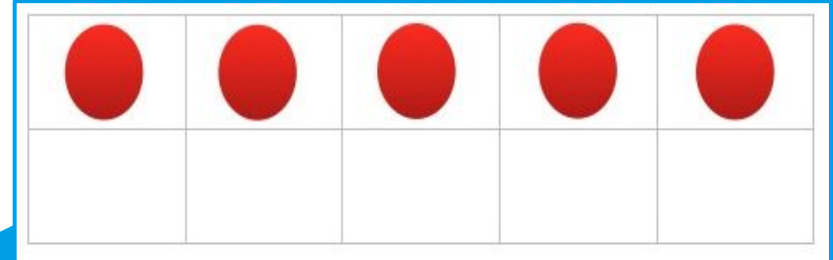


Manipulatives of the Month

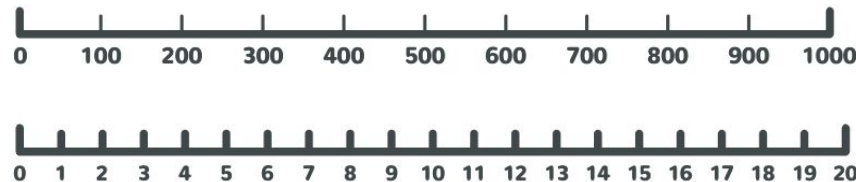
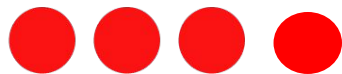
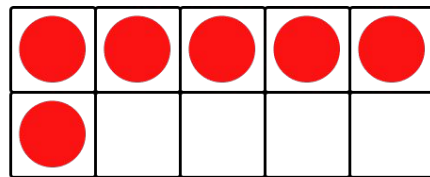
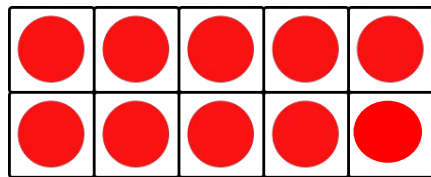
Frames and
Lines



Frames and lines

Number lines are essential tools for helping students develop strong number sense. When integrated into teaching, they encourage students to actively make sense of mathematics by visualising number magnitude, understanding relationships between numbers, and making sense of operations. Unlike counting models that focus on how many objects are in a set, number lines are based on measuring distances from a fixed point. This shift—from counting to measuring—can be challenging for students and requires explicit, systematic instruction.

Just as number lines support a shift toward thinking about numbers in terms of magnitude and distance, **ten-frames** provide a structured way for students to visualise numbers and develop a strong sense of number relationships. By organizing quantities within a familiar 5-by-2 grid, ten-frames help students see numbers in relation to 5 and 10—key benchmarks in our base-ten system.

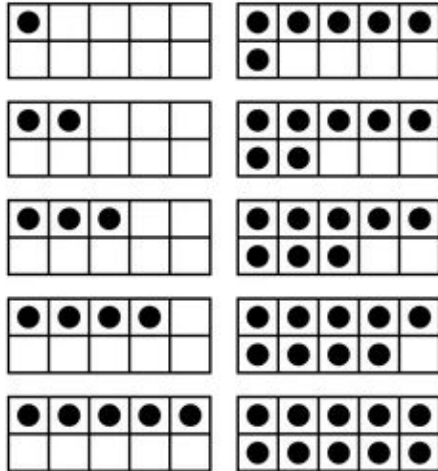


Frames and lines

History:

Number lines have their roots in 17th-century mathematics and became common in education during the 20th century as a visual tool to support number sense and understanding of operations.

Ten-frames, developed more recently through research into early numeracy, provide a structured way for young learners to visualise numbers and build fluency within the base-ten system.



10 ways to use frames and lines in the maths lesson

1. **Start with Concrete Representations** - Use physical objects like meter sticks, tape measures, or floor number lines. Have students physically "walk" the line to understand equal spacing and directionality. Build numbers on the 5/10 frame - look at the spaces filled and unfilled. Build numbers in multiple ways.

2. **Introduce with Familiar Numbers** - Create number lines that include small whole numbers (0–10 or 0–20) and have students place numbers, count forward and backward, and identify missing numbers. Explore the concept of 10. Doubling.



3. **Model Operations** - Addition/Subtraction: Show jumps to the right (for addition) and left (for subtraction). With frames start with a number (e.g., 5), then add more counters and count the total. For subtraction, remove counters and discuss what's left. Multiplication/Division: Use repeated jumps of equal size (e.g., 3 jumps of 4) to represent multiplication. For division, show how many equal jumps fit between two numbers.



4. **Explore Negative Numbers and Fractions** - Extend the number line to include negative numbers or fractions, using colored markers or segments to represent different types of numbers. The frame becomes 1 not 10.

5. **Make It Interactive** - Games & Digital Tools

6. **Encourage Student Talk and Reasoning** - Prompts to Use.

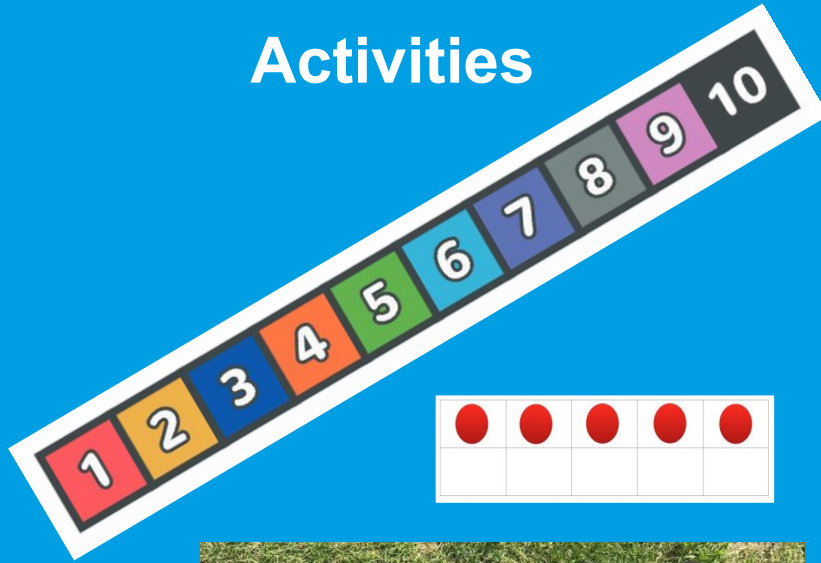
Where numbers march in order, keeping everything in line and on track!

Templates





Activities



1. A blank number line
 - *Exploration*
2. Using a number line as a measuring tool
 - *Investigating*
3. Hit the target
 - *Fluency*
4. Riddles
 - *Problem solving*
5. Left to right or right to left
 - *Negative numbers*
6. Time number line
 - *Making connections*
7. Hopscotch
 - *Game*
8. 5 and 10 frame - Ten & Guess What?
 - *Seeing patterns*
9. The Hungarian frame
 - *Subitising*
10. Fractions & decimals
 - *Making connections*

1. A blank number line

Exploration



Placing numbers on a blank number line students should be able to reason where their numbers sit in relation to each other. Comparing values on a number line, enables students to see the relationship between the numbers and the pattern of the number system.

1. Estimate and Place

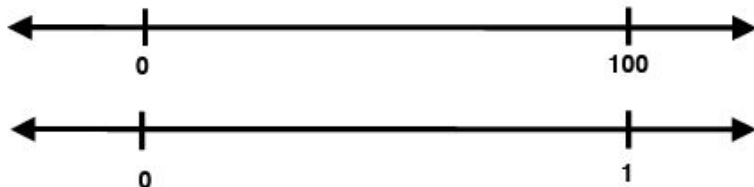
Give students a blank number line with only 0 and 20 marked. Ask them to place numbers like 5, 10, 13, and 18.

2. Find the Midpoint

Provide a number line with only the endpoints labeled (e.g., 0 and 20). Ask, “What number would be in the middle?” and have students justify their thinking.

3. Teen Number Focus

Use a blank number line from 10 to 20 and have students place numbers like 11, 13, 15, and 19. Discuss how they are “10 and a bit.”



4. Compare and Justify

Ask students to place two or more numbers on a blank number line (e.g., 7 and 12) and explain which is greater and how far apart they are.

5. Number Line Mystery

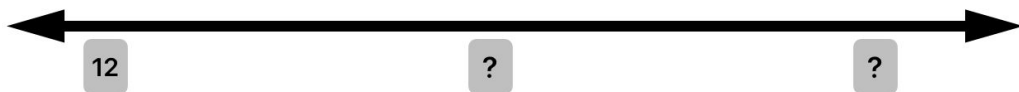
Mark a point on a blank number line without labeling it. Give clues like “This number is halfway between 10 and 20,” or “It’s 2 more than 8,” and have students identify it.

6. Create Your Own

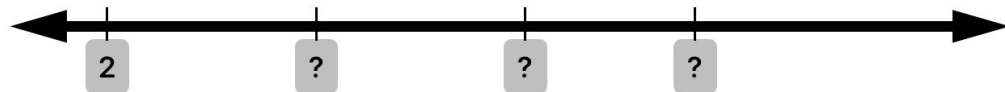
Challenge students to create their own blank number line with selected numbers, endpoints, and spacing—and then trade with a partner to solve.

More blank number line activities...

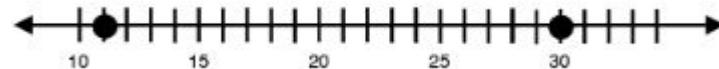
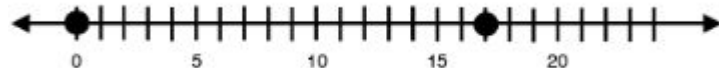
Find the unknown values? How do you know?



If I put 10 in the middle unknown box, what would be the other two values? What if I put 100 in the middle box? 20?



How far is it between the dots shown on the number lines?

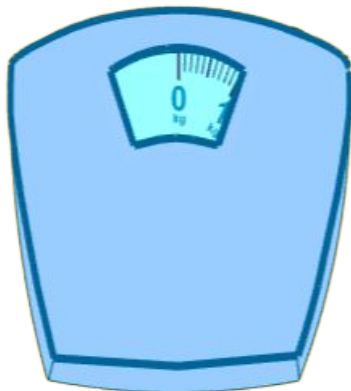


2. Using a number line as a measuring tool

Investigating



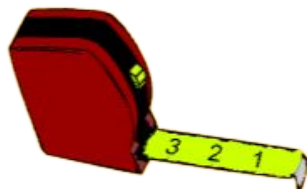
Measure operates within our linear number system, the different scales on measuring equipment is, in essence, a number line. Often not every interval is labelled so we have to work out what each interval represents.



Have a look at these scales - what would the number line look like?



Can you see any number lines around you? Make your own number line to reflect the scale you see.



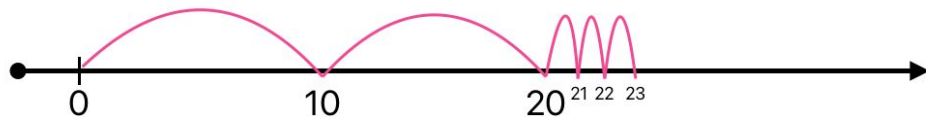
3. Hit the target

Fluency



Use skip jumps of 1, 5, 10, or 100 to hit the target in as few jumps as possible.

- 0 to 23 in as few jumps as possible.



- 0 to 57 in as few jumps as possible.
- 25 to 88 in as few jumps as possible.
- 110 to 215 in as few jumps as possible.
- Try some of your own, are there any that you can do with different combinations?



4. Riddles

Problem solving



"I am two more than five, and three less than 10. What number am I?"

"If you double 2, and then add 1, you'll find me. What number am I?" - "I am halfway between 10 and 2. What number am I?"



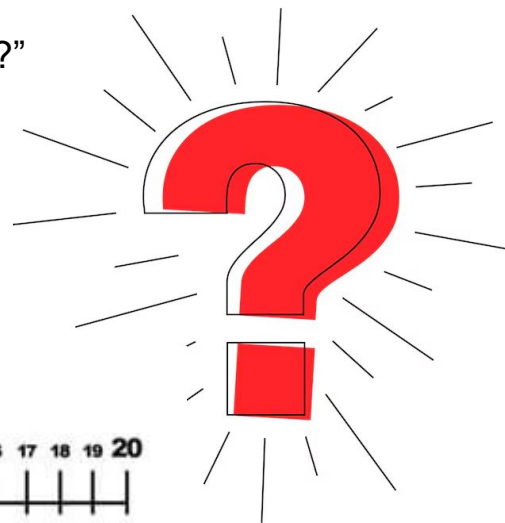
"If you doubled 23 you would find me. What number am I?"

"I am a number between 1 and 100. Half of me is 25. What number am I?"

"I am halfway between -6 and 8. What number am I?"

"Start at -3. Now add 8. What number am I?"

"I am halfway between 85 and 45. What number am I?"



5. Left to Right or Right to Left

Negative numbers



This game is for two players.

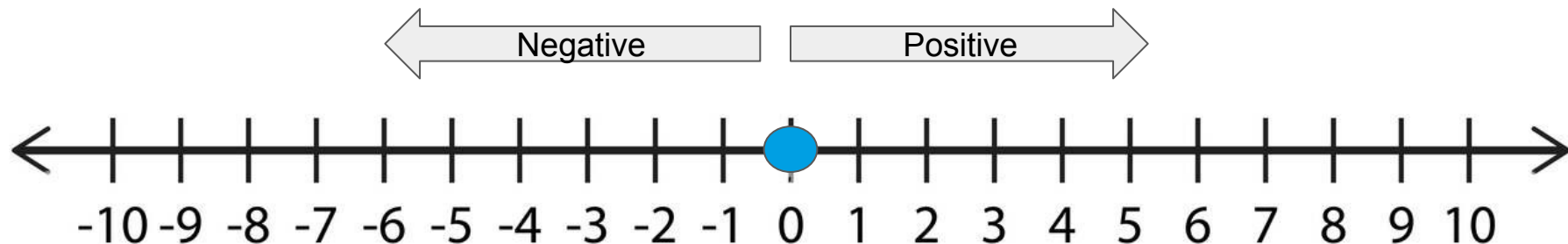
You will need: a number line from -10 to 10 and find a counter and one 1-6 dice.

Decide who is Positive and who is Negative.

Positive moves the counter from left to right and Negative moves the counter from right to left.

Place the counter on 0. Take it in turns to throw the dice and move the counter that number of places in your direction.

If the counter reaches -13, Negative has won. If the counter reaches 13, Positive has won.

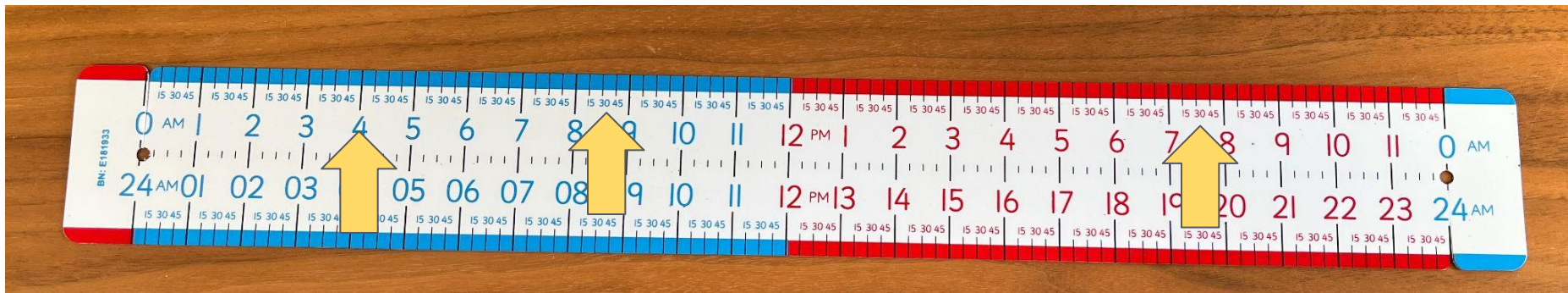


Now change the game. This time, extend the number line to -15 to 15 throw two dice, you can decide whether to add, subtract, multiply or divide the numbers on the dice. You must reach -15 or 15 exactly to win. Are there other ways you could play the game?

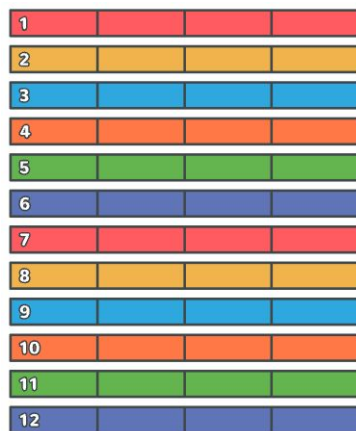
6. Time number line

Making connections

Look at the arrows. What time do you think this might be?



This is another way to look at time. The students can order the strips. Find halfway and then look at quarters.



To show that the passage of time is continuous, make a number line on a something that will bend around to create a circle

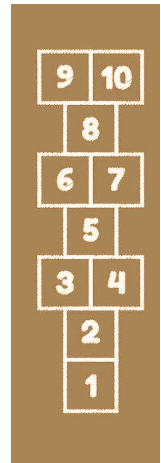
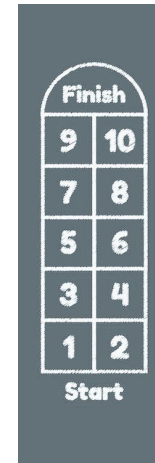
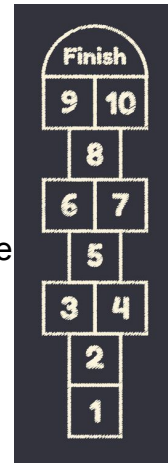
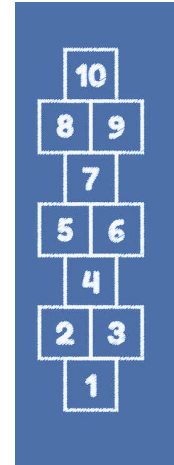
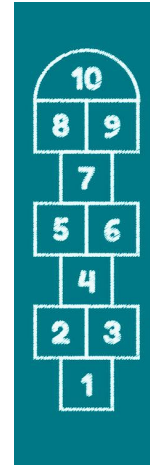
7. Hopscotch

First draw out the hopscotch grid. *See opposite the different choices.* Players take turns tossing a stone/ beanbag into square one of the Hopscotch course.

- Toss the stone/ beanbag into square one. (If you miss, pass the stone to the next player and go to the end of the line.) Hop into each empty square, balancing on one foot in single squares and on both feet in side-by-side squares. If you lose balance or step on a line, return to the start/finish line.
- On the way back, pause at the square before square one, pick up the stone without moving your feet.
- Once your turn is complete, pass the stone to the next player in line.
- After successfully completing a turn with the stone in square one, move on to square two and continue until all ten squares are completed.

Enjoy playing Hopscotch!

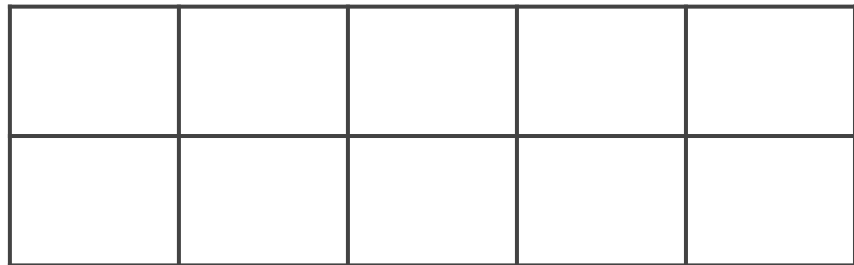
Game



8. Five & Ten Frame



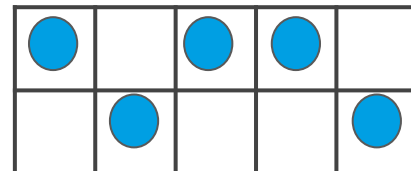
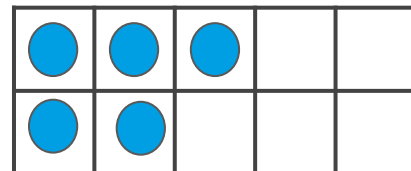
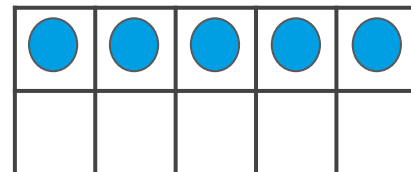
A five / tens frame is used to represent numbers within and up to ten. Students can compose and decompose each number in a variety of ways and see the same number represented in different ways.



Try representing numbers in different ways.



Seeing patterns



Look at the three frames above. What numbers are illustrated? What does the particular arrangement of the counters prompt you to think about the numbers? What can you say about each number's relationship to ten?

8. Ten

Seeing patterns



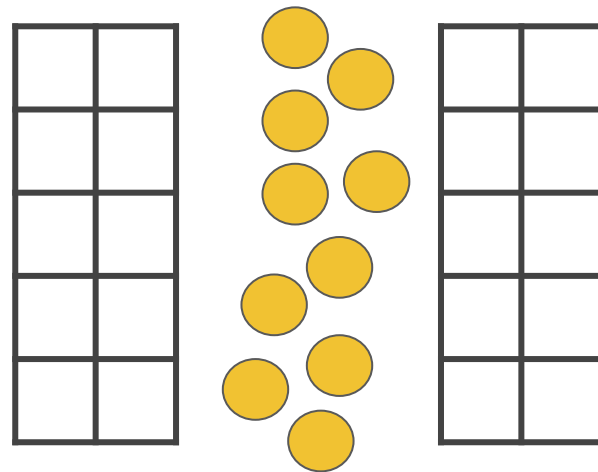
Materials: Blank ten-frames for each player, counters, dice

Rules:

Place ten counters between the two tens frame. Each student takes a turn to roll a die, places that number of counters onto his/her ten-frames, then announces the total number of counters on the frames. When the counters are all used from the centre then the player can take the counters needed from the other players board. The winner is the first player to fill all ten spaces.

Variations/Extensions:

Use two tens frames each with two dice.



8. Guess what?

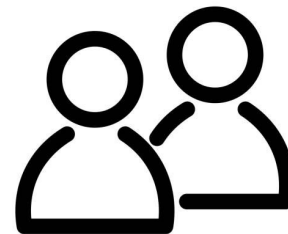
Seeing patterns



Two players

You will need: Blank ten-frames, counters, a large board to act as a screen/barrier between pairs of players.

One player secretly arranges some counters on a ten-frame. The other player asks questions that can be answered yes or no, trying to gain enough clues to work out the arrangement of counters.

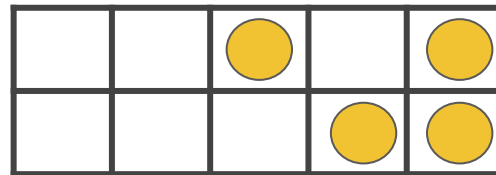


For example:

Is the top row full?

Are there 8 counters?

Is there an empty box in the bottom row?

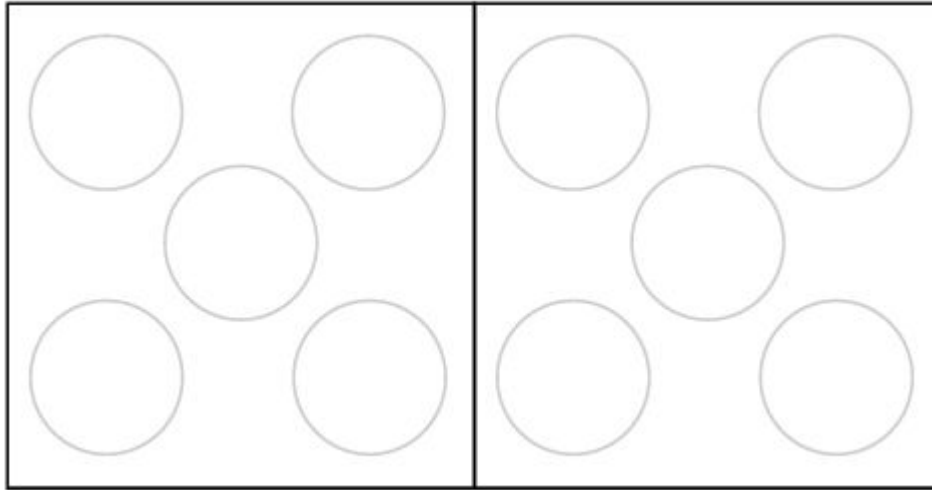


Variations/Extensions

As players become more skilled the number of questions can be counted. The player who asks fewer questions wins.

9. Hungarian Frame

This differs from the traditional Ten frame by using a **domino-style structure** with open slots, allowing students to physically place counters into each space. It promotes pattern recognition and subitizing, making it easier for students to grasp numerical structures at a glance.



These frames can be used in various activities, including:

- Counting: Filling the frame with objects and counting them.
- Addition and Subtraction: Using the frame to represent addition and subtraction problems.
- Matching: Matching the number of objects on the frame to corresponding number cards.

10. Fractions and decimals

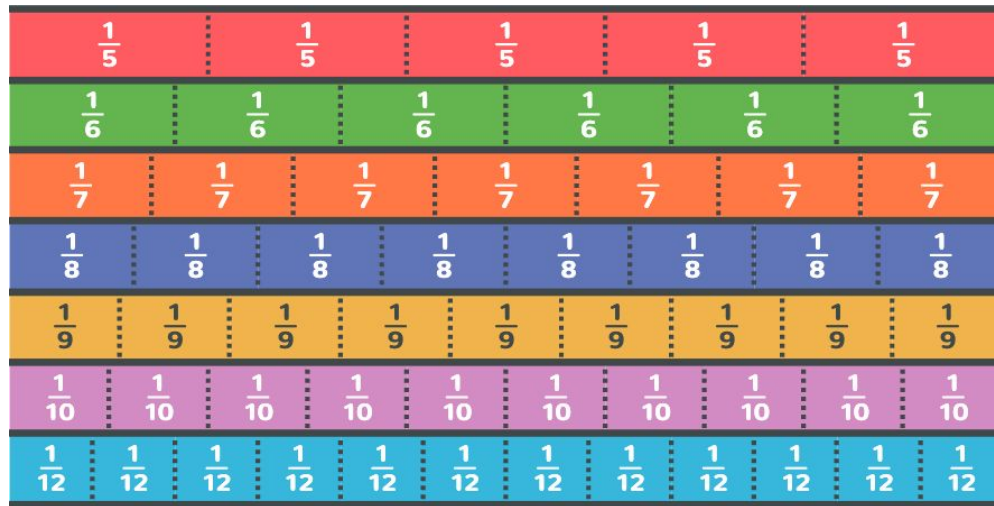
Making connections



Fraction strips are meant to be used in comparison with each other so that students can see the relationship between fractions and fractional parts.

Cut the strips out and fold along the dotted line.

Students making their own fraction strips find it easy to divide into halves and quarters etc but can be tricky to fold thirds, fifths, sixths etc. So, these templates can also be used as a guide by placing paper on top of or next to the relevant fraction and marking where the folds should be. Then fold the paper where they have made the marks. Once students have their completed fraction strips, they are ready to explore some fractional relationships.



What if the whole frame was 1?

What would each box be?

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