eNICLE
Grade 1 and 2 Teacher Development Programme

Session Nine Teacher Handbook

Name

_____

School

_____

DECLARATION
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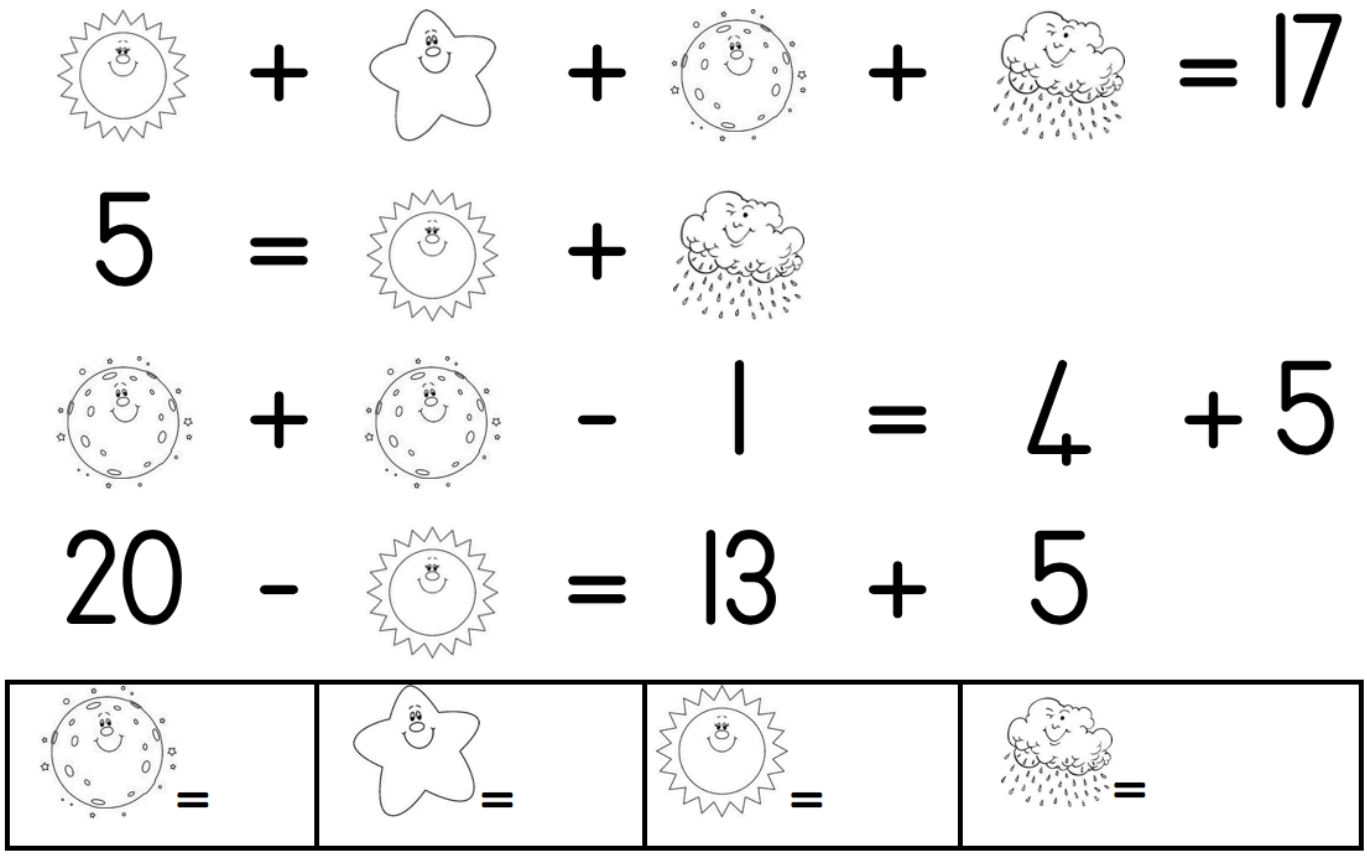
Today's Number Talk(s)



Find the value of the pictures

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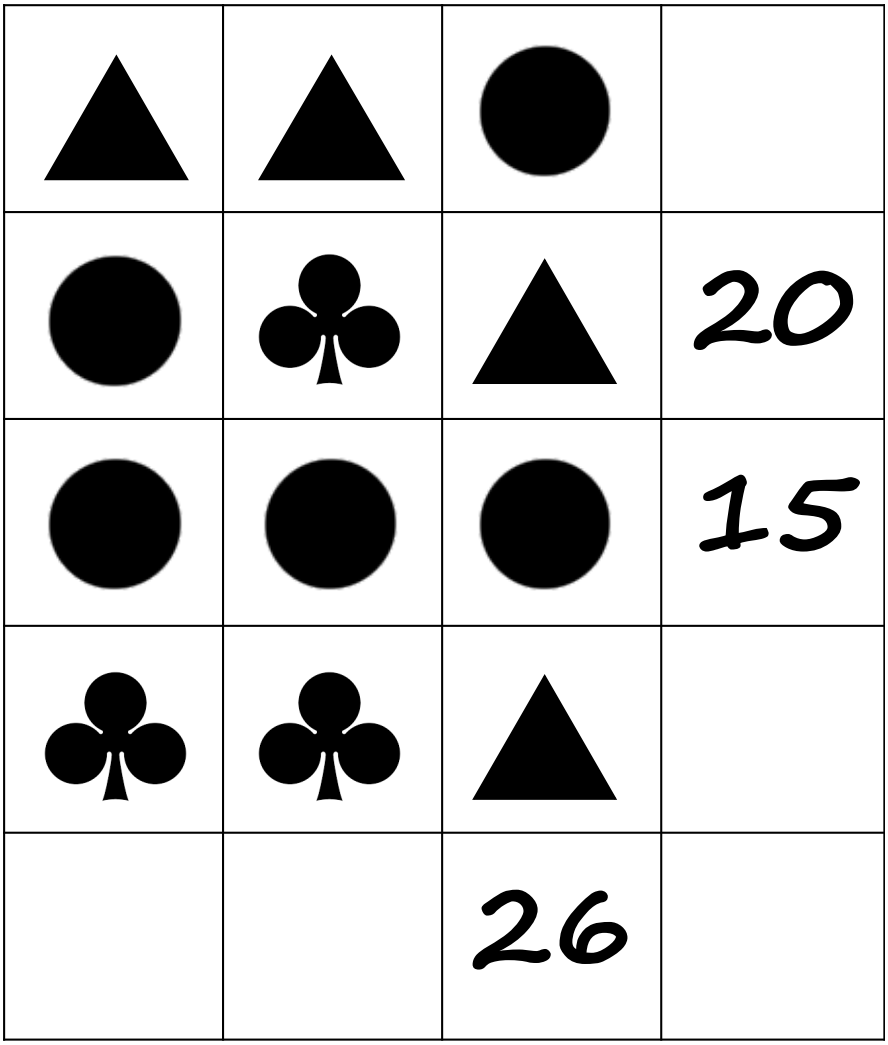

Find the value of the shapes.

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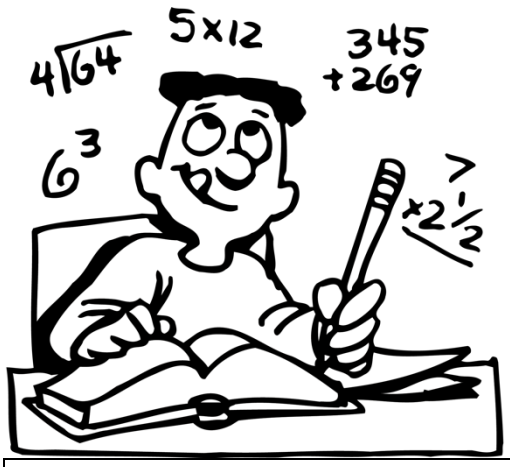
Semi-structured number lines

There are many types of number lines:

- Empty (with no beginning or end points or other marks)
- Closed (with beginning and end points)
- Open (with a beginning point but no end point or vice versa)
- Structured (with well-defined partitions and labelled marks)
- Semi-structured (with some partitions and some missing labelled marks)

In session Eight, we worked with **structured number lines**. In this session we move onto working with **semi-structured number lines.** A semi-structured number line will have some partitions and some of the number labels will be missing.

Different types of number lines require different kinds of thinking



Before we look at the semi-structured number line, let's look at some examples of the **thinking** involved in number line work[1].

With an open line we can partition (or subdivide) the space as necessary to solve a problem. The open number line in Figure 1 could be a starting point for different number representations.

One point on a number line does not tell us much about the numbers we are working with.

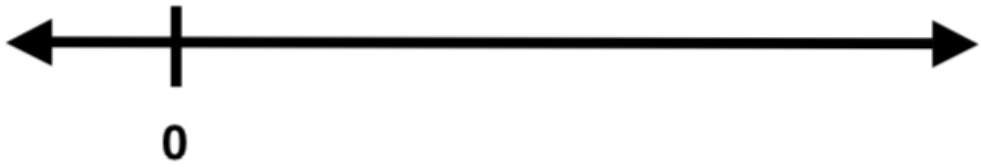


Figure 1: An open number line

[1] The ideas here have been adapted from "*Learning to Think Mathematically with the Number Line A Resource for Teachers, A Tool for Young Children*"
Dr. Jeffrey Frykholm the University of Colorado https://www.mathlearningcenter.org/sites/default/files/pdfs/LTM_Numberline.pdf

Although this open line could be used in many ways, here are two ideas (see Figure 2):

- Showing zero to 100 or
- Showing zero to 1

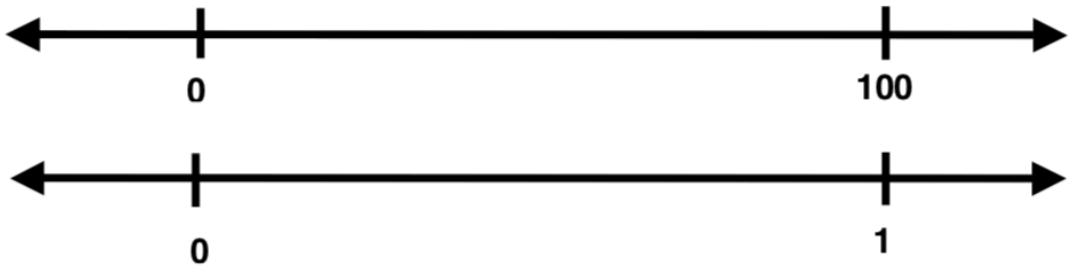


Figure 2: Different number representations on closed number lines

Once we add a second point to a number line, the number line changes from being an open number line to a **closed number line**. Now each number line has its own meaning.

For example, with Figure 2:

The first number line shows zero and 100. This might encourage learners to think in terms of tens and twenties or perhaps 50 as they imagine how to partition this line. They might use doubling and halving strategies.

The second line shows 0 to 1. Learners might start to think about fractions. Learners may use halving strategies to find numbers like ½ or ¼. If they were asked to find thirds or fifths, they would need to think differently, but we might not expect Grade 1 and 2 learners to think in this way.

These two examples show that **different thinking** is required to work with these two number lines.

Other examples:

In Figure 3 they might work out the pattern from the other numbers shown on the number line to find the missing numbers. In this case the pattern is counting up from 40 to 200 in twenties.

Learners might use some kind of estimation strategy to partition or find missing numbers. In this approach, they use other numbers provided to work out the missing numbers.

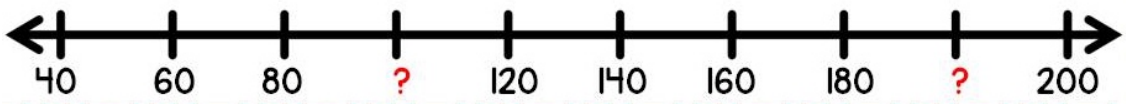


Figure 3: Work out the pattern - counting in 20s

Before you work with the semi-structured number line

Make sure that you have done a lot of work with the structured number line. The learners should be comfortable with working with these before doing any semi-structured number line work.

(See Session Eight Teacher's Handbook for activities.)

Why work with semi-structured number lines?

Working with semi-structured number lines helps learners to:

- Develop good number sense
- Visualise a mental number line in their heads
- Use and develop strategies such as:
    - doubling and halving
    - estimation
    - patterns
    - friendly numbers (i.e. tens and hundreds)
- Locate whole or parts of numbers in relation to other numbers
- Order numbers
- Provide support for working with empty number lines

Clothes Line Maths

One way to work with a semi-structured number line is to create a **life-sized** number line in your classroom. This number line has a number of useful features:

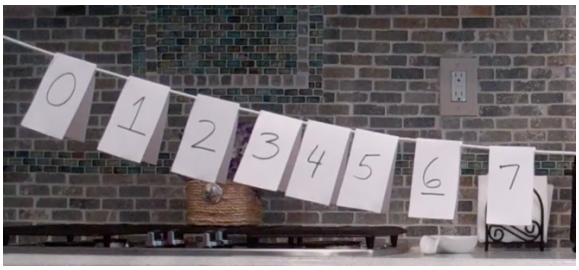
- Learners can interact directly with the number line in many different ways and can manipulate the numbers and their position on the line.
- It can be adjusted to work with different number ranges
- It can encourage discussion

Preparing a "Clothes line" (string) number line in your classroom

- Find a place in your classroom where you can hang a thin rope (or piece of string) across the room so it is at the learners' eye level.
- Prepare tent cards (see below) to hang on the number line.

Watch these "Clothes Line for Number Sense" videos!

Here are two websites with videos showing young children working with these types of number lines.

Different representations. https://mathwithmeaning.wordpress.com/tag/clothesline/ 	Move the pieces of paper so they make sense to you! http://mr-stadel.blogspot.com/2015/08/clothesline.html 

Activities in this handbook

Activities used in this handbook have been adapted from three sources. These are acknowledged where they have been used.

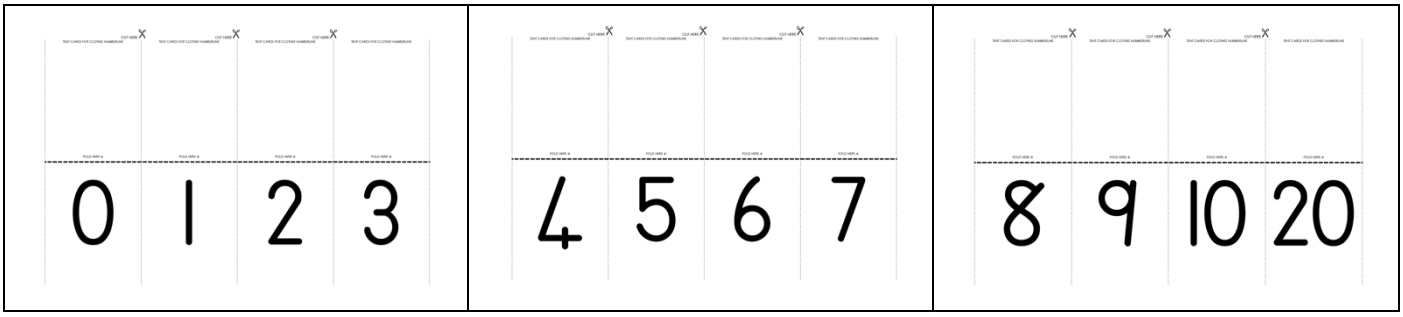
1. *Learning to Think Mathematically with the Number Line A Resource for Teachers, A Tool for Young Children*
   https://www.mathlearningcenter.org/sites/default/files/pdfs/LTM_Numberline.pdf
2. *Divisible by 3 - Andrew Stadel:*
   http://mr-stadel.blogspot.com/2015/08/clothesline.html
3. *Math with Meaning*:
   https://mathwithmeaning.wordpress.com/tag/clothesline/

Using the tent cards for semi-structured number line work

In your resource pack you have been provided with 8 pages of tent cards to use with a life-sized number line.

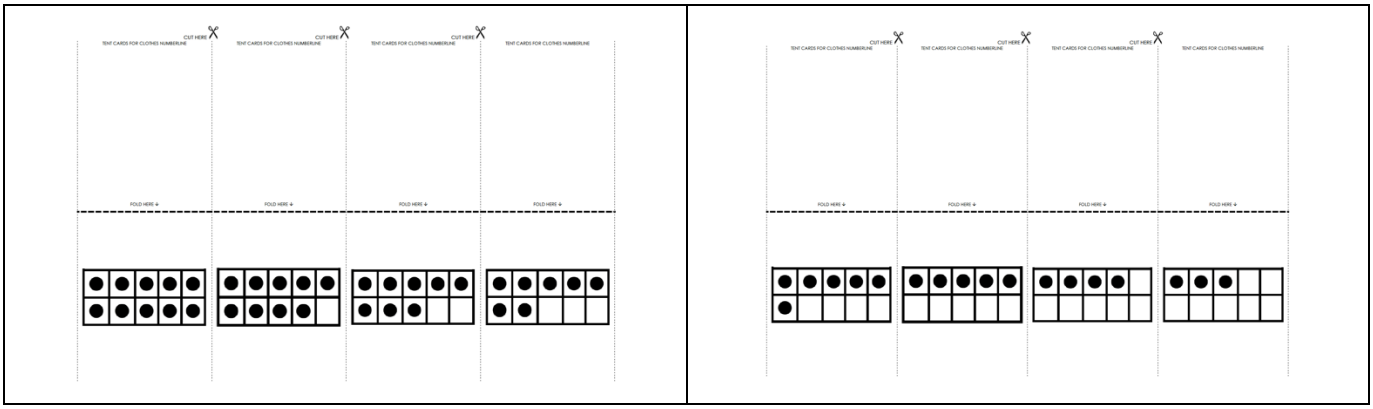
Printed cards 0 to 10, 20

These can be used for introductory work and for younger learners.



10-frame cards 3 to 10

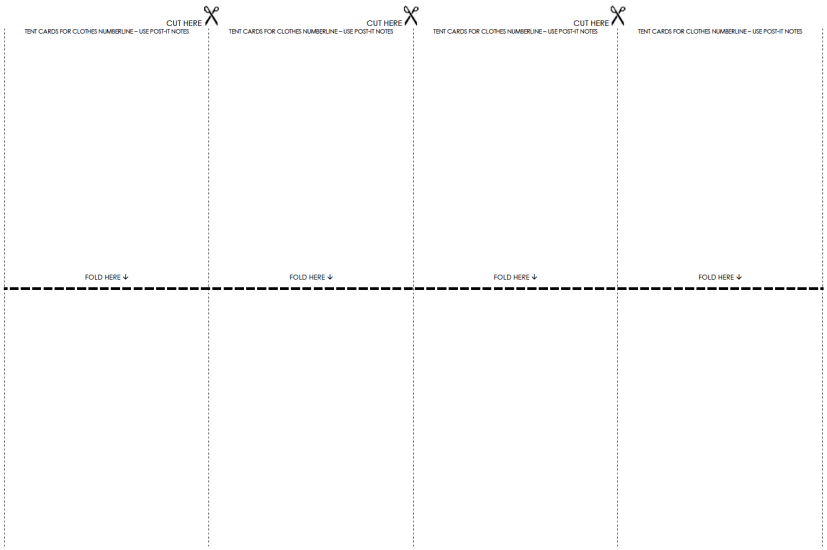
These can be used to match 10-frame representations of numbers to 10 with number symbols. See later activity descriptions.



Blank tent cards – 8 cards

These can be used to work with any numbers NOT provided on the printed cards, including fractions.

Simply write the numbers on a Post-It note and stick the note onto one of these cards.



Initial preparation

Cut the cards along the dotted lines as indicated and fold where shown. Store the cards in an envelope, Ziploc bag or secure with elastic bands.

Reflection Activity

Get into groups of 3-5 or work with the teachers at your table.

Reflect on your use of the following activities from the last session.

Thinking about Number Talks and Structured Number Lines

1. Did you do any **Number Talks** with your class this month?
   If so, what did you do?
   How did you find the experience?
   Did you learn anything about how your learners think?
2. Reflect on your experiences of using **structured number lines.**
3. Did you make any adaptations to the activities? If so, show / explain to the members of your group.
4. What were the learner experiences of the activities?
5. Where in your school did you draw your number line?
6. Did you find anyone to sponsor a permanent number line in your school?

NOTES:

This section provides details of the activities that are presented in this workshop.

Every workshop will have a similar section so you know where to look in the handbook.

Resources

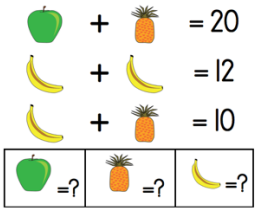
Number talk prompts

Page: 13

Semi-Structured Number Line Activities

Page: 16

Number Talks: Maths Challenges



Why use the challenges for number talks?

They help learners to:

- Understand the idea that a symbol (image) can stand for something unknown and they need to find the fixed value of the unknown in order to solve the problem.
- Describe what they know and how to use that to work out what they don't know.
- Be able to explain and justify their thinking.
- Increase confidence in talking about maths.
- Work visually.
- Develop maths vocabulary.

GUIDELINES	• Do not suggest methods • **All** learners should participate • Allow many solution strategies	
OBJECT OF LEARNING	• Learners explain their thinking: HOW they SEE it and WHY it makes SENSE	Learners begin to: • See and use numbers flexibly • Reason abstractly • Speak mathematically

Working with the Number Talk Prompts

The "Maths Challenges" prompts below are for Grade 1 and 2 learners.

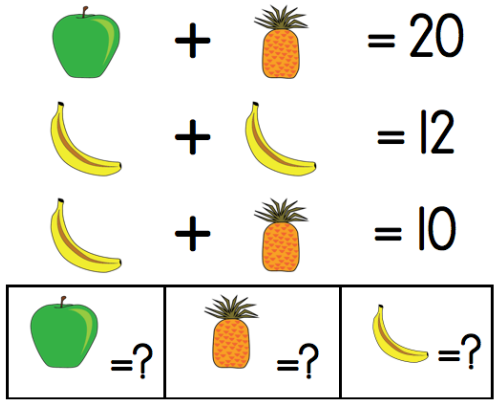
To use these prompts:

- Select a number talk prompt from the templates on pages 35 to 40.
- Work through the prompt yourself so that you know how you can solve it.
- Decide how to present the prompt to the learners in your classroom. Will you:
    - Draw it on the board?
    - Project it?
    - Photocopy pages for pairs of learners to work with?
- Learners may need longer than 10 minutes to work with these prompts. 15-20 minutes should be sufficient.

Prompts

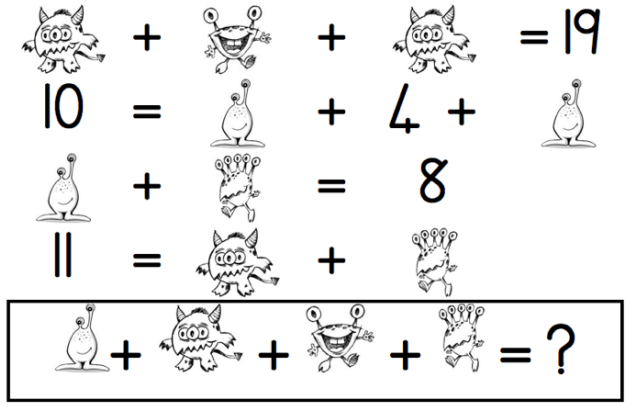
These have been graded from easiest to more difficult.

1



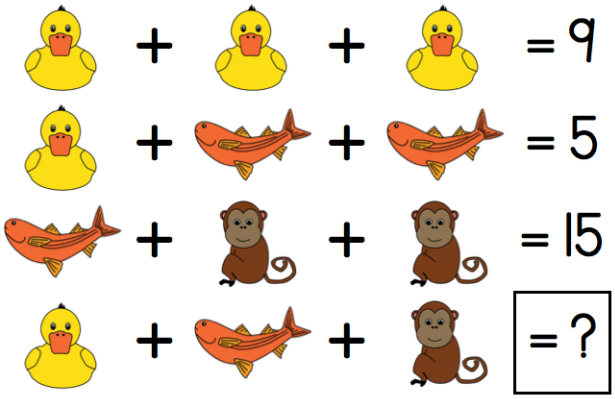
Addition, numbers to 20, three items

2



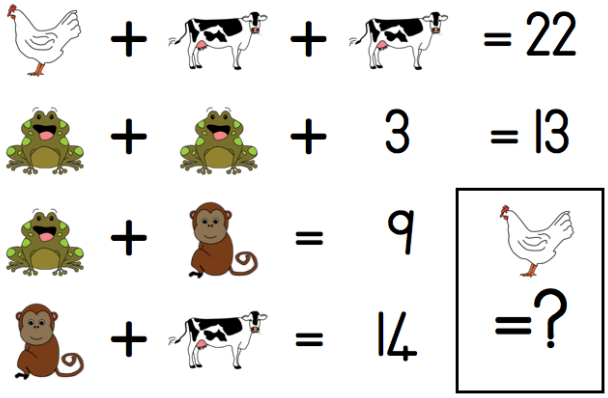
Addition, numbers to 20, equal sign in different positions, 4 items

3



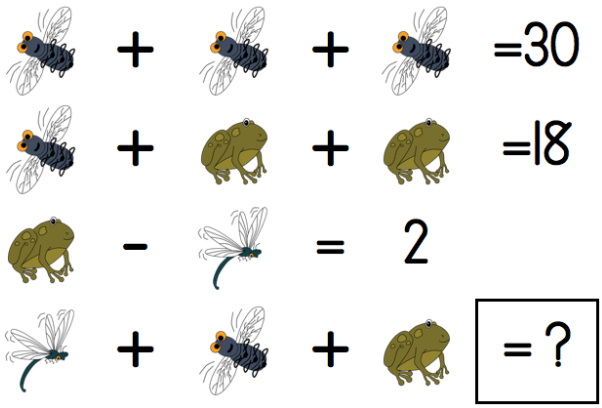
Addition, numbers to 20, three items

4



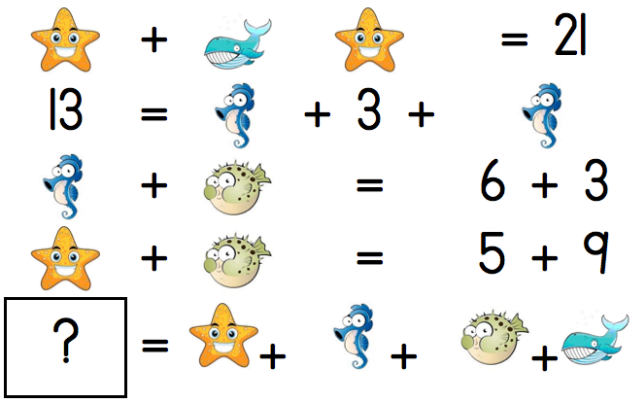
Addition, numbers over 20

5



Addition & subtraction, numbers over 20

6



Addition, numbers over 20, equal sign in different positions

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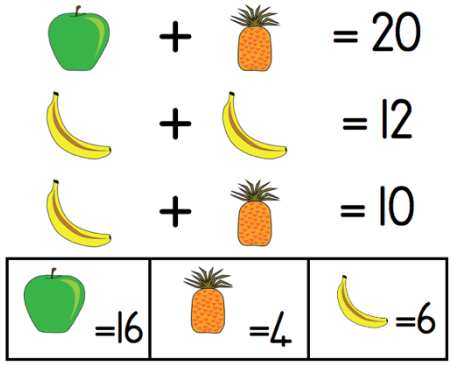
Solutions

1



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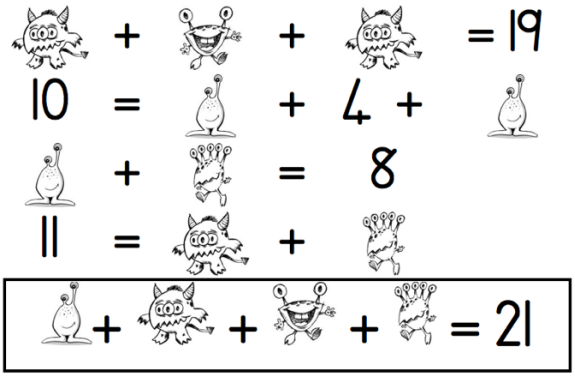

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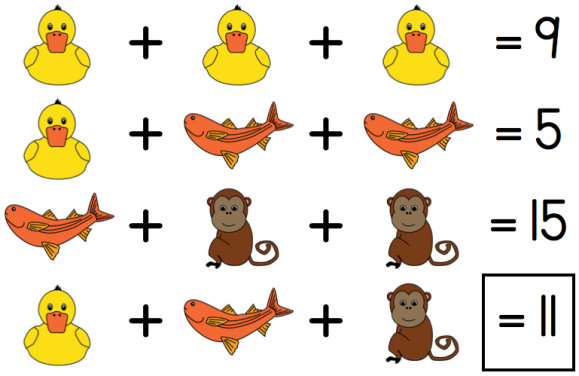
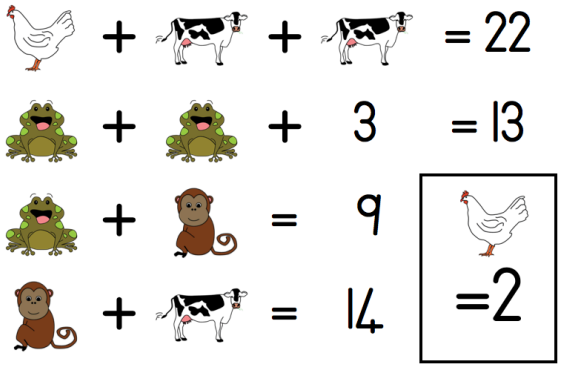


4



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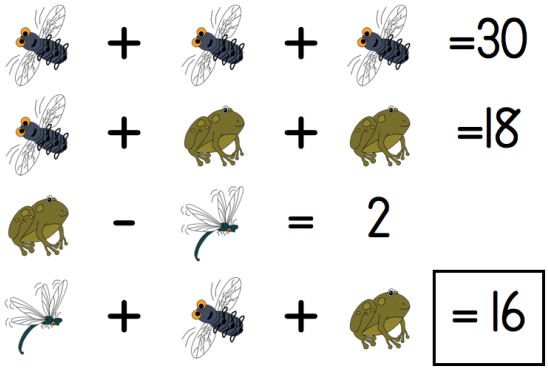
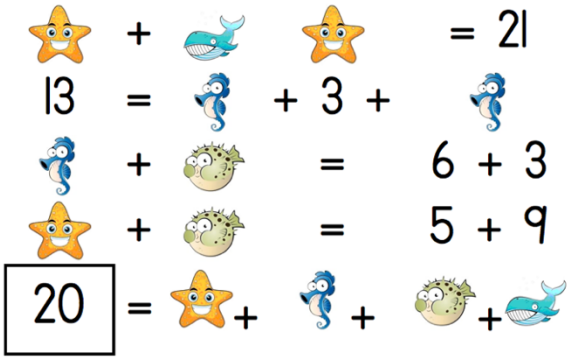


6



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Zero to ten[2]

When learners are comfortable working with structured number lines, you can begin to introduce semi-structured number lines in the form of a "**Clothes Line**".

There are a number of different activities that you can do with this type of number line, working from zero to 10. The ideas below start from get gradually more complex.

Mathematical object of learning:	***You need:***	***Work with:***

• Develop number sense between zero and ten.
  ○ Position numbers on a number line (e.g. "Can you show me where the number 8 belongs?")
  ○ Identify the value of a position on a number line (e.g. "Can you tell me what number should go on the empty card?)
	• String or clothes line
	• Tent cards (blank or with printed numbers)
	• Post-it notes to use with blank tent cards
		The whole class if you have space, or smaller groups

PREPARATION

- Setup your "Clothes Line"
- Prepare the tent cards you will need for this activity as described on page 8 above.

THE ACTIVITY

1. ZERO and 10

- Start with the zero card.
- Ask: "**Where should I place zero on the number line?**"
  It is important for learners to realise that zero can go anywhere.
- Based on learners' ideas, place the zero card on the number line, leaving space to the right of zero for other numbers.
- Next, use the 10-card.
- Ask: **"Where should I place 10?"**
- After input from learners, place the number ten on the number line, leaving plenty of space between zero and ten.

NOTES:
Take advantage of the open number line to foster discussion about where ten could go (anywhere, because we have not yet determined a scale for the number line).

Continue with other activities on the next page.

[2] Adapted from Learning to Think Mathematically with the Number Line A Resource for Teachers, A Tool for Young Children https://www.mathlearningcenter.org/sites/default/files/pdfs/LTM_Numberline.pdf

Zero to ten continued

2. OTHER NUMBERS TO 10

Next, learners place other numbered cards between the zero and the 10 on the number line. Give cards to a selection of learners so that they can participate in hanging the cards on the number line.

- Begin with the number 5.
- Ask: "**If I know zero and I know 10, do I know where to place 5?"**
- Listen for how learners explain their ideas that 5 would be halfway between zero and ten.

- **Note**: If learners decide to place a number in the wrong spot initially, that is okay. You might choose to continue without correcting. As learners work with the space they have and cards begin to bump into each other, they may make adjustments to the placement of the cards and self-correct.

- Continue with other cards.
- Encourage learners to explain how they know where a card might be placed.
- Listen for comments to give you an indication of the developing number sense: "4 is half of 8, so it should be placed halfway between zero and 8."... "6 is one more than 5, so put it one to the right of 5."... etc.

3. UNKNOWN NUMBERS ON THE NUMBER LINE

- Take all the number cards off the line except for the zero and ten.
- Place one empty card with a "?" at the halfway point between zero and 10 (i.e. 5)
- Put another roughly where one would expect to see the number two.
- Ask: "**Can you tell me what numbers would go on each card?"**

Change the location of the empty cards. Also, you may include other numbers to help learners work out what goes on the empty card.

For example:

- Place the zero, ten and 8 cards on the number line
- Next, place a question mark card between 8 and 10.
- Ask: "**What number goes on the card?"**

VARIATIONS

- Use your "Clothes Line" to match 10-frame values with number symbols. These are in your resource packs. This is a useful activity for working in the number range 1 to 10 and as a transition from 10-frames to number symbols.
- For younger children, or for those who are struggling with numbers to ten, begin with numbers between zero and 5.
- For older or children who need extension, extend the number line to 20, 50, 100, etc.
- You might also use number ranges that do not include zero – for example, use endpoints of 15 and 75.
- Adapt the tent cards using post-it notes to show these different number ranges.

Move the numbers so they make sense[3]

In this activity, mix up the numbers on the number line and ask learners to re-arrange them so that they make sense.

Mathematical object of learning:	***You need:***	***Work with:***
• Explore the order of numbers given a set of mixed up numbers	• String or clothes line • Tent cards (blank or with printed numbers) in your number range • Post-it notes to use with blank tent cards	The whole class if you have space, or smaller groups

PREPARATION

- Set up a "Clothes Line" across the front of the room
- Decide on your number range e.g. 0 to 10
- Place numbered tent cards randomly along the number line (see the photograph below as an example)

THE ACTIVITY

- Say: "**Move the cards so they make sense to you**"
- Invite learners to come up and arrange the cards in a way that makes sense.
- Listen to the learners' self-talk, explanations and rationale for placing the cards where they do.
- When they seem to be finished ask: "**So why does that make sense to you?**"
- Ask them to explain their thinking.
- Repeat the activity with a different arrangement of cards and different learners.

VARIATIONS

- Use your "Clothes Line" number line to match 10-frame values with number symbols. These are in your resource packs.
  This is useful activity for working in the number range 1 to 10 and as a transition from 10-frames to number symbols.

[3] Sourced from: Clothes Line 1 http://mr-stadel.blogspot.com/2015/08/clothesline.html

Where would these numbers go?[4]

In this version of the activity, you provide learners with two starting numbers. Then, you ask them where two other numbers might go relative to the two starting numbers.

Mathematical object of learning:	***You need:***	***Work with:***
• reinforce number relationships specifically, number order	• String or clothes line • Tent cards (blank or with printed numbers) • Post-it notes to use with blank tent cards	The whole class if you have space, or smaller groups

PREPARATION

- Set up a "Clothes Line" across the front of the room
- Decide on your number range e.g. 0 to 10
- Place two numbered tent cards on the number line e.g. zero and one

THE ACTIVITY

- Say: "**Here is zero and one.**"
- Say: "**Show me where 4 and 5 would go.**"
- Listen to the learners' self-talk, explanations and reasons for placing the cards where they do.
- When they are finished, ask: "Why does that make sense to you?"
- Ask them to explain their thinking.
- Repeat the activity with two different starting cards and different learners.

[4] Sourced from: Clothes Line 3 http://mr-stadel.blogspot.com/2015/08/clothesline.html

Next to, Far Away[5]

This activity allows learners to explore the positions of numbers. Learners think about the distances separating three numbers and how the number line can help them work out the differences between those numbers.

As learners work through this activity, they will have opportunities to think about number combinations, addition and subtraction facts, etc.

This activity can be done with the life-sized number line and/or with pencil and paper.

Mathematical object of learning:	***You need:***	***Work with:***
• explore relationships between groups of three numbers (e.g. greater/less than, relative distances from one another, etc.)	• String or clothes line • Tent cards (blank or with printed numbers) • Post-it notes to use with blank tent cards • Clear space in or outside the classroom	You can work with the whole class if you have space to do so. Otherwise, work with smaller groups

PREPARATION

- Setup your "Clothes Line" across the front of the room.
- Hang a zero card on the number line.
- Choose an endpoint based on the number range you are working with e.g. 10, 20, 40, or perhaps 100.
- Hang that card on the line.

THE ACTIVITY

- Ask learners to draw **three** cards from a hat.
- Ask learners to place their number cards on the number line.
- Listen to their self-talk, explanations and reasons for placing the cards where they do.

For example
With endpoints of zero and 20, learners may place 4, 7 and 16 like this:

[5] Adapted from Learning to Think Mathematically with the Number Line A Resource for Teachers, A Tool for Young Children https://www.mathlearningcenter.org/sites/default/files/pdfs/LTM_Numberline.pdf

Next to, Far Away continued

Ask a series of questions that will encourage children to think about the distances separating these numbers and their relationships to each other (e.g. greater than, less than).

Next, choose a new set of three numbers. Different numbers will lead to different questions and concepts.

There are many questions you could ask about these numbers, but here are some examples.

Example 1: with endpoints of zero and 20 and the numbers 4, 7 and 16

- **Which two numbers are closest together? How close are they?**
- **How far is the 7 from the 16?**
- **What would you have to add to the 4 in order to get to 16?**
- **What number card would be exactly halfway between 4 and 16?"**
- **Which is greater -- the distance between 4 and 7, or between 16 and 20?"**
- **What number is less than 16, but greater than 4?**

Example 2: select endpoints of 15 and 85. Give learners the cards for 21, 35, 51. This could be used as extension or for older learners. Questions might include:

- **Which two of the cards are closest to each other?**
- **How close are they?**
- **Which is a greater distance: from 21 to 85? Or from 51 to 15?**
- **Is 51 closer to 35, or is it closer to 85?**
- **What number is exactly halfway between 35 and 85?**
- **Is 35 closer to 21 or 51? How much closer to each number?**

Finding the middle (halving)[6]

It is important for learners to be able to determine "half" of a given quantity.

In this activity learners are given opportunities to examine the half/double relationships using the number line.

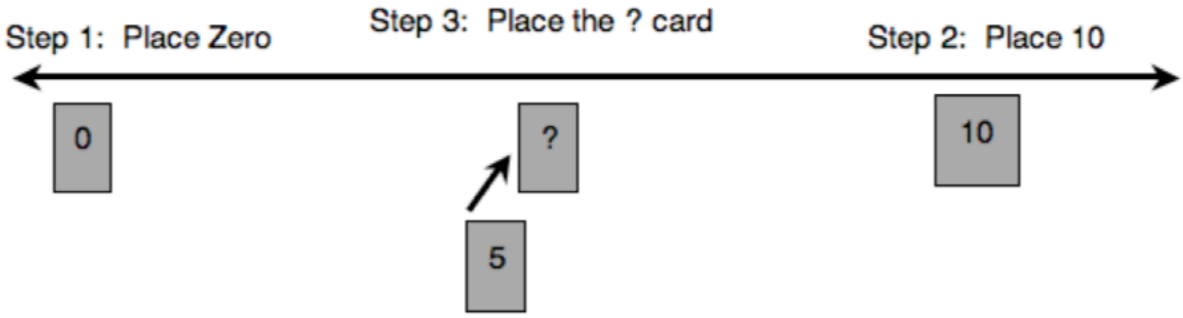
Mathematical object of learning:	***You need:***	***Work with:***
• Use the number line to find the middle (half) between two numbers. • Use the number line as a tool to model mathematical thinking	• String or clothes line • Tent cards (blank or with printed numbers) • Post-it notes to use with blank tent cards	You can work with the whole class if you have space to do so. Otherwise, work with smaller groups

PREPARATION

- Prepare your "Clothes Line".
- Prepare various number cards, including zero, 3, 5, 6, 10 and 12 and one empty card with a "?" on it.

THE ACTIVITY

- Hang a zero card on the number line.
- Ask: "**Where would you put the number 10**?"
- Ask a learner to place the "?" card at the point that looks to be exactly halfway between the zero and the 10 number cards.
- Ask: "**What number would go in the empty box halfway between zero and 10?**"
- After discussion, replace the "?" card with the number 5.



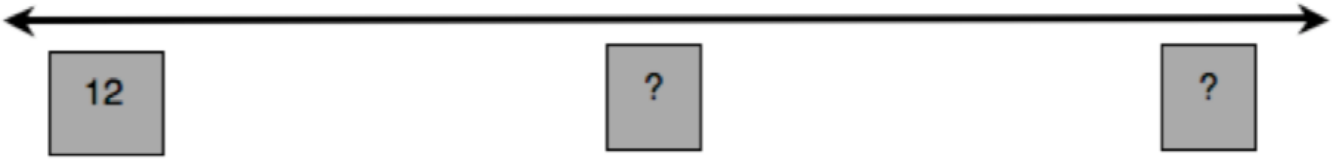
- Leave the cards on the number line (zero, 5, 10),
- Repeat the activity with a new set of numbers.
- For example, ask where they would put the number 12 on the line.
- Ask learners to place the number 6 on the number line.
- Listen to their explanations.
- Ask them to describe their thinking: "**How do you know where to place the number 6?**"
- Some may note that 6 is right next to 5.
  Others will use the halving strategy, working off the number 12.
- Make sure that learners discuss both methods for working out the middle of the number line.

[6] Adapted from Learning to Think Mathematically with the Number Line A Resource for Teachers, A Tool for Young Children https://www.mathlearningcenter.org/sites/default/files/pdfs/LTM_Numberline.pdf

Finding the middle (halving) continued

VARIATIONS

1. Repeat this activity again with different numbers.
2. Use larger or smaller numbers depending on the level of learners.
3. To vary the activity, begin by placing a number on the number line (e.g. 12).
   a. Place two "?" cards, equally spaced, to the right of the 12.
   b. Ask: "**What two numbers might go on the "?" cards?**"
   c. Listen to their explanations to understand what halving strategies they are using to find the middle value.



NOTES:

Doubling[7]

This activity is designed to help children understand, visualise and use "doubles" such as 2 and 4; 4 and 8; 5 and 10 and so on.

An understanding of doubles and the use of "doubling" as a mental strategy are important. When children can visualise doubles, they can use that in various ways as they work with numbers.

For example, many children use "doubles +1" or "doubles -1" strategies to work out number facts such as 6 + 7.

Mathematical object of learning:	***You need:***	***Work with:***
• Visualise and use doubles on a number line	• String or clothes line • Tent cards (blank or with printed numbers) • Post-it notes to use with blank tent cards	You can work with the whole class if you have space to do so. Otherwise, work with smaller groups

INTRODUCTION CONTEXTS

You may wish to use story contexts to promote understanding of doubles.

Example:

"There are four children sitting at each of your tables. Without looking down, how many shoes would you find under your table?"

You might build on this context by constructing a grid like this on your board.

Number of Children at your table	1	2	3	6	5	10			
Number of Shoes under the table	2	4	6						

There is no need to go in sequence (from 1-10, for example, on the top row). Vary the order so that they are encouraged to think in terms of doubling and halving.

Ask the children to help you complete the table.

[7] Adapted from Learning to Think Mathematically with the Number Line A Resource for Teachers, A Tool for Young Children https://www.mathlearningcenter.org/sites/default/files/pdfs/LTM_Numberline.pdf

Doubling continued

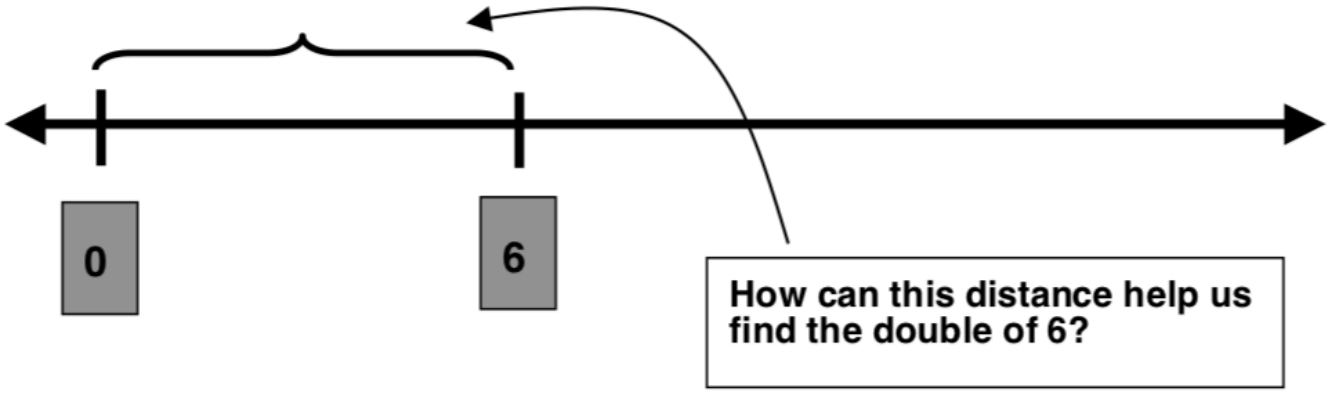
As you work through the table, you can show the pairs of numbers on a number line.

NOTES

- It is important that children can solve the problem by:
  - making visual estimates of where the "doubles" will fall on the number line
  - by counting equal intervals on the number line.
- It is important to begin with zero labelled on the number line so that the learners can work out a reasonable visual scale for doubling.

- Place the 2-card on the number line.
- Ask: **"If 4 is the double of 2, where should we place the 4-card?"**
- After the cards have been placed, take a piece of string and measure from zero to 2.
- Ask: **"How can we use this string to know if we put the 4card in exactly the right place?"**
- Listen for how learners explain that the distance between zero and 2 must be the same as the distance between 2 and 4.

- Continue with another example.
- **"Suppose there were 6 children at the table. How many shoes would there be under the table? Let's use the number line to help..."**
- Ask the children where to place the number 6 on the line.
- To highlight a visual strategy for determining the double of 6, you might take a string and measure the distance from zero to 6.
- Ask the children how that string could be used work out the double of 6.
- Continue with other doubles pairs



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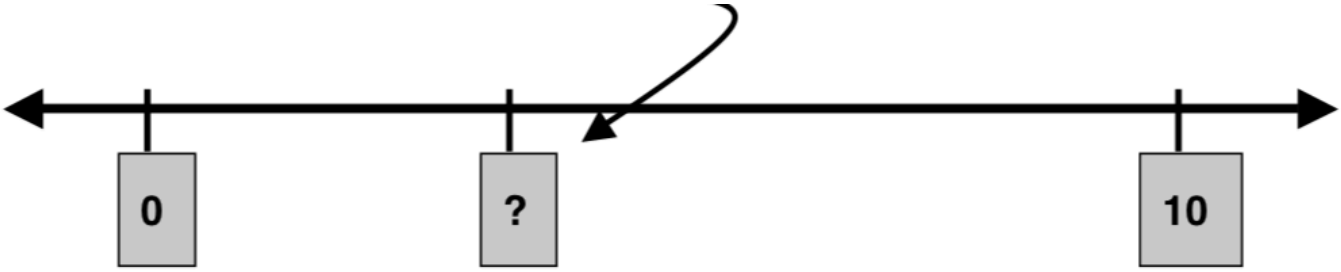
What's on the card?[8]

This activity allows teachers to observe the thinking strategies and number sense of learners as they reason about numbers and their relationships to each other.

Mathematical object of learning:	***You need:***	***Work with:***
• Use informal strategies to identify missing values on a number line. • Develop number sense: number relationships and visualisations of the number line to find missing values.	• String number line • Depending on the number range: Tent cards including some number cards that are blank (or have a question mark inside)	You can work with the whole class if you have space to do so. Otherwise, work with smaller groups

ACTVITIY

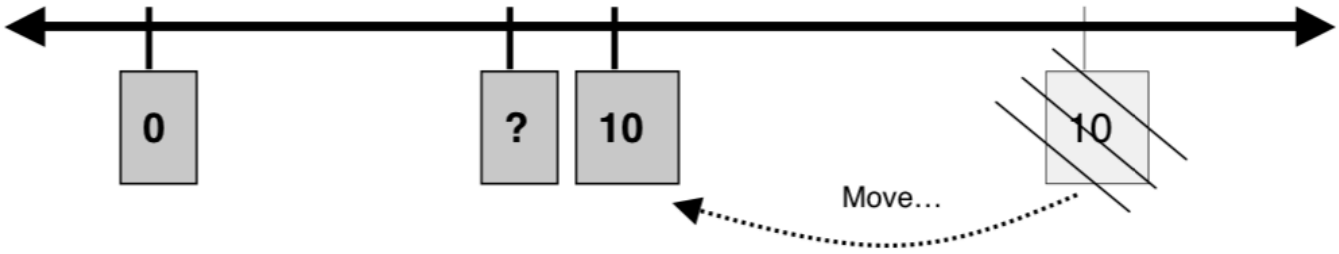
- Place the zero card (or another starting value) on the number line.
- Hold up an empty number card.
- Ask: **"Where should I place this empty number card on the number line?"**
- Encourage learners to think about the fact that the empty number card can go anywhere on the line as the number line is open and the card could represent any number on the line.
- Place the card on the number line.
- Take a second card with a number on it (e.g. 10).
- Place it on the number line to the right of the empty card.
- Ask: **"Now, do we have some idea of what the value of the empty number card might be?"**



[8] Adapted from Learning to Think Mathematically with the Number Line A Resource for Teachers, A Tool for Young Children https://www.mathlearningcenter.org/sites/default/files/pdfs/LTM_Numberline.pdf

What's on the card? continued

- Move the 10-card closer to the empty box.
- Say: "**I have moved the 10-card much closer to the empty card.**"
- Ask: "**Do we have to change the number we selected for our empty card? What is a better number to put in there?**"

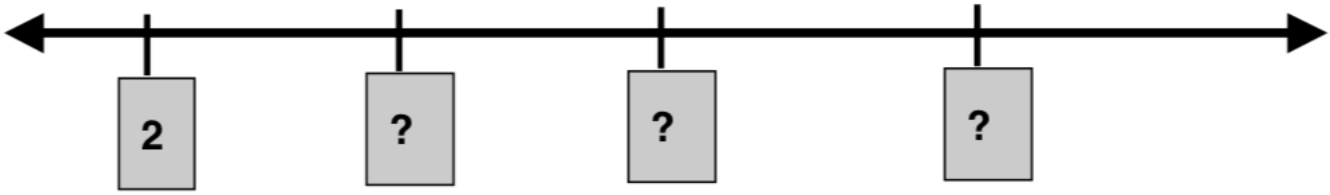


- Listen to the explanations of the children as they discuss what new number should go on the card. Moving one or more of the number cards is useful in promoting mathematical thinking and understanding.
- Continue other similar examples.

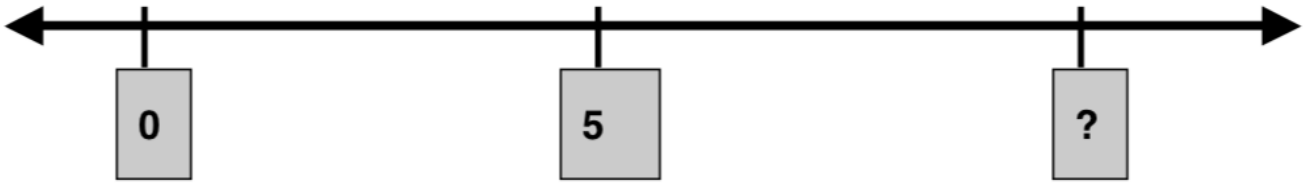
Continue to check learners' understanding by allowing for classroom discussion. By changing the starting card (left side endpoint), you can encourage the children to think in different ways.

A few examples of are given below:

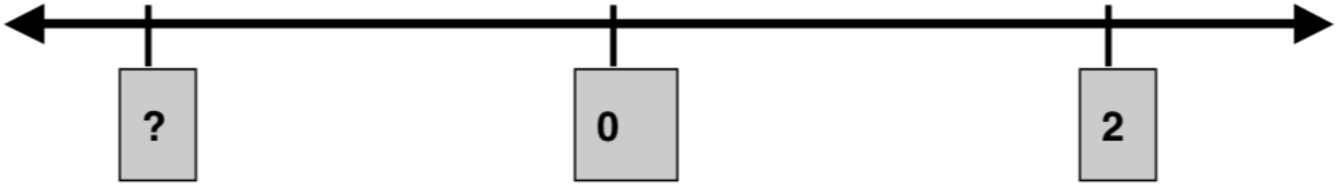
- Ask: "**If I put a 10 on the middle unknown card, what are the other two numbers?**"
- **"What if I put 100 on the middle card. What are the other two numbers?"**



- Ask: "**What if I changed the 5 to a 10? Would the empty card have to change?"**



- Ask: "**What goes on the empty card?"**



"What Number Am I" Riddles[9]

Provide riddles for the learners to solve. Encourage learners to use the number line when necessary to solve the riddle. With experience, learners can create riddles for their classmates.

You can adapt the riddles to focus on number ranges appropriate for your learners.

Some learners may not have the mental strategies they need to solve the number riddles. Let them create a number line to help them to think.

You could use one of these riddles as a **Number Talk prompt**.

Mathematical object of learning:	***You need:***	***Work with:***
• Development of number sense: See and use numbers flexibly • Start to reason abstractly • Begin to speak mathematically	• String number line • Tent cards including some number cards that are blank (or have a question mark)	You can work with the whole class if you have space to do so. Otherwise, work with smaller groups

PREPARATION

- Prepare your "Clothes Line".
- Prepare number cards appropriate for your learners, including some number cards that are blank (or have a question mark them).
- Begin by doing the first number riddle with learners. When learners are ready, they can show their own solution strategies on the number line.

Example Riddles using numbers between zero and 20:

- "I am two more than five and three less than 10. What number am I?" [7]
- "You can find me when you double 5 and then add 2. What number am I? [12]
- "If you double 2 and then add 1, you'll find me. What number am I?" [5]
- "I am halfway between 10 and 2. What number am I?" [6]
- "Count backwards from 10 until you get to 6. How many steps did you take?" [4]

Example Riddles using numbers between 10 and 100:

- "If you doubled 23 you would find me. What number am I?" [46]
- "I am a number between 1 and 100. Half of me is 25. What number am I?" [50]
- "Start at 13. Count by 10, five times. What number am I?" [63]
- "Start at 20. Add half of me to 20. You are now at 60. What number am I? [80]
- "I am halfway between 85 and 45. What number am I?" [65]

LEARNERS CREATE THEIR OWN RIDDLES

Once learners are familiar with the activity, ask them to create a riddle for a given number.

For example, each learner is assigned a number between a given range (e.g. 1 to 10). Learners create a riddle for their numbers and then the riddles may be shared and solved with a partner.

[9] Adapted from Learning to Think Mathematically with the Number Line A Resource for Teachers, A Tool for Young Children https://www.mathlearningcenter.org/sites/default/files/pdfs/LTM_Numberline.pdf

Worksheets

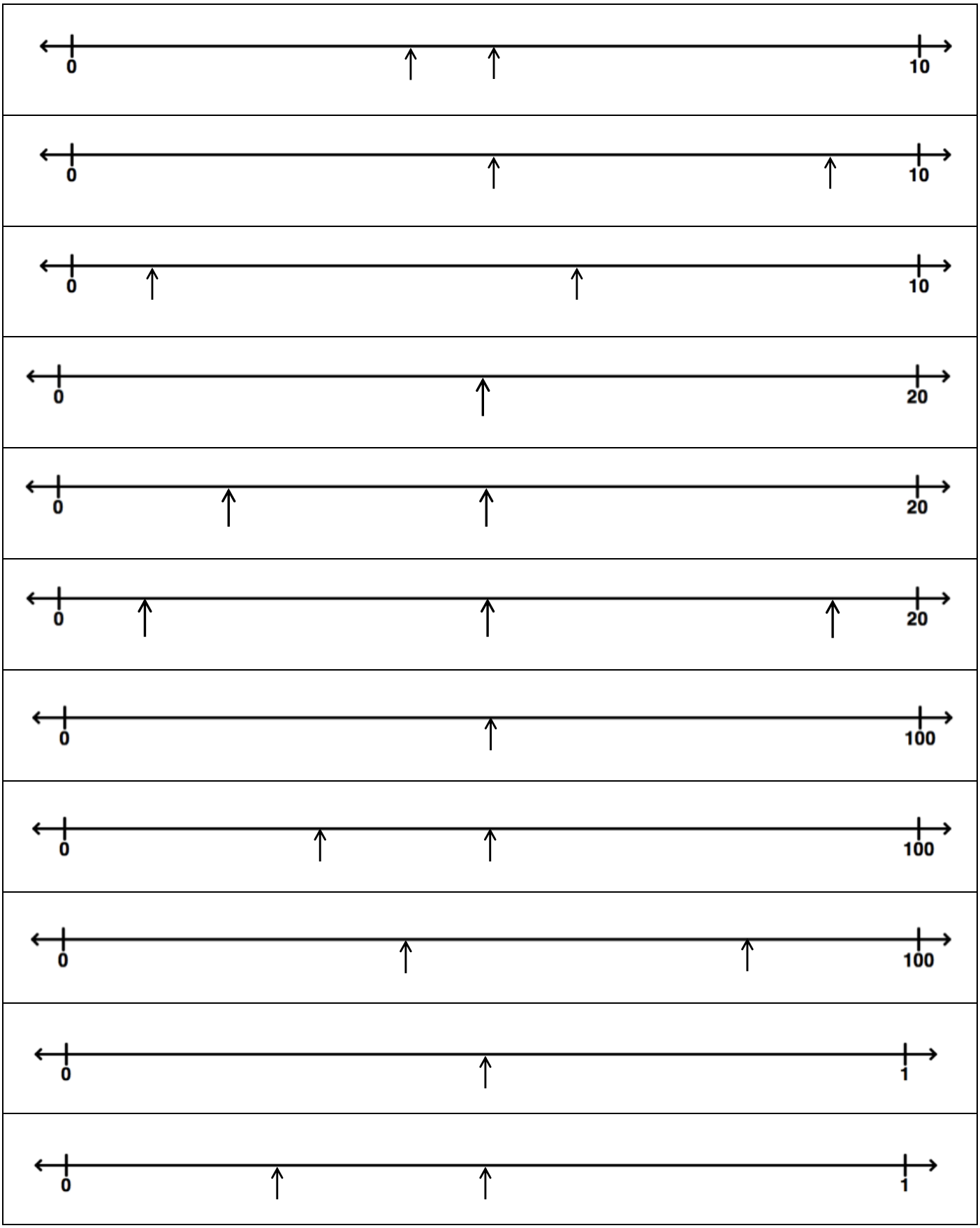
Use the worksheets on the following pages to allow learners to practice their number line work on paper.

Mathematical object of learning:	***You need:***	***Work with:***

• Develop number sense using semi-structured number lines to:
  ○ Position numbers on a number line (e.g. "Can you show me where the number 8 belongs?")
  ○ Identify the value of a location on a number line (e.g. "Can you tell me what number should go on the empty card?)
	• Copies of worksheets	• Learners work in pairs and take turns. They show their workings and explain their thinking to each other
		OR
		• Learners work on their own. They show their workings.

FIND YOUR PLACE ON THE NUMBER LINE

What number will go above the arrows? Write the numbers above the arrows.



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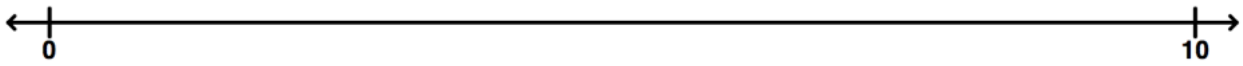
FIND YOUR PLACE ON THE NUMBER LINE

Draw an arrow to show where the middle of each number line will be.

Write the middle number at the arrow. Then find the number given.

2	
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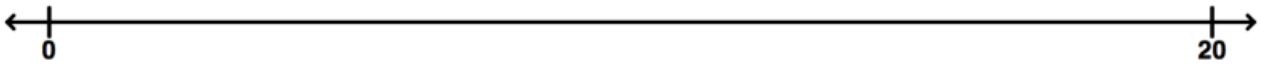
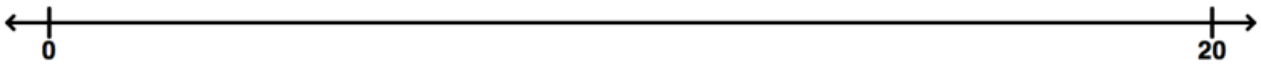
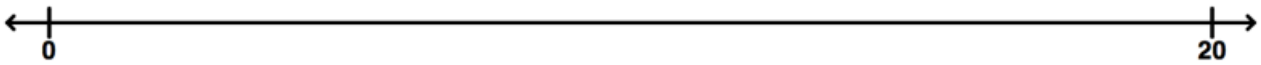
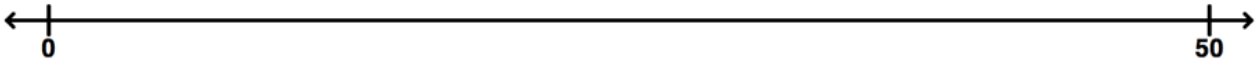
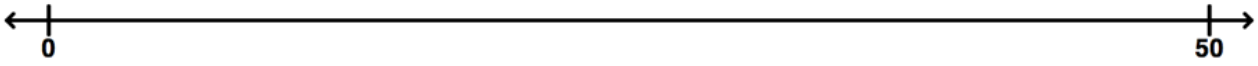
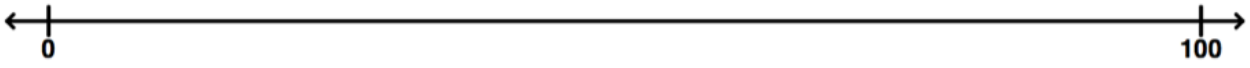
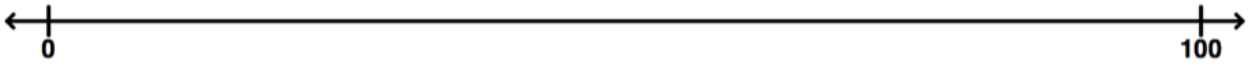
12	
16	
4	
20	
40	
40	
90	

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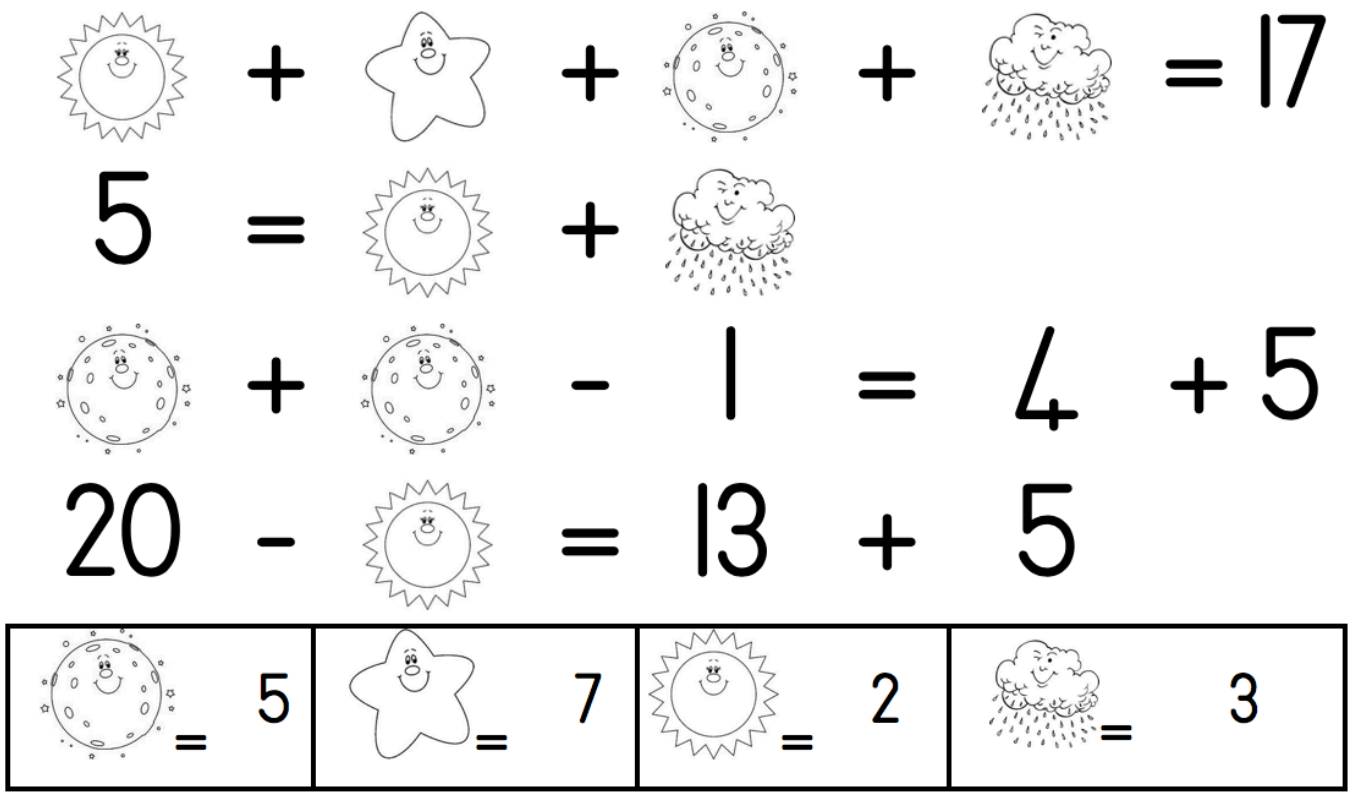
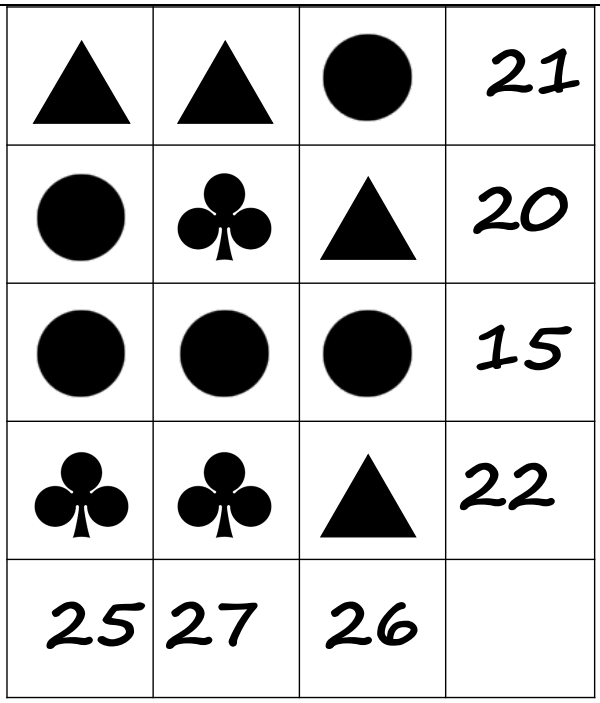
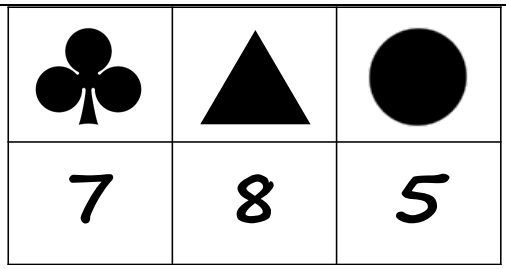
Today's number talk discussion



Reflection questions:

- What kind of **mathematical facts and skills** do learners need to solve this puzzle? Can you think of at least three?
- What kind of **mathematical thinking** do learners need to solve this puzzle?
- Think about your class. Would you say this puzzle was?
    - Beginner level?
    - Medium level?
    - Advanced level?
- Why?



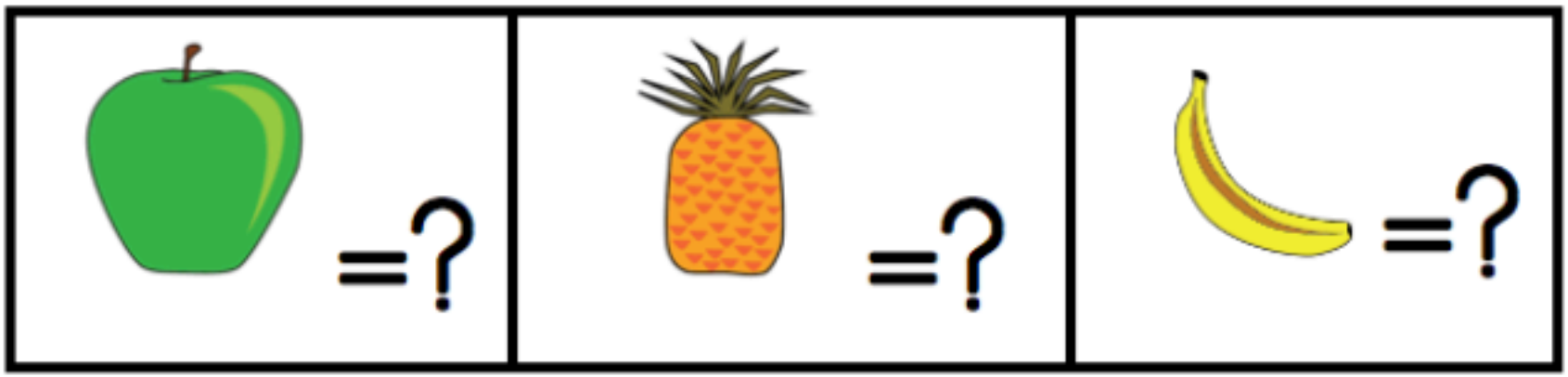


Reflection questions:

- How did you work out this puzzle? Explain your thinking to a partner.
- What kind of **mathematical facts and skills** do learners need to solve this puzzle?
- What kind of **mathematical thinking** do learners need to solve this puzzle?
- Think about your class. Would you say this puzzle was?
    - Beginner level?
    - Medium level?
    - Advanced level?
- Why?

Masters for photocopying

- Number talk challenge prompts
- Number line tent cards



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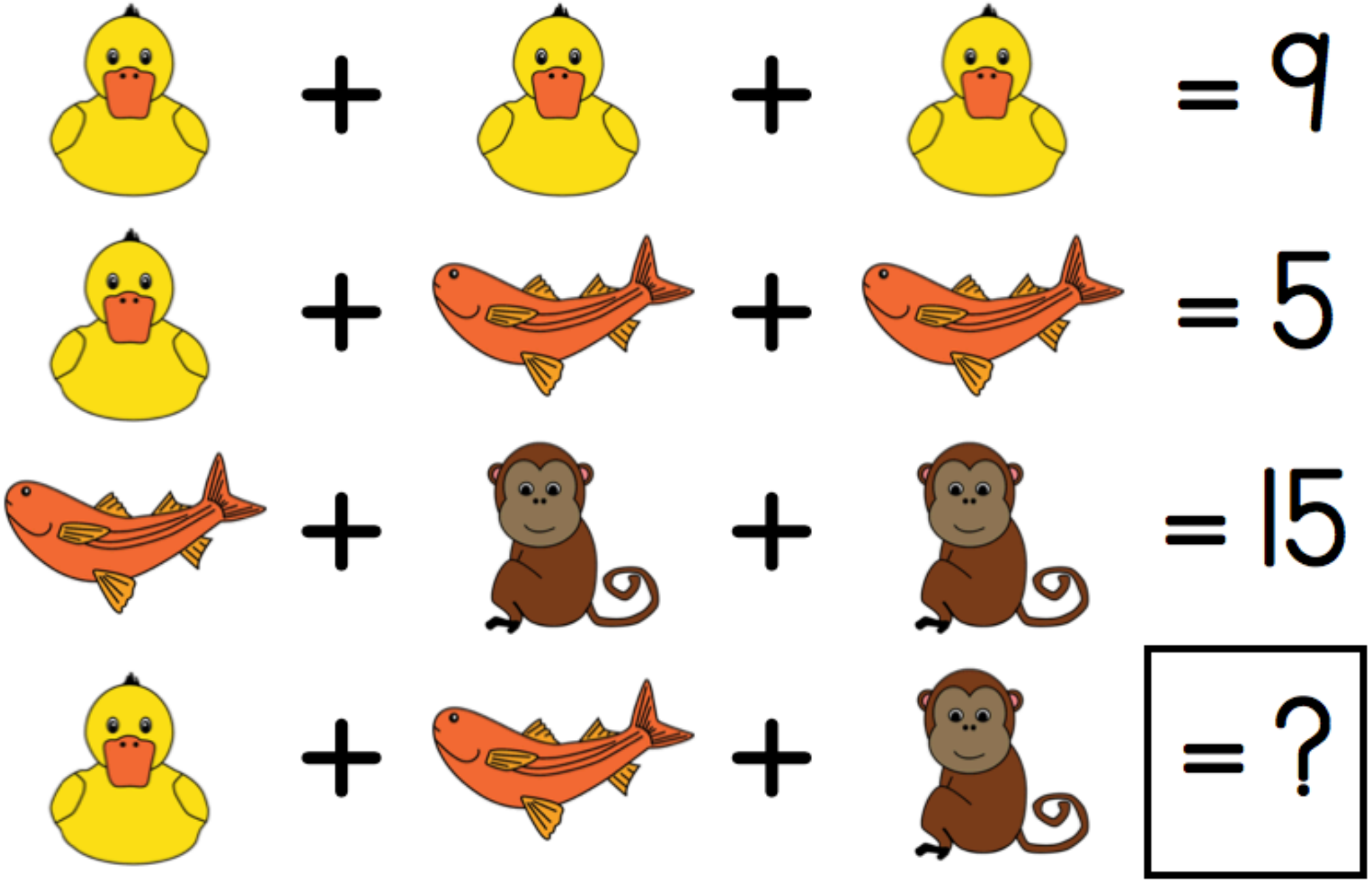

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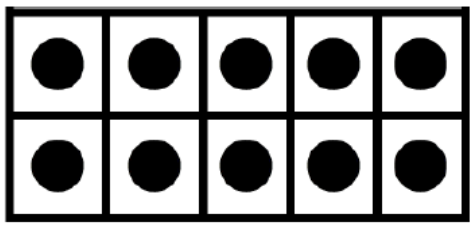

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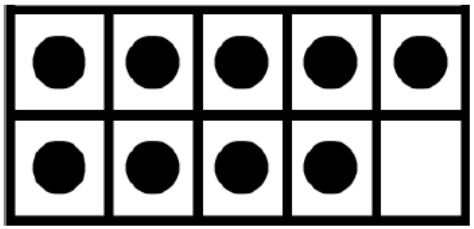

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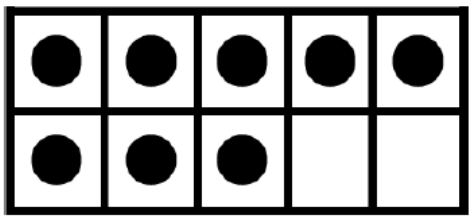

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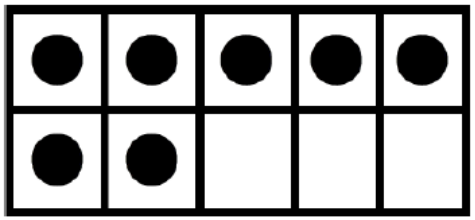

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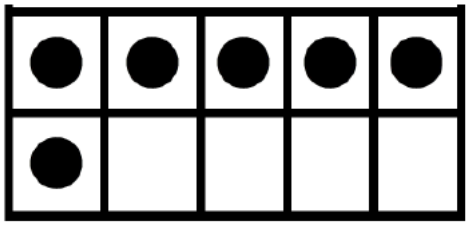

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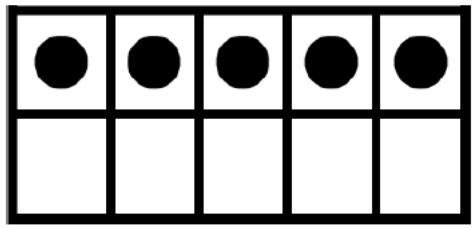

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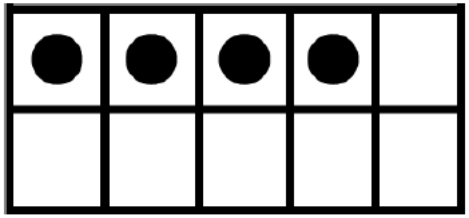

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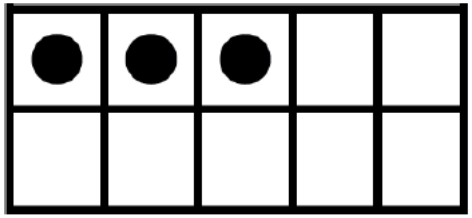

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