

User Guide for Teachers



Mathletics

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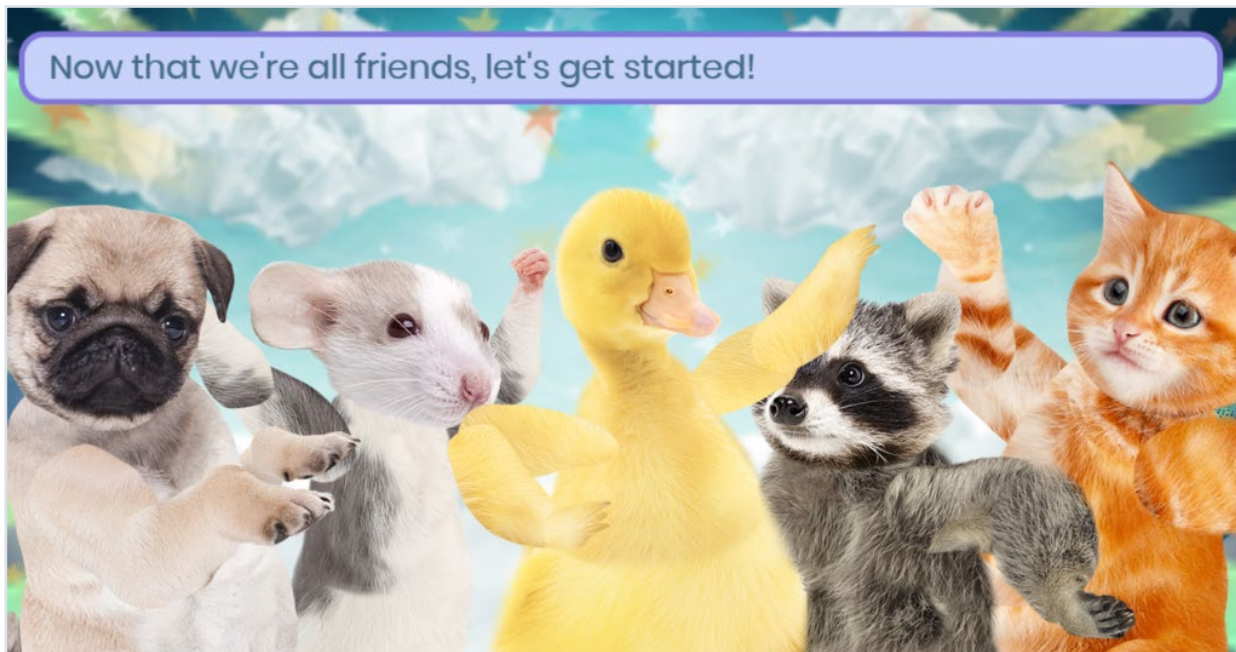
Overview

Play Paws is a unique and innovative digital learning experience that builds essential **place value, number sense, addition and subtraction** skills and capabilities.

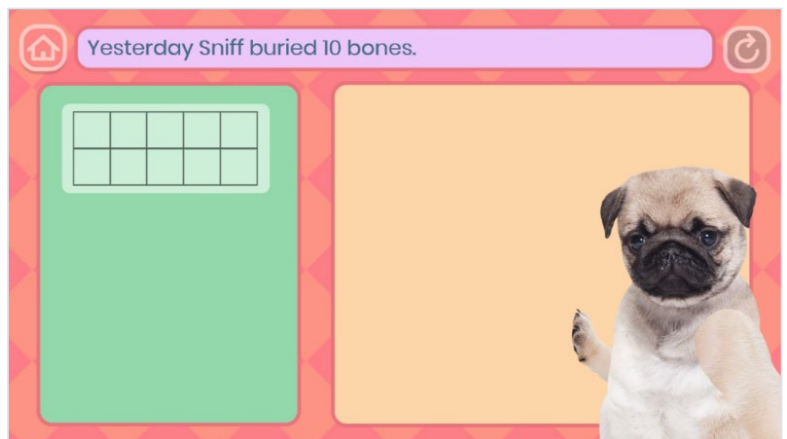
Play Paws helps students to develop number sense and to gain a deep understanding of place value. A series of guided modules and practice modules support students as they use ten frames and place value blocks to master addition and subtraction strategies.

Play Paws characters

Meet the Play Paws characters – Sniff the Dog, Bubbles the Rat, Happy the Duck, Rodeo the Racoon and Tiger the Cat.



Students interact with the Play Paws characters both as learning buddies, as well as in engaging problem-solving scenarios – from burying bones, to sharing cheese and collecting fish.

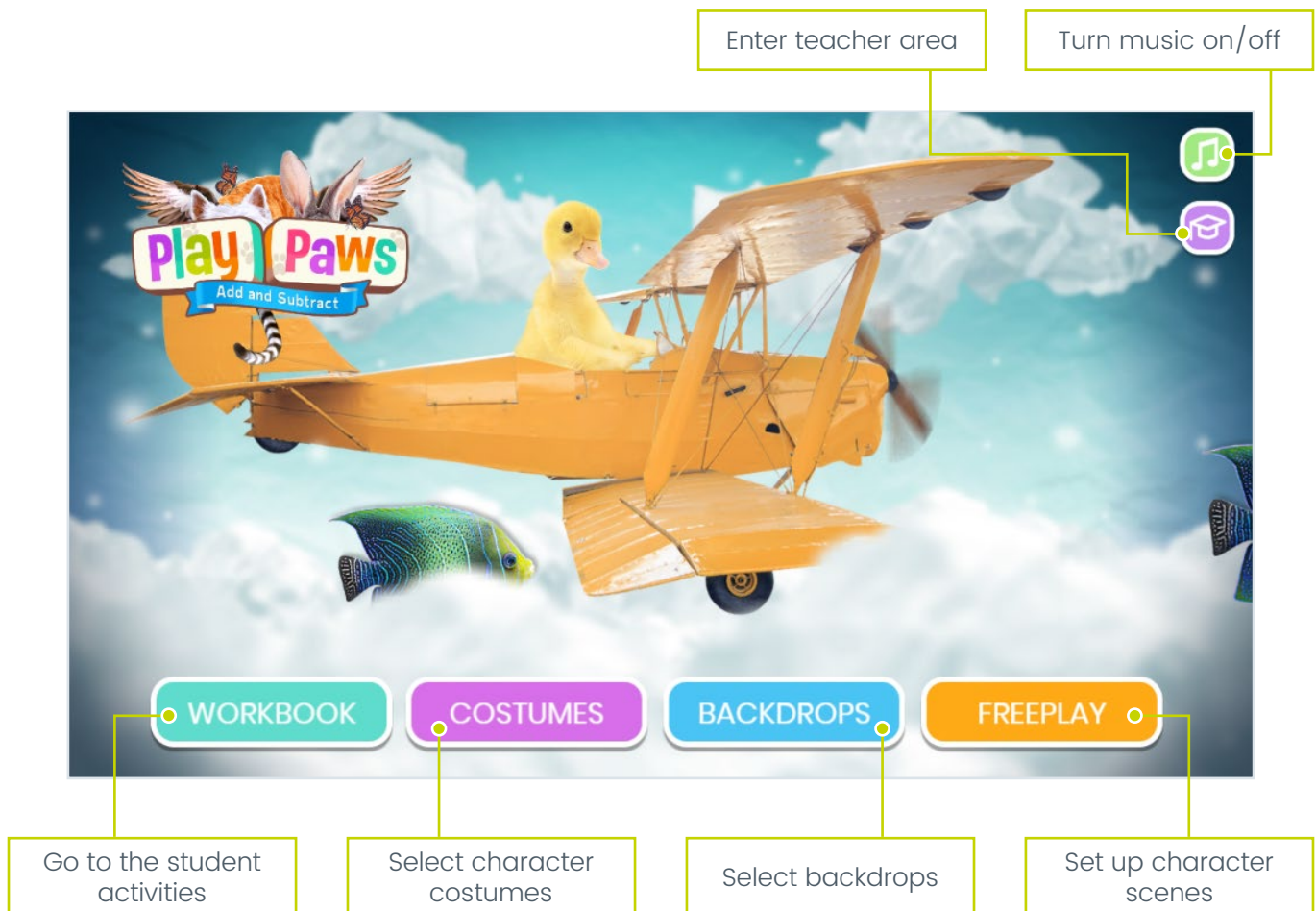


Accessing Play Paws

Play Paws is accessed through the 'Play' area of the Mathletics Student Console and in the 'Student view' of the Teacher Console.

Navigation

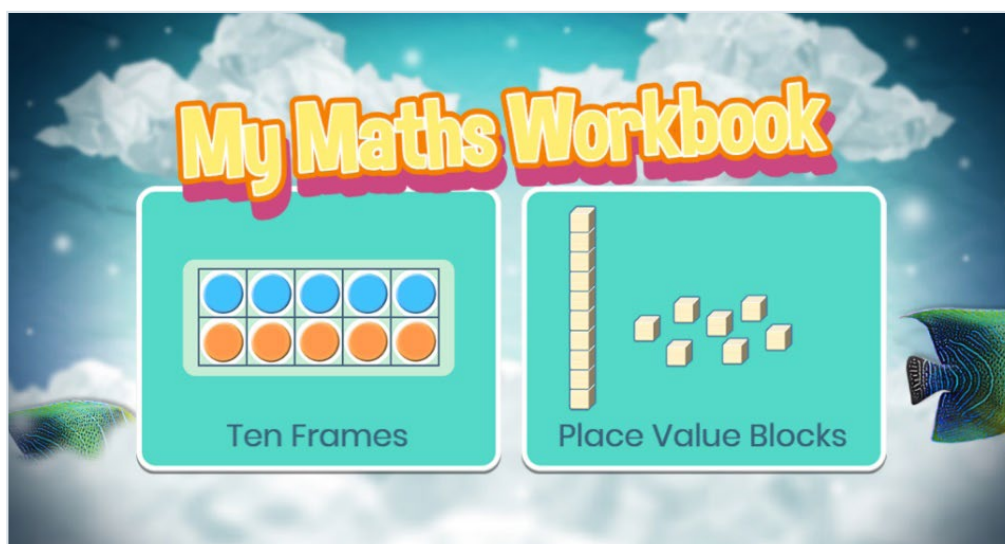
From the homepage, users can make the following selections:



Activities

Virtual manipulatives

Play Paws uses two familiar classroom manipulatives, ten frames and place value blocks, and presents them as virtual manipulatives.



1 Ten frames

Ten frames are used to model and identify numbers with a focus on the benchmarks of 5 and 10. They represent numbers, count, add and subtract. They also help develop the concept of a 'ten' in early place value understanding.

In Play Paws, the ten frames help:

- develop a visual representation for 5 and 10
- teach a range of addition and subtraction strategies
- reinforce addition and subtraction number facts
- explore commutativity
- make connections between addition and subtraction.

2 Place value blocks

Place value blocks, also known as base 10 blocks, Dienes blocks and multibase arithmetic blocks (MAB), are used to develop place value understanding. With different blocks representing ones and tens, students manipulate the blocks to show numbers and model the four operations. They are also used to represent decimal fractions.

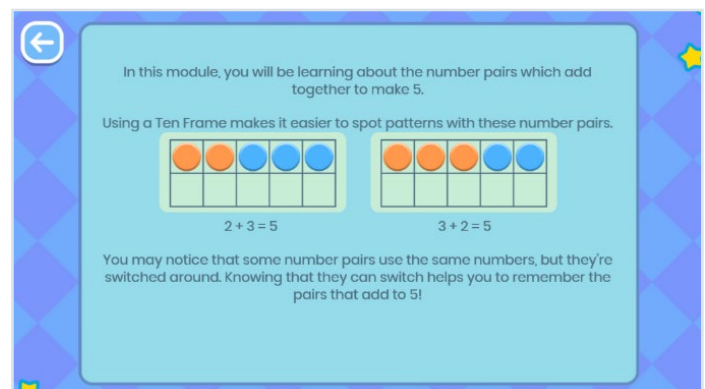
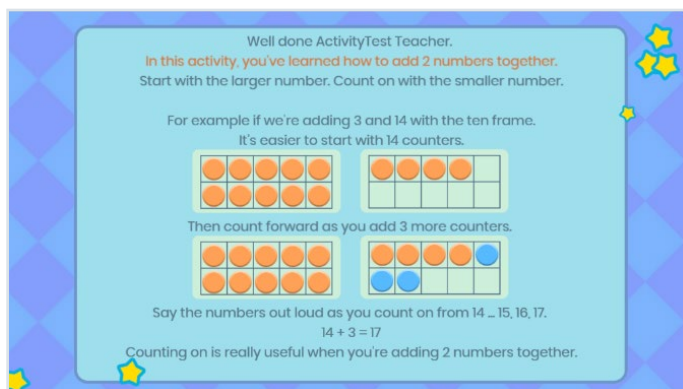
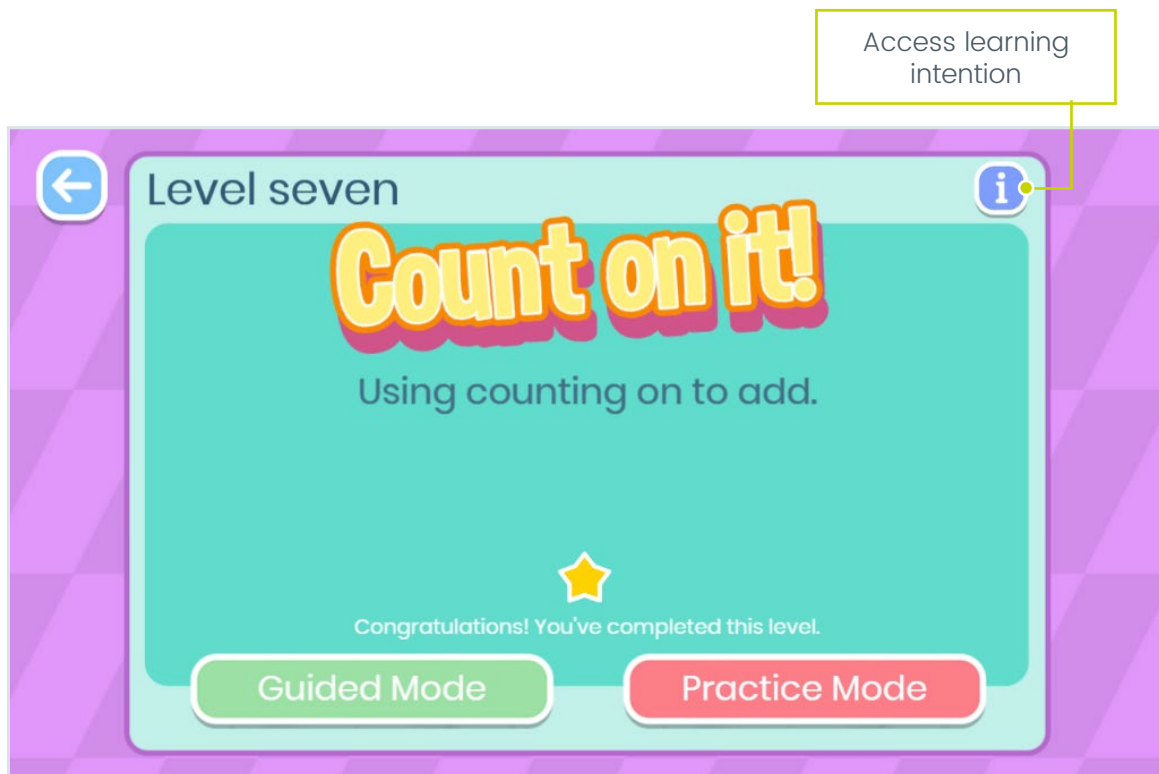
In Play Paws, place value blocks help:

- develop an understanding of ones and tens
- explore the relationship between place value positions
- represent 2-digit numbers
- explicitly teach addition and subtraction strategies
- model the processes used in written vertical algorithms.

Activities

Learning intentions

Each module includes a learning intention screen which explains the purpose of the lesson/strategy. Click on the **i** button to open the learning intention. This can be used as a preview to the lesson by both students and teachers. It also opens automatically at the completion of the Practice Mode to review student learning.



Activities

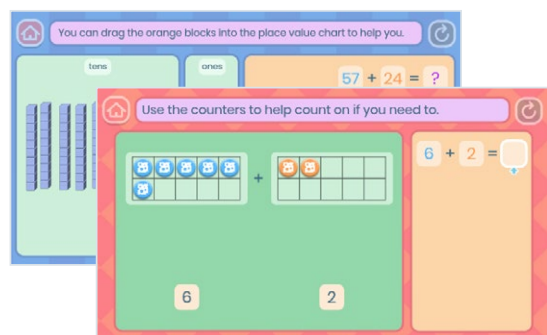
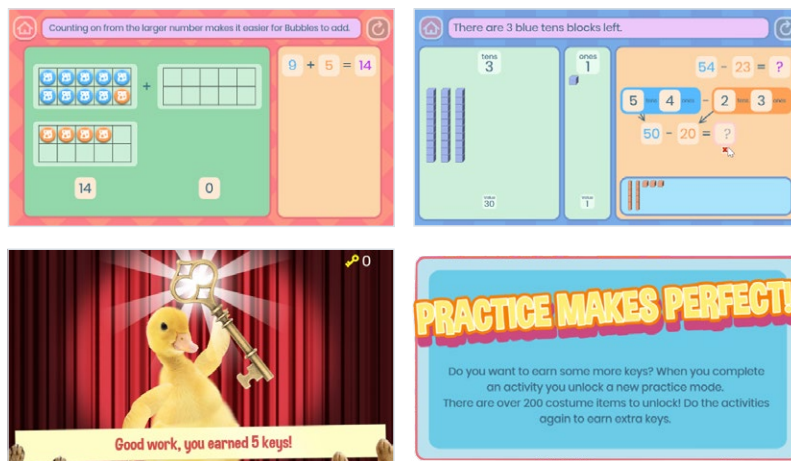
Learning modes

Guided mode

Play Paws begins each module in guided mode. With clear instructions and explanations, students are guided using the manipulatives and the creation of matching number sentences.

Tasks are based on problem-solving scenarios involving the characters. They feature clear statements about the advantages of using each strategy and the best times to apply them.

Error messages also guide students through the tasks and lead them to a correct solution. This guidance and clear learning intentions ensure that students do not inadvertently use incorrect strategies and consequently develop misconceptions.



Practice mode

After the guided mode, students move to the practice mode. Students are encouraged to use the same strategies as the guided mode but without the instructions and step-by-step guidance.

Manipulatives have the same interactive features, but it is not compulsory to use them to complete the activity.

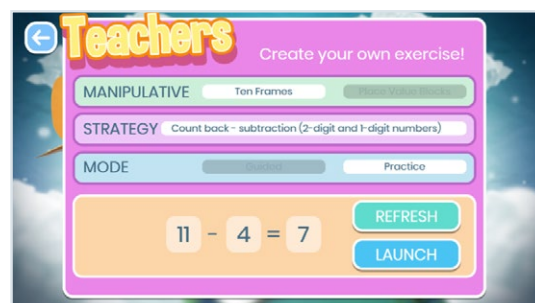
Again, error messages help support students in their learning. However, if they continue to make errors, students are redirected back to the practice mode.

Teacher mode

Access teacher mode using the teacher icon  on the home screen.

For whole class and small group demonstrations, teachers can access the teacher mode and choose the manipulative, strategy, mode and number sentence.

This tool gives teachers the control and allows them to deliver the relevant activity at the right time for their students.



Freeplay mode

After completing each set of guided questions, students can trade in their keys for character costumes and backdrops.

In the Freeplay area, students can interact with the characters and take screen shots of their creations.

Using Play Paws with your students

1 Whole class with explicit instruction



Enter the teacher area by clicking the icon on the home page.



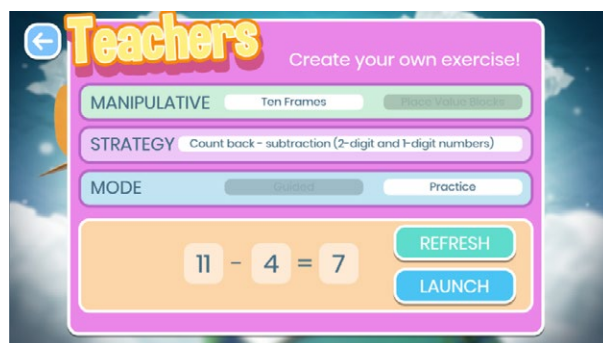
Select the manipulative and strategy and either of the options below:

Option 1: Guided Mode

This mode allows you to listen to the guided instructions with the students and follow the steps together.

Option 2: Practice Mode

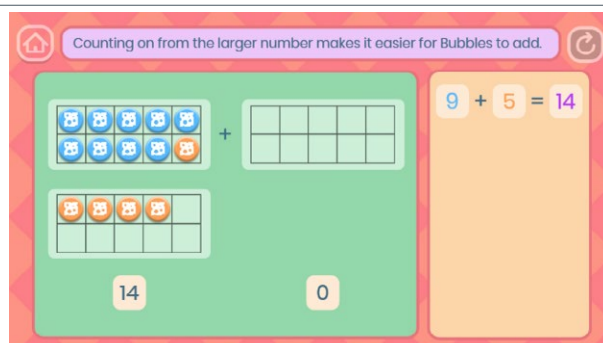
This mode allows you to provide instructions in your own words as you work through the strategy with the class.



Option 1: Guided Mode

With the volume on, work through the module question listening to the instructions, following the steps and entering responses.

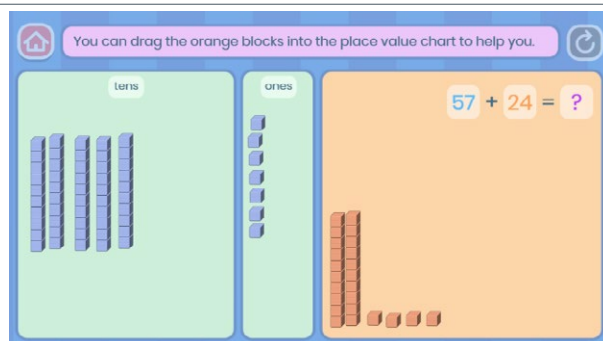
Be sure to focus on both the functionality of the manipulative and game as well as the concepts being explored.



Option 2: Practice Mode

Allow Play Paws to set up the activity then work through the module question providing your own instructions, guiding the steps and entering responses.

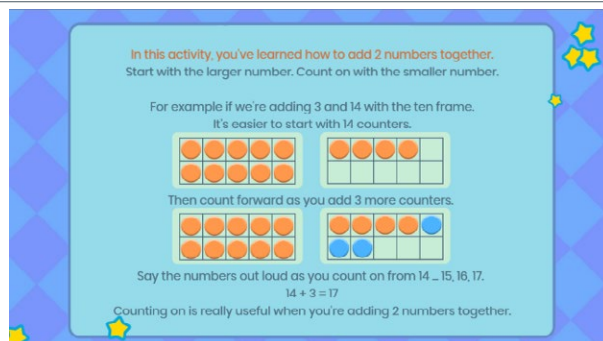
Be sure to focus on both the functionality of the manipulative and game as well as the concepts being explored.



Using Play Paws with your students

Revisit the lesson intentions

Remind students of the purpose of the lesson and the strategy being used.



Independent practice

Students work independently to complete the Guided Mode activities and then progress to Practice Mode.



2 Home and independent use

Access Play Paws

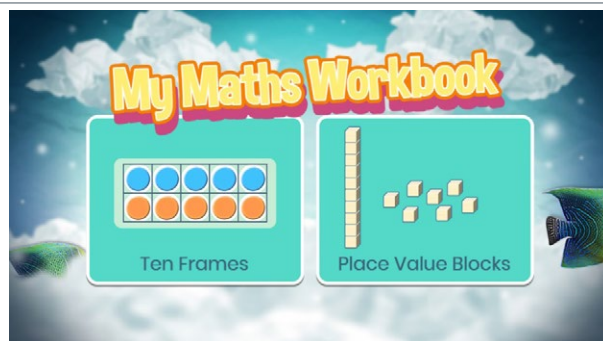
Students access Play Paws through the Mathletics 'Play' area.

Students choose 'WORKBOOK' to open the manipulatives option screen.



Select manipulative

Students choose either Ten Frames or Place Value Blocks as instructed by their teacher or parent.



Using Play Paws with your students

Choose a lesson

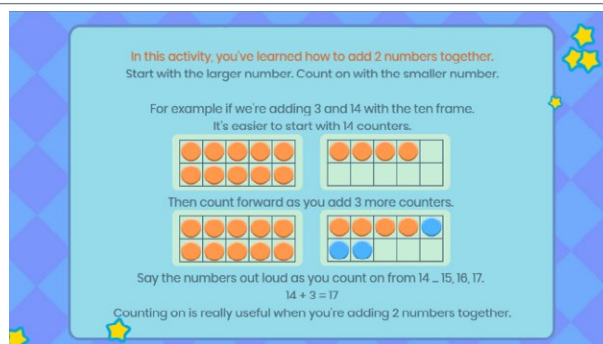
Students choose a lesson and are automatically directed to the Guided Mode activities.



Lesson intention

At the conclusion of the set of guided activities, the learning intention screen is displayed.

This reinforces the concepts and strategies they have just explored and informs them of the best time to use these strategies.



Rewards

Students are awarded a gold star to indicate that they have completed the guided questions for each module.

They also earn gold keys that can be traded for costumes and backgrounds in the 'Freeplay' area.



Practice Mode

Students are then encouraged to progress to Practice Mode where they apply their skills and understanding with less support.

Completion of these activities also earns keys.

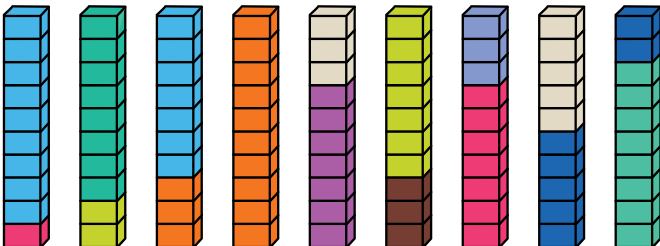


Samples lesson plans

1 Ten frames Lesson 2: Making a 10 (Part 1)

Lesson Focus:	Using a ten frame to model and record addition facts to 10
RESOURCES	<ul style="list-style-type: none"> • Ten frames and counters • Individual whiteboards and whiteboard markers • Large computer display (such as an interactive whiteboard) • Computers or tablets with Play Paws • Numbeanies cards (1 to 10) or similar number cards • Numbeanies instruction card: <i>Number Bond Memory Game</i> • Connecting cubes
INTRODUCTION	<p>Review prior learning by looking at the number before and after each number less than 10. Using a set of Mathletics Numbeanies cards (numeral cards 0–10), hold up a card and ask the class simple 'one more/one less' questions:</p> <ul style="list-style-type: none"> • What is one more than 4? • What is one less than 7? • What number comes after 8? • What number comes before 3? <p>Students answer by holding up the correct number of fingers.</p> <p>Remind students how to use the ten frames to model numbers. Encourage students to use an ordered approach – always start with the top row first, filling spaces with a counter from left to right, before moving on to the second row (techniques may vary but consistency is encouraged at this stage).</p> <p>Provide each student or pair with a ten frame and sets of two different types of counters (eg red and blue). Again, hold up a Numbeanies card and ask students to model that number using their ten frames.</p> <p>Hold up the number 10 last. Have students use both types of counters to make the number 10. Explore the different arrangements the students have made. Explain the purpose of the lesson: exploring all the different ways to add two numbers to make 10.</p>
TEACHING	<p>Using a suitable display, access the teacher area and select Ten Frames > Making Ten (Part 1) > Guided Mode and click LAUNCH. Listen to the instructions and complete the steps together.</p> <p>Alternatively, access the teacher area and select Ten Frames > Making Ten (Part 1) > Practice Mode and click LAUNCH. Demonstrate the steps and use appropriate mathematical language to talk through the process.</p>
PRACTICE	<p>Students complete the full set of Guided Mode questions independently.</p> <p>Students then work through the Practice Mode of Making Ten (Part 1 and Part 2).</p>

Samples lesson plans

Lesson Focus:	Using a ten frame to model and record addition facts to 10
APPLICATION and EXTENSION	<p>Using individual whiteboards, ten frames and counters, students work in pairs to make an addition sentences for 10 for their partner to complete. For example $6 + ? = 10$. Students can use the ten frame to help them and then complete the number sentence on the whiteboard.</p> <p>Use Numbeanies cards to complete <i>Number Bond Memory</i> to further consolidate addition facts to 10.</p> <p>Use connecting cubes to show all the addition facts to 10. Arrange the blocks in an ordered way to show thinking.</p> 

2 Place value blocks Lesson 5: Make a Ten

Lesson Focus:	Using place value blocks to model addition of a 1-digit number to a 2-digit number where the sum of the ones is greater than 10 (requiring regrouping/carrying)
RESOURCES	<ul style="list-style-type: none"> Place value blocks Computers or tablets with Play Paws Numbeanies cards (1–10)
INTRODUCTION	<p>Review how to model 2-digit numbers using place value blocks. Display a 2-digit number and have students display the number as tens and ones using the blocks.</p> <p>Review prior understanding of addition using place value blocks by providing an addition number sentence where no regrouping/carrying is required, e.g. $24 + 5 = ?$ and $42 + 6 = ?$ Students use place value blocks to model the addition.</p> <p>Ask students why these questions are easy to calculate using blocks. The ones can be added separately without regrouping.</p> <p>Now ask students to model an example which requires regrouping, eg $27 + 8 = ?$ Ask students why this question is harder than the previous examples. The sum of the ones is greater than ten, so this number is more difficult to read.</p> <p>Explain the focus of today's lesson found in the lesson intention in Play Paws: 'Learn to make a ten to add a 1-digit number to a 2-digit number'. Alternatively, teachers can use their own description.</p>

Samples lesson plans

Lesson Focus:	Using place value blocks to model addition of a 1-digit number to a 2-digit number where the sum of the ones is greater than 10 (requiring regrouping/carrying)
TEACHING	<p>Using a suitable display, access the teacher area and select Place Value Blocks > Make a Ten > Guided Mode and click LAUNCH. Listen to the instructions and complete the steps together.</p> <p>Alternatively, access the teacher area and select Place Value Blocks > Make a Ten > Practice Mode and click LAUNCH. Demonstrate the steps and use appropriate mathematical language to talk through the process.</p>
PRACTICE	<p>If needed, the children can complete the Guided Mode again on their own.</p> <p>Students then work independently through the Practice Mode of 'Make a Ten'.</p>
APPLICATION and EXTENSION	<p>Working in pairs, students tell their partner a number story and have them use place value blocks to find the answer. For example, I have 18 stickers at home and I went and bought 5 more. How many do I have now? Or, I have 23 marbles in a jar, and then I am given 9 more. How many marbles do I have now?</p> <p>Play the Numbeanies game <i>Target 100: Addition</i> for further extension.</p>

Play Paws guided modules content

Activity name	Activity description	Guided questions
1 Making 5	Finding number pairs that add to 5.	$1 + 4 = 5$ $2 + 3 = 5$ $3 + 2 = 5$ $4 + 1 = 5$
2 Making 10 (Part 1)	Finding number pairs that add to 10.	$1 + 9 = 10$ $2 + 8 = 10$ $3 + 7 = 10$ $4 + 6 = 10$ $5 + 5 = 10$
3 Making 10 (Part 2)	Finding number pairs that add to 10.	$6 + 4 = 10$ $7 + 3 = 10$ $8 + 2 = 10$ $9 + 1 = 10$
4 Teen Numbers (Part 1)	Exploring numbers 11 to 19.	$10 + 1 = 11$ $10 + 2 = 12$ $10 + 3 = 13$ $10 + 4 = 14$ $10 + 5 = 15$
5 Teen Numbers (Part 2)	Exploring numbers 11 to 19.	$10 + 6 = 16$ $10 + 7 = 17$ $10 + 8 = 18$ $10 + 9 = 19$
6 Swap the Facts	Swapping the number order of addition facts. (Commutative property)	$2 + 5 = 7$ $5 + 2 = 7$ $9 + 1 = 10$ $1 + 9 = 10$ $3 + 5 = 8$ $5 + 3 = 8$ $2 + 7 = 9$ $7 + 2 = 9$
7 Count on it! (Part 1)	Using counting on to add.	$6 + 3 = 9$ $6 + 2 = 8$ $8 + 4 = 12$ $9 + 5 = 14$

Play Paws guided modules content

Activity name	Activity description	Guided questions
8 Count on it! (Part 2)	Using counting on to add.	$8 + 3 = 11$ $9 + 4 = 13$ $13 + 5 = 18$ $12 + 7 = 19$
9 Counting Back (Part 1)	Using counting back to subtract.	$9 - 3 = 6$ $8 - 5 = 3$ $7 - 2 = 5$ $10 - 4 = 6$
10 Counting Back (Part 2)	Using counting back to subtract.	$13 - 5 = 8$ $14 - 6 = 8$ $12 - 5 = 7$ $15 - 6 = 9$
11 Double Trouble (Part 1)	Adding doubles.	$1 + 1 = 2$ $2 + 2 = 4$ $3 + 3 = 6$ $4 + 4 = 8$ $5 + 5 = 10$
12 Double Trouble (Part 2)	Adding doubles.	$6 + 6 = 12$ $7 + 7 = 14$ $8 + 8 = 16$ $9 + 9 = 18$
13 Beyond Doubles (Part 1)	Adding using doubles facts.	$3 + 4 = 7$ $4 + 5 = 9$ $5 + 6 = 11$
14 Beyond Doubles (Part 2)	Adding using doubles facts.	$6 + 7 = 13$ $7 + 8 = 15$ $8 + 9 = 17$
15 Building Bridges	Bridging to ten to add.	$9 + 4 = 13$ $7 + 5 = 12$ $8 + 6 = 14$ $9 + 7 = 16$

Play Paws guided modules content

Activity name	Activity description	Guided questions
16 Building Bigger Bridges	Bridging to the next ten to add.	$18 + 7 = 25$ $17 + 5 = 22$ $18 + 8 = 26$ $19 + 6 = 25$
17 Subtracting with Bridges	Bridging to ten to subtract.	$13 - 5 = 8$ $14 - 6 = 8$ $12 - 5 = 7$ $17 - 8 = 9$
18 Fact Families	Exploring addition and subtraction fact families.	$3 + 5 = 8$ $5 + 3 = 8$ $8 - 3 = 5$ $8 - 5 = 3$ $2 + 7 = 9$ $7 + 2 = 9$ $9 - 2 = 7$ $9 - 7 = 2$ $5 + 4 = 9$ $4 + 5 = 9$ $9 - 5 = 4$ $9 - 4 = 5$

Place Value Blocks

Activity name	Activity description	Sample questions
1 Explore Tens and Ones	Learn how to use place value blocks to represent 2-digit numbers.	27 44 30 58 75
2 Read a Number	Use place value blocks to read 2-digit numbers.	34 50 75 12
3 Add Tens and Ones	Learn how to add by splitting 2-digit numbers into tens and ones.	$47 + 32 = 79$ $13 + 25 = 38$ $51 + 25 = 76$ $24 + 33 = 57$

Play Paws guided modules content

Activity name	Activity description	Sample questions
4 Subtract Tens and Ones	Learn how to subtract by splitting 2-digit numbers into tens and ones.	$56 - 32 = 24$ $24 - 11 = 13$ $47 - 12 = 35$ $36 - 23 = 13$
5 Make a Ten	Learn to make a ten to add a 1-digit number to a 2-digit number.	$18 + 5 = 23$ $37 + 5 = 42$ $26 + 8 = 34$ $19 + 9 = 28$
6 Split a Ten	Learn to split a ten to subtract a 1-digit number from a 2-digit number.	$34 - 7 = 27$ $23 - 8 = 15$ $45 - 6 = 39$ $62 - 5 = 57$
7 Split to Add	Split 2-digit numbers into tens and ones to add them together (with regrouping).	$47 + 36 = 83$ $16 + 25 = 41$ $58 + 25 = 83$ $27 + 35 = 62$
8 Jump to Subtract	Use a jump strategy to subtract two 2-digit numbers (with regrouping).	$35 - 17 = 18$ $63 - 26 = 37$ $45 - 16 = 29$ $71 - 35 = 36$

Theoretical background

Overview

While many other resources provide practice and fluency opportunities for students in addition and subtraction, Play Paws is unique in that its modules provide guided learning of the strategies. In a classroom it is not always possible to ensure the efficacy of the techniques the students are using.

Play Paws also helps students make connections between concrete materials, images and representations, as well as number properties. Significantly, it also provides digital access to the classroom manipulatives at home.

Play Paws has been created to meet the increased need for engaging games that help students learn and master mathematical concepts and skills.

Number sense

Number sense is a student's ability to interact with the numbers 'flexibly and conceptually' (Boaler, 2009). It is arguably the most important mathematical concept in modern school education.

Number sense has also been referred to as 'making friends with numbers' or the understanding that 'numbers are meaningful and outcomes are sensible and expected'. By linking place value with the operations of addition and subtraction, students have a purpose for exploring place value and developing number sense. Without a solid number sense, students often rely on procedures rather than being able to apply genuine understanding.

Place value

Place value is a fundamental foundation of numeracy development. Without a stable, thorough and flexible understanding of place value, all other conceptual development is impacted. A deficit in place value comprehension forces students to rely on procedures and rules without the flexibility to adjust and manipulate values, especially when using operations and applying concepts to problems. For example, students with a poor understanding of place value will have difficulty applying strategies for operations and will tend to rely on written methods.

Play Paws guides young students as they begin to understand place value – one of the most important concepts they need to master in mathematics. Through the interactive manipulatives in Play Paws, students develop a strong sense of the value of tens and ones and understand the conceptual representation of 2-digit numbers.

Addition and subtraction

Addition and subtraction are the first operations introduced to children. They follow on naturally from counting on and back. Addition and subtraction are closely linked to each other and to the concept of place value. In combination, these concepts make up a significant proportion of 'number sense'.

Through interactive manipulatives, Play Paws introduces students to a range of efficient and effective mental strategies to add and subtract. The strategies build on place value understanding and contribute to the students' number sense.

Theoretical background

Explicit instruction

Explicit instruction is an evidence-based approach that reduces ambiguity through systematic instruction. It has been described as “a carefully scaffolded and guided instructional process that is done with great intention” (Hattie et al., 2017). In mathematics this is further clarified by three key components:

- clear teacher demonstrations of concepts and skills
- repeated guided practice opportunities, and
- corrective academic feedback.

Play Paws incorporates the key features of explicit instruction through:

- clear learning intentions for each lesson
- clear demonstrations using ten frames and place value blocks
- scaffolded and guided instruction
- regular and timely feedback to redirect learning and praise achievement.

Virtual manipulatives in mathematics

Virtual manipulatives are interactive, computer-based simulations of physical manipulatives that are accessed via the Internet or computer software. The benefits of virtual manipulatives have been widely reported and include their ability to focus student attention, encourage creativity, increase representational fluency, improve precision and efficiency, increase motivation, provide flexibility for learning, promote autonomy, improve accessibility for a diverse range of learners, reduce the stigma of support for older learners, ease of use and portability.

Virtual manipulatives are highly effective tools that enable students to explore representations of mathematical concepts and make connections between concrete and abstract understanding. Virtual manipulatives are particularly useful for students who are having difficulty with place value understanding and subtraction strategies. Both individual, explicit instruction and collaborative, exploratory approaches are equally effective when working with virtual manipulatives.

Mathletics



For more information about Play Paws,
contact our friendly team.

www.mathletics.com/contact

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