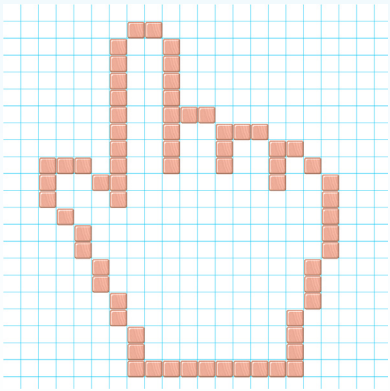
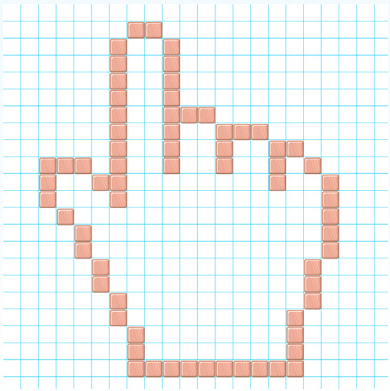


Overview

Discover the joy of mathematics with this playful, interactive environment that helps to build fundamental math concepts...



Mathematics educators define number sense as an intuitive understanding of numbers, their magnitude, relationships, and how they are affected by operations. Number sense is an important part of the continuum of skills and concepts that permeate the K-12 math curriculum. Research has shown that children learn best through active involvement in the learning process. Hands-On Math: Interactive Number Sense is designed to be a tool that teachers can use for active teaching and active learning. Math manipulative devices can be a rich source of teaching strategies for problem solving and can be very helpful in developing an intuitive understanding of mathematical concepts. The Hands-On Math series suggests ways in which concrete learning experiences can be extended to a representational level and still remain manipulative and interactive.

The guide consists of two sections. The first part is written for the teacher and explains the functions of the app and options available. It presents ideas for instructional strategies that can be implemented with each simulated manipulative device. The second section of the manual is a set of curriculum-based activities that are designed to help the teacher in using the Hands-On Math app. These activities have been developed for elementary and middle school age children and are arranged by order of grade level where the concepts are typically introduced. Teachers will want to decide what is the best sequence for using the materials with their particular group of students. Each lesson is aimed at specific mathematical objectives including addition, subtraction, multiplication, division, place value, fractions, probability, geometry, and logic. Each activity is meant to be a beginning. Teachers will want to encourage the children to explore extensions of each activity. Orally discussing each activity will help to foster higher level thinking.

Hands-On Math: Interactive Number Sense is a starting point. Learning should be fun and as students work with the app, it is my intention that they will begin discussing, sharing and creatively exploring mathematics.

-- Fred Ventura, Ph.D.

Introduction to Hands-On Math: Interactive Number Sense

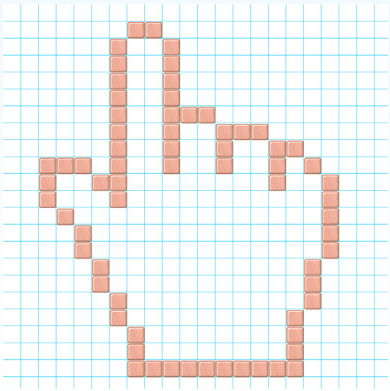
Approaches to the teaching of mathematics that rely heavily on one methodology are inherently weak and unlikely to produce optimal results. Educators have found that teaching strategies must adapt to accomodate new discoveries which expand our understanding of the learning process and new technologies which expand our delivery systems.

According to learning theory, children learn best when they are actively involved in the learning process. There are many ways to do this but one example is having children work in small groups in a laboratory/discovery situation. Small group instruction encourages variation in teaching methodology. Variation in the way in which material is presented serves the instructional process since one particular methodology may not be best for all children. Different children respond differently to a particular educational approach. The same methodology that is appropriate for one content area or developmental stage may not be appropriate in a different content area or with children who are at a different developmental stage.

Piaget's theory of cognitive development is a comprehensive theory about the nature and development of human intelligence.

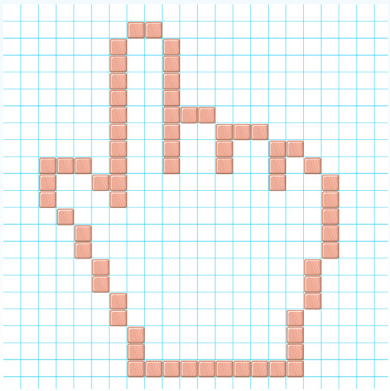
For learning mathematics an active teaching and active learning situation is a very desirable educational environment. To create it the teacher must be aware of the behavioral characteristics of the students with regard to mathematics, must be knowledgeable in the particular skills which are being taught and must be able to draw upon diverse strategies in order to decide which is the most appropriate for fostering the development of the targeted mathematical concepts.

In general, educational psychologists believe that the ability of children to learn passes through developmental stages. Each stage is characterized by particular behaviors. In the early stages learning is tied to perceptual responses. As the child matures, abstract reasoning becomes possible and concrete models are useful for laying the conceptual groundwork for new ideas, but once a concept has been internalized the concrete models are no longer necessary. The work of Swiss psychologist, Jean Piaget, has contributed a great deal to support this theory, and to foster the development of educational strategies which are consistent with the theory.



Using an iPad in a Manipulative Approach to Math

We use the term "playground" to convey the open-ended, discovery approach to learning that this tool was designed to support.



Hands-On Math: Interactive Number Sense combines and extends the use of concrete materials for teaching mathematics to the touch-based interactive enviroment of the Apple® iPad™. When used in conjunction with actual manipulative devices the app offers a unique set of strategies for active learning. While using the app students can draw upon concepts developed from concrete experiences that were gained using manipulative devices and will work with the same concepts in a more representational manner using the app. In this way the child's concrete mathematical knowledge is used to help transition to a representational stage and serves as a foundation for the development of abstract mathematical thinking skills.

Once mathematical concepts have been internalized by the child in a concrete way, the stage is set for a deeper understanding of the more formal, abstract axioms of higher mathematics.

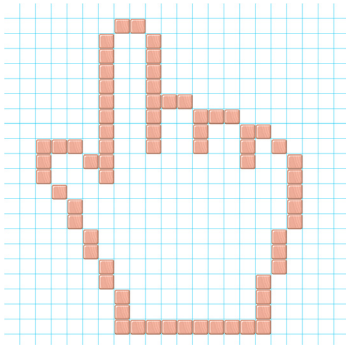
Hands-On Math: Interactive Number Sense simulates the use of colored Number Bars. The app creates an open-ended area called the Number Sense Playground. On the Number Sense Playground students manipulate the colored Number Bars to discover, investigate, test, validate, explore and internalize fundamental math concepts.

Using the Number Sense Playground students can move objects and experiment with mathematical ideas. The author and designer coined the term, "artificially intelligent math manipulative" to describe how using the Number Bars differs from concrete manipulative devices traditionally used in classrooms. The Number Bars on the Number Sense Playground provide intelligent feedback as the student manipulates the bars.

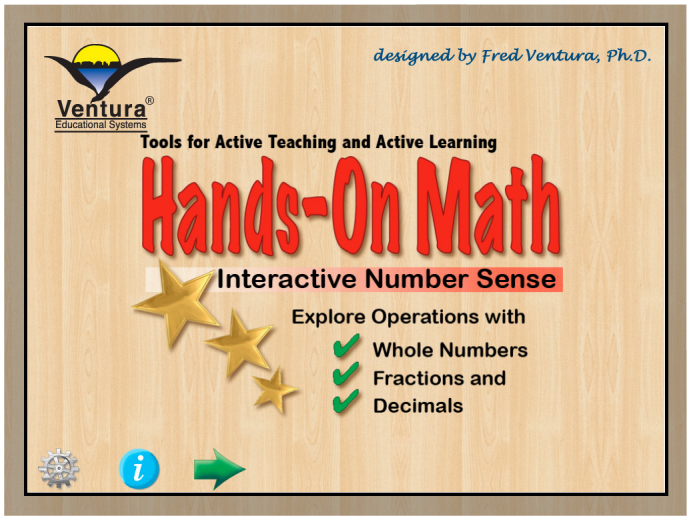
The Number Sense Playground can also be used with lessons that present mathematical concepts in a structured way. Initially teachers may want to provide ample free exploration time and then after the students have become familiar with the product direct students into more structured investigations. Students will make discoveries and when they do teachers should encourage them to share their discoveries with others in their group.

Getting Started

Hands-On Math: Interactive Number Sense encourages exploration. The program is designed in such a way that the physical operation of the app does not interfere with the learning activity. Icons are used to provide the user with complete control over the interaction with the software features.



Tap the Number Sense icon to launch the app.

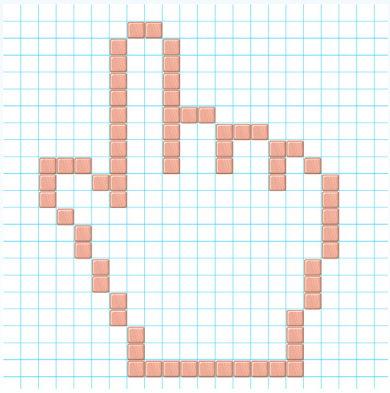


The opening view presents the title page with three options:

Settings - Tap this icon to control the sound, speech and view options of the app.

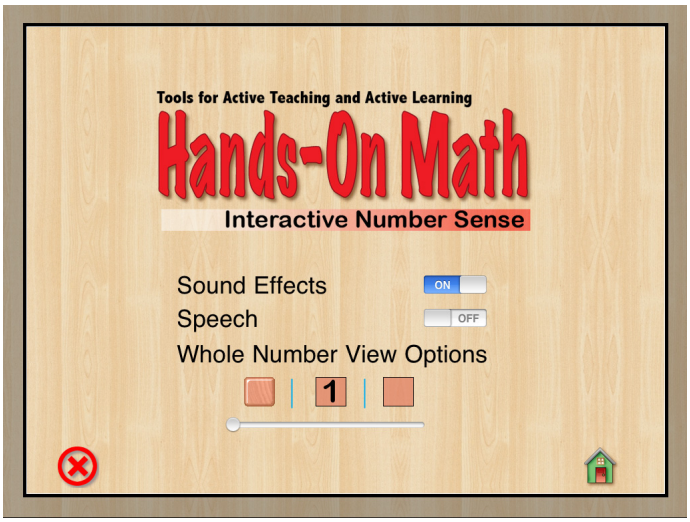
Info - Tap this icon to access the User's Guide where an overview of the app is presented.

Begin - Tap the green arrow to start using the Hands-On Math: Interactive Number Sense Playground.



Settings

The Settings option provides control of some of the basic features of the app. Options include sound effects, speech and view options when studying whole numbers.

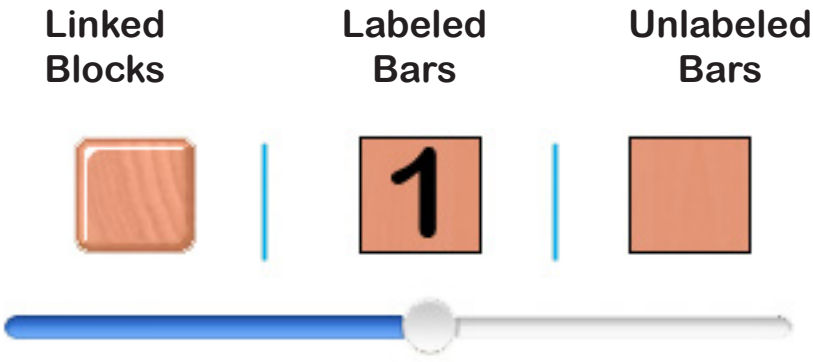


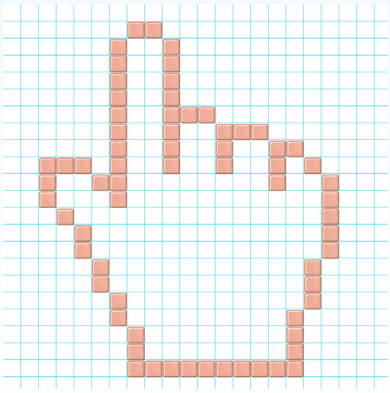
Mild sound effects are used through out the app and add a level of interest for students. When using the app with very young students teachers may wish to have the Speech option on. When Speech is on the value associated with each whole Number Bar is pronounced when the bar is first brought out onto the Number Sense Playground.

Developmental stages should be considered when deciding which view of the Number Bars to select.

Use the on/off switch to activate or deactivate sound effects and speech.

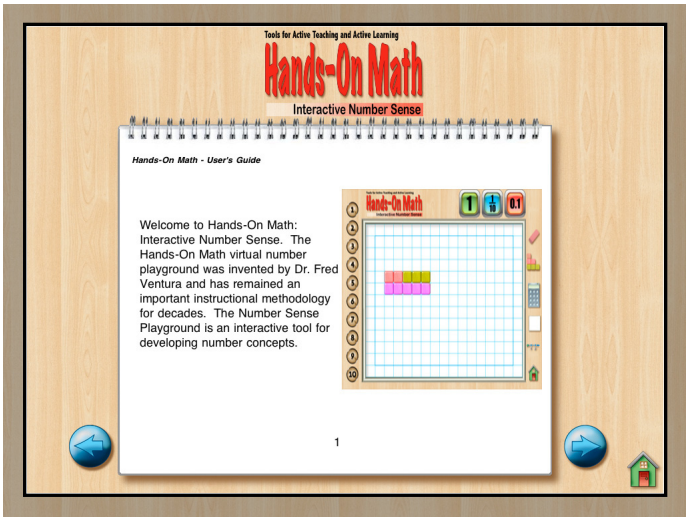
Whole number view options are controlled with a slider. As the slider is moved to the right the images used for the Number Bars changes from linked blocks, to a bar labeled with a number, to an unlabeled bar. Sliding to the right increases the degree of abstraction.





In App User's Guide

Tapping the Info icon brings up the Hands-On Math User's Guide. The guide provides a quick overview to the features of the app. It serves as a quick reference to the use of the product.



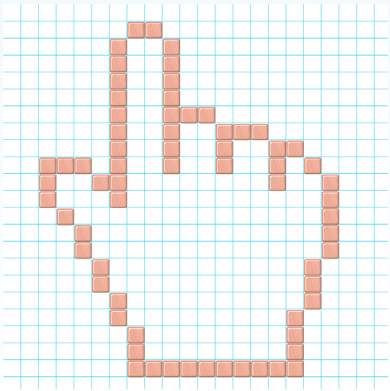
Users can navigate by tapping either the right or left arrows. Swiping right or left can also be used to move to the next page or previous page.

Exit the user's guide by tapping the home icon.

Next Page - Tap this icon to move to the next page.

Previous Page - Tap this icon to move to the next page.

Home - Tap this icon to exit from the User's Guide.



Number Sense Playground

The Number Sense Playground is where the fun begins. Tap the green arrow to get started. You will notice at the top right corner of the screen three large buttons.

Three Modes

Whole Numbers

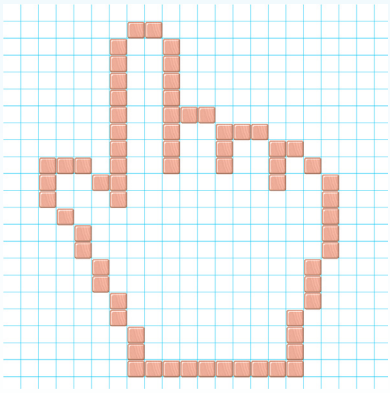
Tap this icon to select whole Number Bars. When this icon is tapped the playground is reset. Whole Number Bars can not be combined with either fraction or decimal bars. The way in which the whole Number Bars are displayed is controlled by the settings. Three options are provided, blocks, bars with numbers and bars without numbers.

Fractions

This icon is used to select the fraction mode. If the previous mode was whole numbers any numbers bars left on the playground will be removed, but if the previous mode was decimals, then the bars are left on the playground for instructional purposes.

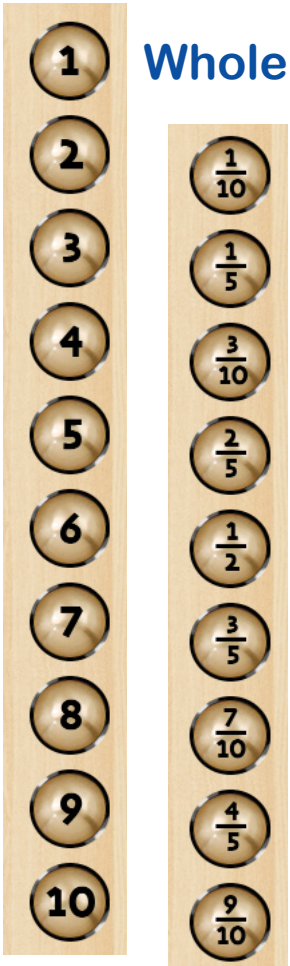
Decimals

This icon is used to select the decimal mode. As in the fractions option, if the previous mode was whole numbers any numbers bars left on the playground will be removed, but if the previous mode was fractions, then the bars are left on the playground for instructional purposes.



Adding Number Bars to the Playground

A column of buttons is shown on the left side of the screen. Tap a button to add a Number Bar to the playground.

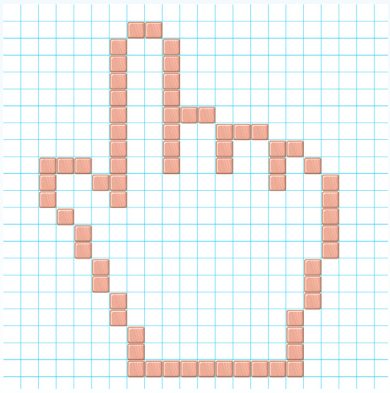


Whole Numbers

Fractions

Decimals

When all of the available Number Bars have been added to the playground, the column of buttons disappears. If one or more bars are removed from the playground, the column reappears.



Toggle Between Number Bar Mode and Pencil Mode

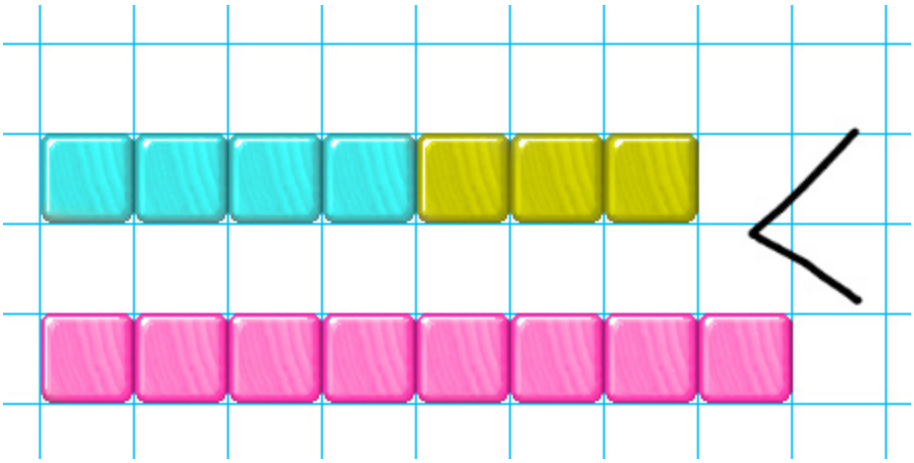
The Number Bars icon on the right side of the iPad screen designates the Number Bar mode. In this mode Number Bars can be added to the screen, manipulated or removed from the screen. However it may be instructionally beneficial from time to time to write on the screen. Switch to the pencil mode by tapping the Number Bar icon,

Number Bar Mode

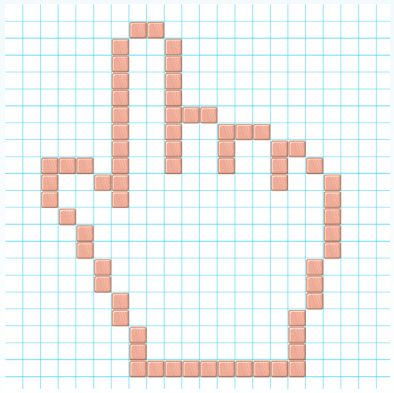
Tap this icon to switch between Number Bar Mode and Pencil Mode. In Number Bar Mode, the Number Bars can be moved, added or removed.

Pencil Mode

In Pencil Mode swiping with your finger causes a line to be drawn. Pencil Mode can be used to point out an interesting mathematical idea.



4+3<7

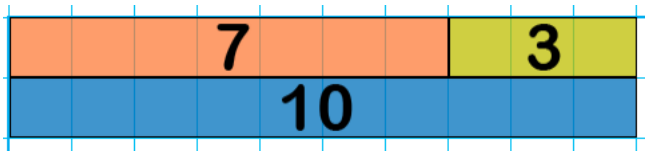


Eraser

In Number Bar Mode, tapping the eraser clears the playground of all the Number Bars. In Pencil Mode, tapping the eraser erases any writing but leaves the Number Bars.

The Number Pad

Tap the Number Pad icon to activate it. The Number Pad randomly generates problems to investigate using the Number Sense Playground. Depending on the mode setting, either whole numbers, fractions or decimals are used.



Entering an Answer

Use the key pad to enter an answer. Tap the red arrow to back up and remove a digit. Tap the green arrow to enter an answer.

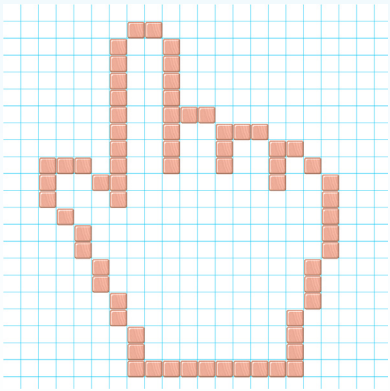
Positive affirmations are given when a correct answer is given and speech is activated. Incorrect answers result in a "Try again" message.

Moving the Number Pad

The position of the Number Pad can be changed by dragging the control icon.

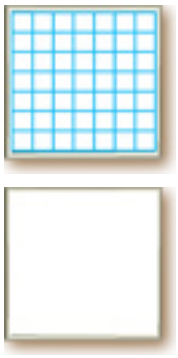
Closing the Number Pad

Tap the top left corner of the Number Pad to close it.



The Grid

Generally it will be most useful to display a grid as the background for the Number Sense Playground, but there may be times when teachers do not wish to show a grid. Tap the grid icon to change the background.



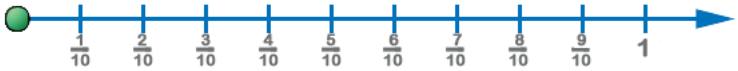
Tap the grid icon to change the background of the Number Sense Playground.

Number Line

Three different types of number lines can be displayed on the Number Sense Playground.

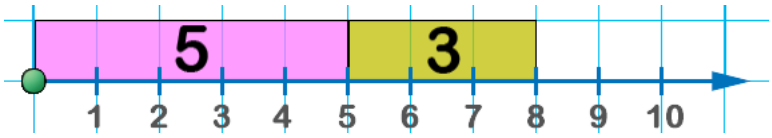
Whole Numbers

Fractions

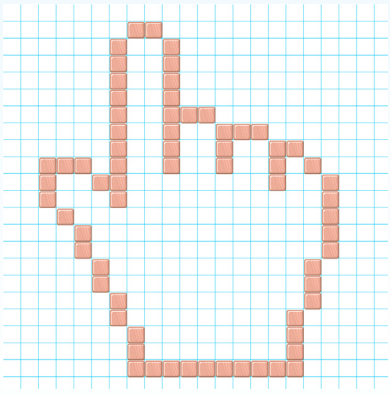


Decimals

Use the number line to show fundamental relationships.

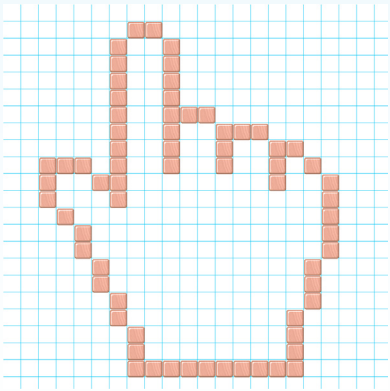


Notes



Some activities suggest that students use the iPad Notes App to record the results of their investigations.

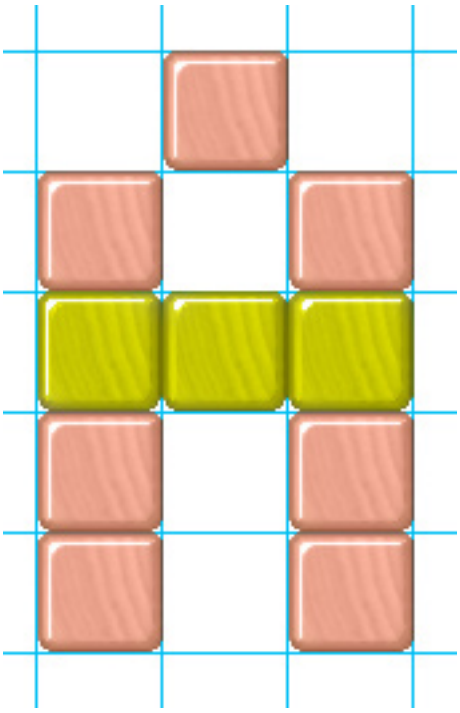
Activities



Letters of the Alphabet

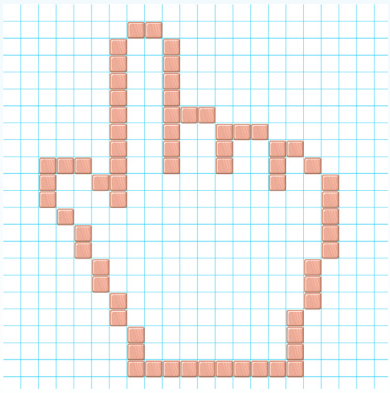
Early Learning Experience

Can you make the letters of the alphabet using the Number Bars? Here's an example for the letter A.



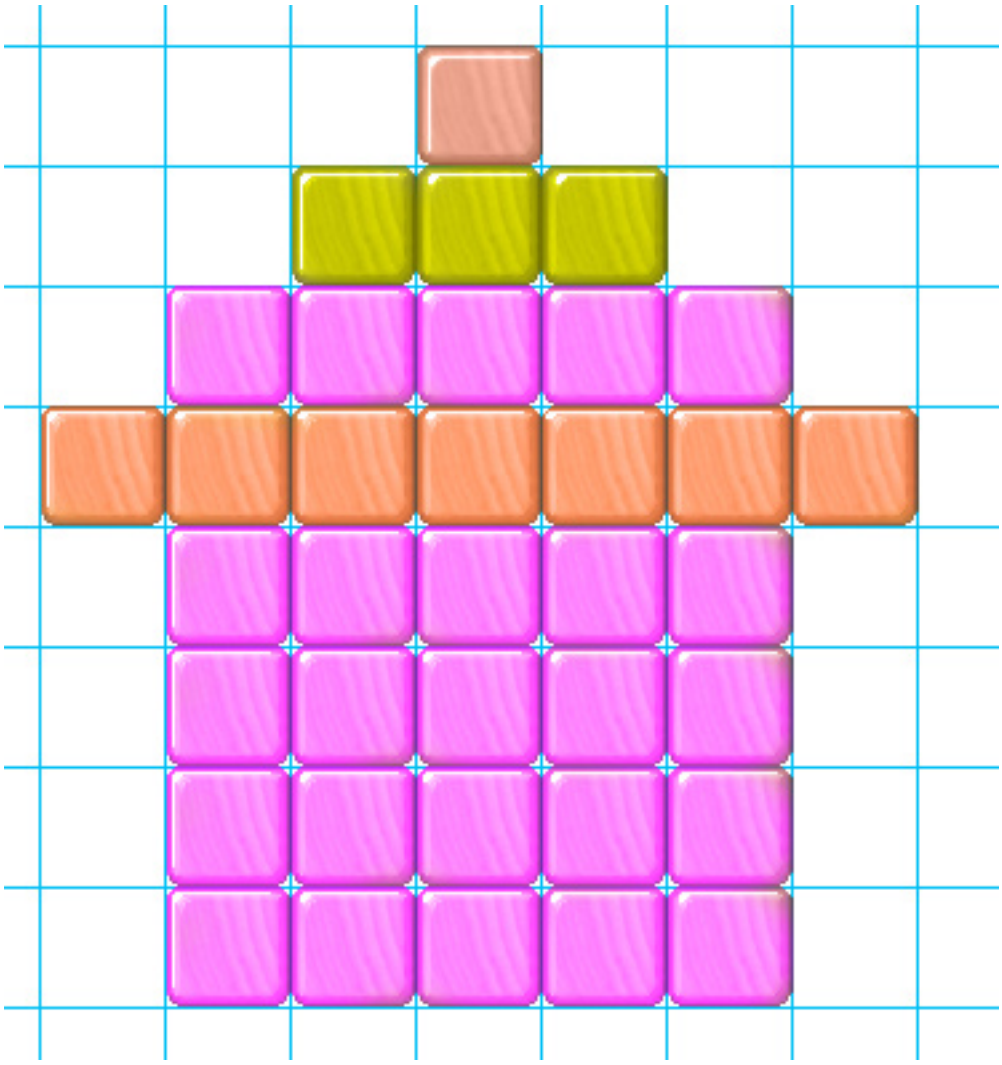
Investigation

1. How many Number Bars were used to make this letter?
2. Is this letter symmetrical?
3. How many Number Bars tall is this letter?
4. How many Number Bars wide is this letter?

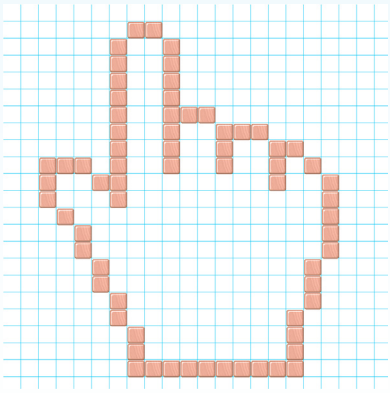


Let's Build a House!

Make a picture of a house using the Number Bars.

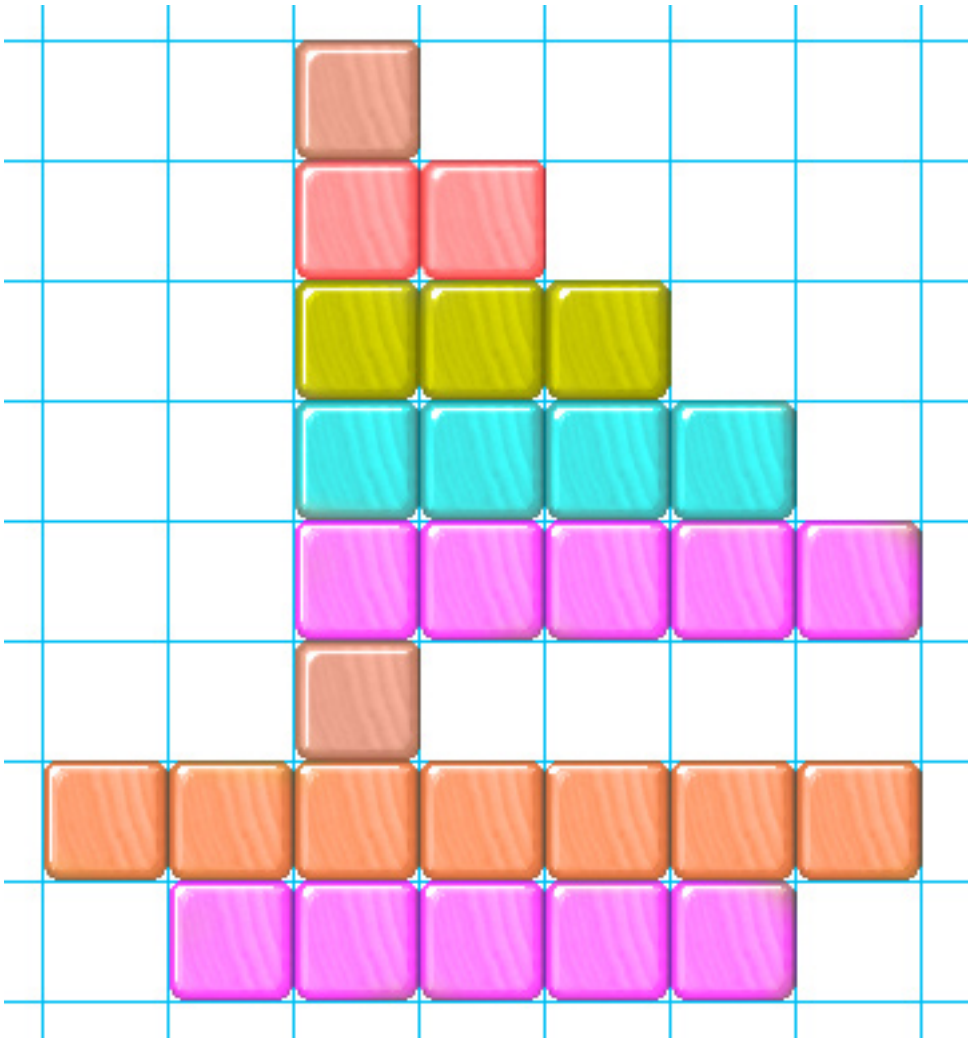


1. How many Number Bars were used to make the house?
2. How many Number Bars were used to make the roof?
3. Were more Number Bars used to make the house?



My Sailboat

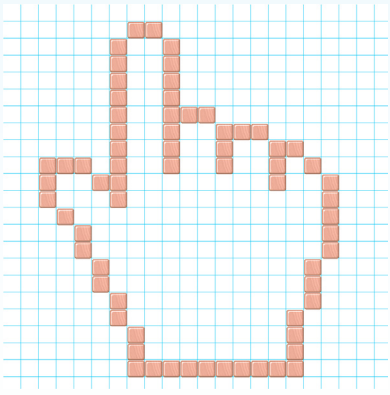
You can use the Number Bars to make a sailboat.



1. How long is your boat?

2. How many Number Bars were used to make the sail?

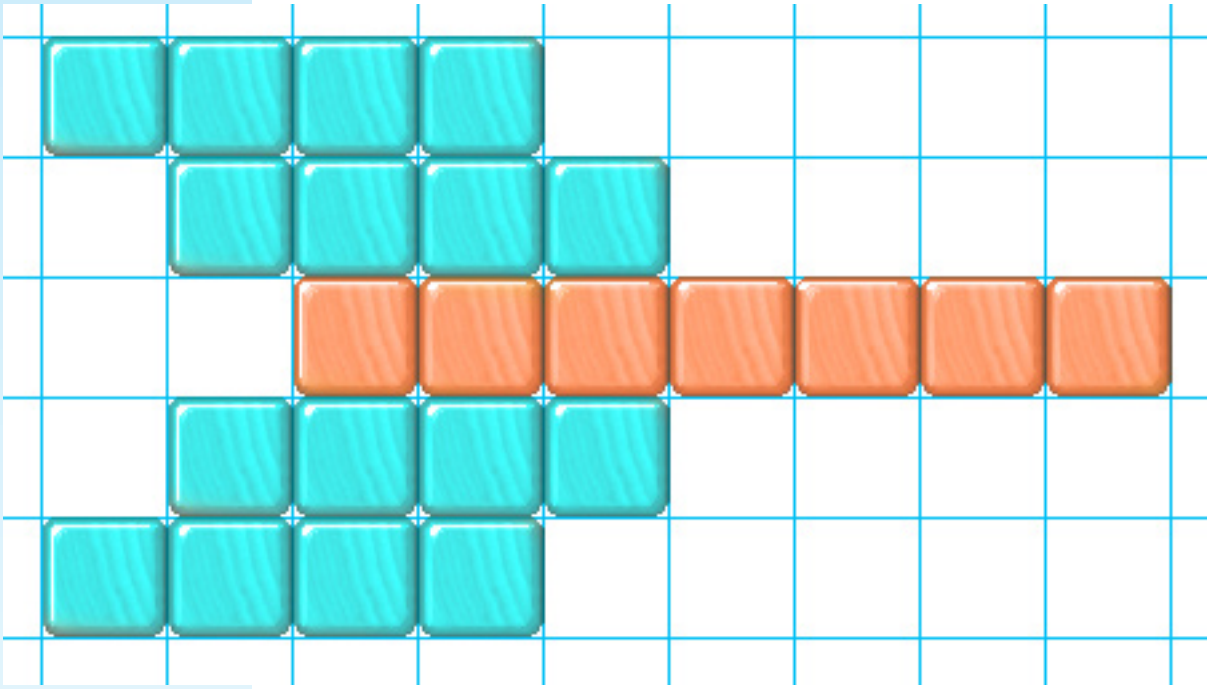
3. Is the length of your boat an odd number or an even number?



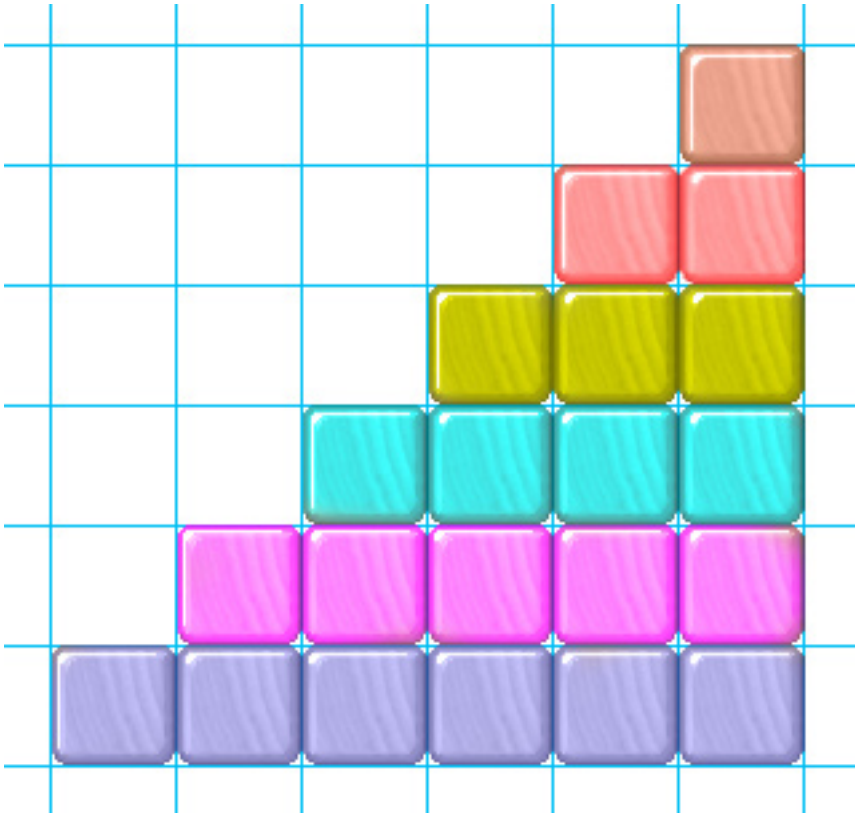
Can You Make This?

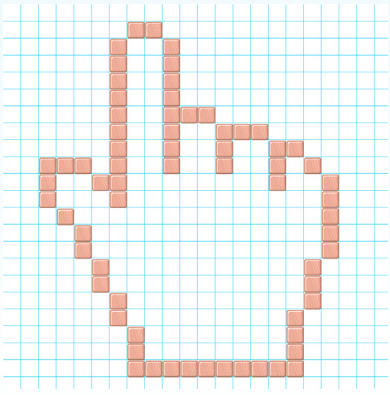
Can you make these pictures with Number Bars?

Spaceship

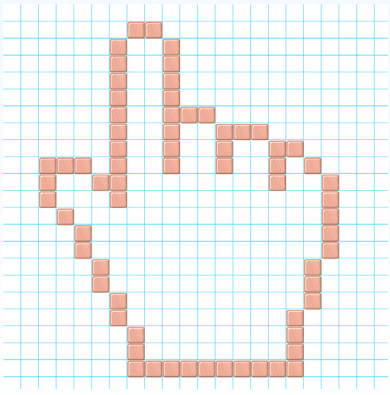


Stairs



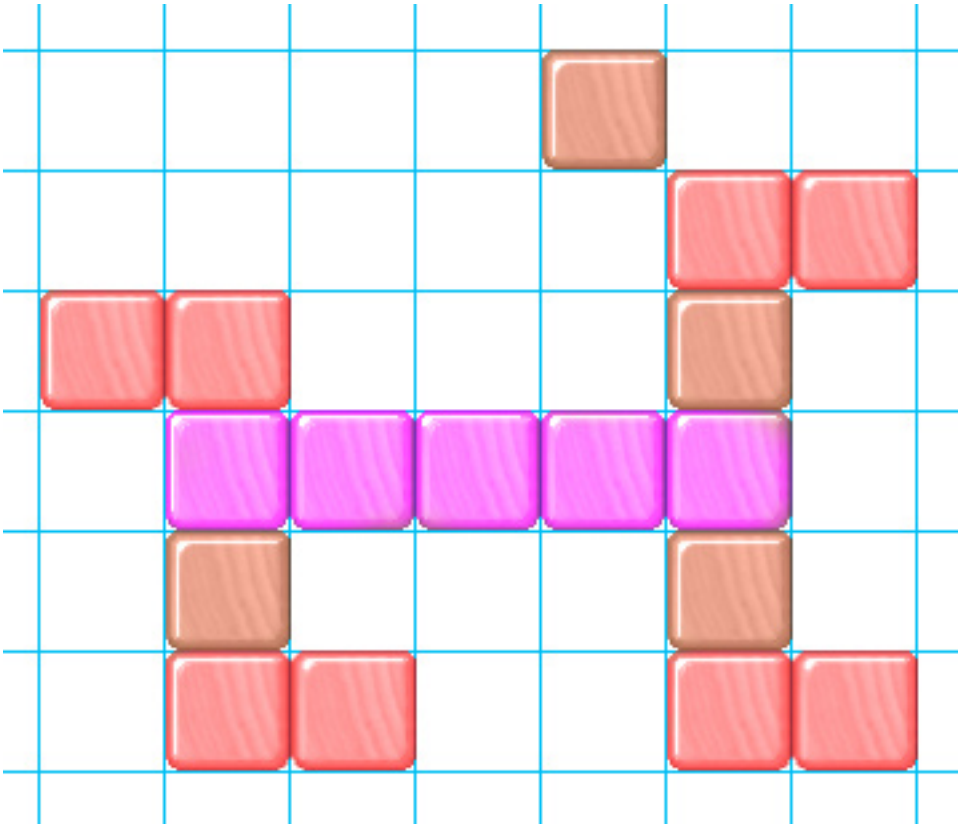


Can You Make This?

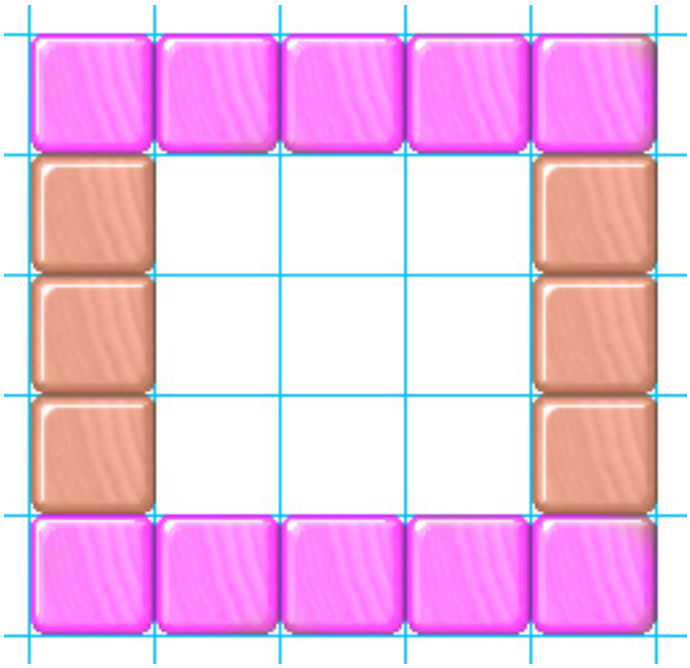


Can you make these pictures with Number Bars?

Puppy

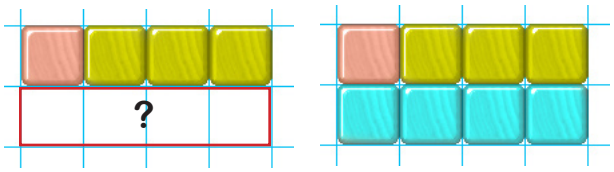


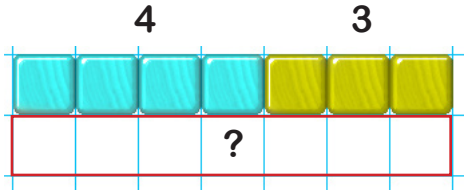
Square

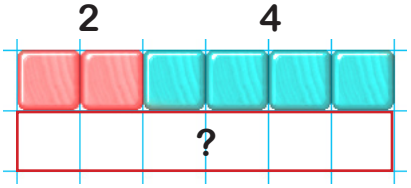


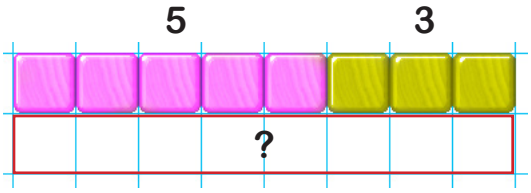
Early Learning Experience

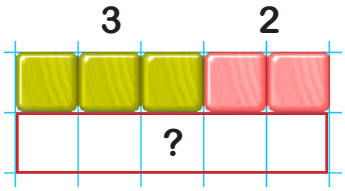
In this activity you will choose the two Number Bars given in the problem and move them to an open area on the Number Sense Playground. Your task is to find a Number Bar that is the same length as the two Number Bars given. Make notes to keep track of what you find out.

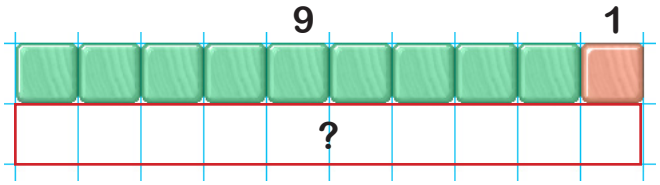


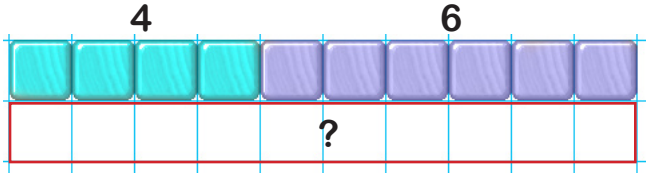
1. 

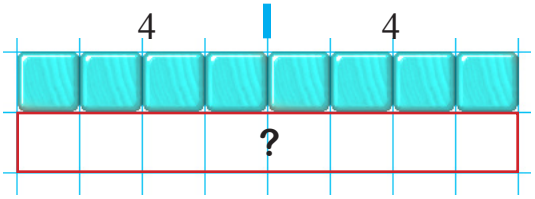
2. 

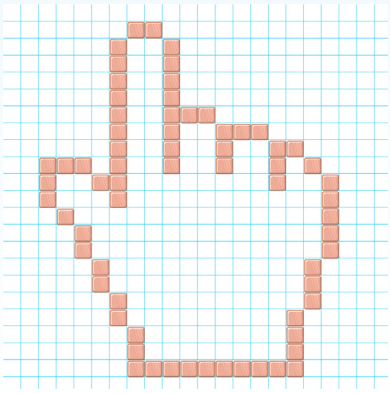
3. 

4. 

5. 

6. 

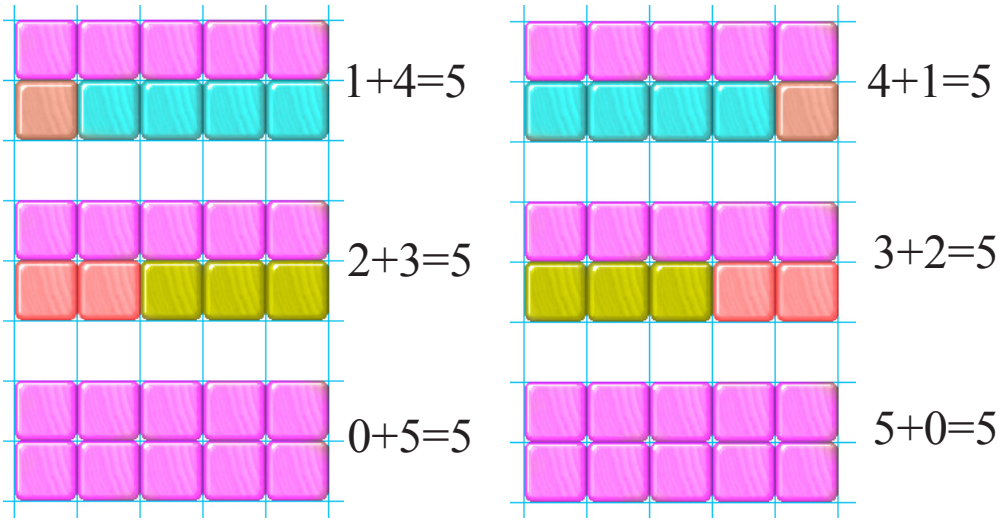
7. 



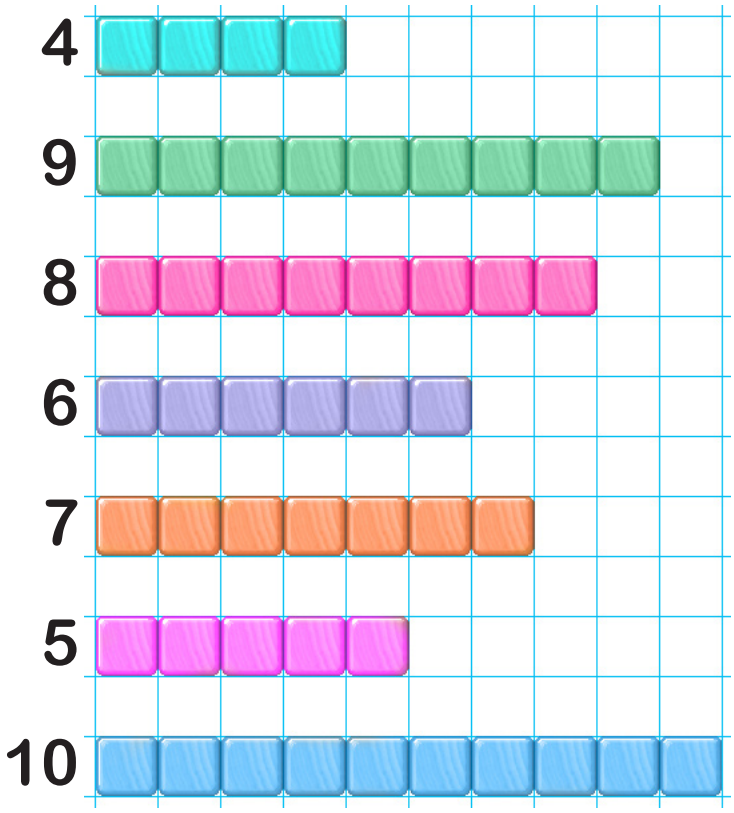
How Many Ways?

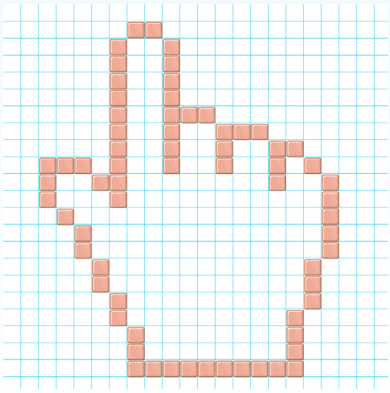
Investigation and Discovery

There are lots of ways to make a Number Bar train that is 5 units long. Look at all the examples below.



How many different ways can you make each of these numbers? Use the Number Sense Playground to experiment. Record your discoveries in your notebook.

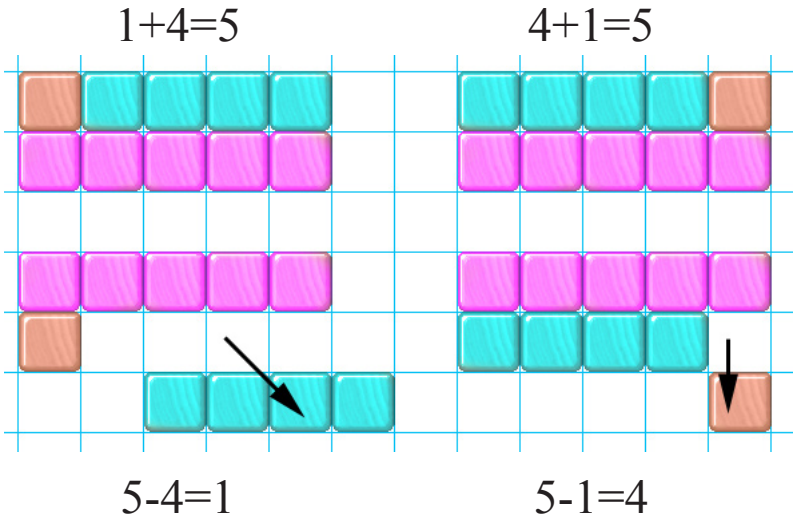




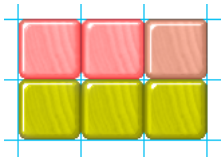
Fact Families

Investigation and Discovery

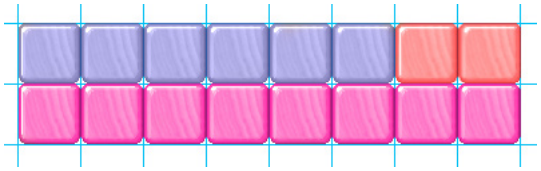
Did you know that numbers have families? A family is a set of facts that are related. Here is an example of a group of related facts.



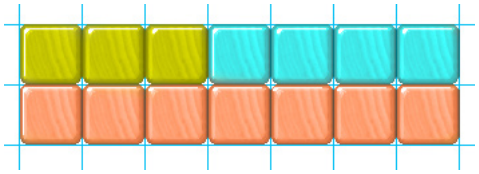
Use the Number Sense Playground to find a fact family for each of these examples. Record your discoveries in your notebook.



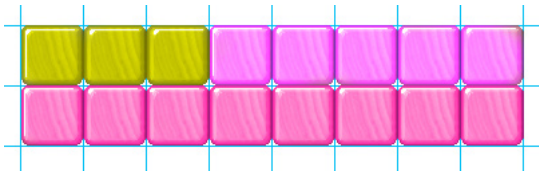
1+2=3



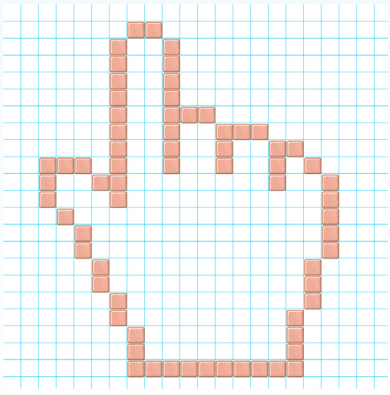
6+2=8



3+4=7



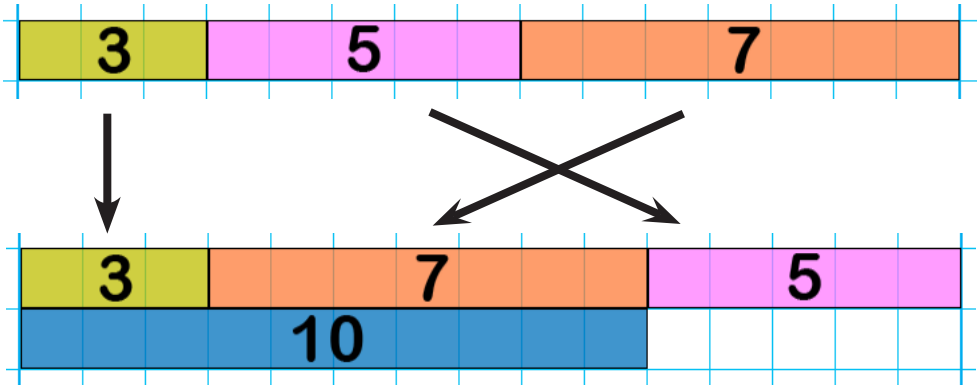
3+5=8



Make a Ten

Whenever you add a group of numbers it is easier to get the right answer if you look for a way to make a ten. Here is an example.

Suppose you want to add 3 + 5 + 7. Put a 3, 5, 7 and 10 on the Number Sense Playground.

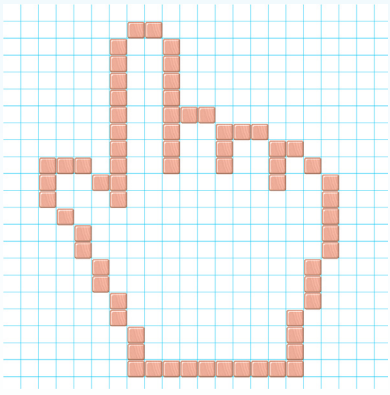


If you switch the position of the 5 and 7 Number Bars, then it is easy to see the 3 bar and the 7 bar make 10. The problem is easy: 10 + 5 = 15.

Use the Number Sense Playground to complete this activity. Follow these steps on each problem.

1. Place a 10 Number Bar in the middle of the screen.
2. Choose the three Number Bars given in each problem.
3. Move the Number Bars so that two of the bars are equal in length to the 10.
4. Write the total of the three Number Bars.
5. After each problem erase the playground and start again.

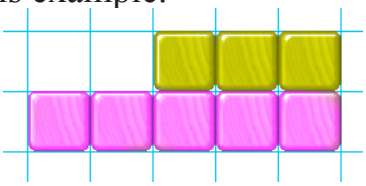
1. 3 + 2 + 7 = _____
2. 5 + 6 + 5 = _____
3. 4 + 2 + 6 = _____
4. 6 + 7 + 4 = _____
5. 9 + 4 + 1 = _____
6. 8 + 6 + 2 = _____
7. 4 + 7 + 6 = _____
8. 5 + 2 + 5 = _____
9. 3 + 6 + 7 = _____
10. 6 + 9 + 4 = _____



Number Bar Puzzles

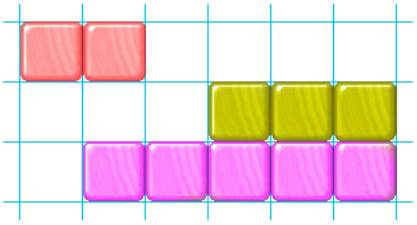
When you are using the Number Sense Playground you can make puzzles for yourself and others. Here is how.

1. Choose two different Number Bars and place them like this example.



□ + 3 = 5

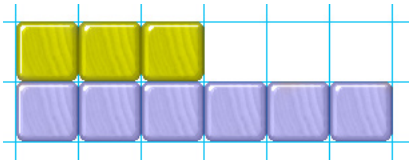
2. Write a number sentence to go with the two Number Bars you have selected.
3. Use a box to show the missing Number Bar.
4. Find the missing Number Bar and put it next to the shorter Number Bar.



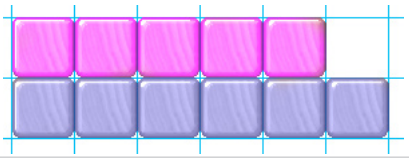
2 + 3 = 5

5. Write a number for the missing Number Bar in the box.

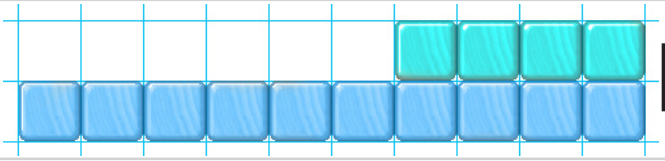
Find the missing number in these examples. Write a number sentence in your notebook showing the missing number.

1. 

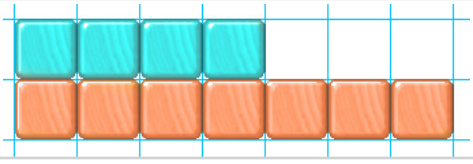
3 + □ = 6

2. 

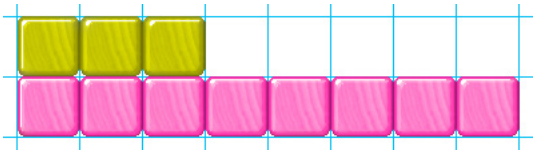
5 + □ = 6

3. 

□ + 3 = 10

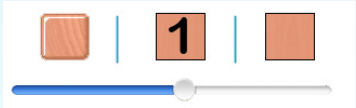
4. 

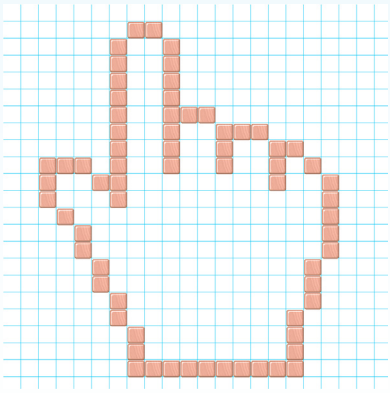
4 + □ = 7

5. 

3 + □ = 8

Remember: When working with whole numbers, the view can be changed in the settings.

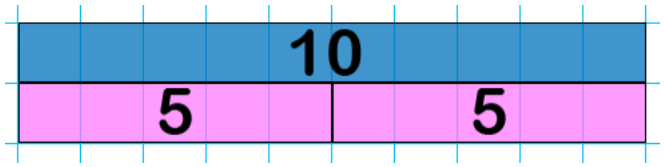




A Look at Multiplication

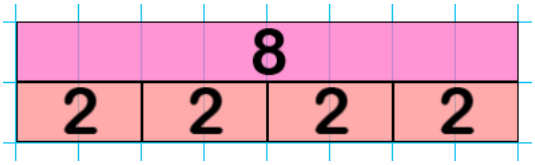
Investigation and Discovery

Use the Number Sense Playground to explore multiplication. Choose the Number Bar given in each problem. Find a different ways to make each number by repeating the same Number Bar. Write your discoveries in your notebook.



$5 \times 2 = 10$

$2 \times 4 = 8$



1. 

$\square \times \square = 9$

2. 

$\square \times \square = 8$

3. 

$\square \times \square = 6$

4. 

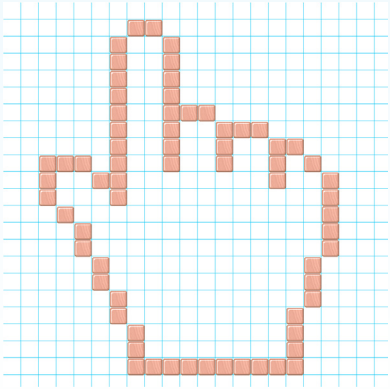
$\square \times \square = 4$

5. 

$\square \times \square = 6$

6. 

$\square \times \square = 12$



Many Ways to Make a Number

Investigation and Discovery

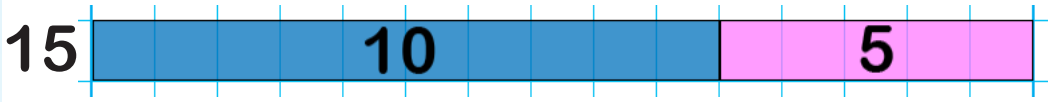
There are five ways to make a 12 by repeating the same Number Bar. Use the Number Sense Playground to investigate.

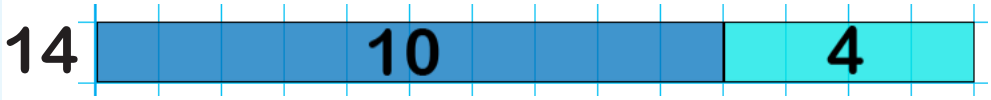
Here's one example.

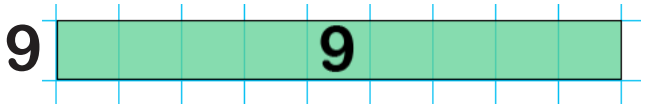
$$4 \times 3 = 12$$

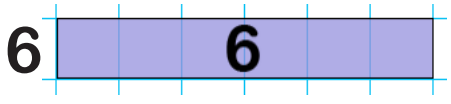
Can you find other ways to make a 12 by repeating the same Number Bar. Record in your notebook your discoveries.

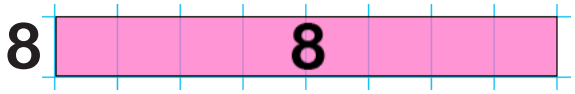
How many ways can you find to make these numbers? Record in your notebook your discoveries.

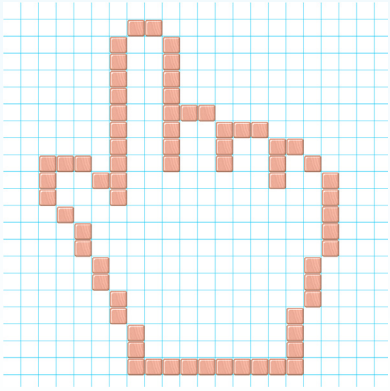






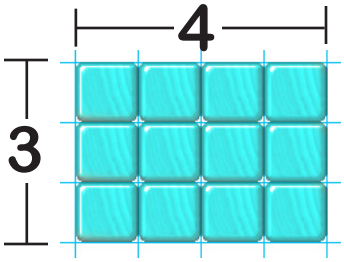






Making Rectangles

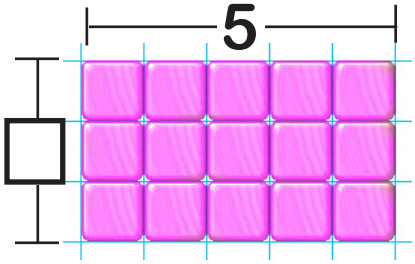
When Number Bars are placed like this, it is called a stack.



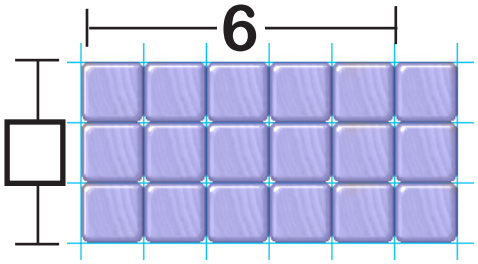
Three 4 bars were used to make this stack. The stack shows $3 \times 4 = 12$.

$$3 \times 4 = 12$$

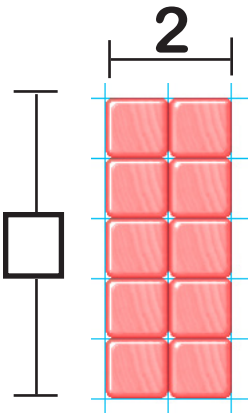
Use 5 bars to make a stack that shows 15. Write a multiplication fact in your notebook to go with the stack.



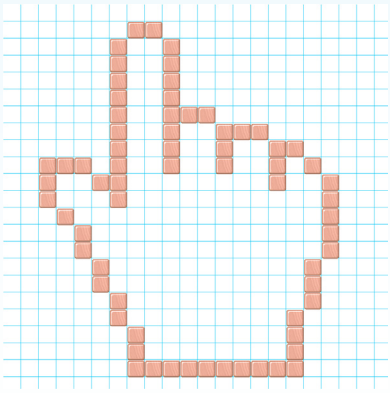
$\square \times 5 = 15$

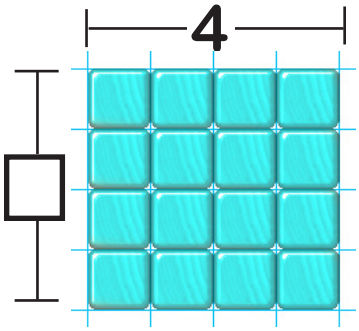


$\square \times 6 = 18$



$\square \times 2 = 10$



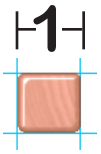


$\square \times 4 = 16$

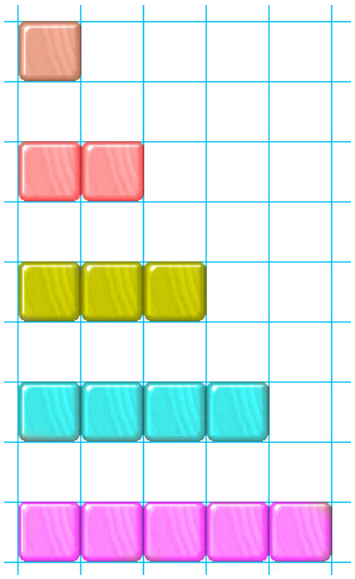
Making Rectangles

Exploring Perimeter

The distance around a figure is called the perimeter. The length of any side of the smallest Number Bar is 1 unit. The perimeter of this Number Bar is 4 units.



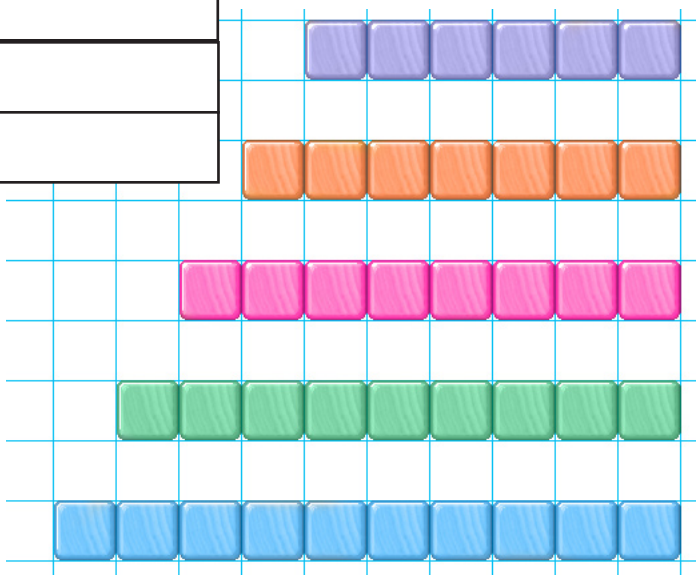
Note: *Each side of this Number Bar is 1 unit.*

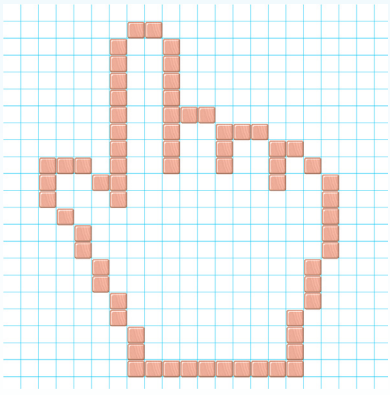


Number Bar	Perimeter
1	
2	
3	
4	
5	

Copy this chart in your notebook and write the perimeter of each number.

Number Bar	Perimeter
6	
7	
8	
9	
10	

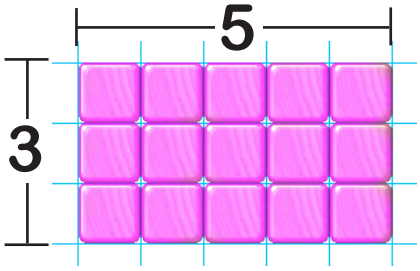




Making Rectangles

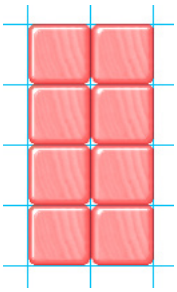
Finding Perimeter

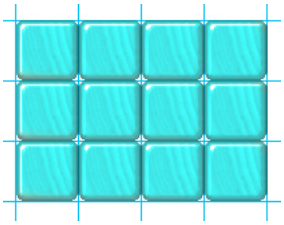
A figure with four sides and four right angles is a rectangle. The figure shown below is a rectangle. One way to find the perimeter of a rectangle is to add the lengths of each of the sides.

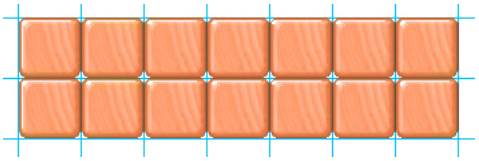


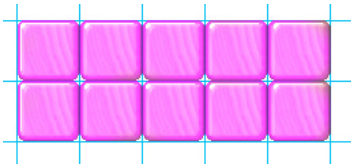
3 + 5 + 3 + 5 = 16

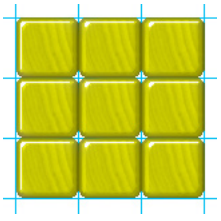
Find the perimeter of these figures and write the answers in your notebook.

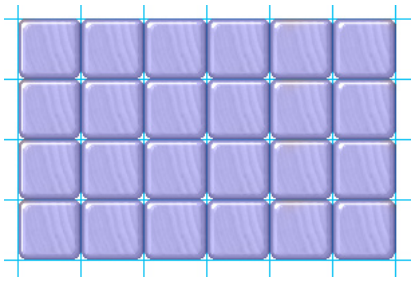
1. 

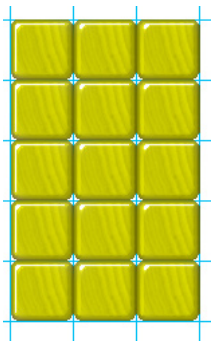
2. 

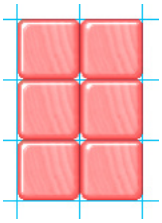
3. 

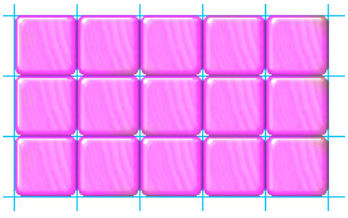
4. 

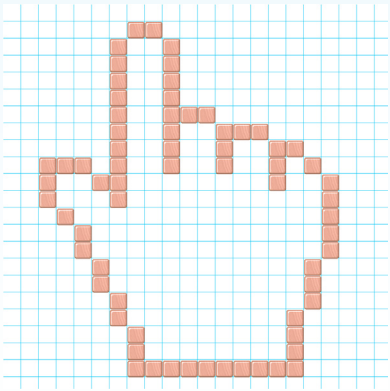
5. 

6. 

7. 

8. 

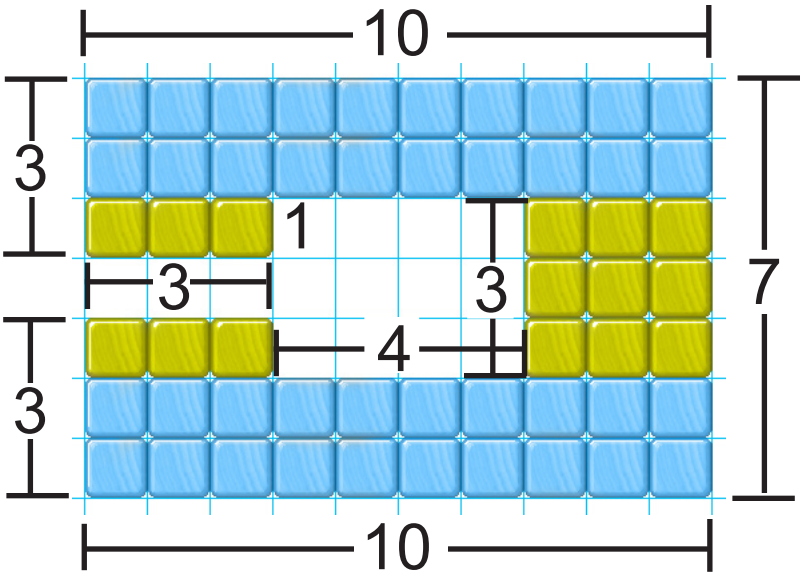
9. 



Finding Perimeters of Irregular Figures

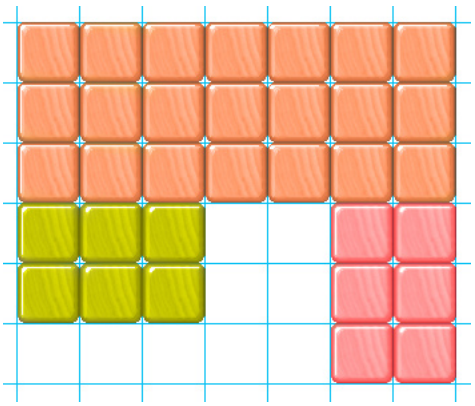
Practice Finding Perimeter

Make each of these figures using the Number Sense Playground. Count the length of each side and find the perimeter.



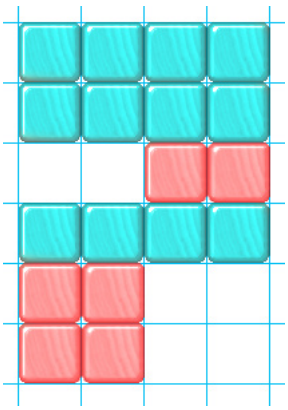
Number of sides = 12
Perimeter = 52

1.



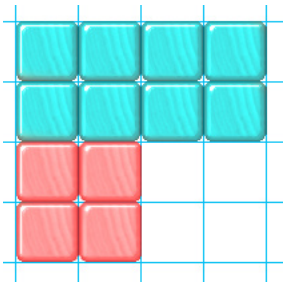
Number of sides = ___
Perimeter = ___

3.



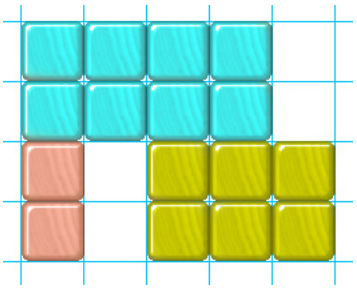
Number of sides = ___
Perimeter = ___

2.

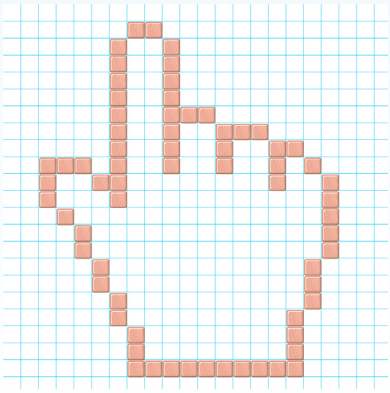


Number of sides = ___
Perimeter = ___

4.

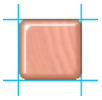


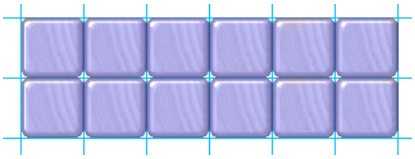
Number of sides = ___
Perimeter = ___



Finding the Area of Rectangles

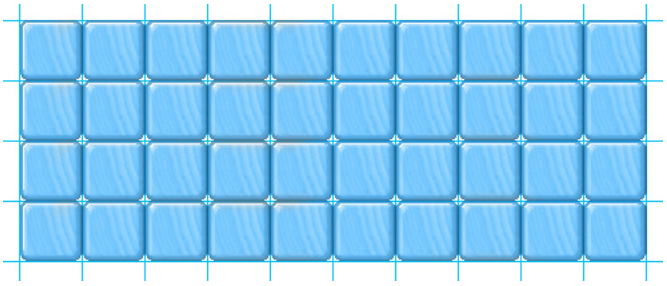
Use the Number Sense Playground to learn about the area of rectangles. Use a grid background for this activity.

 =1 square unit



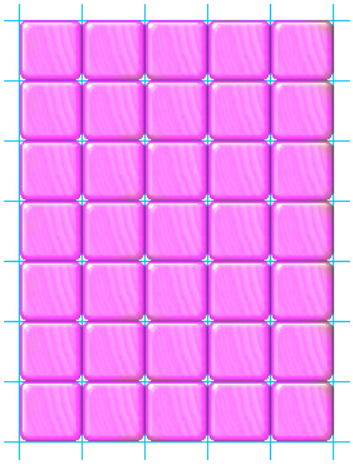
The area of this figure is 12 square units.

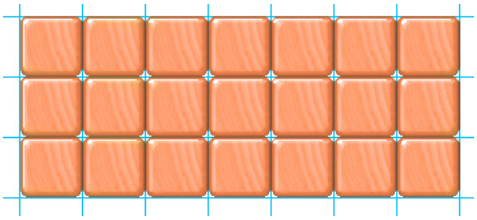
How many square units is this area?

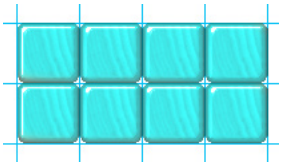


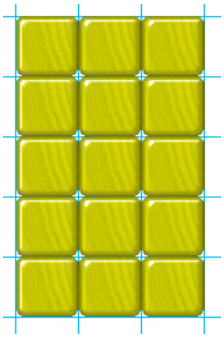
The length of this figure is 10 units and the width is 4. The area of the figure is 10 units × 4 units or 40 square units

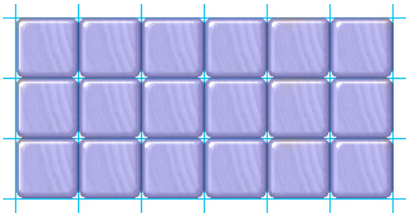
Make these figures on the Number Sense Playground. Write the area of the figure in your notebook.

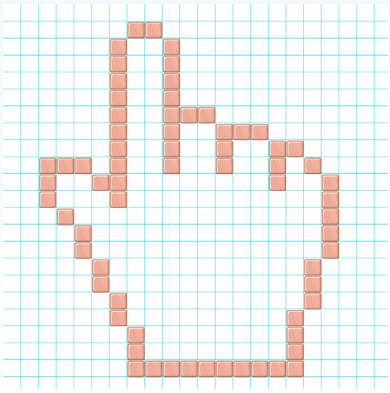
1. 

3. 

4. 

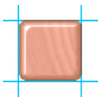
2. 

5. 



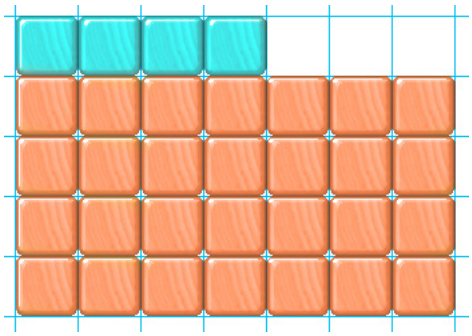
Finding the Area of Rectangles

Use the Number Sense Playground to learn about the area of rectangles. Use a grid background for this activity.

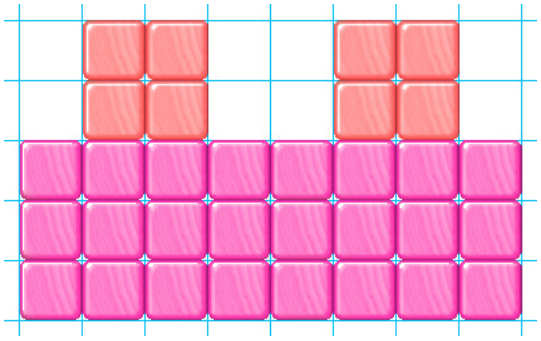
 =1 square unit

Make these figures on the Number Sense Playground. Write the area of the figure in your notebook.

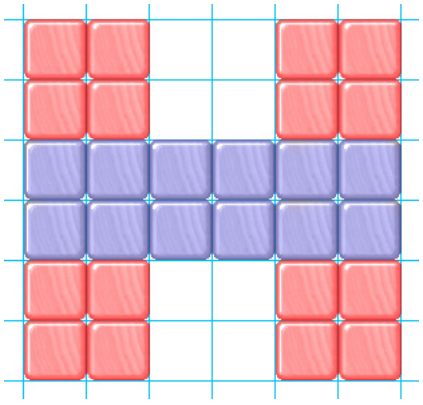
1.



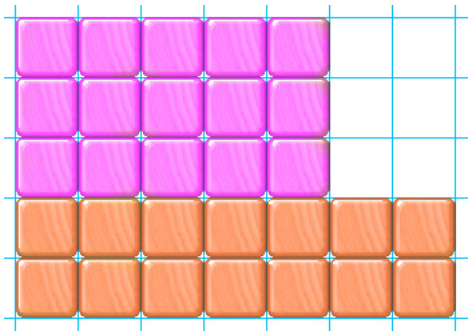
2.



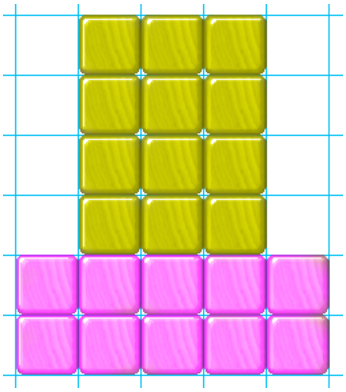
3.



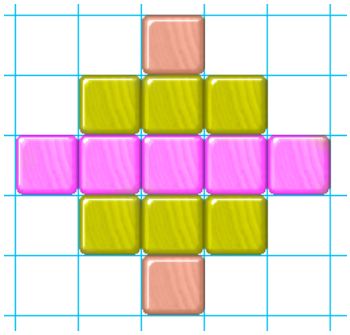
4.



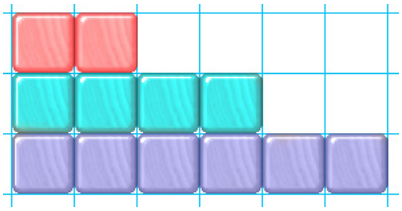
6.



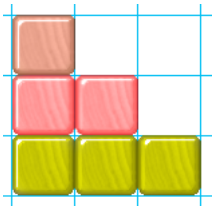
7.



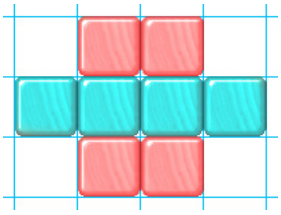
8.

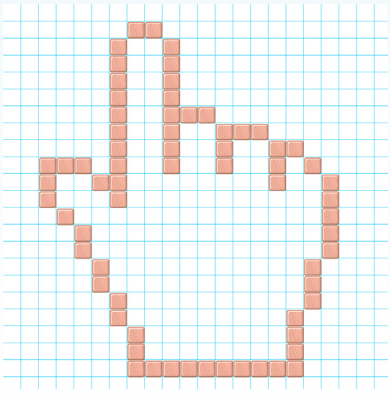


9.



10.





Least Common Multiple (LCM)

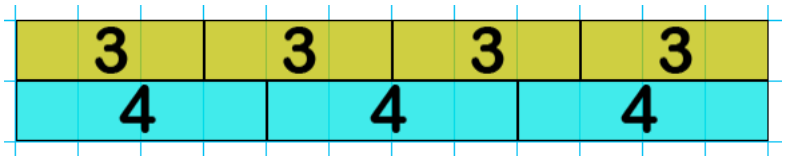
Exploring New Ideas

The Least Common Multiple (LCM) is the smallest number that is a multiple of two numbers. In this activity you will use the Number Sense Playground to find the LCM of two numbers. Use the grid background for this activity.

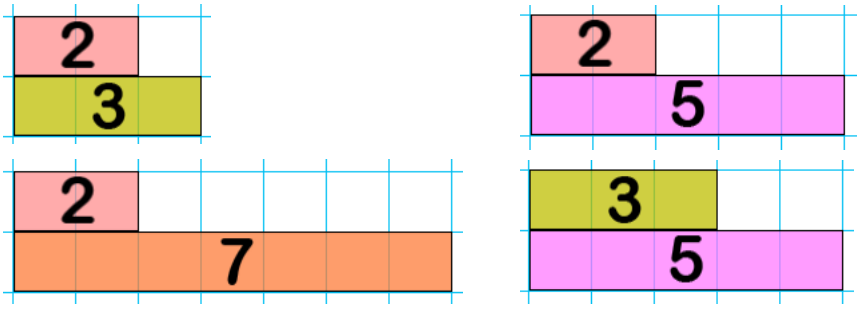
Numbers	Multiples
2	2, 4, 6, 8, 10, 12, 14 ...
3	3, 6, 9, 12, 15, 18, 21 ...

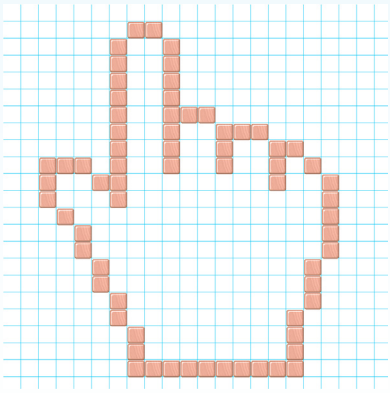
Study the list of multiples. The first number that occurs in both sets is 6. Six is the LCM of 2 and 3. Here is how to find the LCM of 3 and 4 by building trains of the same Number Bar.

1. Place a 3 Number Bar and a 4 Number Bar on the left side of the playground.
2. The 3 Number Bar is shorter so add a 3 bar to the train.
3. Now the 4 Number Bar is shorter so add a 4 bar to the train.
4. Again the train of 3 bars is shorter so add another three bar.
5. Check the train of 4 bars. It is shorter so add a 4 bar to the train.
6. Again check the three bar train. Add a 3 bar. Now the trains are the same length.



How long is each train? Since each train is 12 units long, the LCM for 3 and 4 is 12. Use this method to find the LCM for these numbers. Write your answers in your notebook.

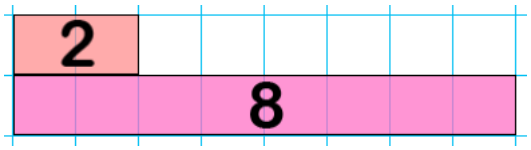


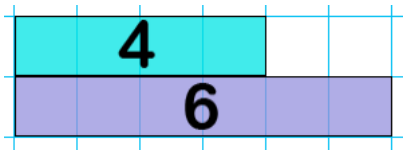


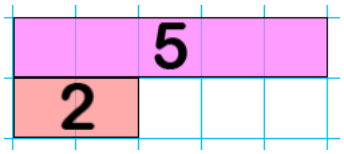
Least Common Multiple (LCM)

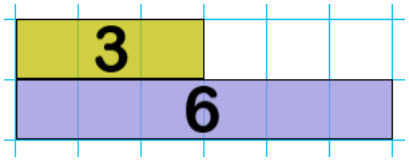
Finding LCM with Number Bar Trains

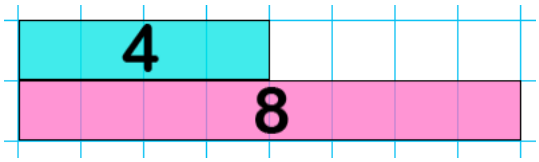
Use the Number Sense Playground to make trains using multiples of the numbers given. Practice the train method for finding the LCM. Record your answers in your notepad.

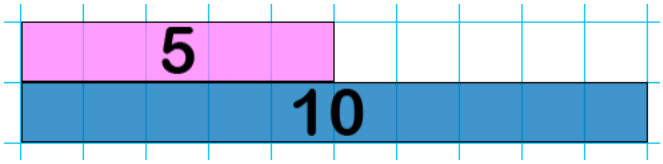
1. 

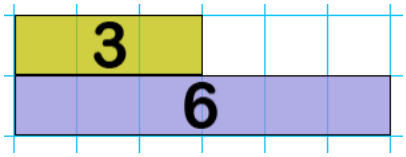
2. 

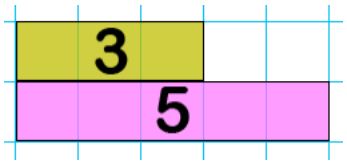
3. 

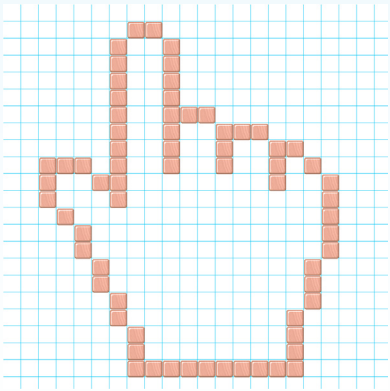
4. 

5. 

6. 

7. 

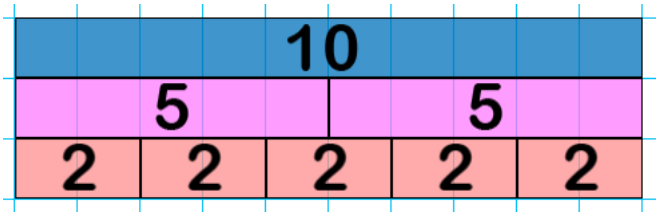
8. 



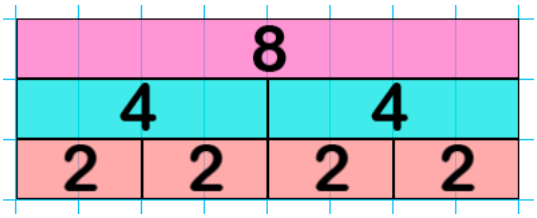
Greatest Common Factor (GCF)

Exploring New Ideas

The Great Common Factor (GCF) is the largest number that is a factor of two other numbers. Here is a method using Number Bars that will find the GCF for 10 and 8.



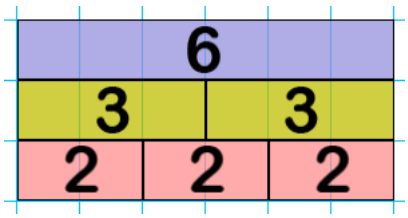
Factors: 5 and 2.

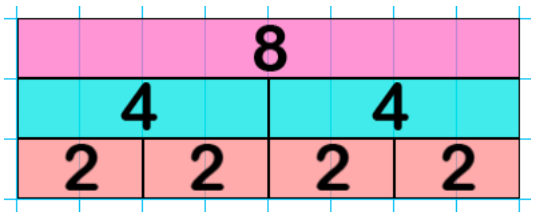


Factors: 4 and 2.

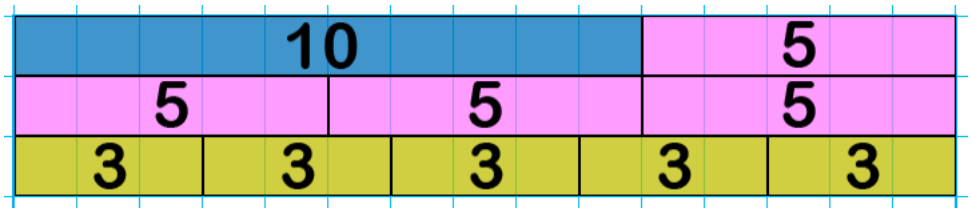
The largest number that appears in both sets is 2.

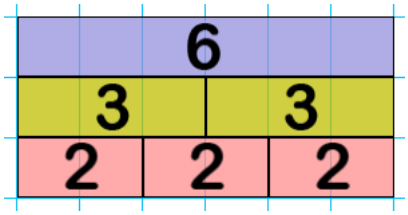
Use the Number Sense Playground to find the GCF for these numbers.



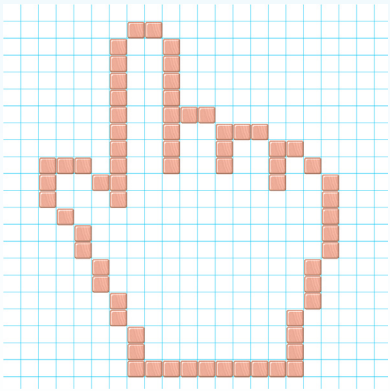


6 and 8, GCF = _____





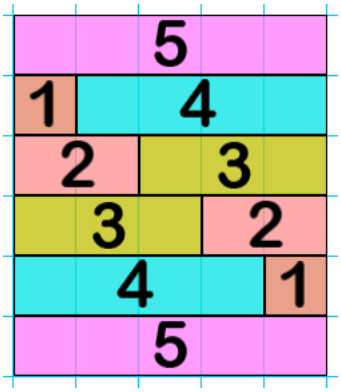
15 and 6, GCF = _____



Graph of a Line

Exploring New Ideas

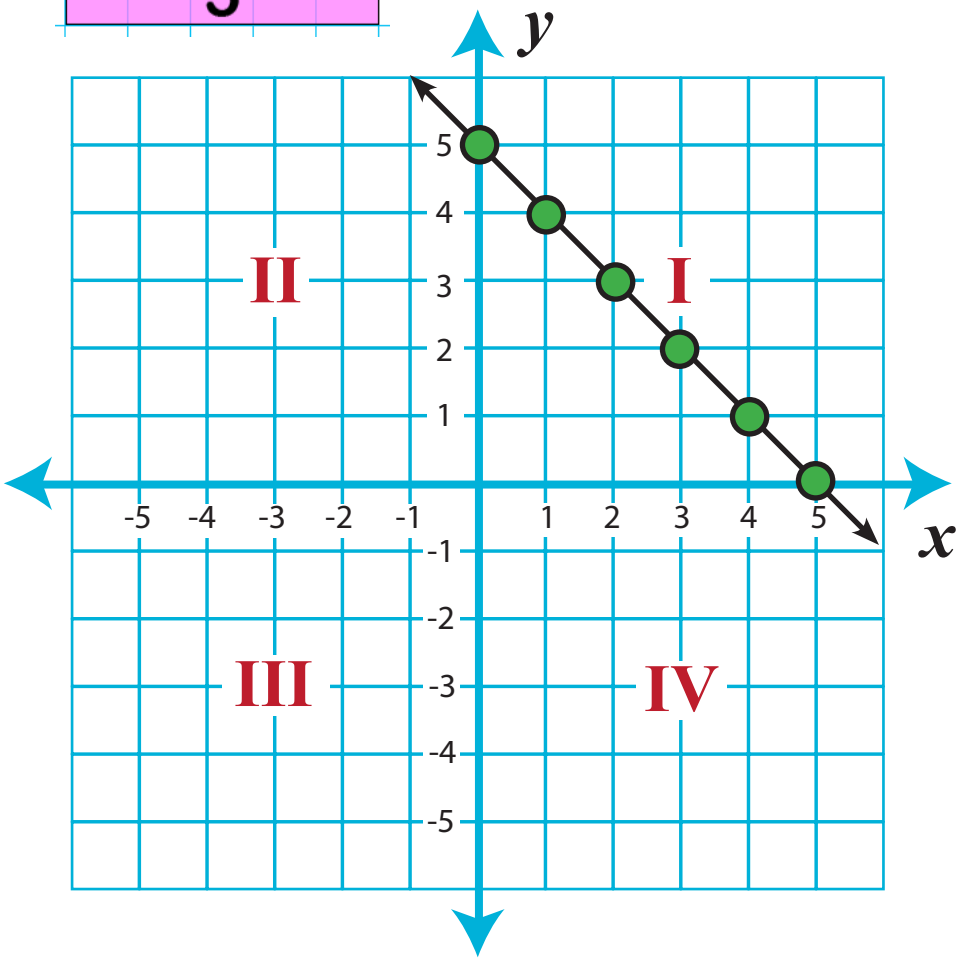
For this activity you will need graph paper. Use the Number Sense Playground. The example below shows how a student found that there are many ways to put Number Bars together to make a train equal to 5.

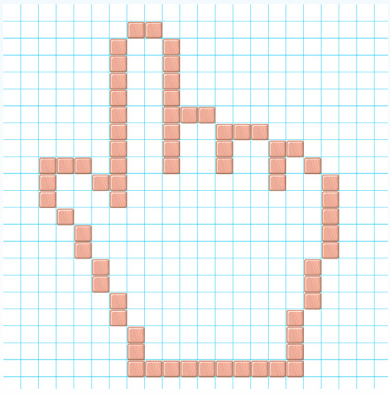


$x + y = 5$

$0 + 5 = 5$
$1 + 4 = 5$
$2 + 3 = 5$
$3 + 2 = 5$
$4 + 1 = 5$
$5 + 0 = 5$

x	y
0	5
1	4
2	3
3	2
4	1
5	0



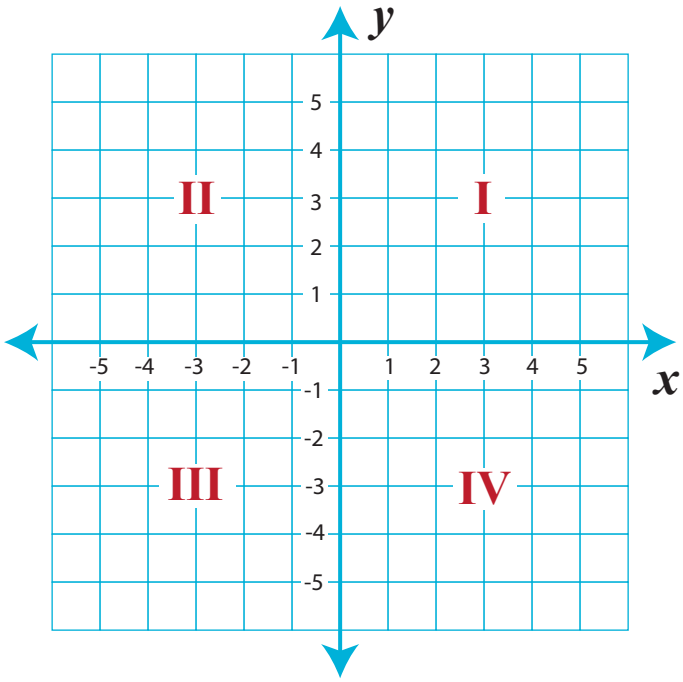


Make a table and graph the solution for each equation.

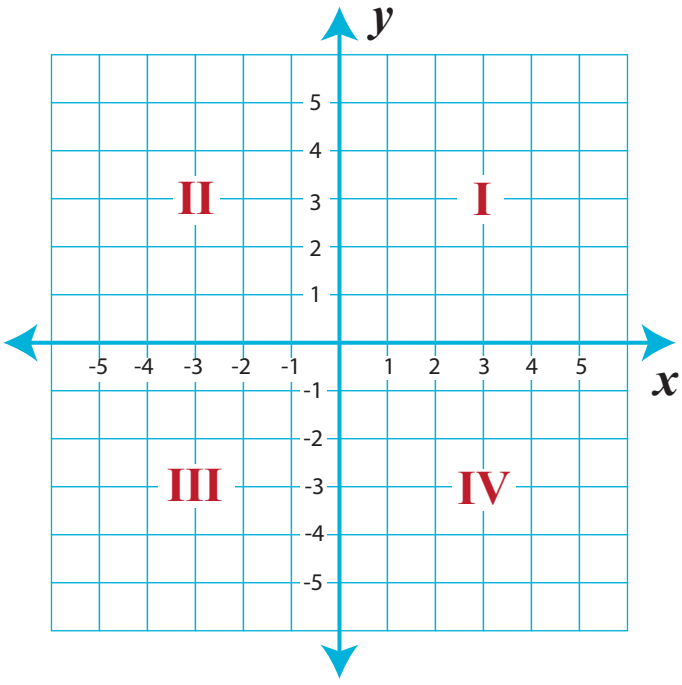
1. $x + y = 2$
2. $x + y = 3$
3. $x + y = 5$
4. $x + y = 6$
5. $x + y = 9$
6. $x + y = 8$

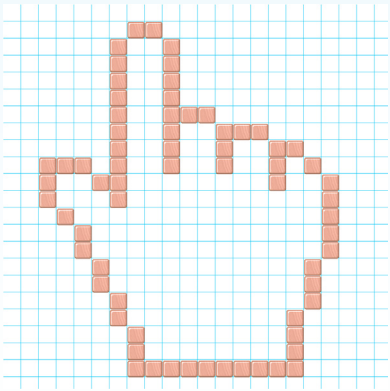
Print this page to complete the graphing activities on page 38.

x	y



x	y



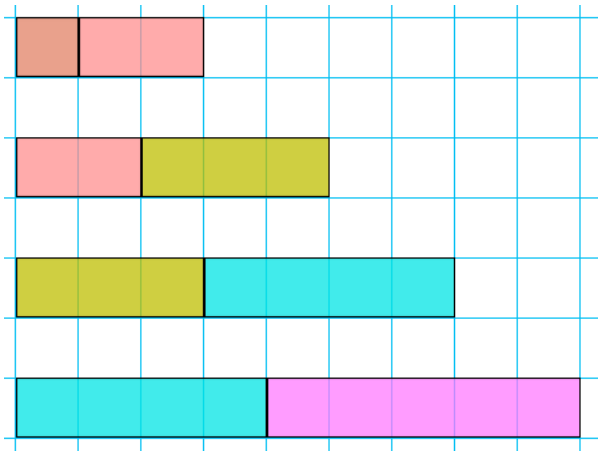


Number Patterns

Visualizing Mathematics

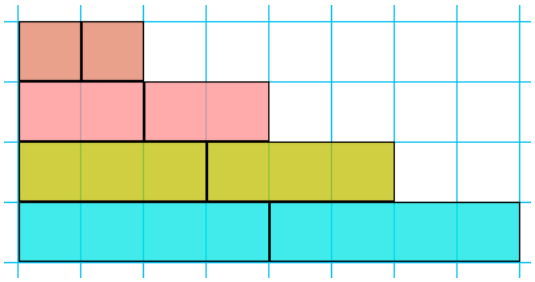
Use the Number Sense Playground to create visual representations of patterns. Copy the tables in your notebook. Complete the patterns by filling in the missing numbers:

1.



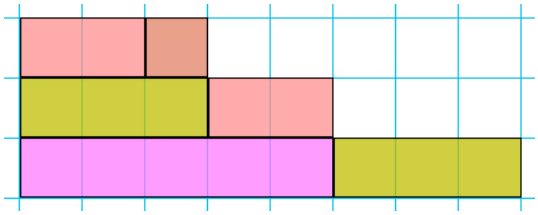
1 + 2	3
2 + 3	5
3 + 4	7
4 + 5	

2.



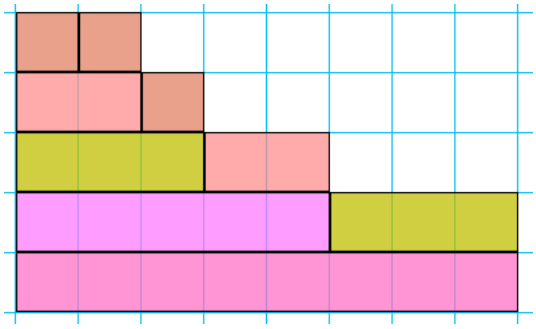
1 + 1	2
2 + 2	4
3 + 3	6
4 + 4	

3.

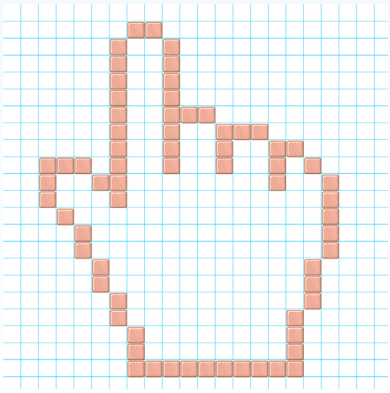


2 + 1	3
3 + 2	5
5 + 3	8
8 + ?	

4.



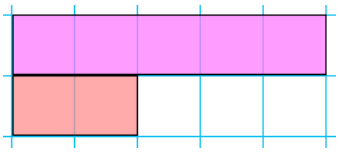
1 + 1	2
1 + 2	3
2 + 3	5
3 + 5	



Subtraction Facts

Building Basic Skills

Use the Number Sense Playground to represent subtraction. Here is an example.



5 – 2 = 3

Place Number Bars on the playground as shown below. Write a subtraction fact for each example in your notebook.

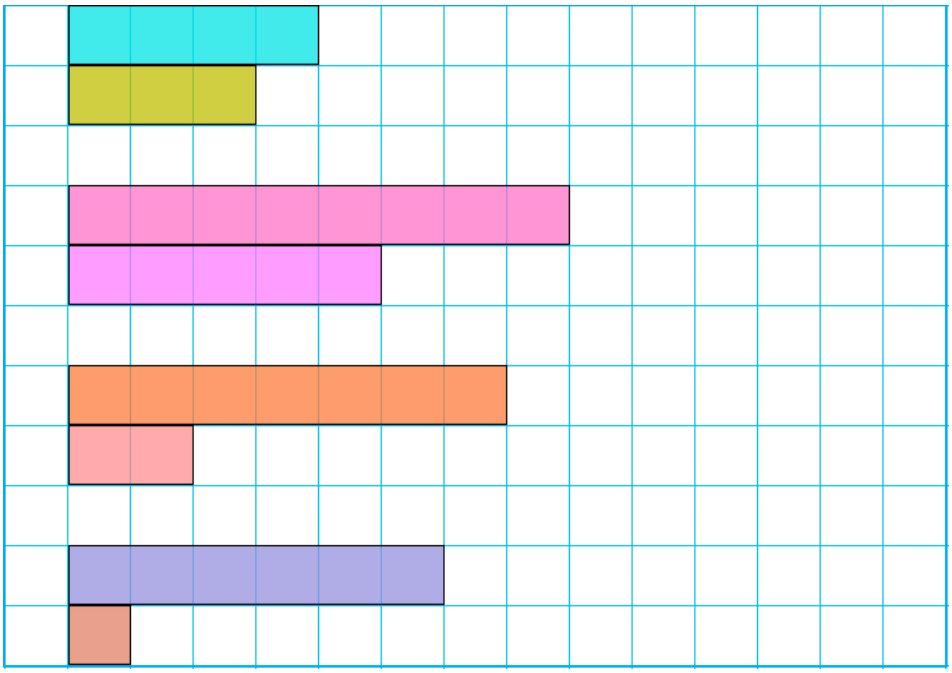
Set 1

1.

2.

3.

4.



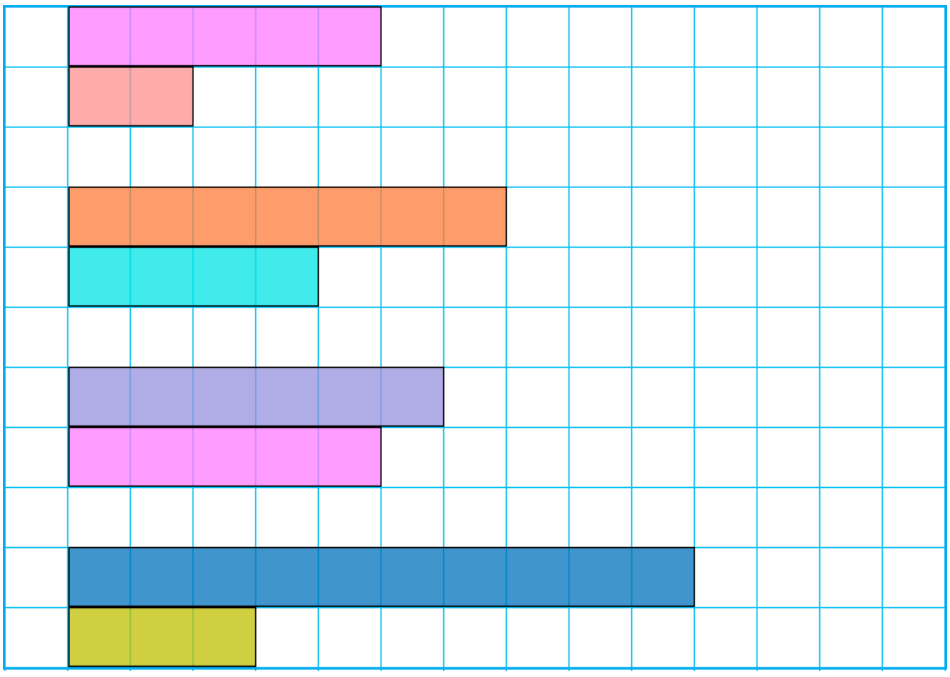
Set 2

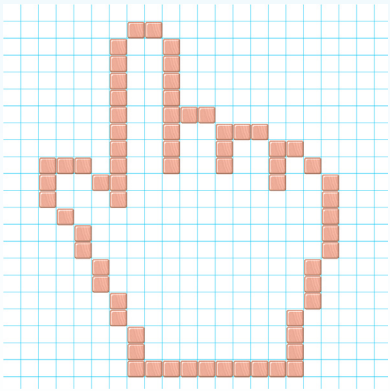
1.

2.

3.

4.



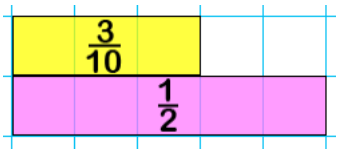


Comparing Fractions

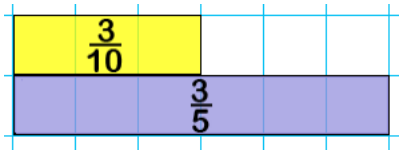
Using Comparison Symbols

Use the Number Sense Playground to compare these fractions. In your notebook write the fractions and a comparison symbol to show the relationship between the fractions.

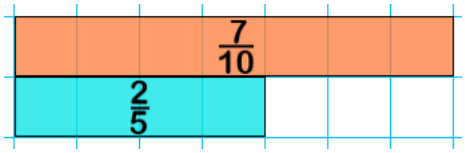
Comparison Symbols		
<	>	=
Less Than	Greater Than	Equal To



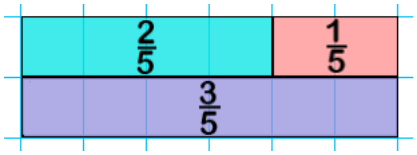
$\frac{3}{10} < \frac{1}{2}$

1. 

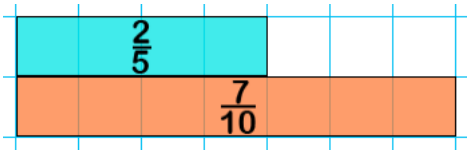
$\frac{3}{10} \bigcirc \frac{3}{5}$

2. 

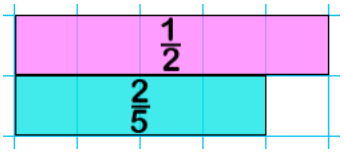
$\frac{3}{10} \bigcirc \frac{3}{5}$

3. 

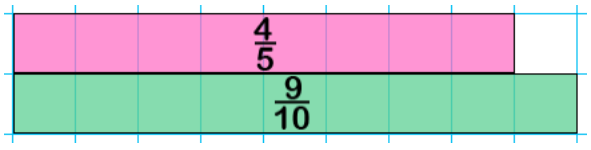
$\frac{2}{5} + \frac{1}{5} \bigcirc \frac{3}{5}$

4. 

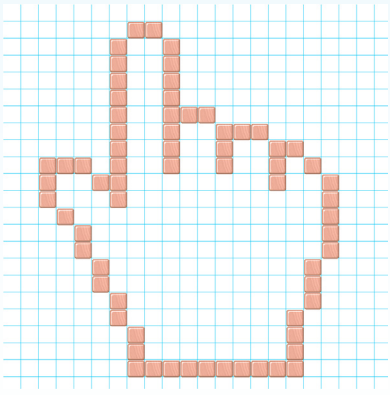
$\frac{2}{5} \bigcirc \frac{7}{10}$

5. 

$\frac{1}{2} \bigcirc \frac{2}{5}$

6. 

$\frac{4}{5} \bigcirc \frac{9}{10}$

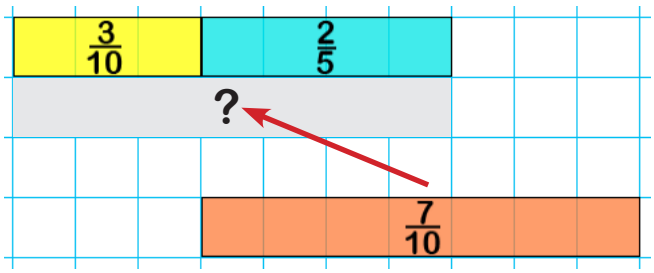


Adding Fractions

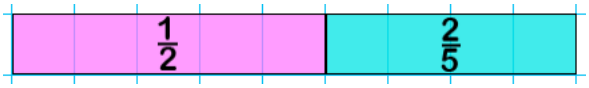
Building Basic Skills

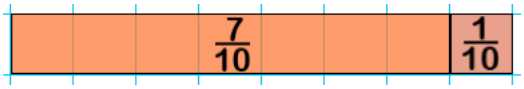
Use the Number Sense Playground to find the sum of two fractions. Write your answers in your notebook. Here is an example.

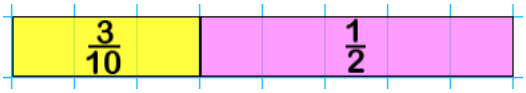
Find the sum.

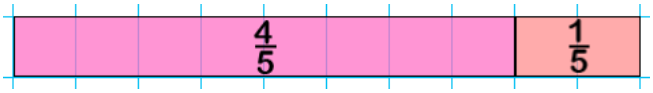


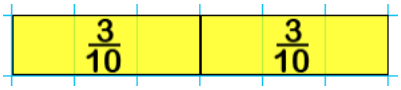
$$\frac{3}{10}+\frac{2}{5}=\frac{7}{10}$$

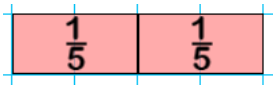
1. 

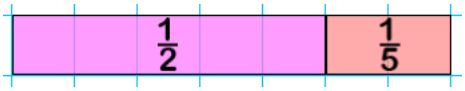
2. 

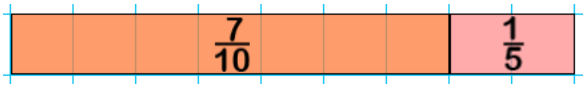
3. 

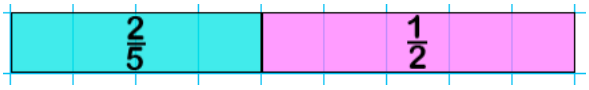
4. 

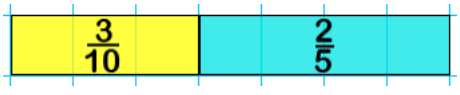
5. 

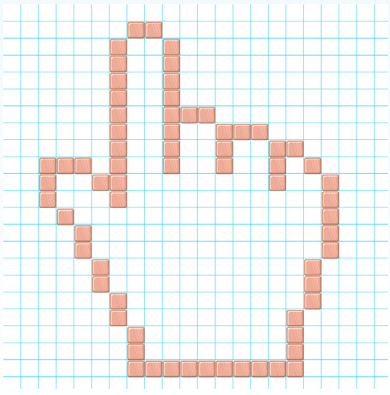
6. 

7. 

8. 

9. 

10. 

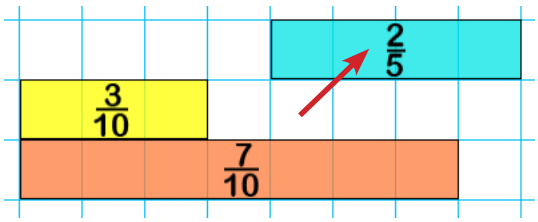


Subtracting Fractions

Building Basic Skills

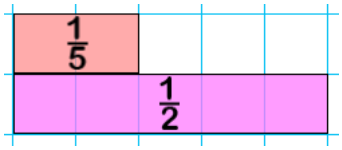
Use the Number Sense Playground to find the difference between two fractions. Here is an example.

Find the difference.

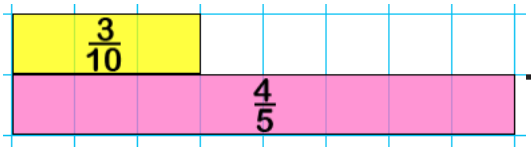


$$\frac{7}{10} - \frac{2}{5} = \frac{3}{10}$$

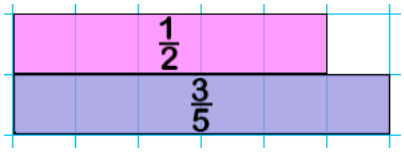
Subtract and write the answers in your notebook.

1. 

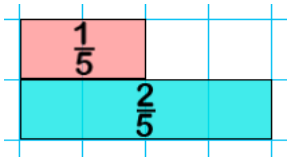
$\frac{1}{2} - \frac{1}{5} =$ ☐

2. 

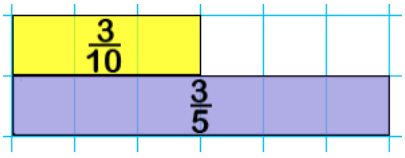
$\frac{4}{5} - \frac{3}{10} =$ ☐

3. 

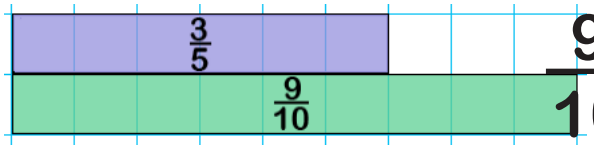
$\frac{3}{5} - \frac{1}{2} =$ ☐

4. 

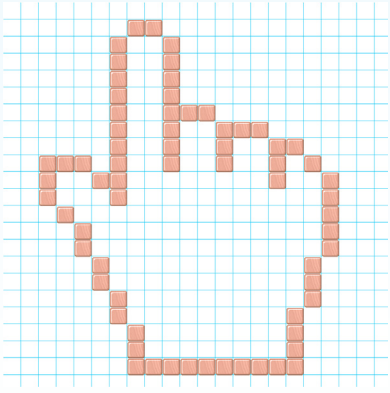
$\frac{2}{5} - \frac{1}{5} =$ ☐

5. 

$\frac{3}{5} - \frac{3}{10} =$ ☐

6. 

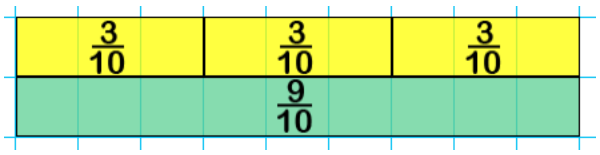
$\frac{9}{10} - \frac{3}{5} =$ ☐



Multiplying Fractions

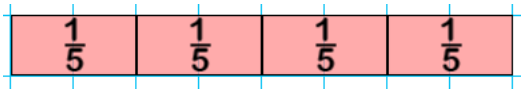
Building Basic Skills

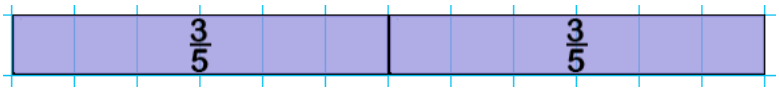
Use the Number Sense Playground to investigate multiplying fractions. Here is an example.

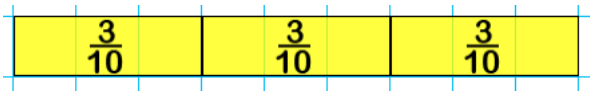


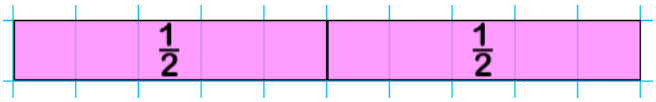
$$\frac{3}{10} \times 3 = \frac{9}{10}$$

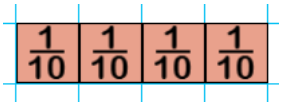
Write an expression and find the product for these examples.

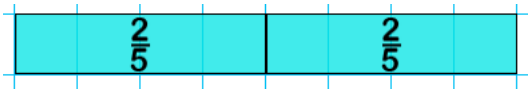
1. 

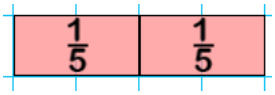
2. 

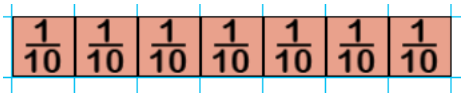
3. 

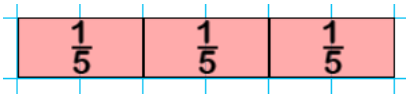
4. 

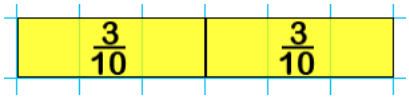
5. 

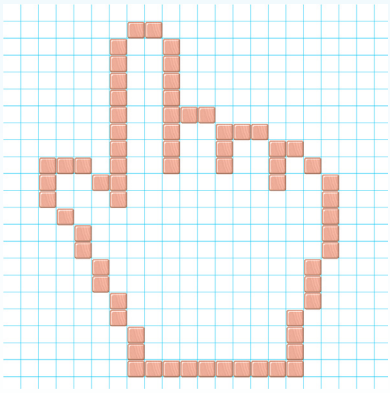
6. 

7. 

8. 

9. 

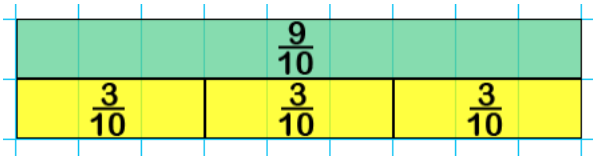
10. 



Dividing Fractions

Building Basic Skills

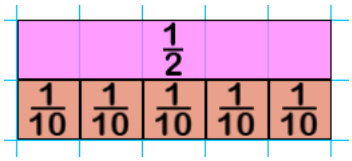
Use the Number Sense Playground to investigate dividing fractions. Here is an example.

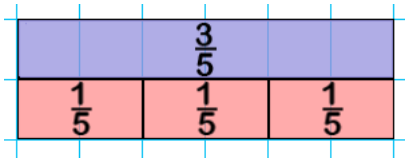


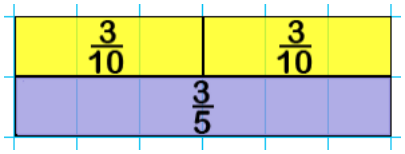
$$\frac{9}{10} \div 3 = \frac{3}{10}$$

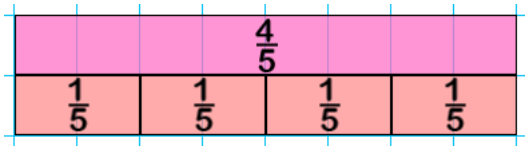
In this example, we found that nine-tenths can be divided into 3 equal parts and each part is three-tenths.

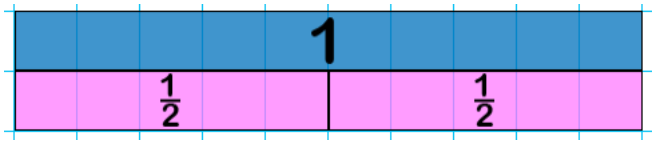
Write an expression and find the quotient for these examples.

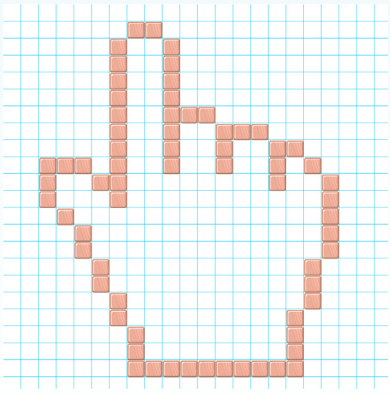
1. 

2. 

3. 

4. 

5. 

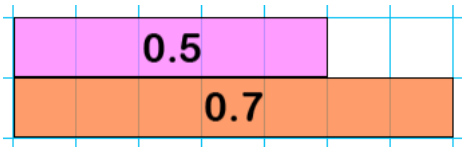


Comparing Decimals

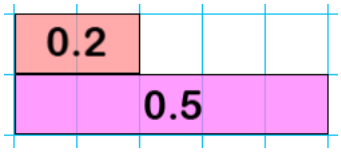
Investigate and Discover

Use the Number Sense Playground to compare decimals. In your notebook write the decimals and a comparison symbol to show the relationship between the decimals.

Comparison Symbols		
<	>	=
Less Than	Greater Than	Equal To



0.5 < 0.7

1. 

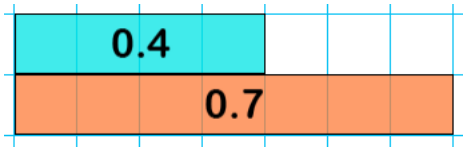
0.2 ◯ 0.5

2. 

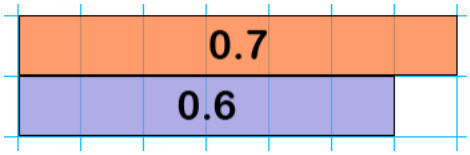
0.4 ◯ 0.6

3. 

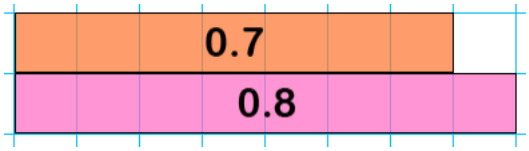
0.6 ◯ 0.5

4. 

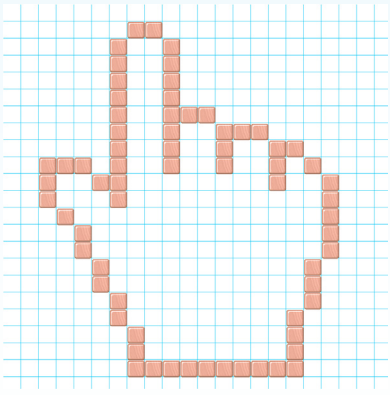
0.4 ◯ 0.7

5. 

0.7 ◯ 0.6

6. 

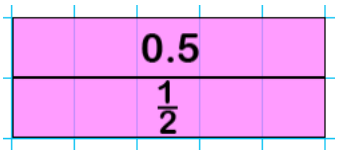
0.7 ◯ 0.8



Fraction and Decimal Equivalents

Investigate and Discover

Use the Number Sense Playground to find fraction and decimal equivalents. In your notebook write an equivalent fraction for each decimal. Here is an example.



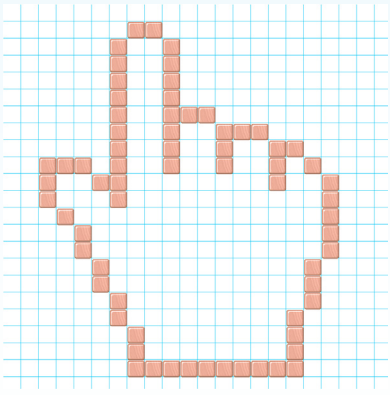
$0.5 = \frac{1}{2}$

Find an Equivalent Decimal

1. $\frac{2}{5}$
2. $\frac{7}{10}$
3. $\frac{3}{10}$
4. $\frac{3}{5}$
5. $\frac{1}{10}$

Find an Equivalent Fraction

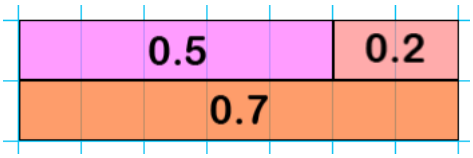
6. 0.3
7. 0.5
8. 0.2
9. 0.9
10. 0.8



Adding Decimals

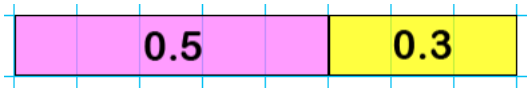
Building Basic Skills

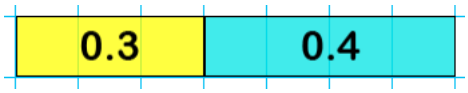
Use the Number Sense Playground to find the sum of two decimals. Write the problem and sum in your notebook. Here is an example.

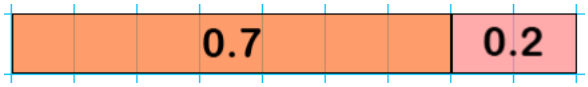


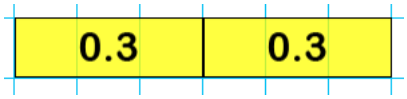
$$\begin{array}{r} 0.5 \\ +\ 0.2 \\ \hline 0.7 \end{array}$$

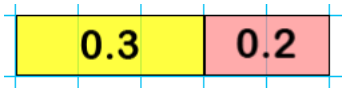
Find the Sum

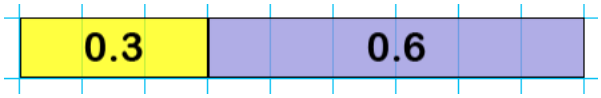
1. 

2. 

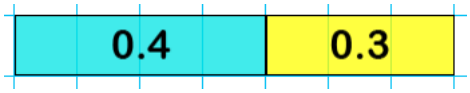
3. 

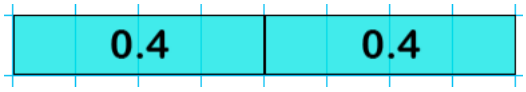
4. 

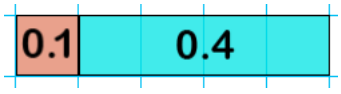
5. 

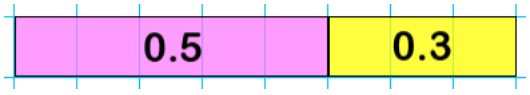
6. 

7. 

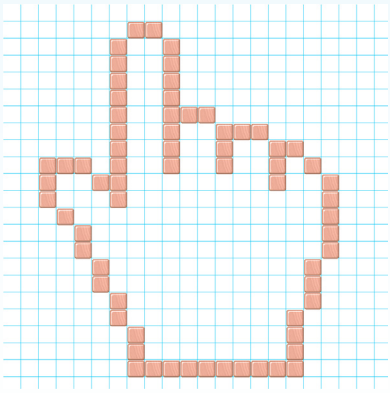
8. 

9. 

10. 

11. 

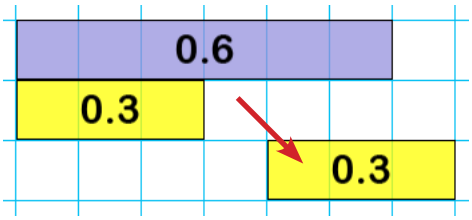
12. 



Subtracting Decimals

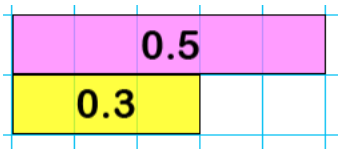
Building Basic Skills

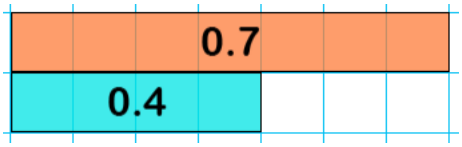
Use the Number Sense Playground to find the difference between two decimals. Write the problem and difference in your notebook. Here is an example.

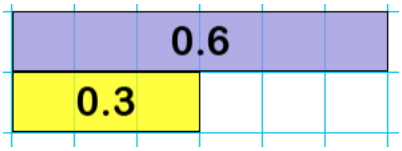


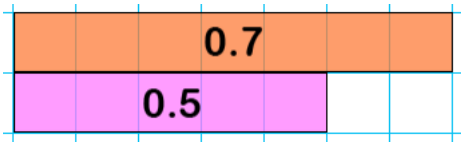
$$\begin{array}{r} 0.6 \\ -\ 0.3 \\ \hline 0.3 \end{array}$$

Find the Difference

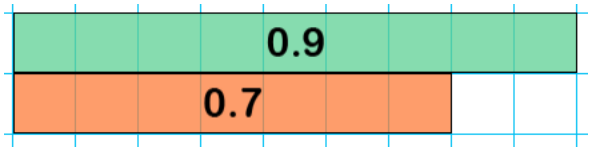
1. 

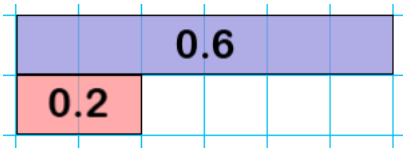
2. 

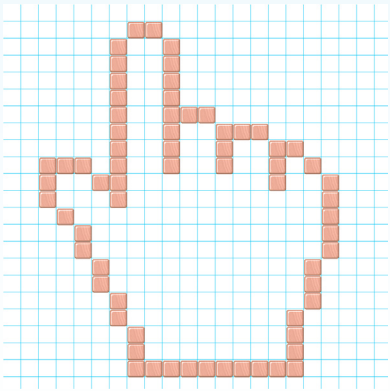
3. 

4. 

5. 

6. 

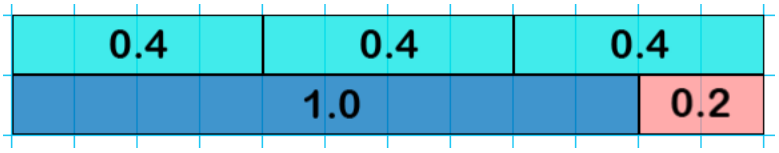
7. 



Multiplying Decimals

Building Basic Skills

Use the Number Sense Playground to find the product for problems with decimals. Write the problem and product in your notebook. Here is an example.



$$\begin{array}{r} 0.4 \\ \times\ 3 \\ \hline 1.2 \end{array}$$

Find the Product

1. 0.2 | 0.2 | 0.2

2. 0.3 | 0.3 | 0.3

3. 0.4 | 0.4

4. 0.5 | 0.5

5. 0.3 | 0.3 | 0.3 | 0.3 | 0.3

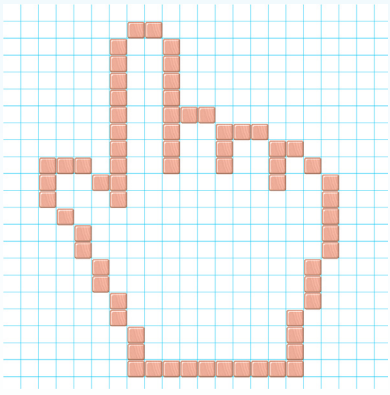
6. 0.2 | 0.2 | 0.2 | 0.2

7. 0.4 | 0.4 | 0.4

8. 0.1 | 0.1 | 0.1 | 0.1

9. 0.3 | 0.3

10. 0.5 | 0.5



Hands-On Math: Interactive Number Sense

Ventura Educational Systems