

CURRICULUM, PEDAGOGY AND BEYOND



THE MATHEMATICAL
ASSOCIATION OF VICTORIA

MAV24
CONFERENCE

Illustrations of Impact

**How consolidating tasks enhance
student learning and engagement**

Who are we?



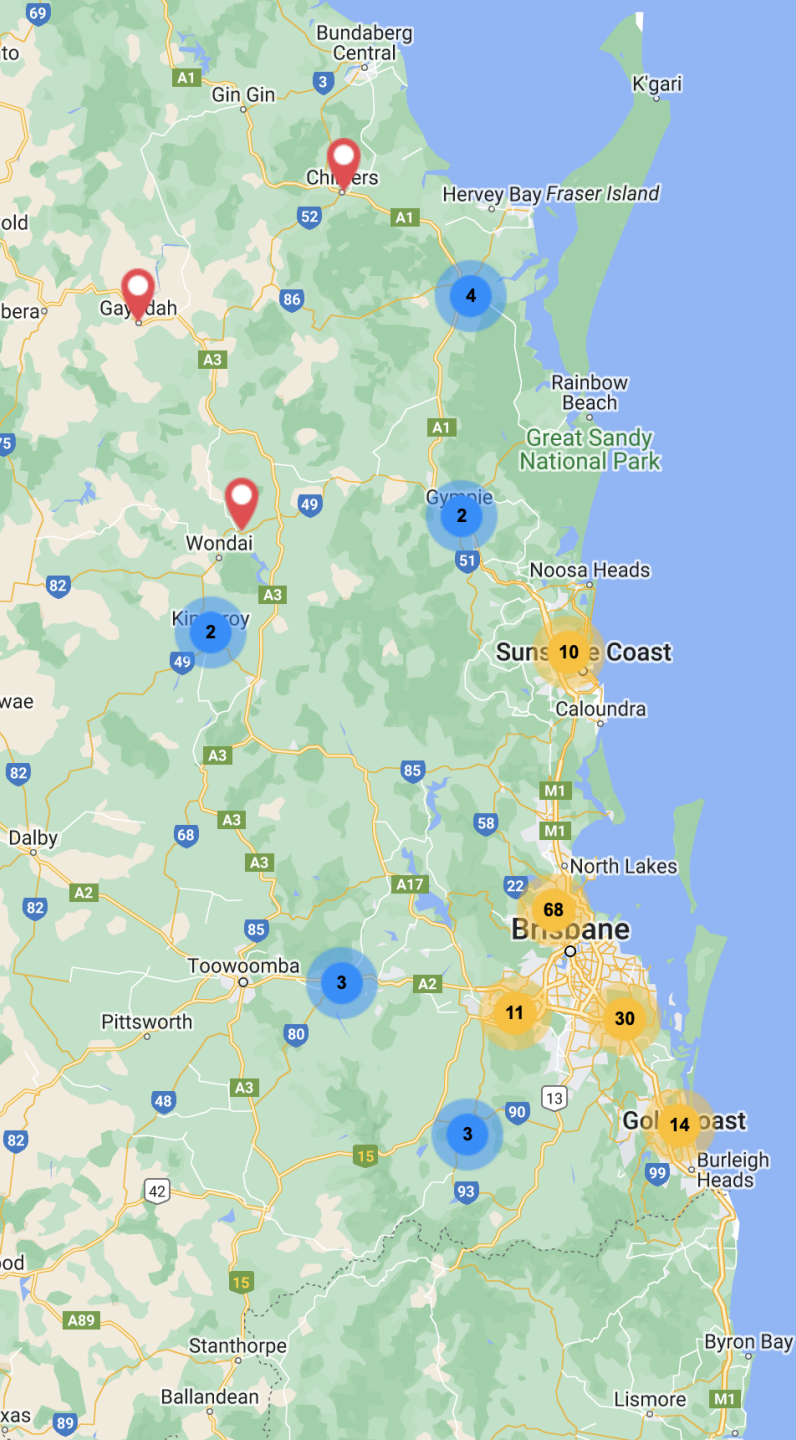
Alana Bandholz

Education Officer: Numeracy
amcdonald@bne.catholic.edu.au



Michael Cini

Education Officer: Numeracy
mcini@bne.catholic.edu.au



- Brisbane Catholic Education (BCE) has a network of 147 schools across Southeast Queensland. The Diocese covers from Hervey Bay and Childers in the North, Gold Coast in the South and out West to Gayndah and Gatton.
- 18 primary schools committed to embarking on a change process implementing Challenging Tasks into their Mathematics teaching and learning in 2025.

Let's do some maths!

How many times does the state of Victoria fit into Queensland?



Does this change your estimation?





Background

- Russo & Hubbard partnership with BCE.
- Change the narrative of pedagogy in mathematics.
- The power of teaching challenging tasks in sequence
- We wanted to emulate the power of Jane and James' demonstration lessons ourselves.



Theoretical underpinnings (Sullivan et al.)

- Moving from simple to complex
- Moving from confusion to clarity
- Building on from familiar
- Productive Struggle (resilience, problem-solving, peer-to-peer learning, activated cognition)



Theoretical underpinnings (Sullivan et al.)

- Student agency (experience before instruction)
- Rigour (appropriately challenging)
- Focus (depth not breadth, do things well, not quickly)
- Coherence (sequence)
- Transferability (bit the same, bit different)
- Choice (open middle or open ended)



The EMC³ instructional model

Source: Sullivan, P. et al. (2021). An instructional model to support planning and teaching student-centred structured inquiry lessons. *Australian Primary Mathematics Classroom*, 26(1), 9-12.

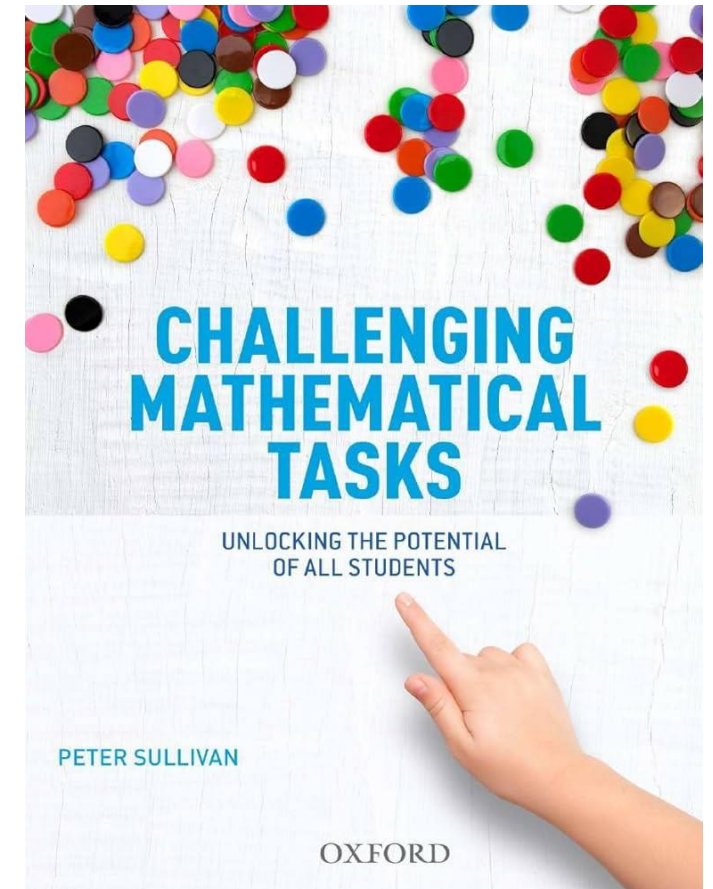
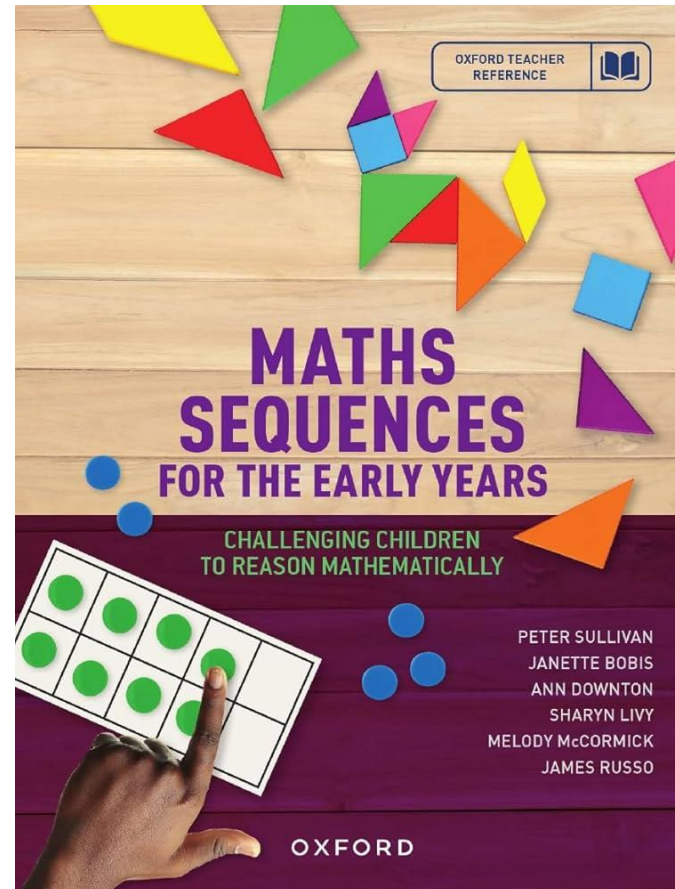
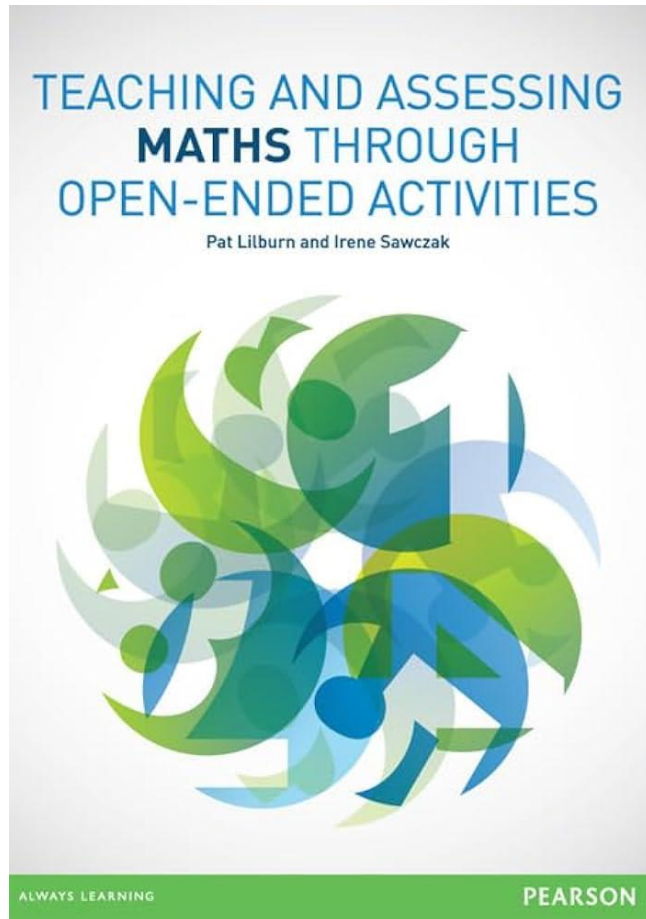


Research questions

1. What makes an effective consolidating lesson?
2. What conditions does a teacher need for a sequence of lessons to have the greatest impact on learning?

Engagement?

Where did our teaching ideas come from?



- **student agency**
- **autonomy**
- **foster reasoning**

Illustrations of impact #1

Prep - Delicious Donuts

I had 12 sprinkles on my donut. I knew how many there were straight away without counting them.

Can you draw what the 12 sprinkles might have looked like?

Now draw them a different way.
Which picture do you think makes it easier to know there were 12 sprinkles on my donut?



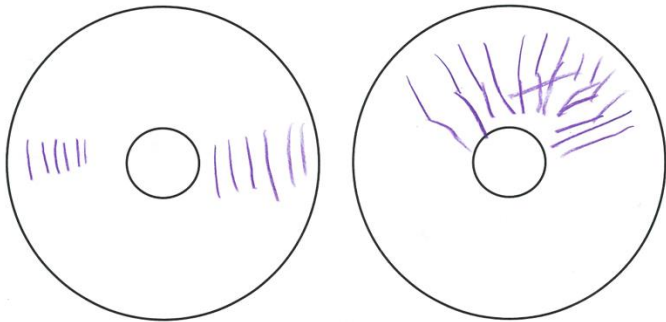
Arlo (Prep)

"I thought that maybe I should do them in squares, so they'll be easier to see."

"I saw three times four," Arlo.

Delicious Donuts

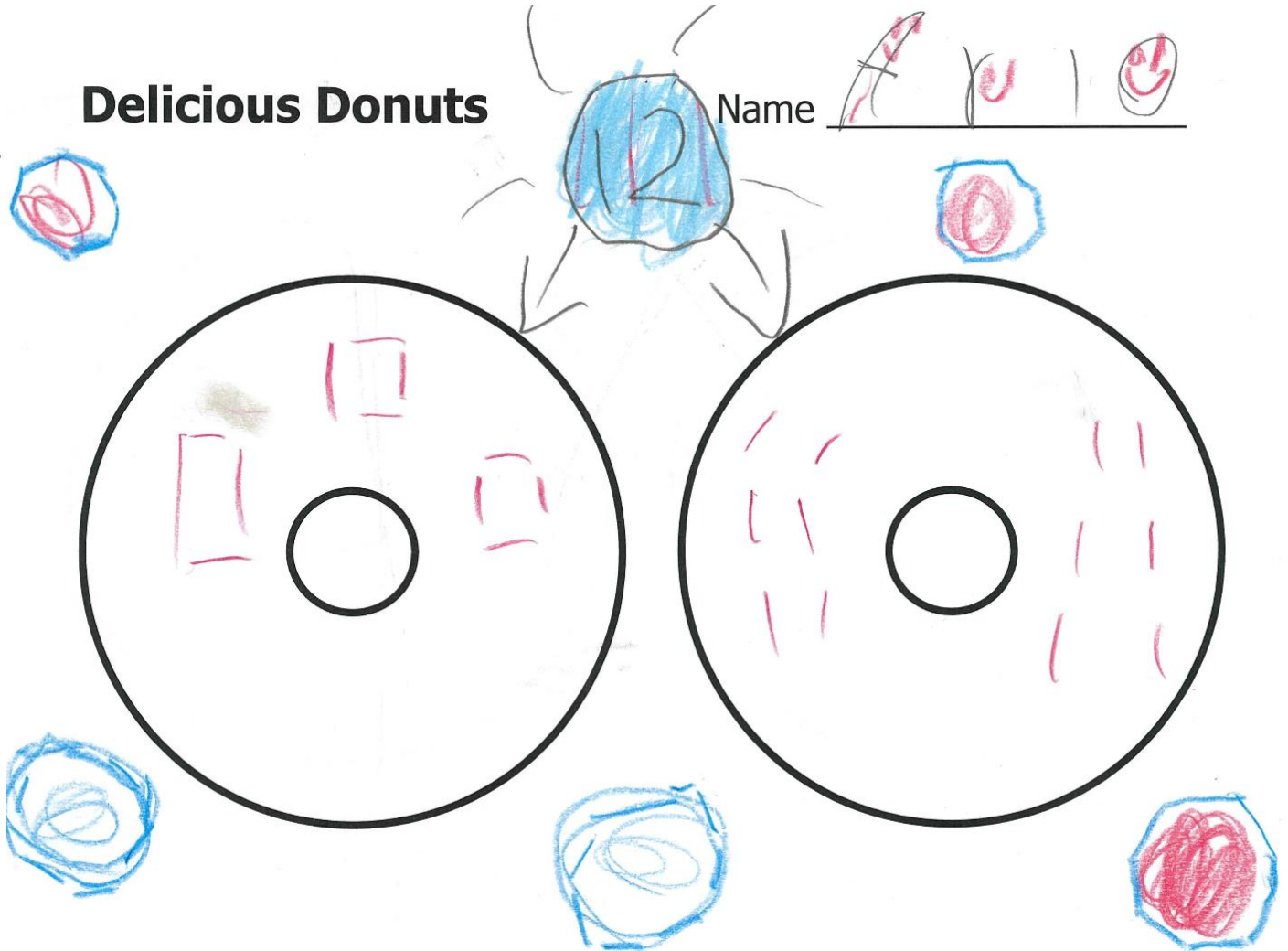
Name Fiona



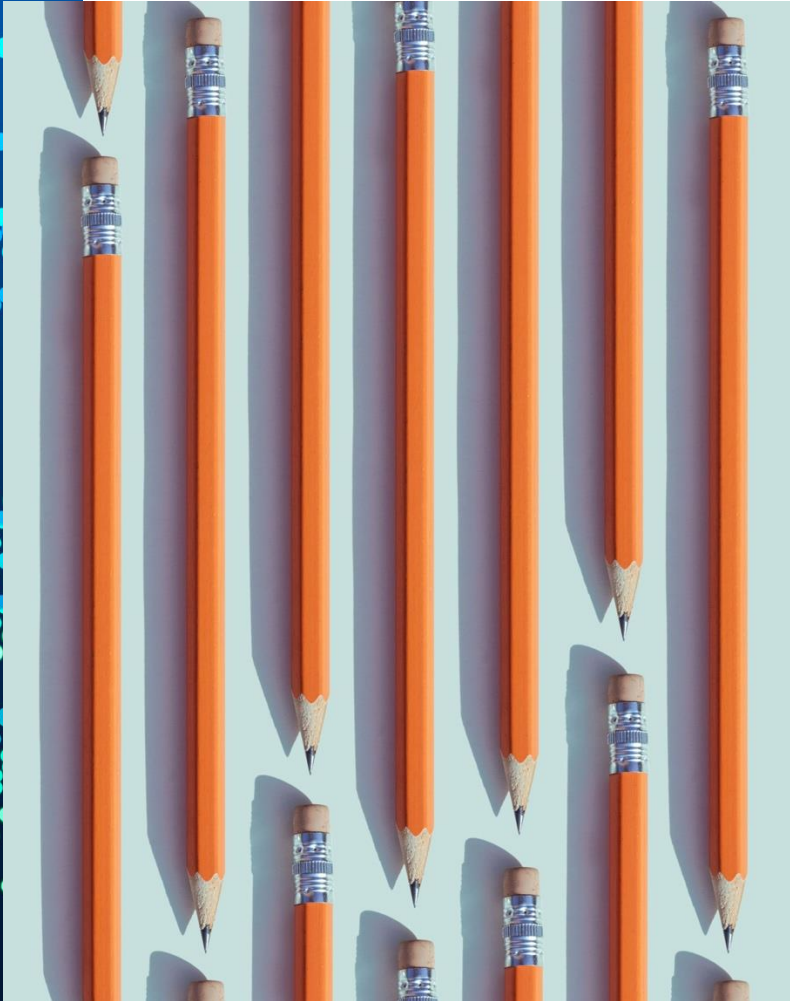
Delicious Donuts

Name

Arlo



Prep – 11 Pencils



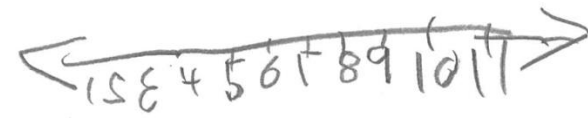
**Together, Eden and
Odin have 11 pencils.**

**How many pencils
might they each
have?**

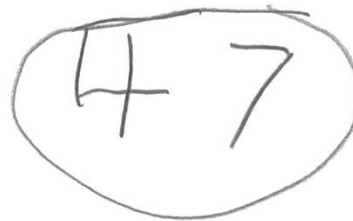
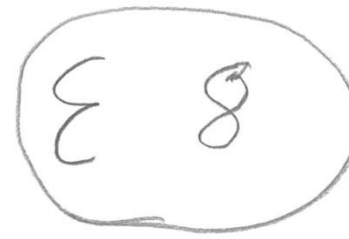
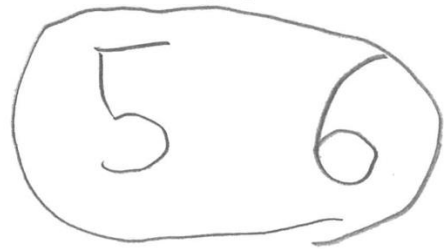
**Choose as many
different answers as
you can.**

Arlo (Prep)

Arlo



~~XX~~ m



Finley (Prep)

6

0

01

~~02~~

0

5

3

1

0

4

- **build on prior knowledge**
- **movement from confusion to clarity**
- **stretch and challenge**

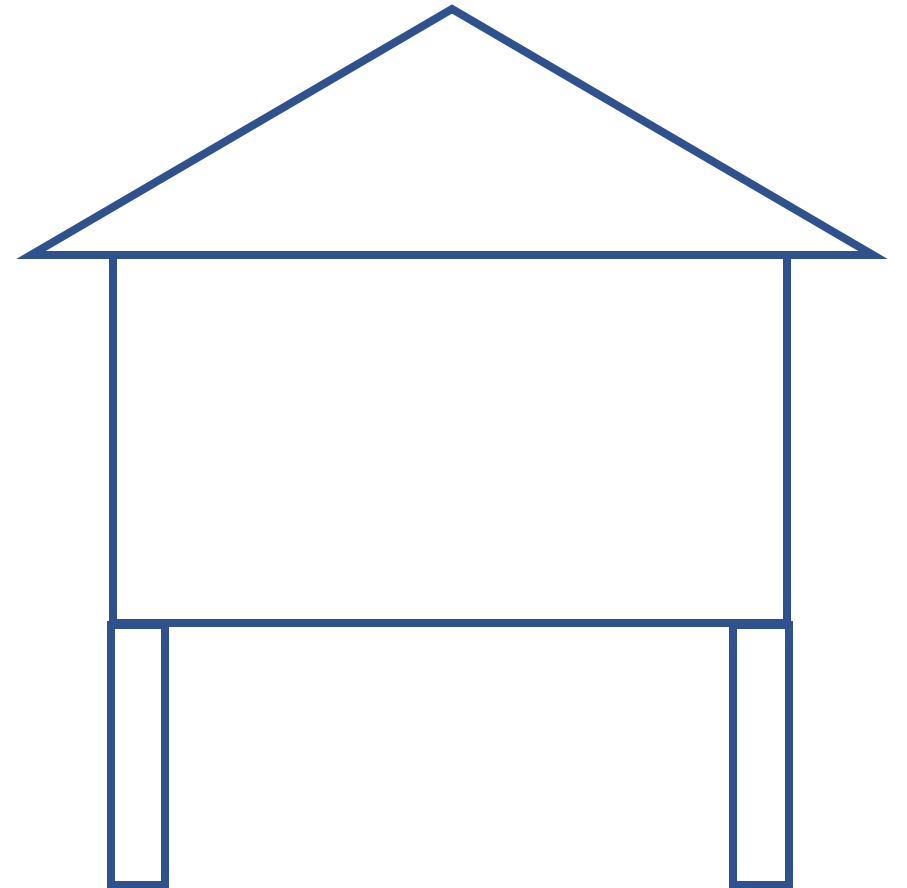
Illustrations of impact #2

Year 1 - The Cubby House

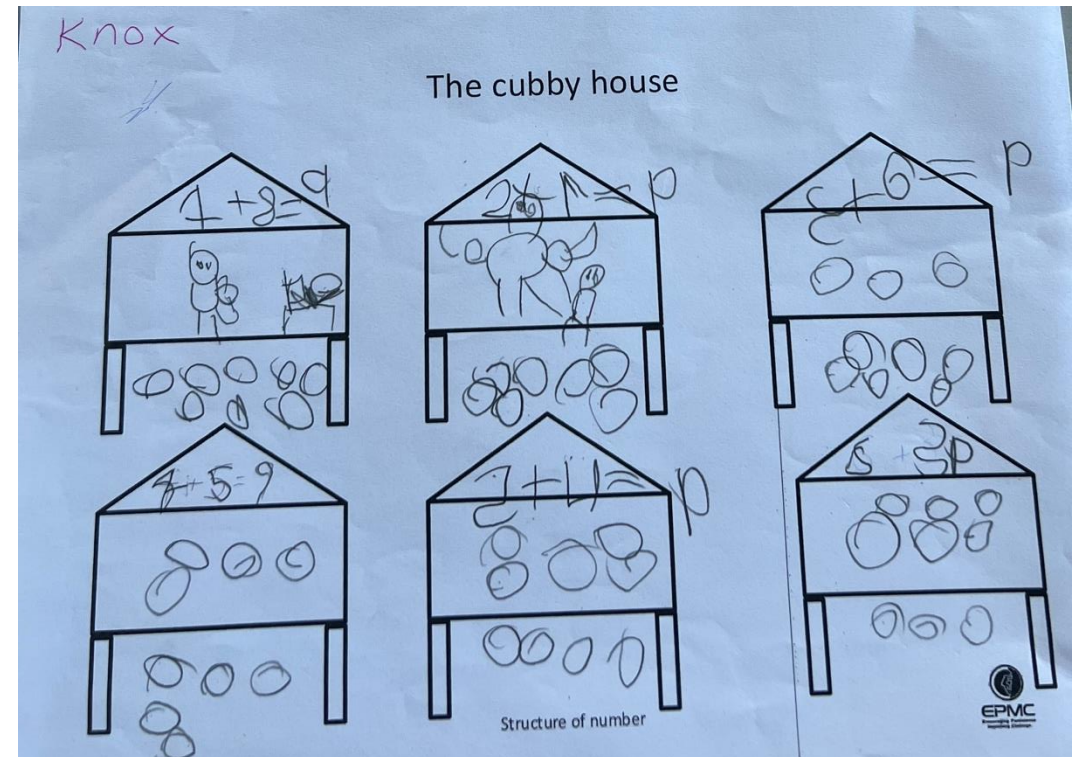
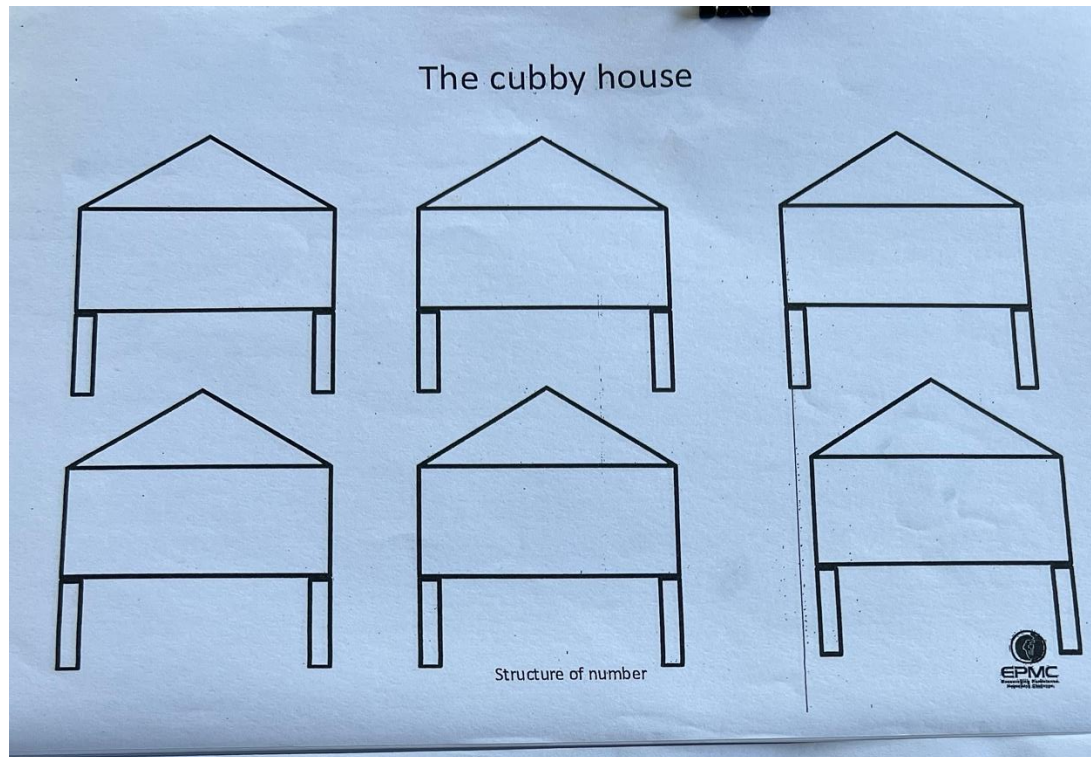
9 friends are playing in a cubby house. Some of the friends play inside the cubby house and some play under the cubby house.

Draw a picture to show how many friends might be inside and how many friends might be under the cubby house.

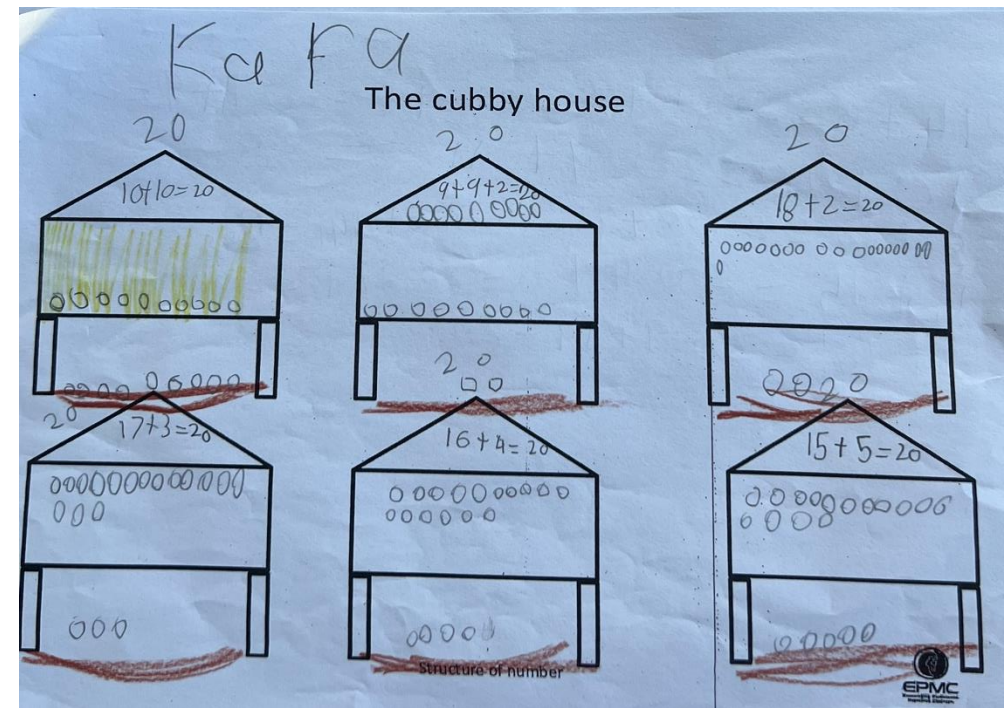
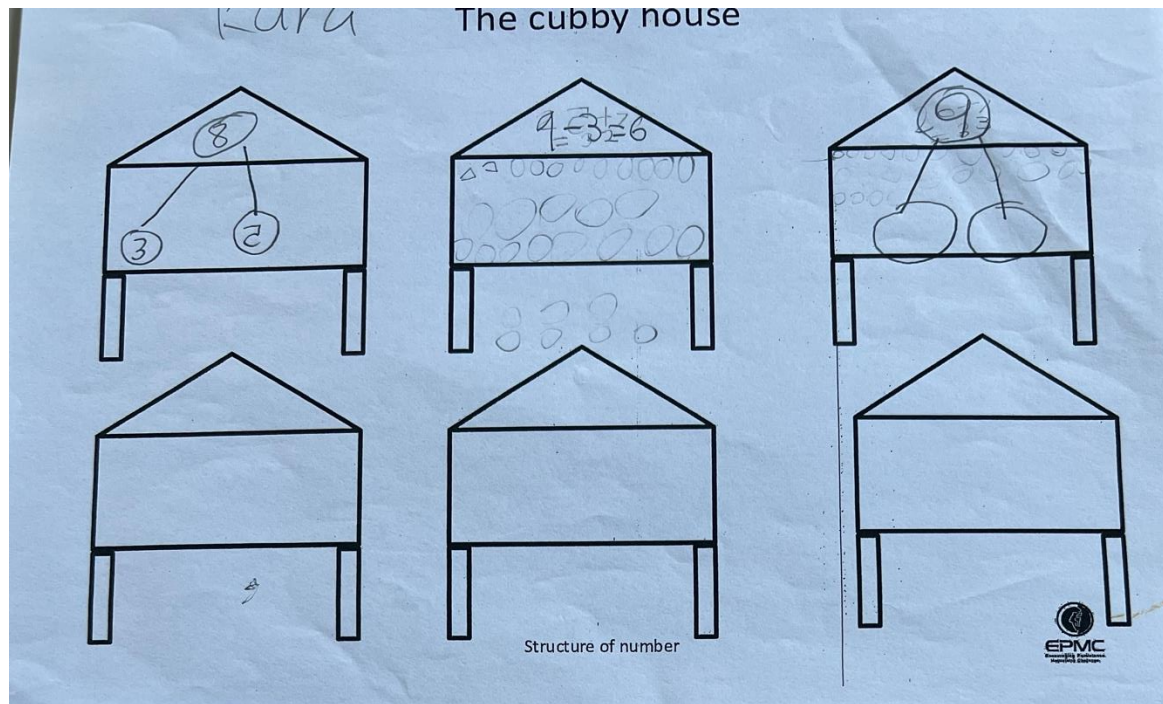
Give as many answers as you can.



Knox (Year 1)



Year 1



$$\begin{array}{l}
 14 + 6 = 20 \quad 13 + 7 = 20 \quad 12 + 8 = 20 \quad 11 + 9 = 20 \\
 10 + 10 = 20 \quad 9 + 11 = 20 \\
 8 + 12 = 20 \quad 7 + 13 = 20 \quad 6 + 14 = 20 \\
 5 + 15 = 20 \quad 4 + 16 = 20 \quad 3 + 17 = 20 \\
 2 + 18 = 20 \quad 1 + 19 = 20
 \end{array}$$

Year 1

oliver main 1A

The cubby house

Structure of number

EPMC

Oliver

The cubby house

Structure of number

EPMC

Year 1

The cubby house

EDith

Structure of number

do you have all the solutions?

Edith

The cubby house

Structure of number

Year 1

Aidan

The cubby house
tried a different strategy.

060

Structure of number

EPMC

Aidan.H

The cubby house

20

20

20

20

20

Structure of number

EPMC

- **making connections**
- **the power of drawing**

Illustrations of impact #3

Year 1 - 12 Legs

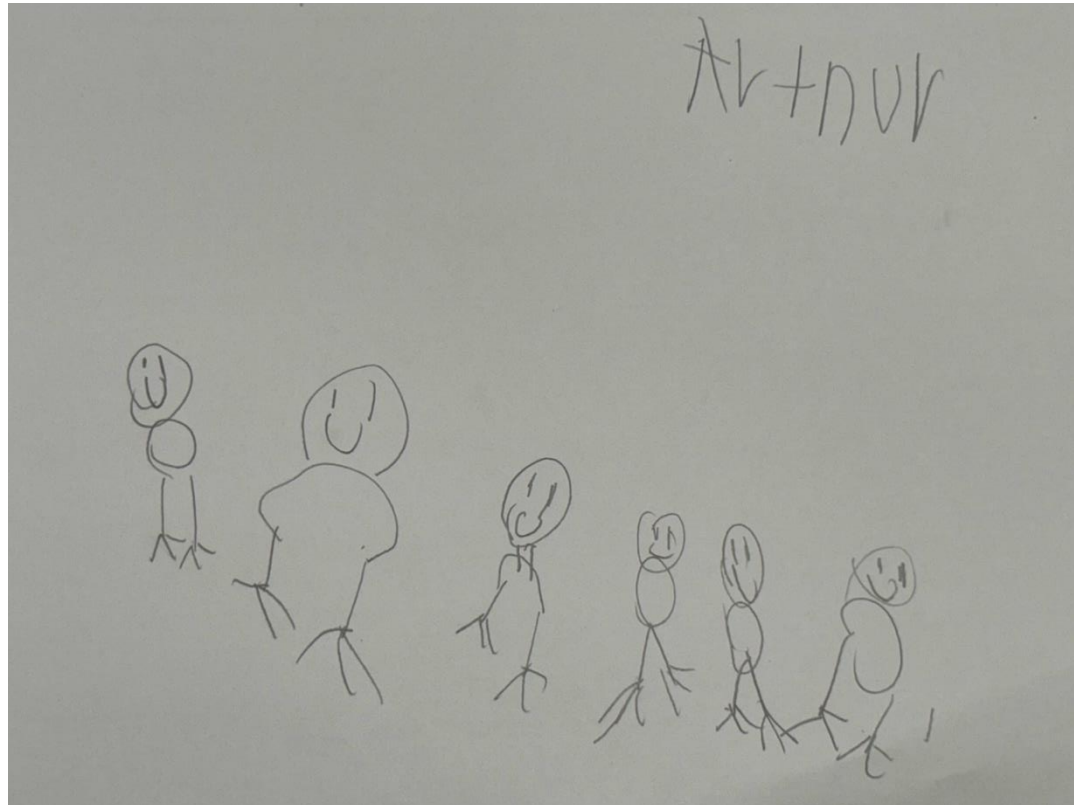
In a photo of a farmyard, I can see 12 legs.

Draw what the animals might be.

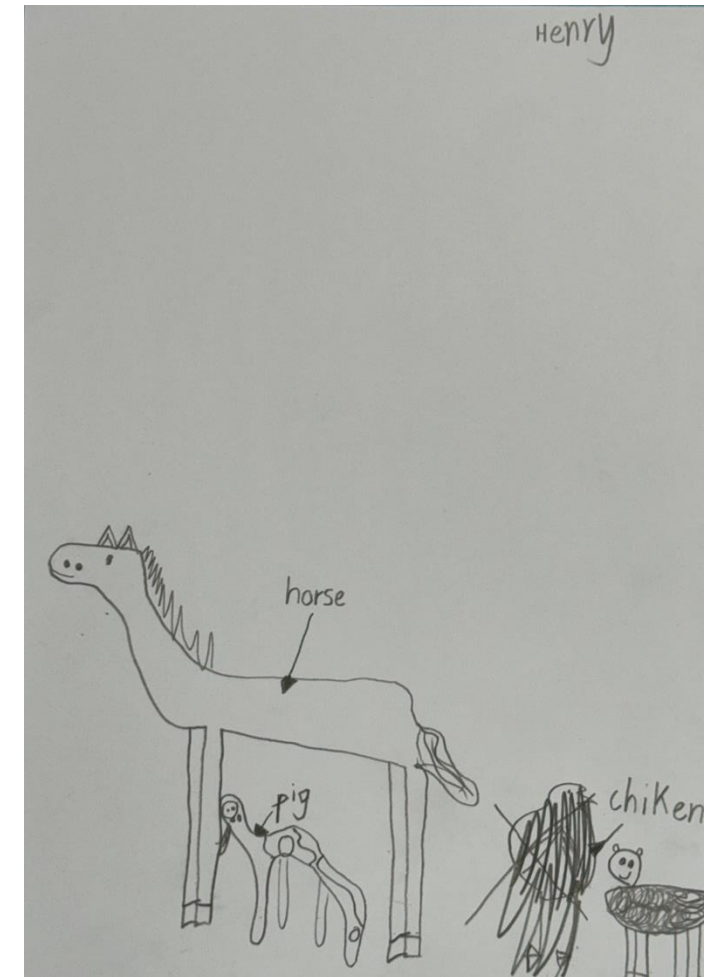
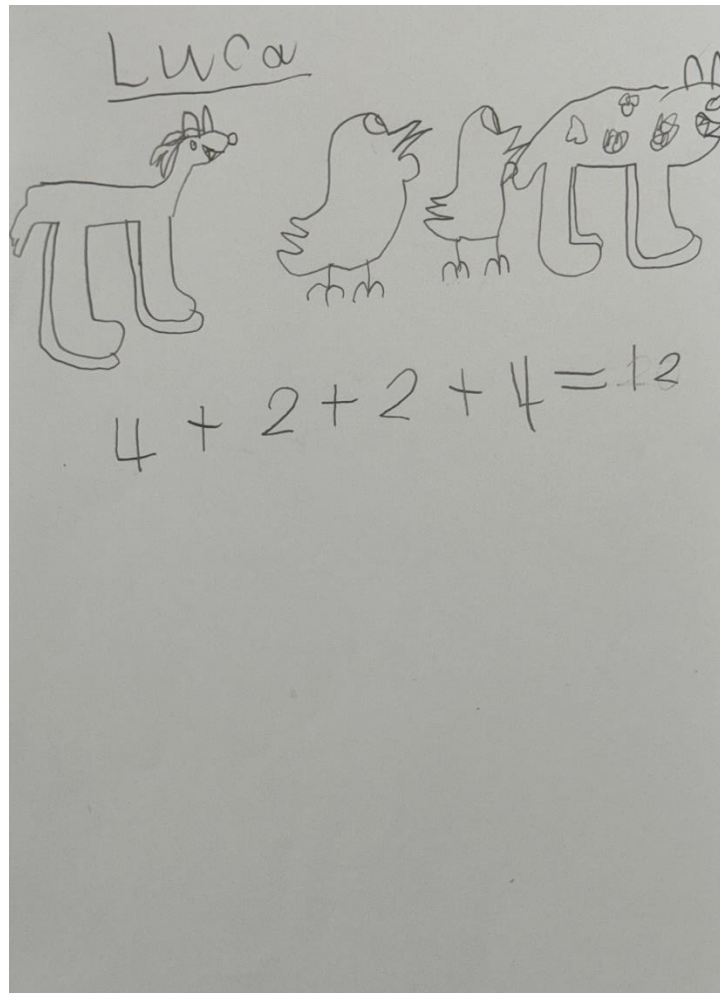
Give more than one possible response.



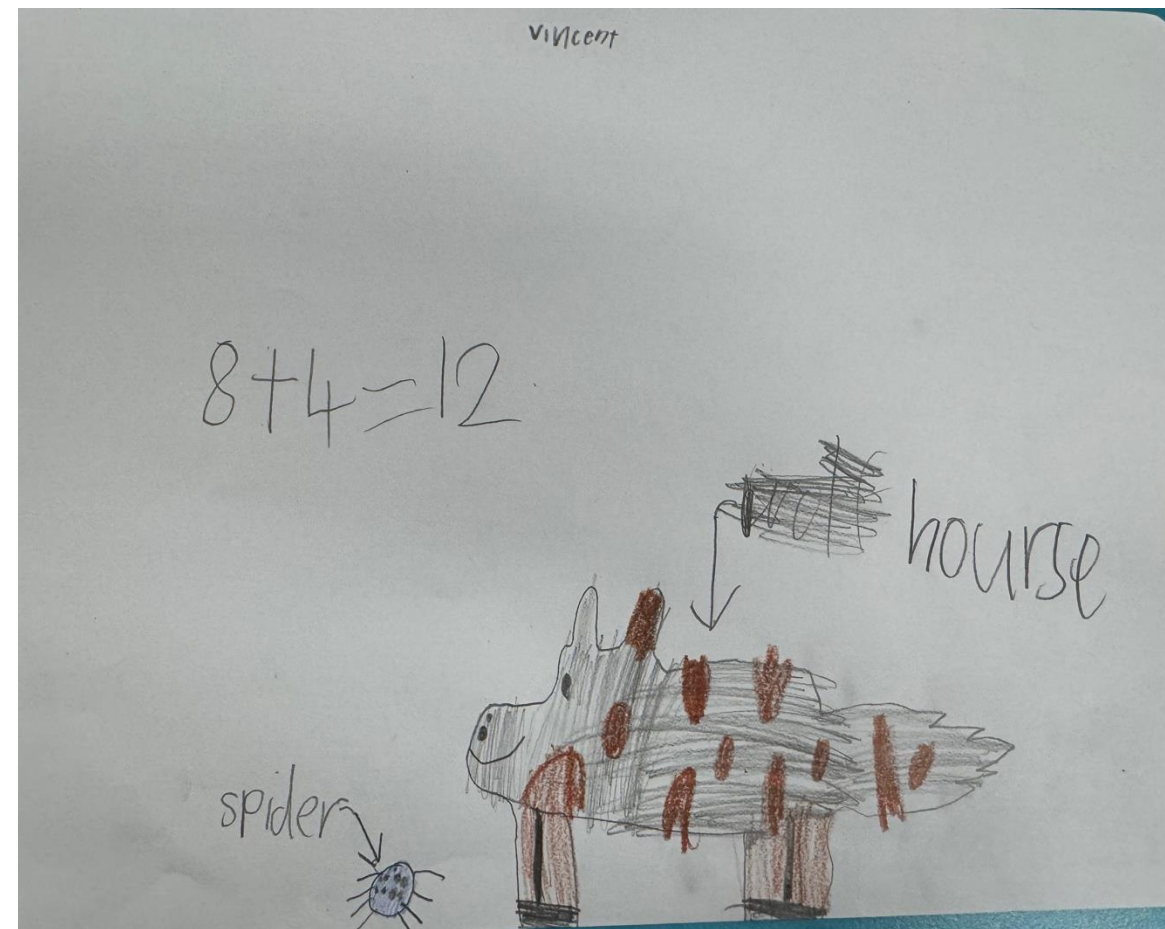
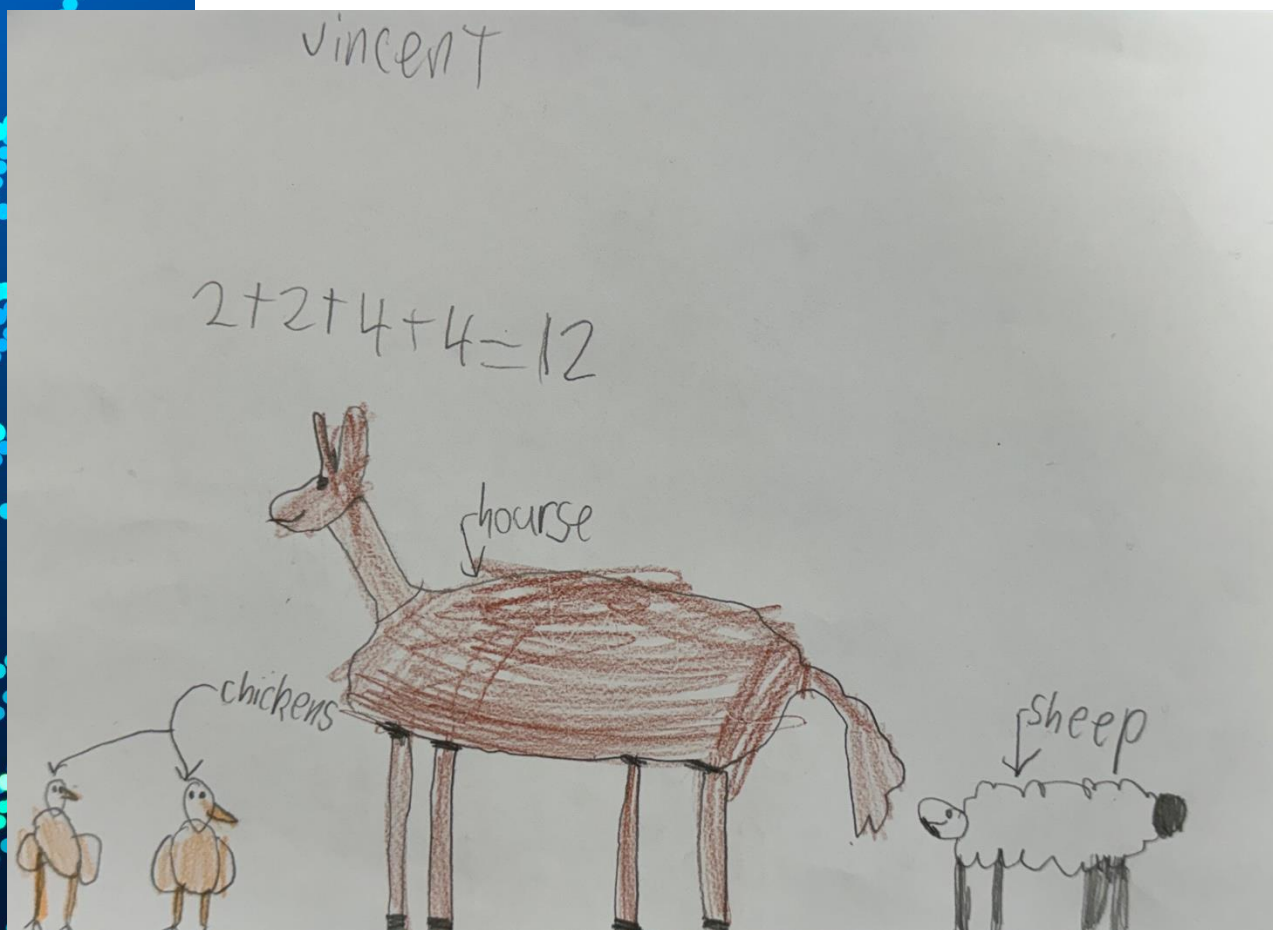
Year 1



Year 1



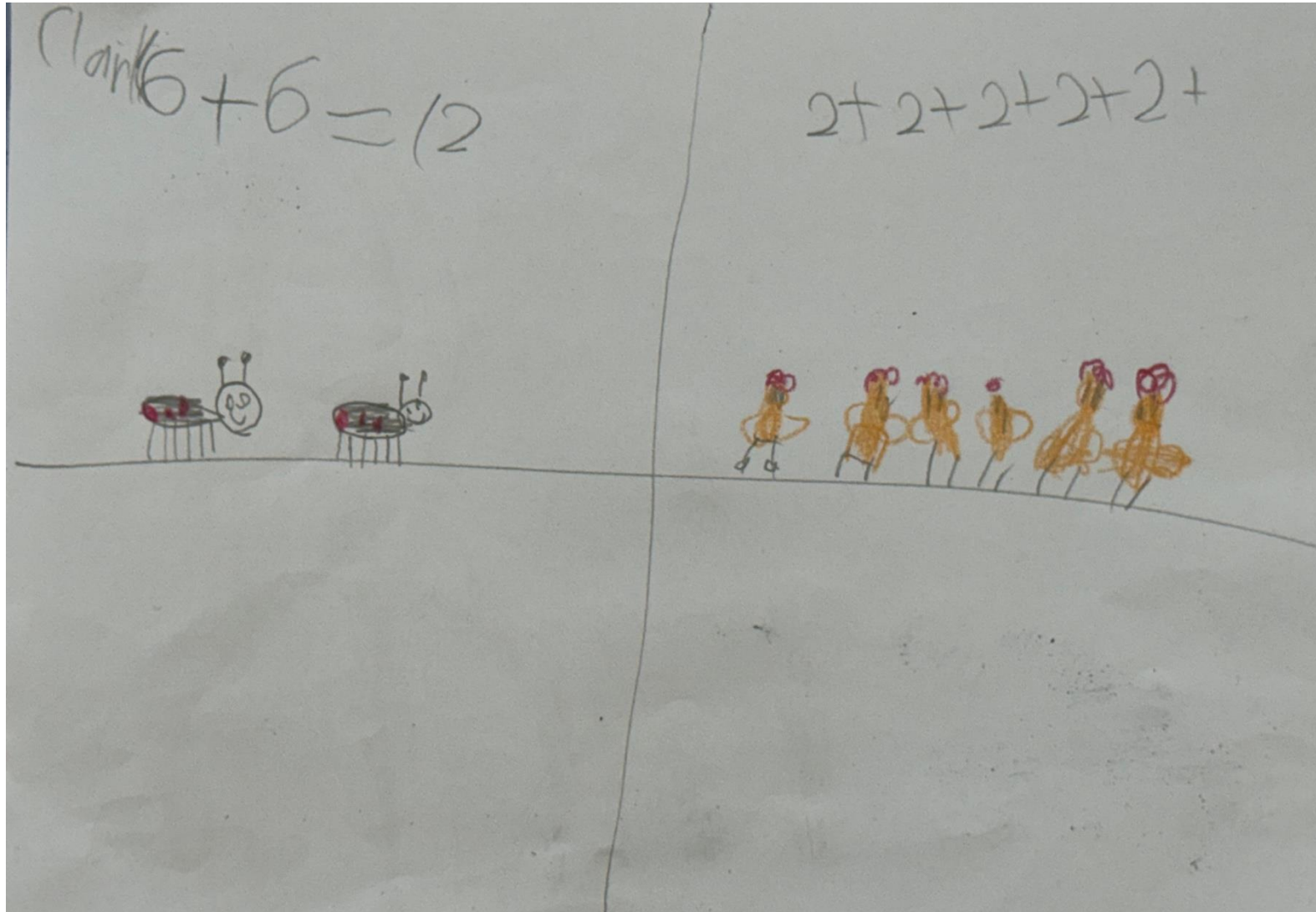
Vincent (Year 1)



Clark (Year 1)



Clarke (Year 1)



- **stretch and challenge**
- **'see' the bigger picture**
- **the power of conversation**

Illustrations of impact #4

Year 1 - Box of chocolates

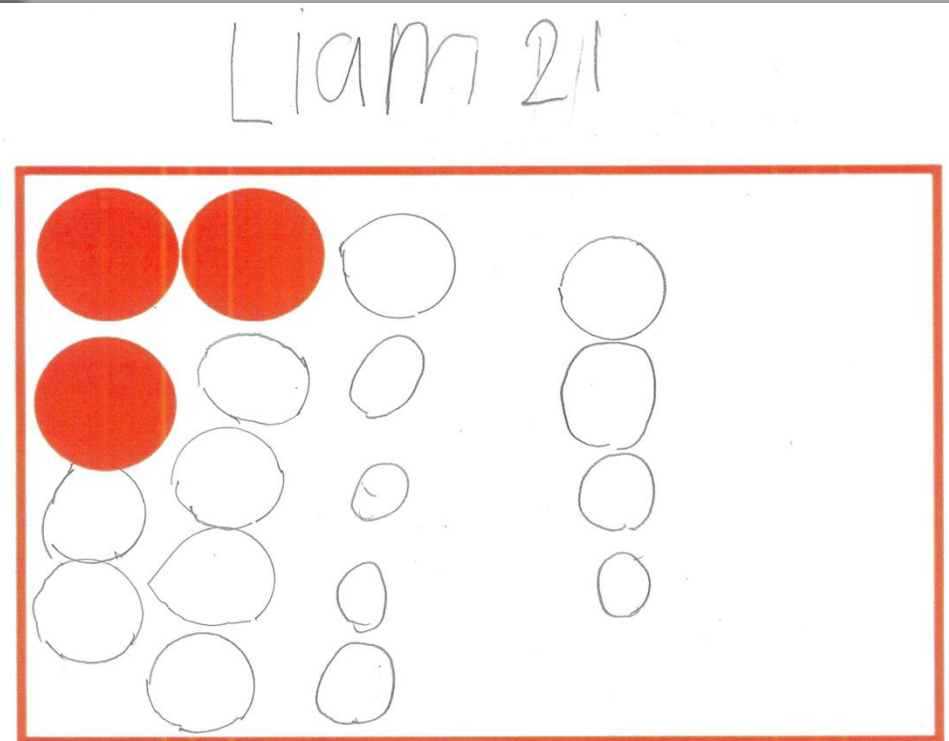
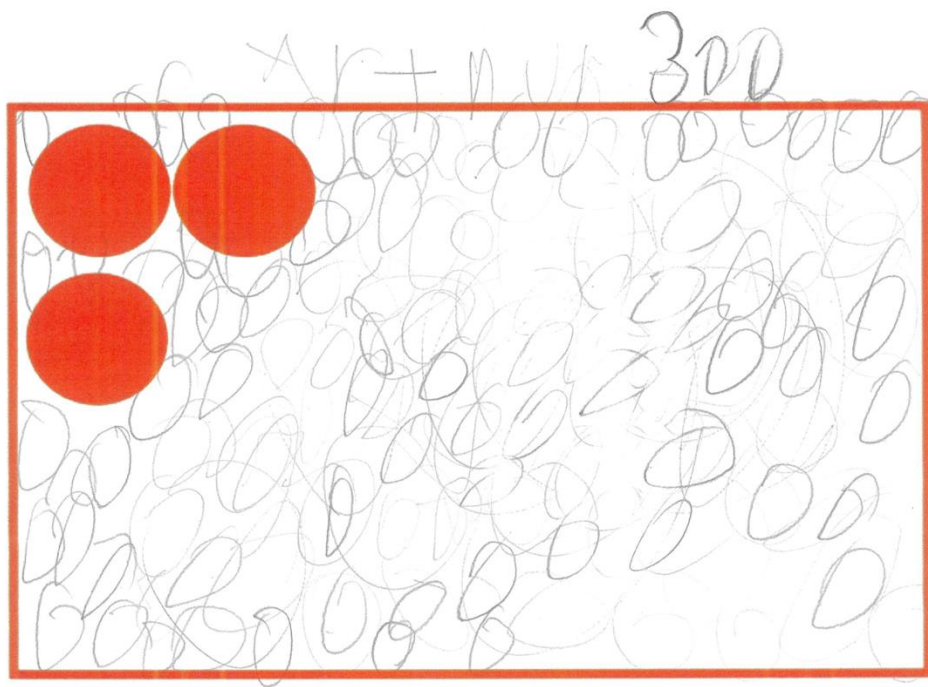
I had a full box of chocolates, but someone ate some of the chocolates.

The box now looks like this

How can I work out the number of chocolates I started with?

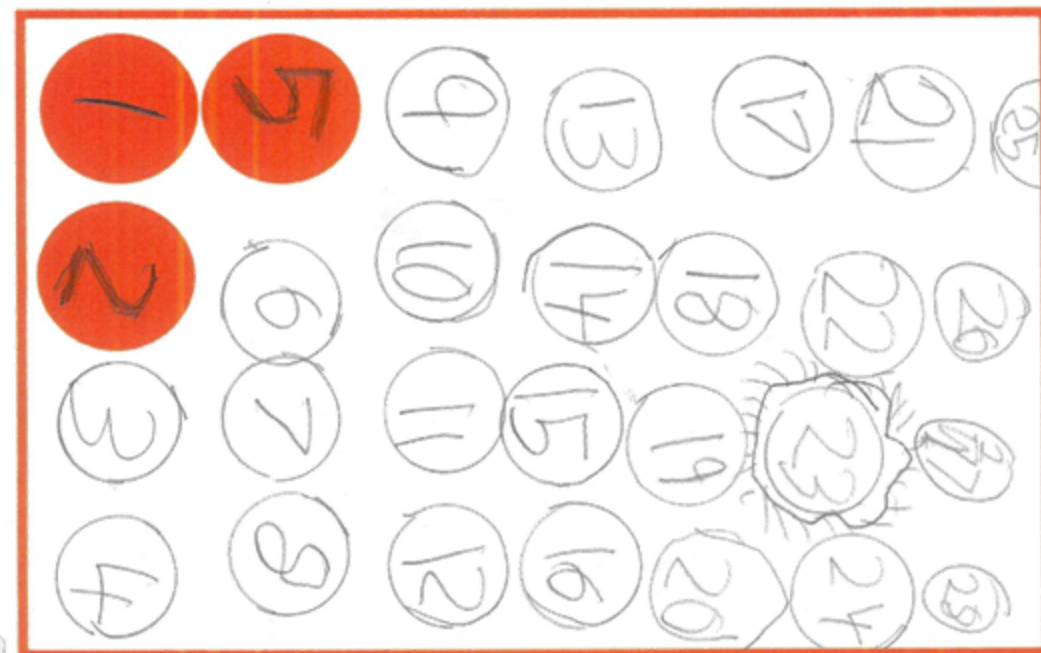
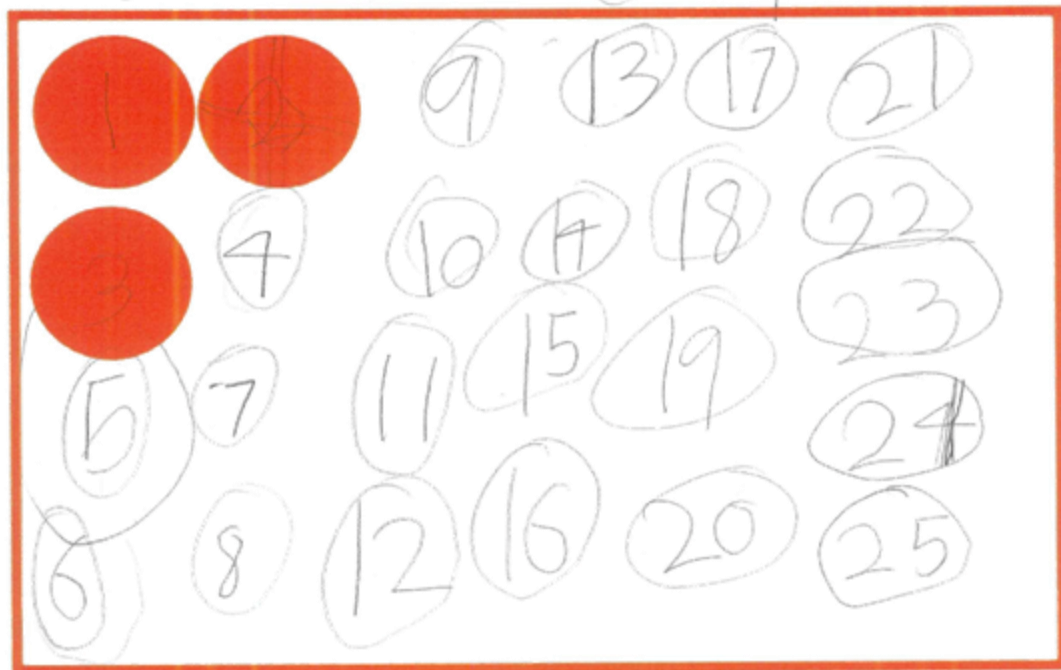


Year 1



Year 1

Charlotte. 25

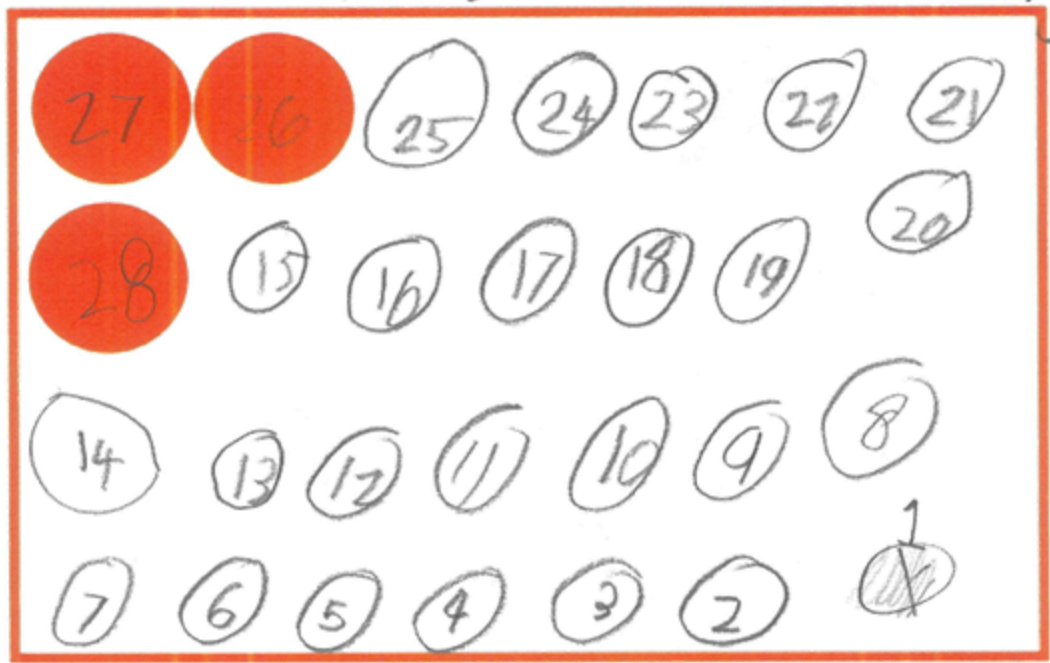


1229

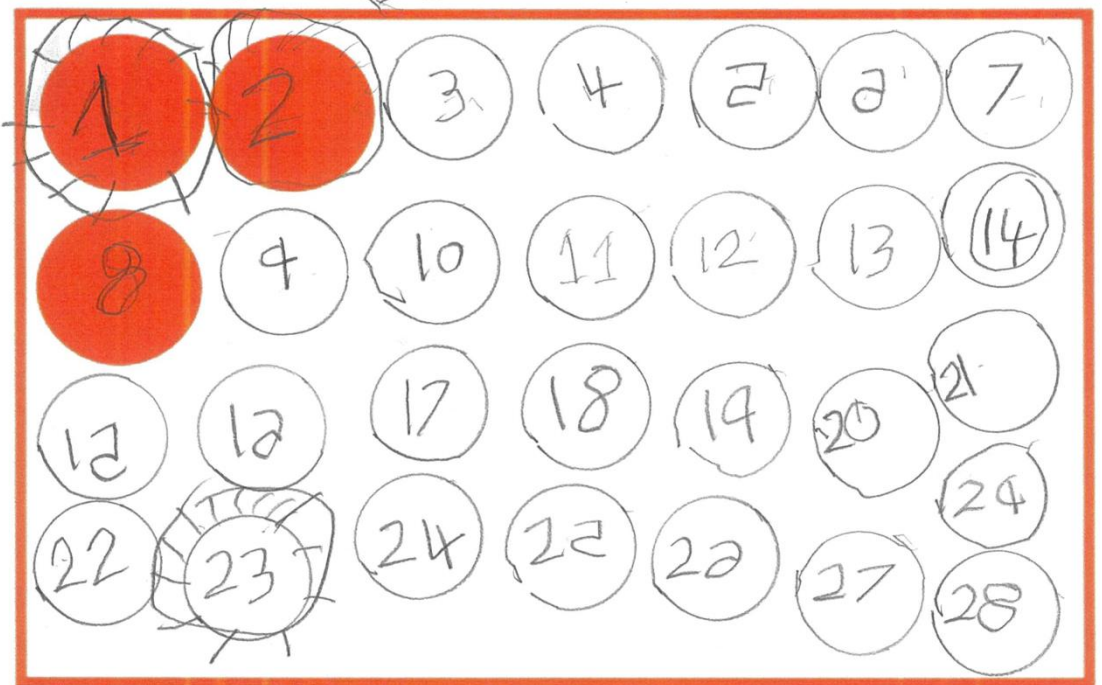
Year 1

28

Henry

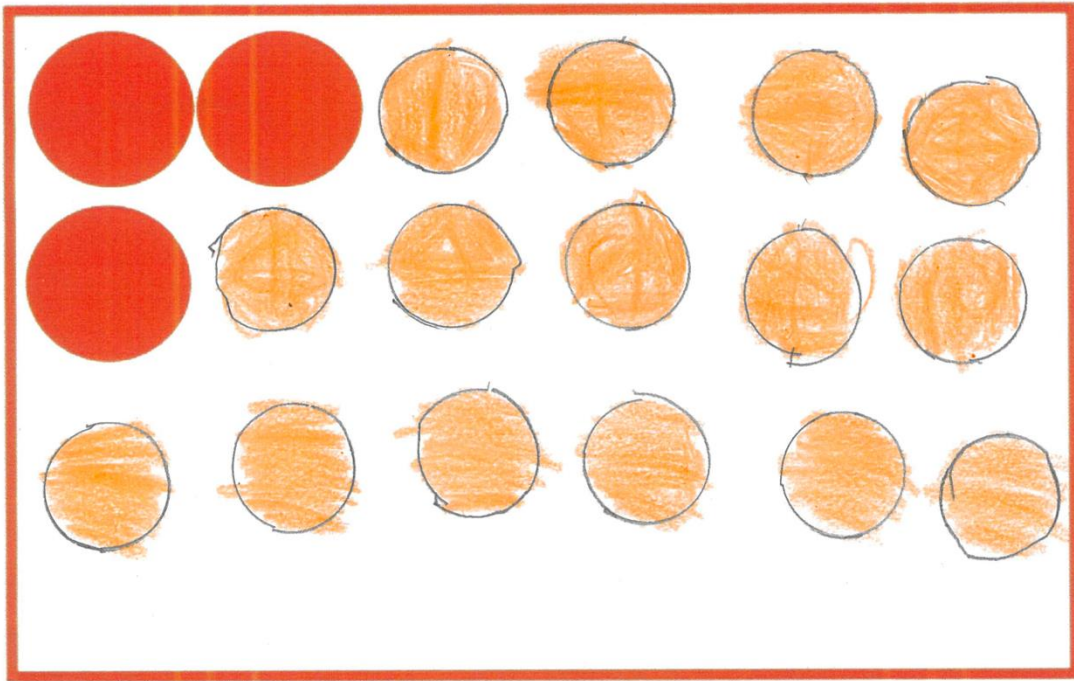


chloe 29

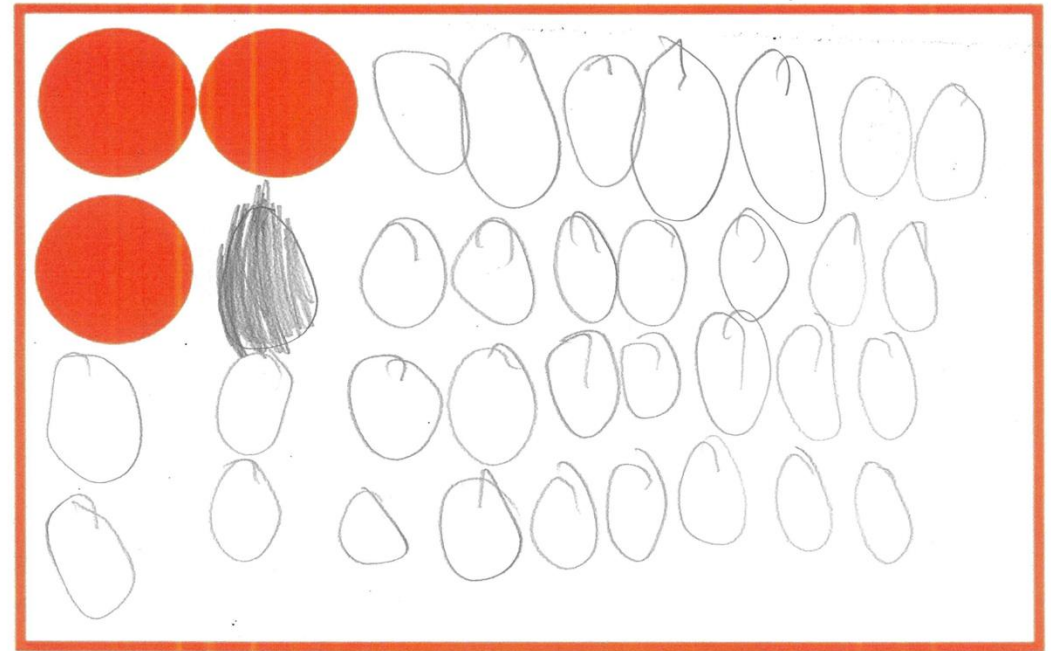


Year 1

Angus 18



Beclan

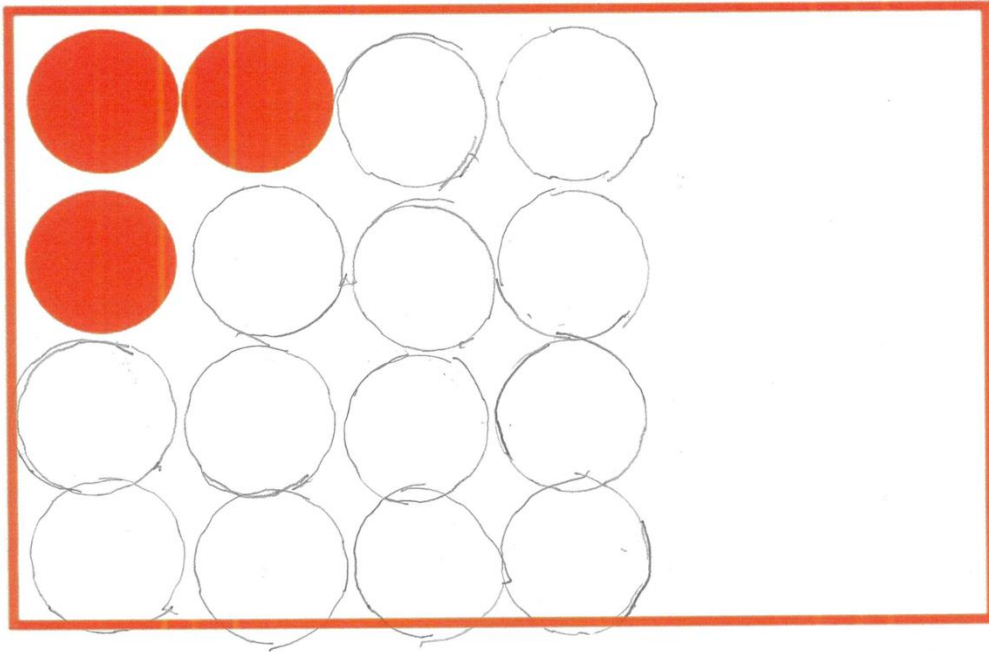


↑
36
headlets

Year 1

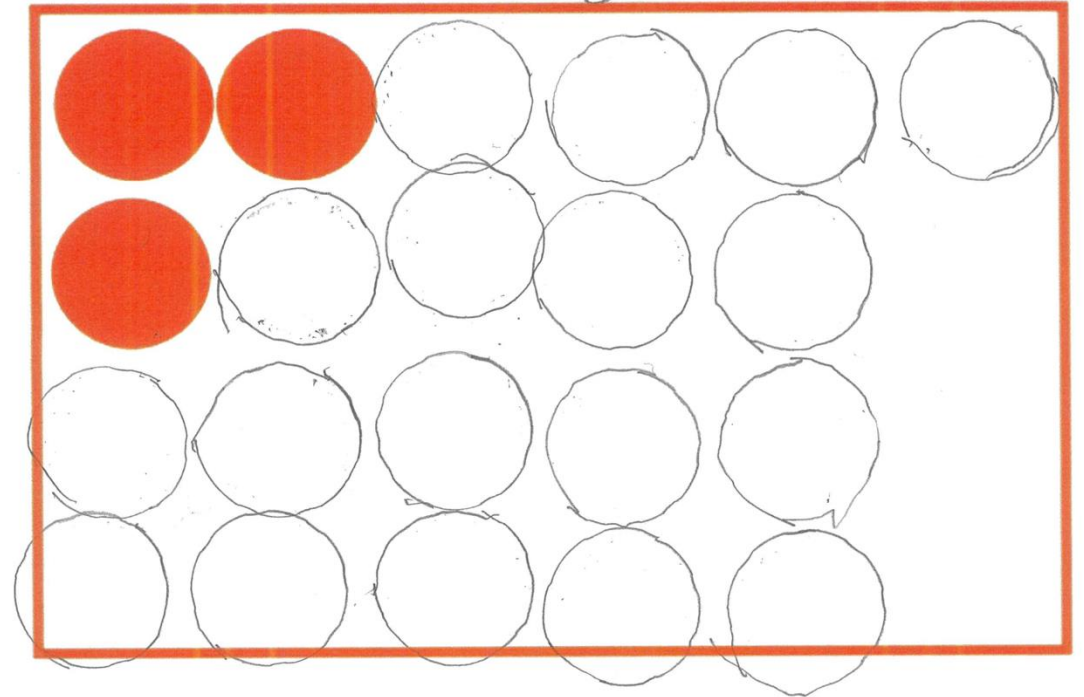
Name Liave

24



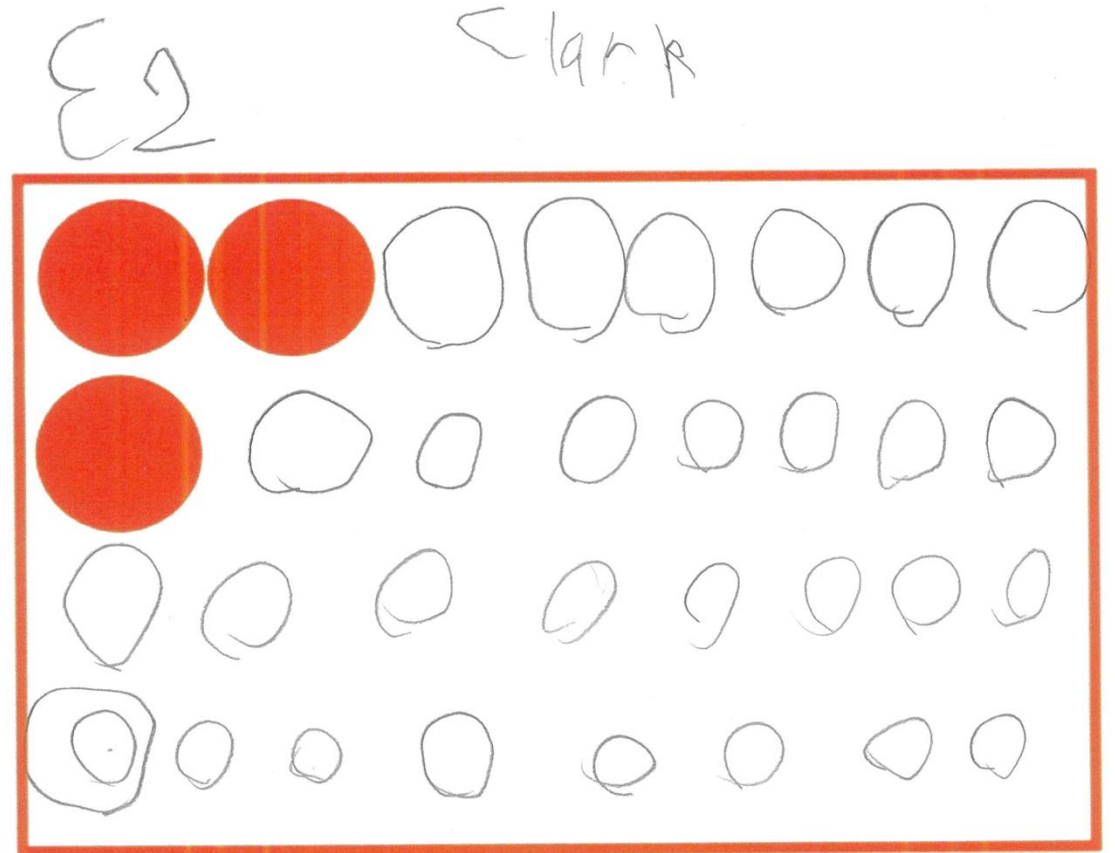
Name Olivia

24



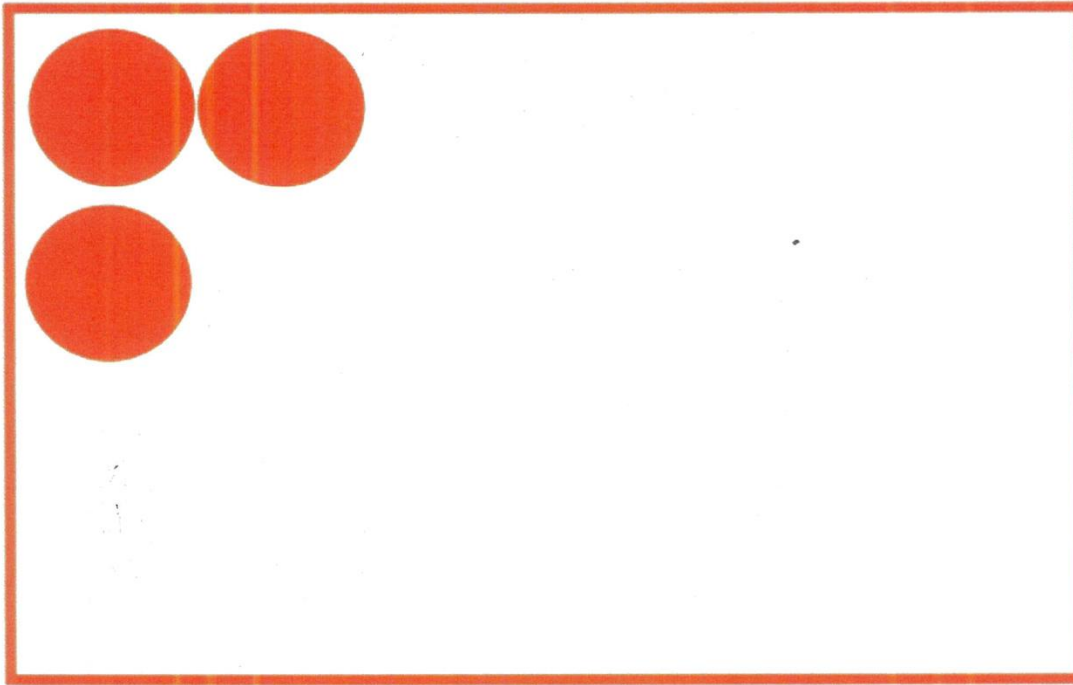
Clarke (Year 1)

“Double eight is sixteen
and double sixteen is
thirty-two,” Clark.



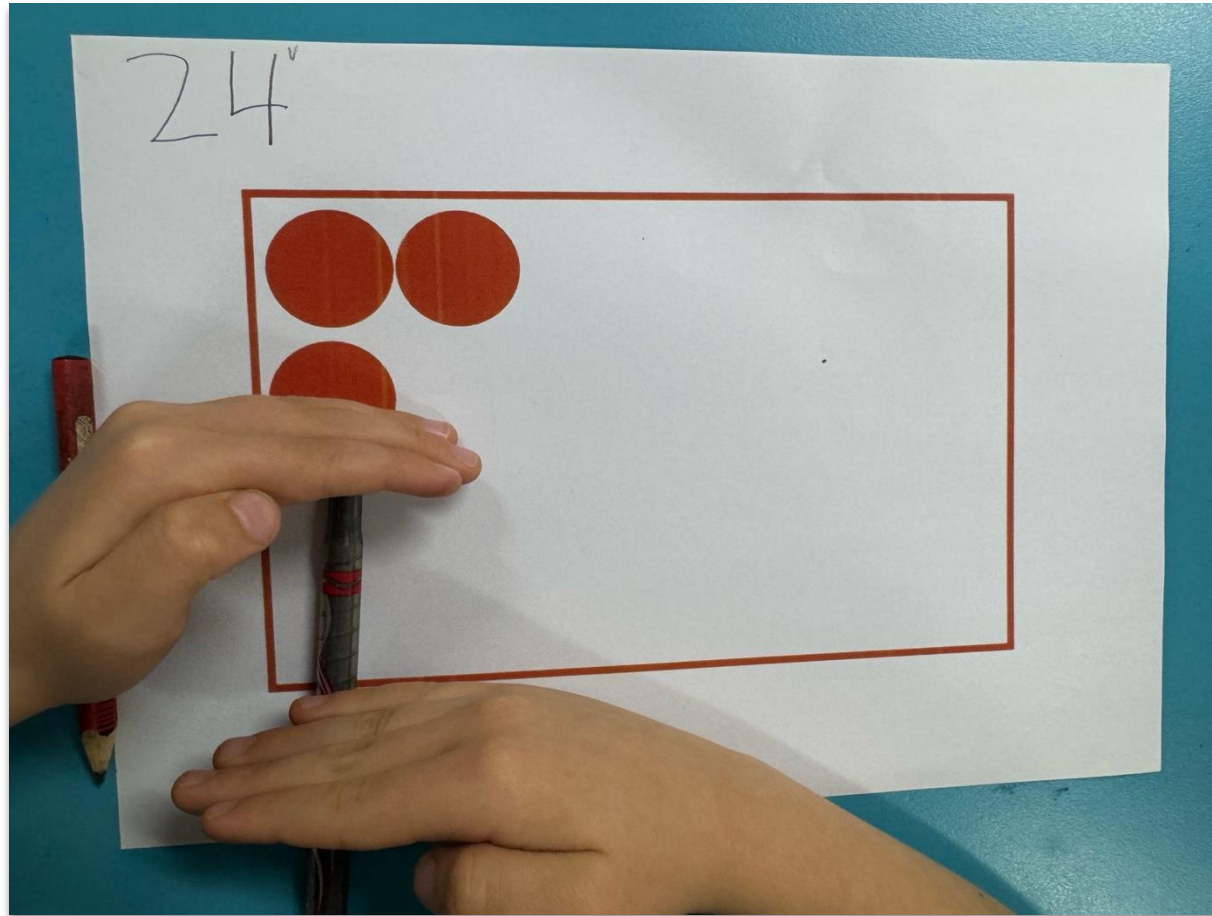
Vincent (Year 1)

24^v



“I don’t need to draw the chocolates, I can see them in my head,” Vincent.

Vincent (Year 1)



- **transfer learning**
- **clarifying thinking**
- **being brave, taking risks**
- **resilience**

Illustrations of impact #5

Year 2 Task – Fraction Flags

A flagpole with a flag attached. The flag is white and contains the text 'Design a flag that is one-quarter red.'

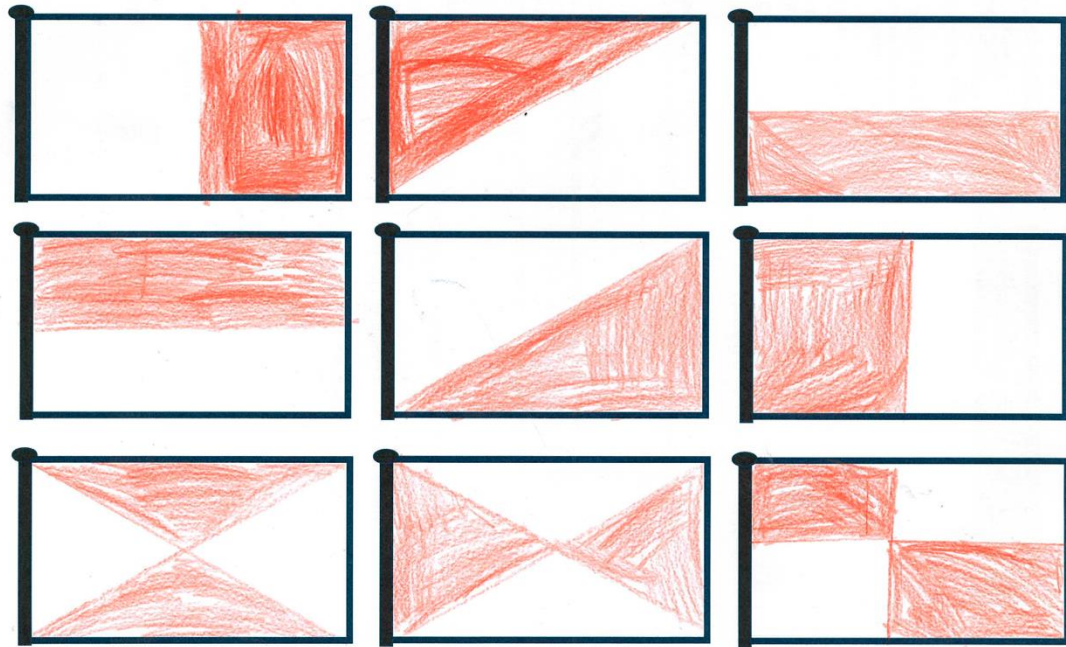
**Design a flag that is
one-quarter red.**

**Are there other
flags you can
design that are
one-quarter red?**

Year 2

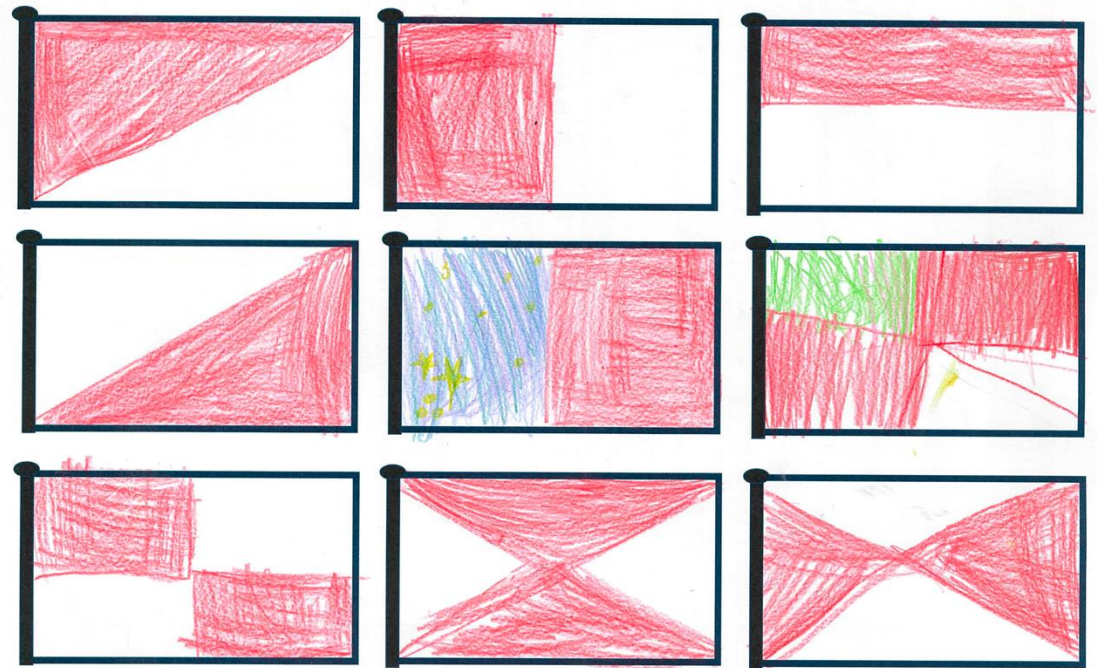
Fraction Flags

Name: Amali



Fraction Flags

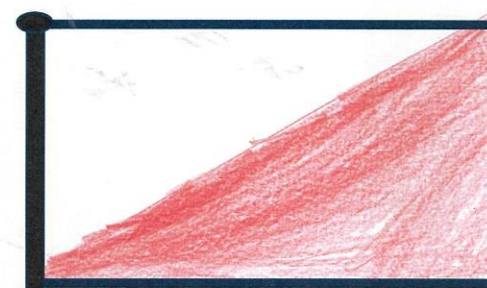
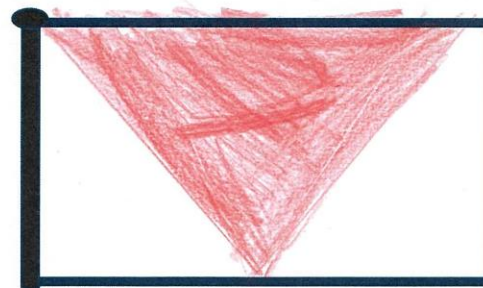
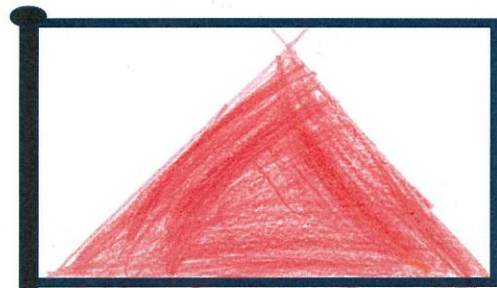
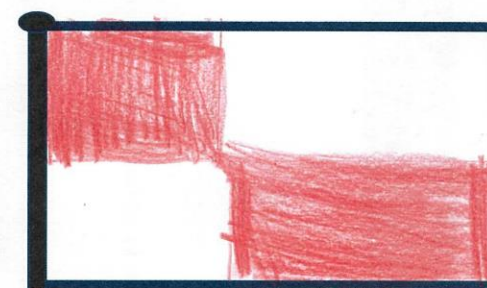
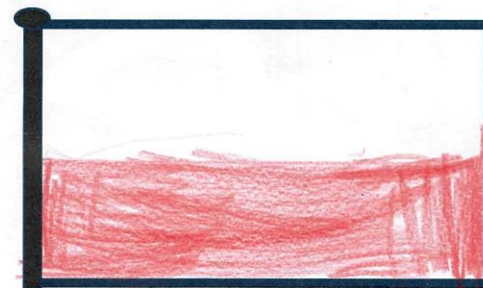
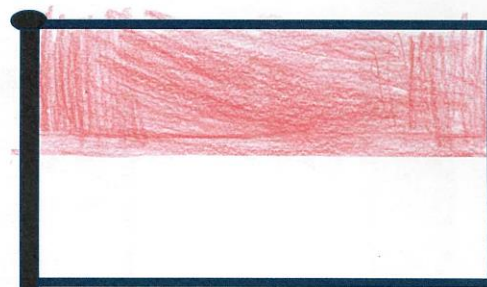
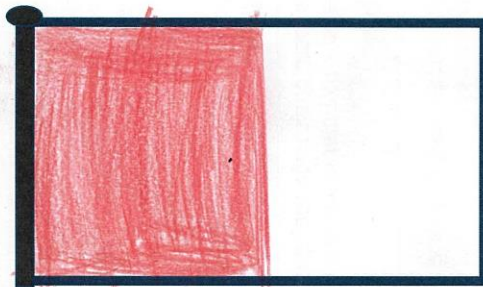
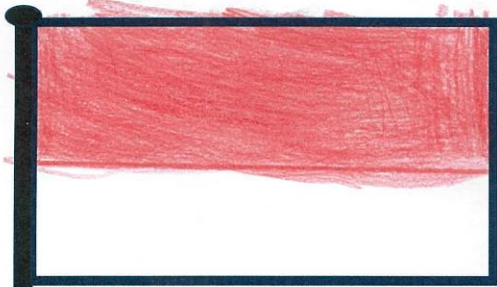
Name: Odette



Gigi (Year 2)

Fraction Flags

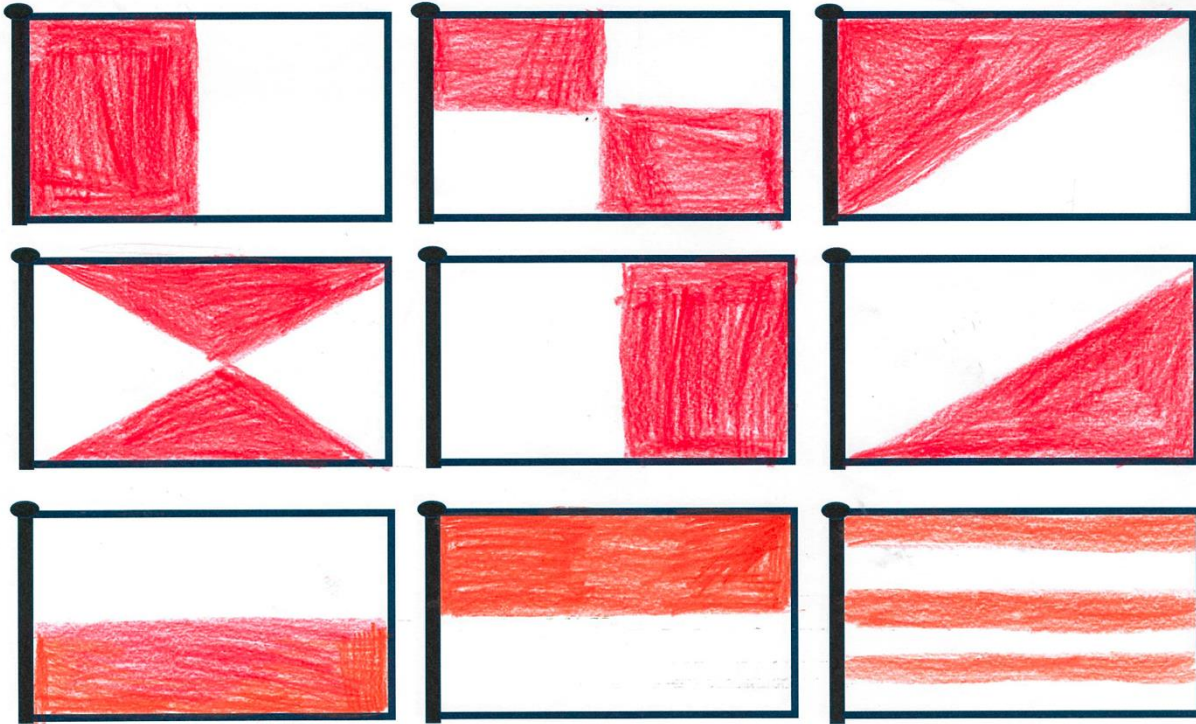
Name: Gigi



Year 2

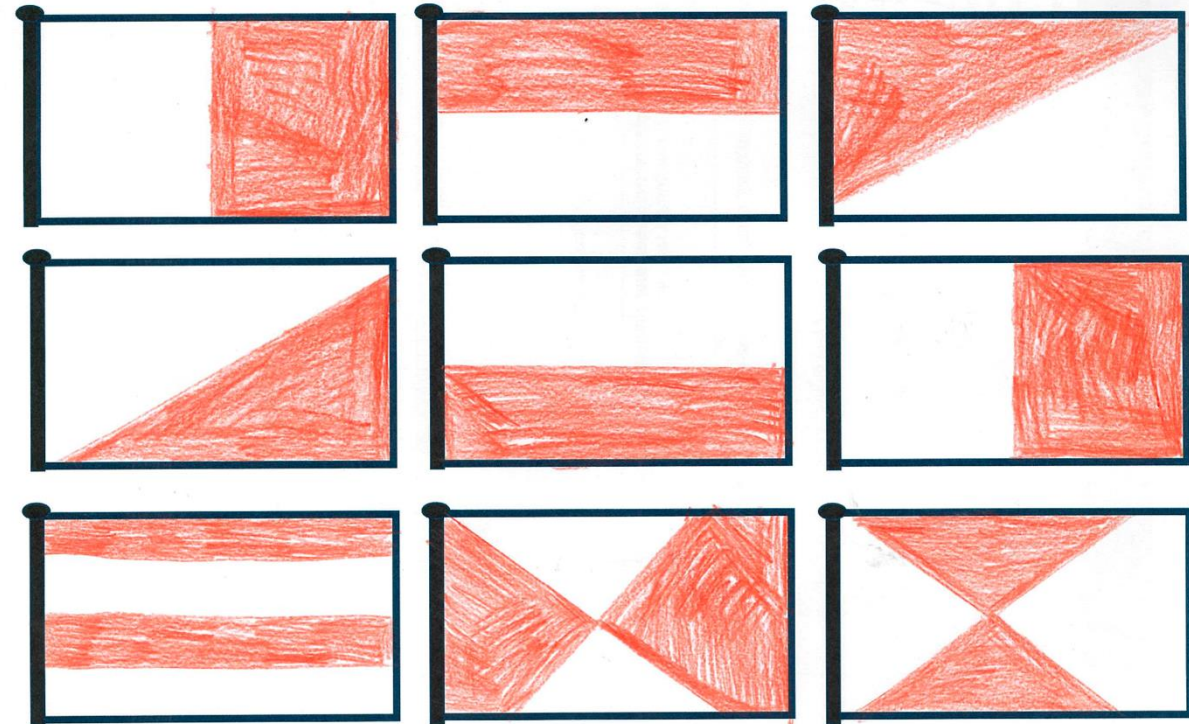
Fraction Flags

Name: Eva



Fraction Flags

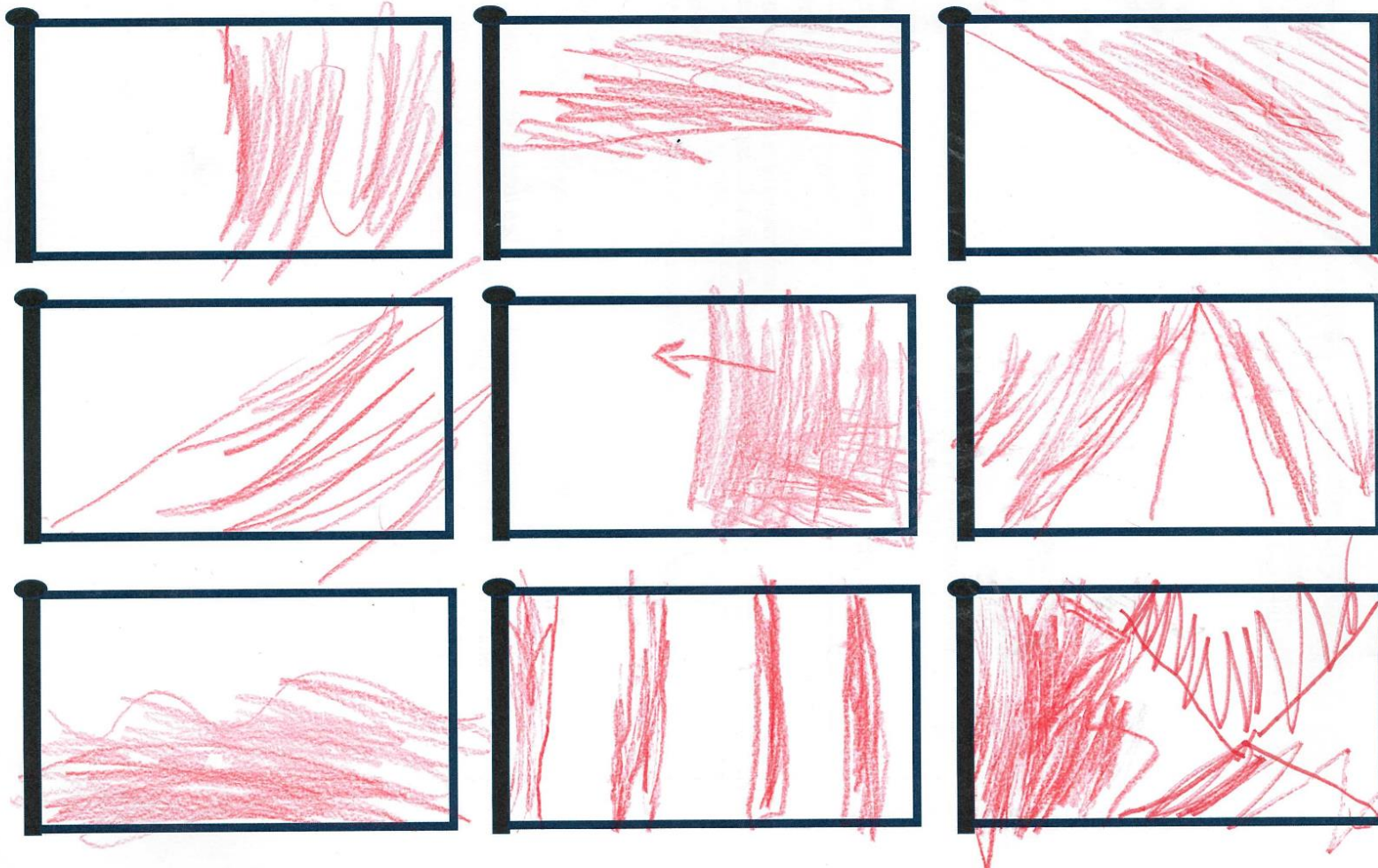
Name: Rylee



Nick (Year 2)

Fraction Flags

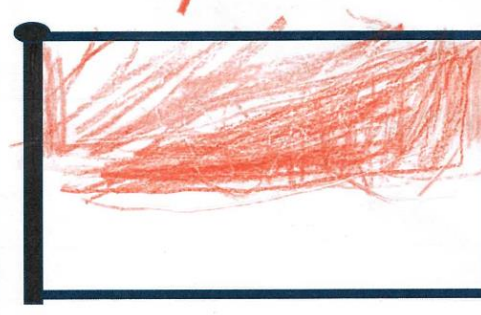
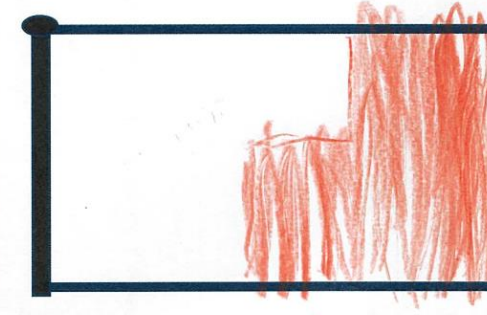
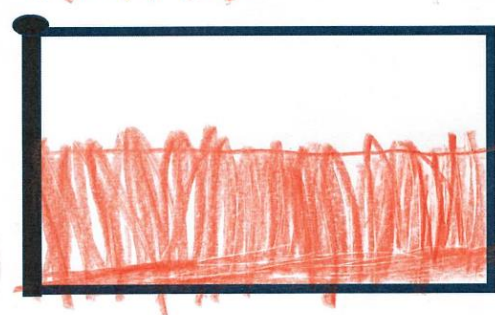
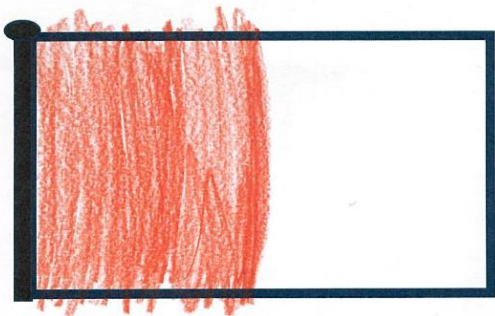
Name: NICK



Zach (Year 2)

Fraction Flags

Name: Zach Forman

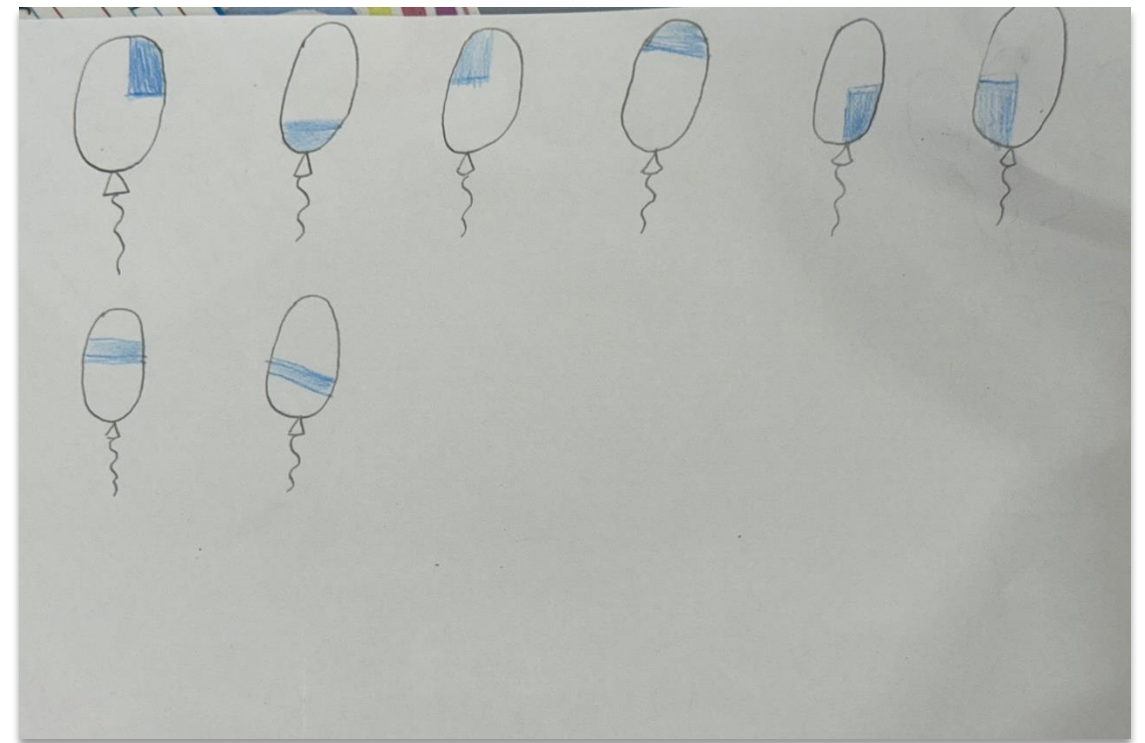
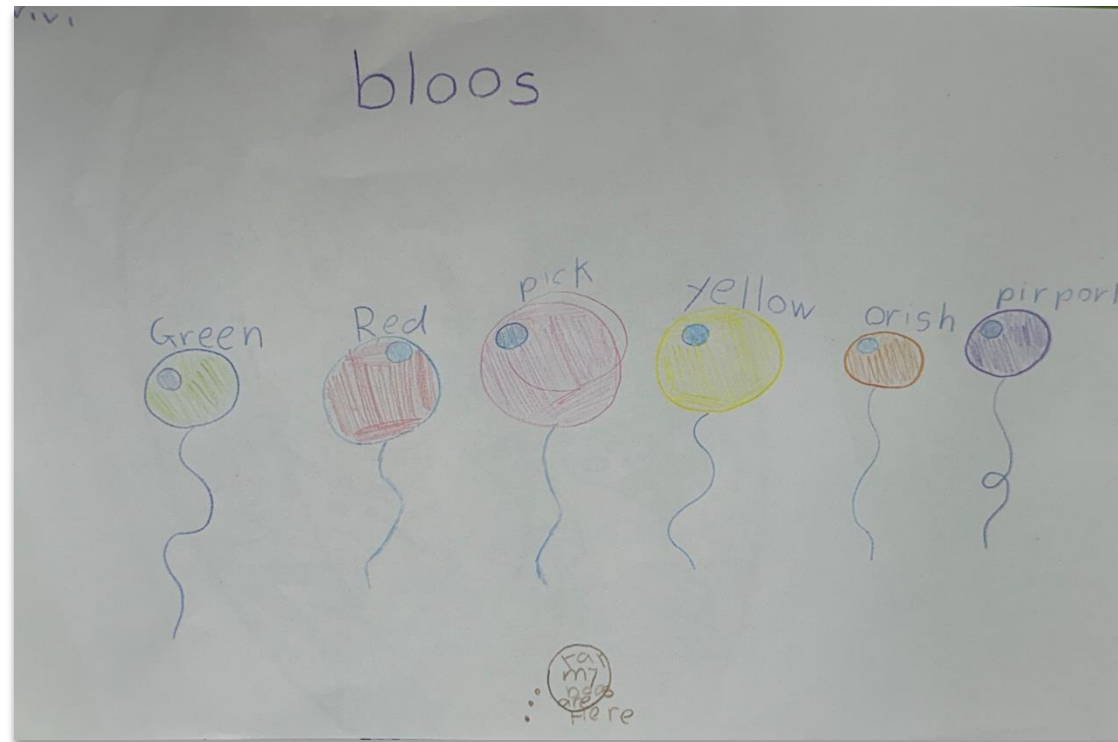


Year 2 Task - Balloons

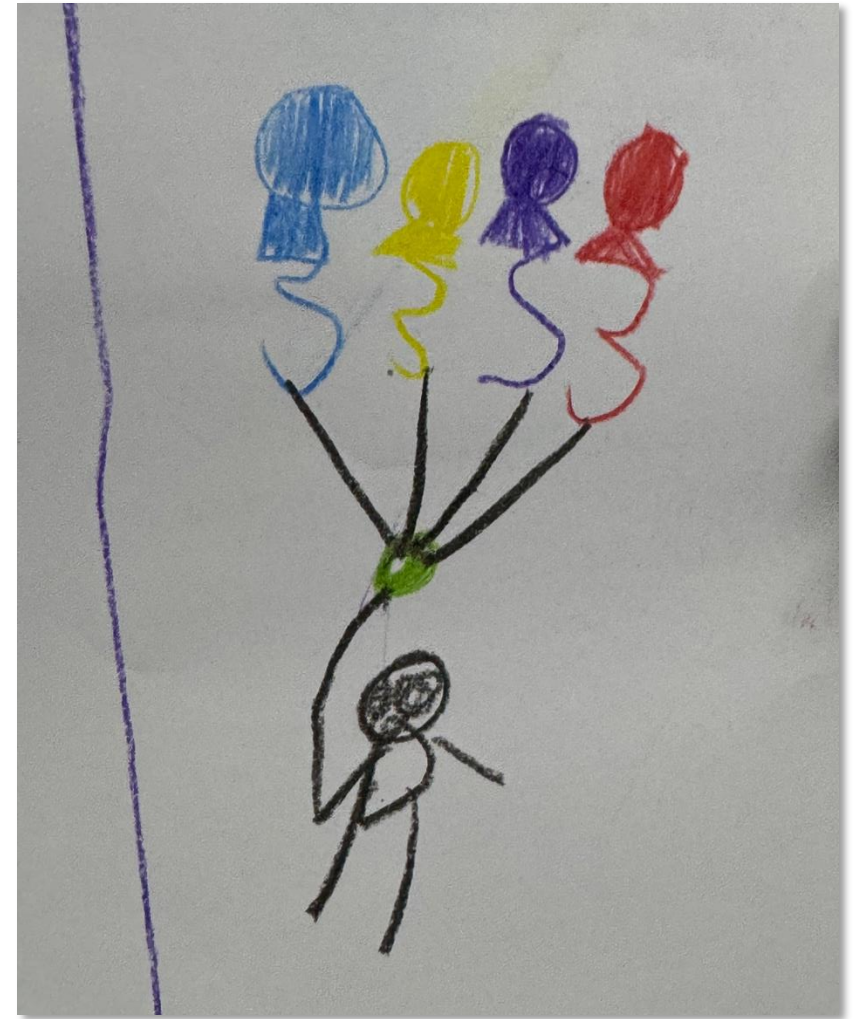
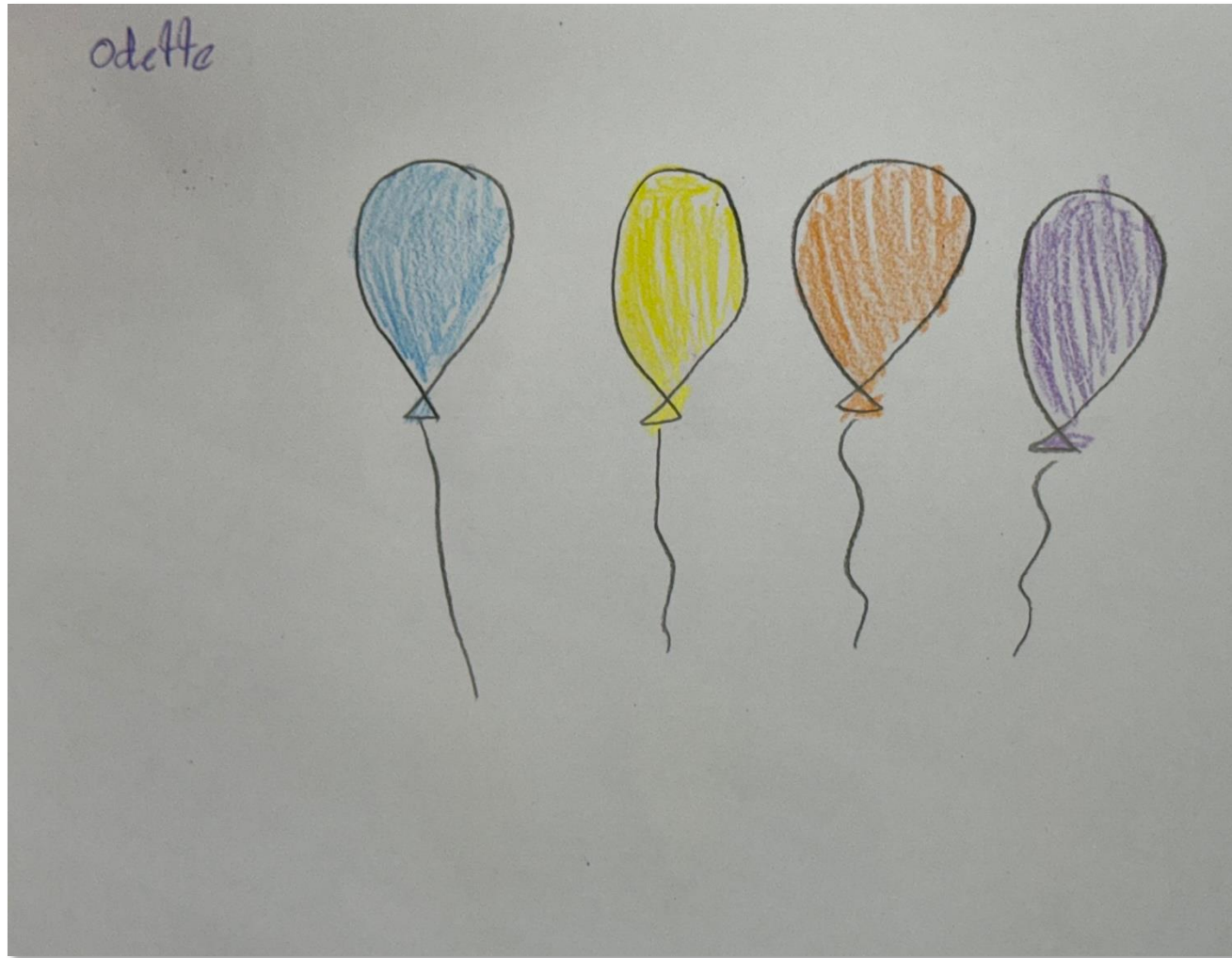
One-quarter of my balloons are blue.
Draw my balloons.



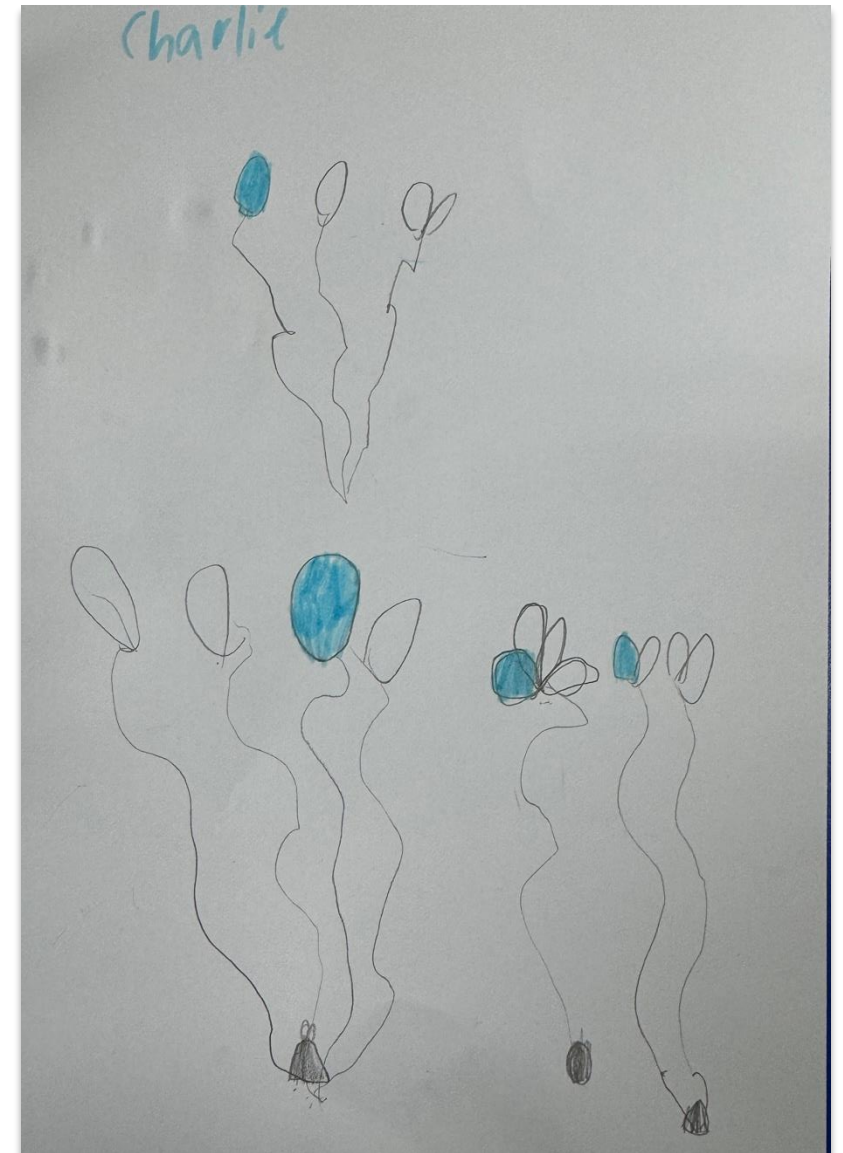
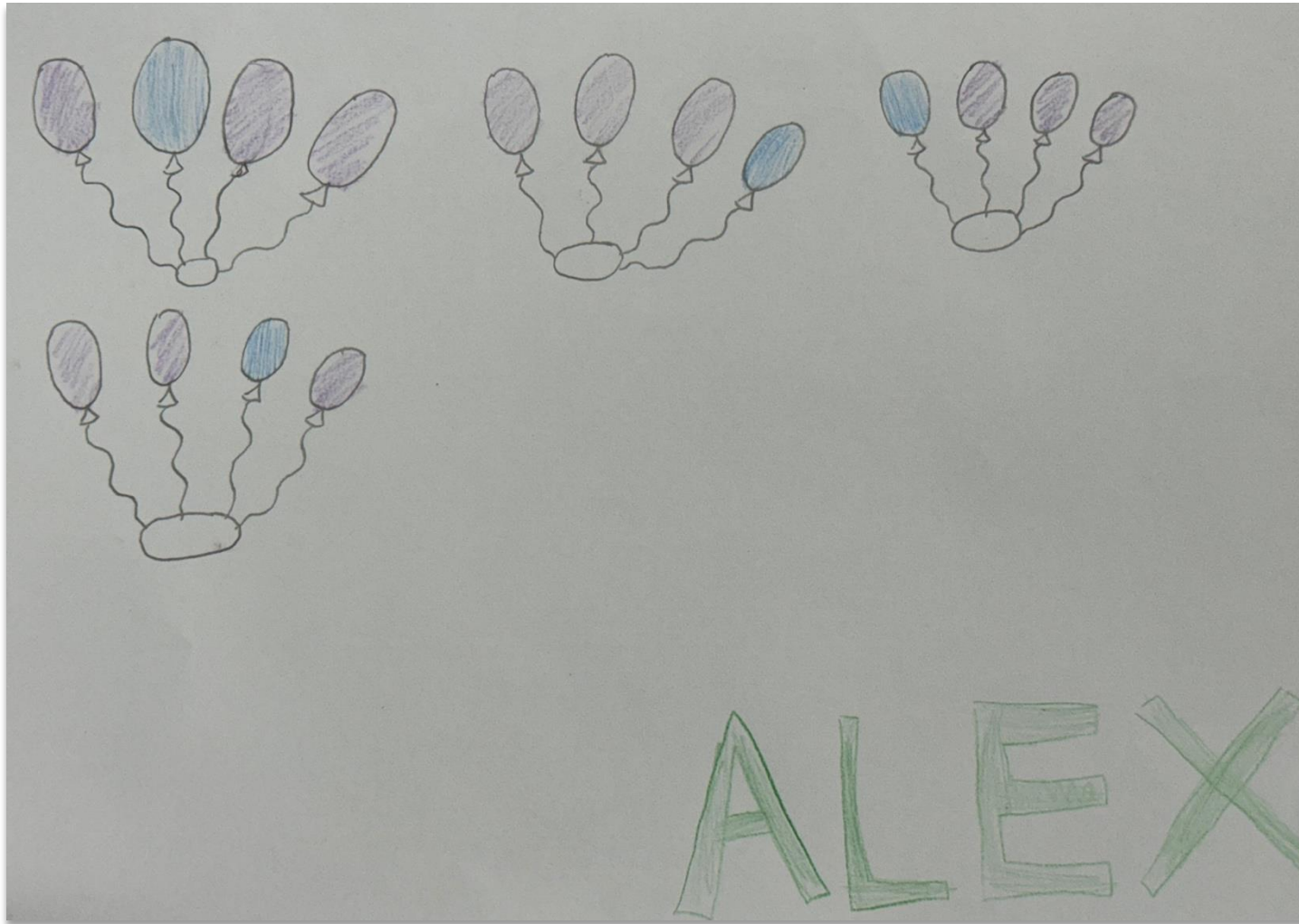
Year 2



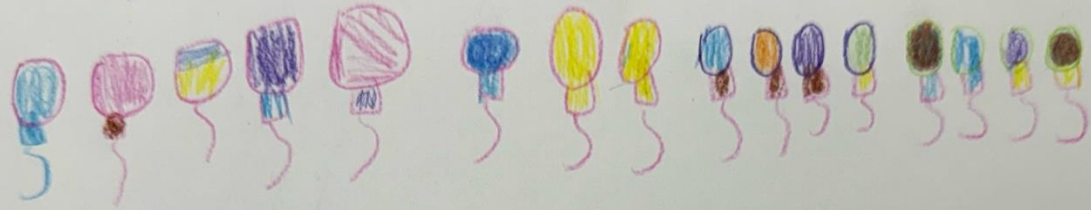
Year 2




Year 2

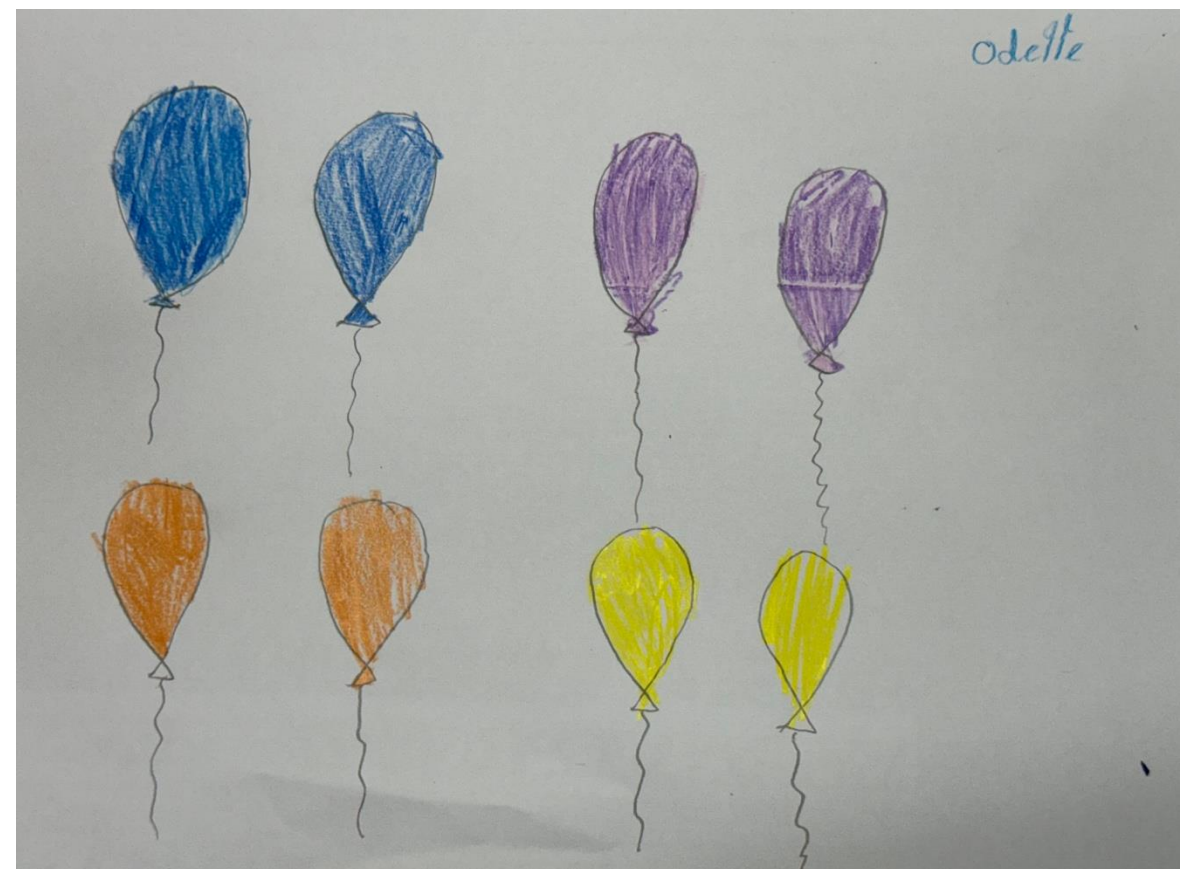
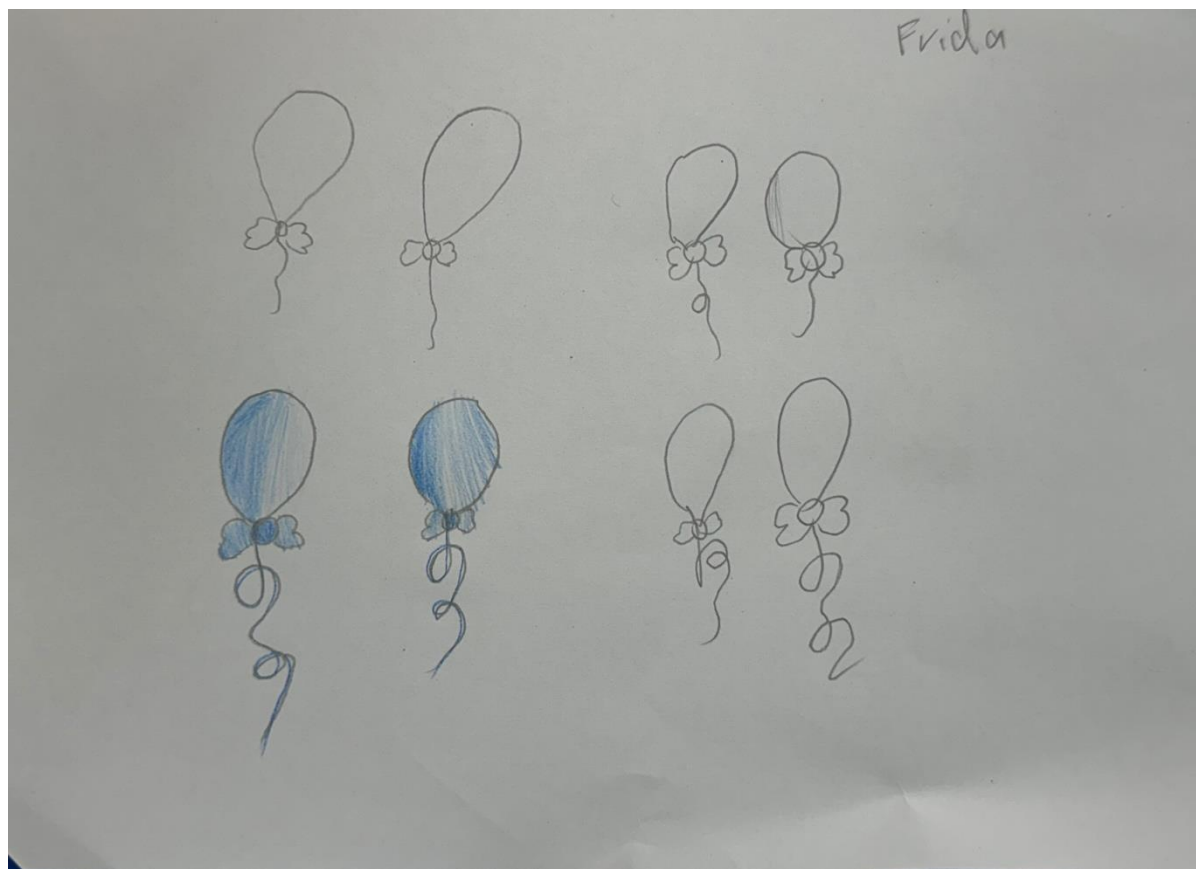


Year 2



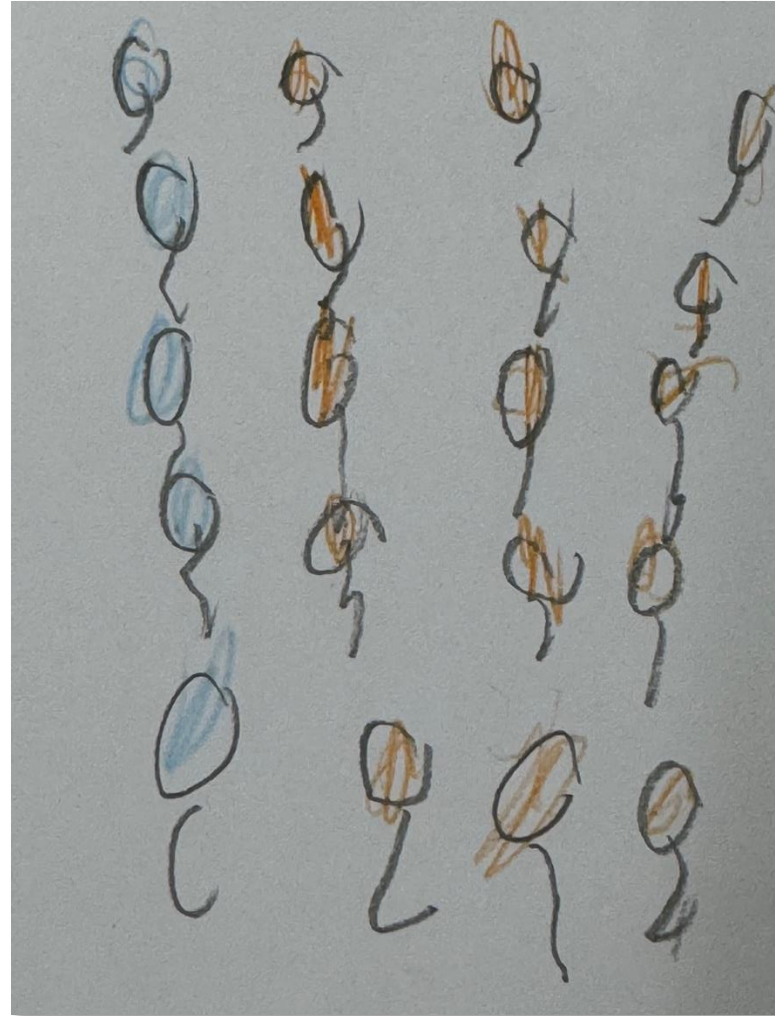
Freyja 

Year 2



Nick (Year 2)

"I can draw as many rows as I like, as long as one of them is blue," Nick.



- **solutions in symbols not drawings**
- **foster fluency**
- **opportunities for stretch and challenge**

Illustrations of impact #6

Year 2 Task – The Magic Doubling Donut Tree

On Monday, there are 3 donuts on the Magic doubling donut tree.

How many donuts will there be on the tree on Friday?



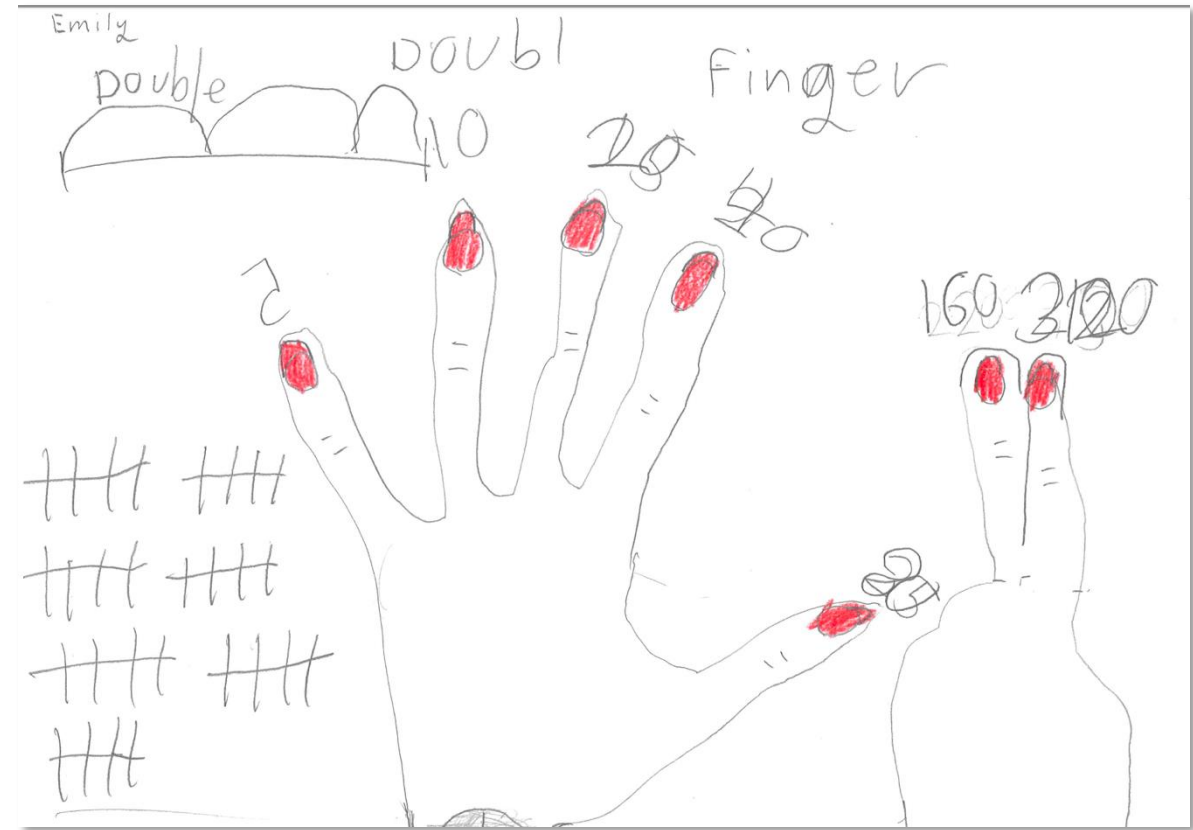
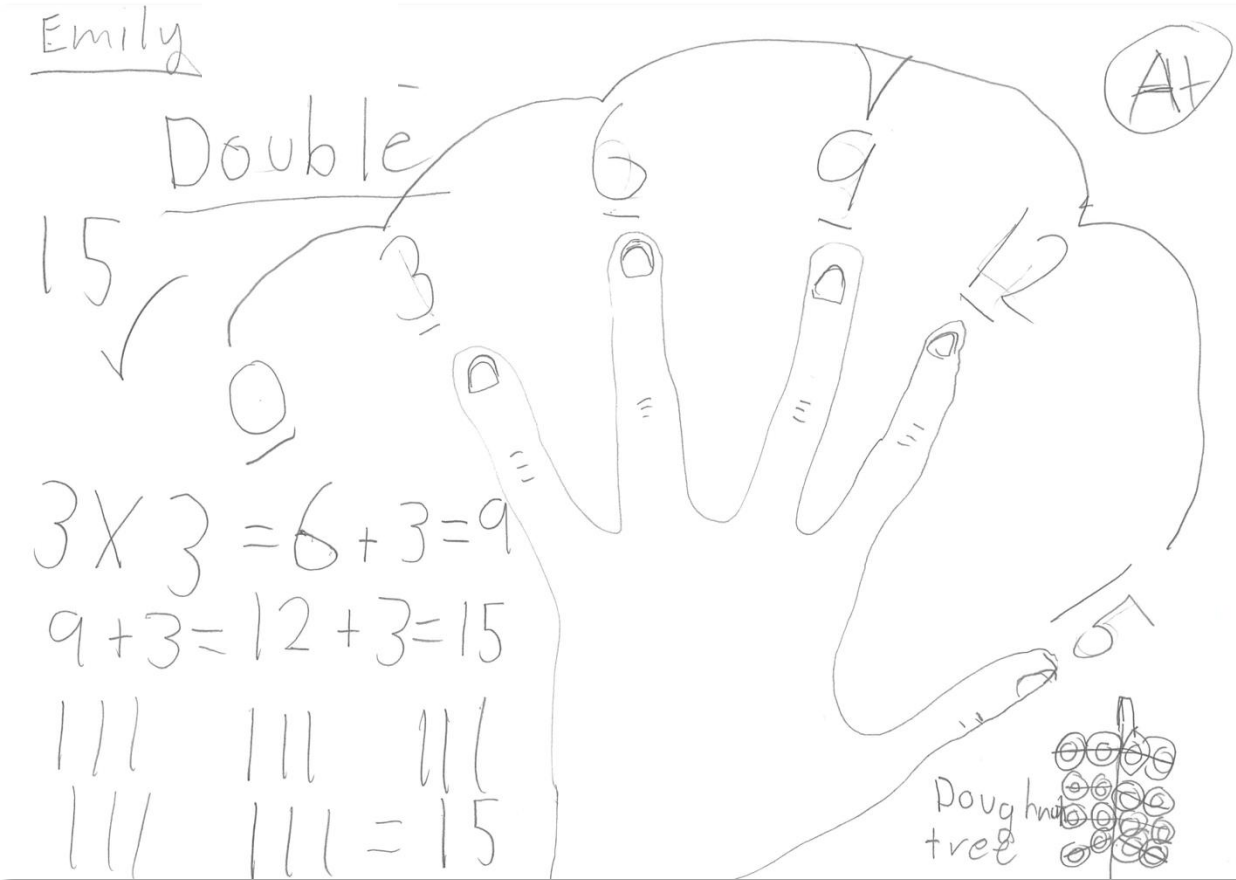
Year 2 – The Magic Donut Tree 2

On Sunday, there are 5 donuts on the magical doubling donut tree.

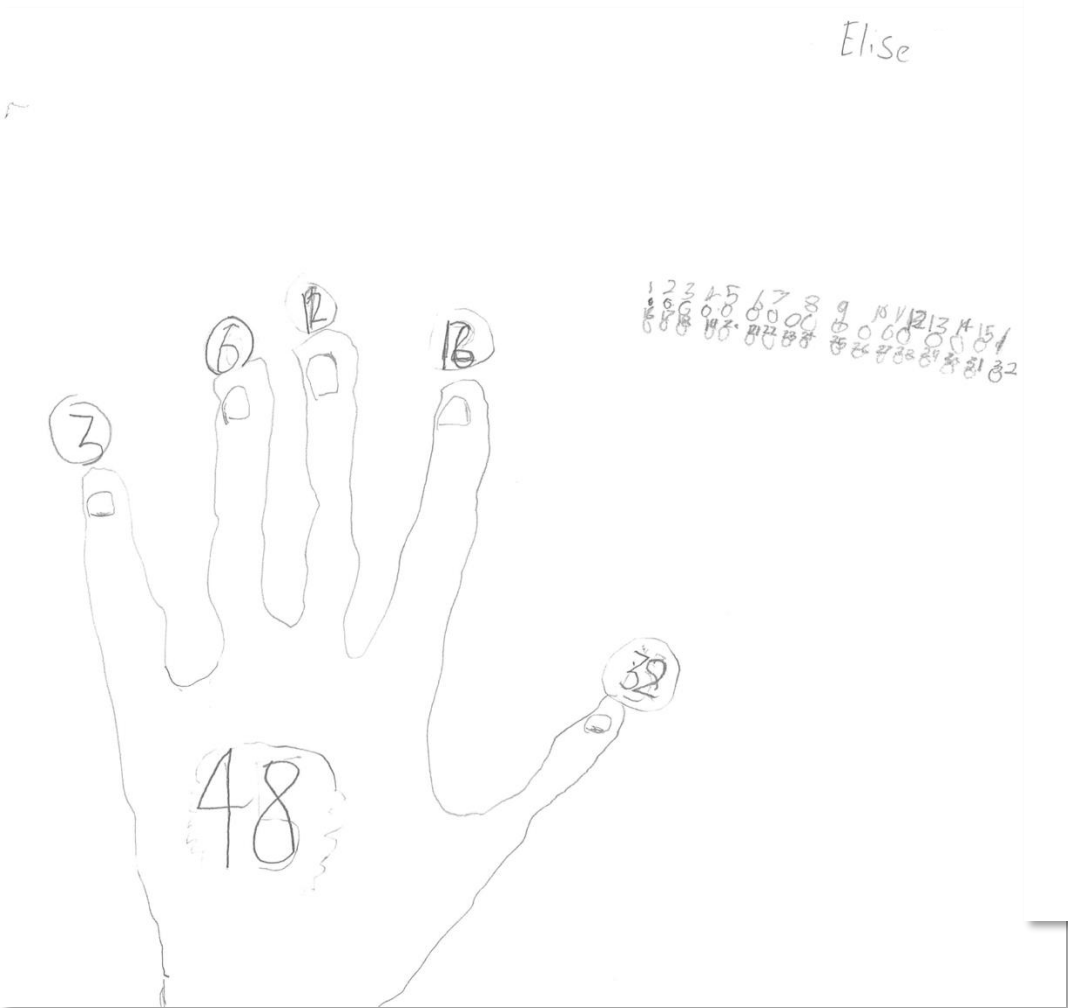
How many donuts will there be at the end of the week?



Emily C. (Year 2)



Elise (Year 2)



Zac (Year 2)

Zac

$3 \times 2 - 9 = 15$

(0) (0) (0) | (0) (0) (0) (0) (0) | (0) (0) (0) 15
 3 | 9 | (0) (0) (0) (0) (0)

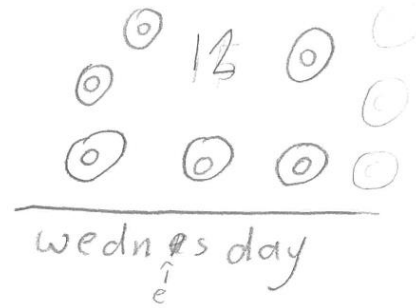
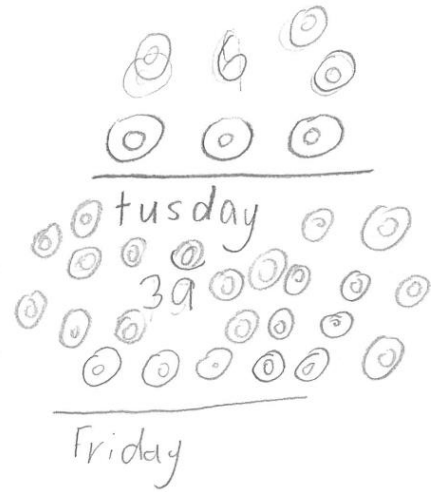
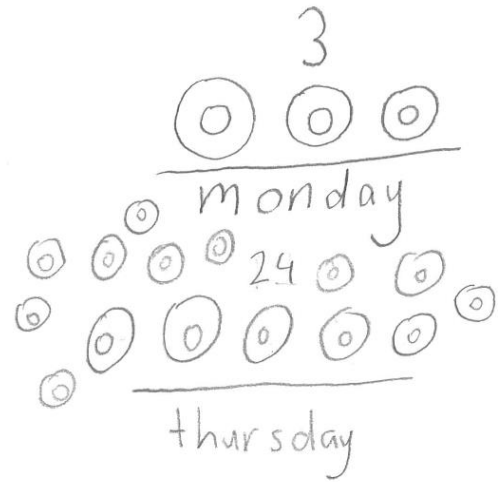
ZAC
NAME:

MO
 $5 + 10 = 15$

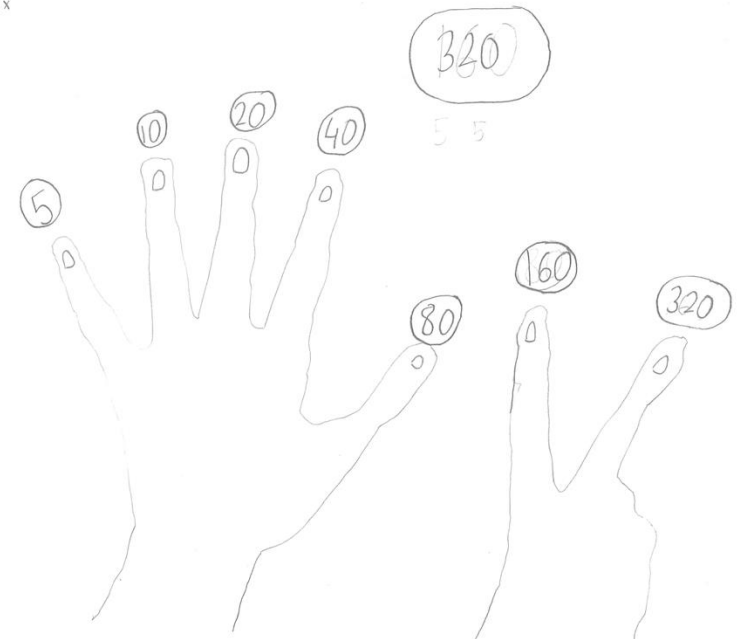
TU WE Th Fri Sat Sun
 30 60 120 240 340 680

Alex (Year 2)

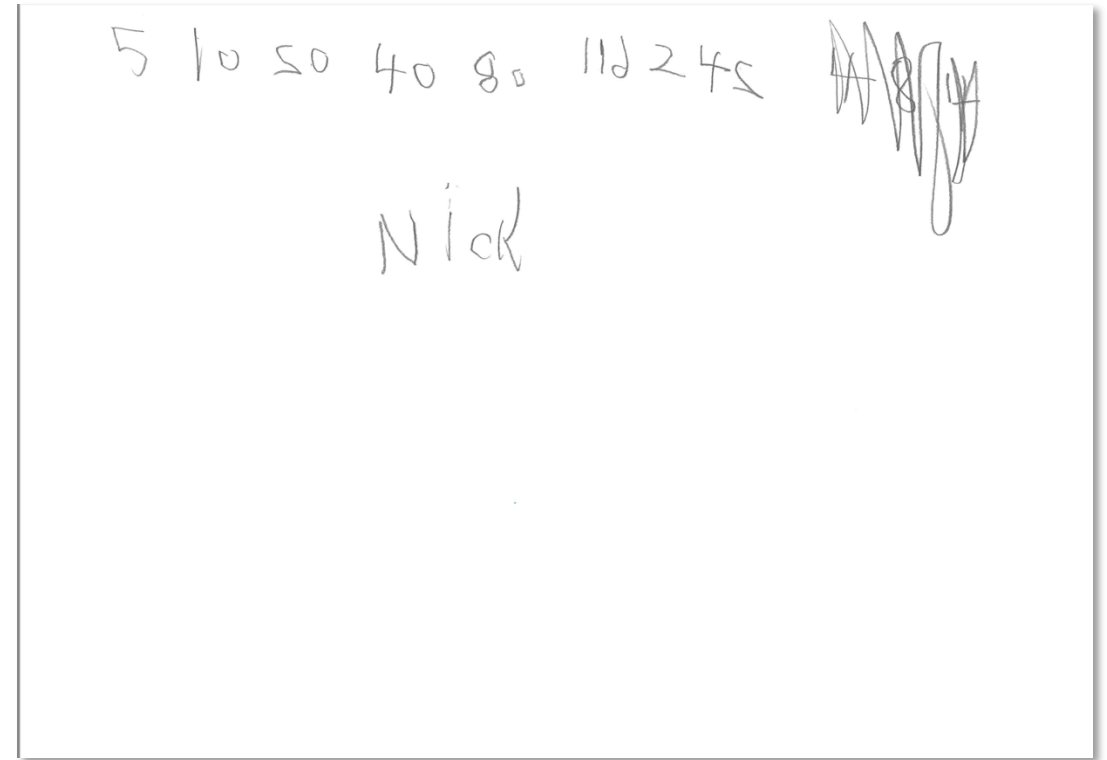
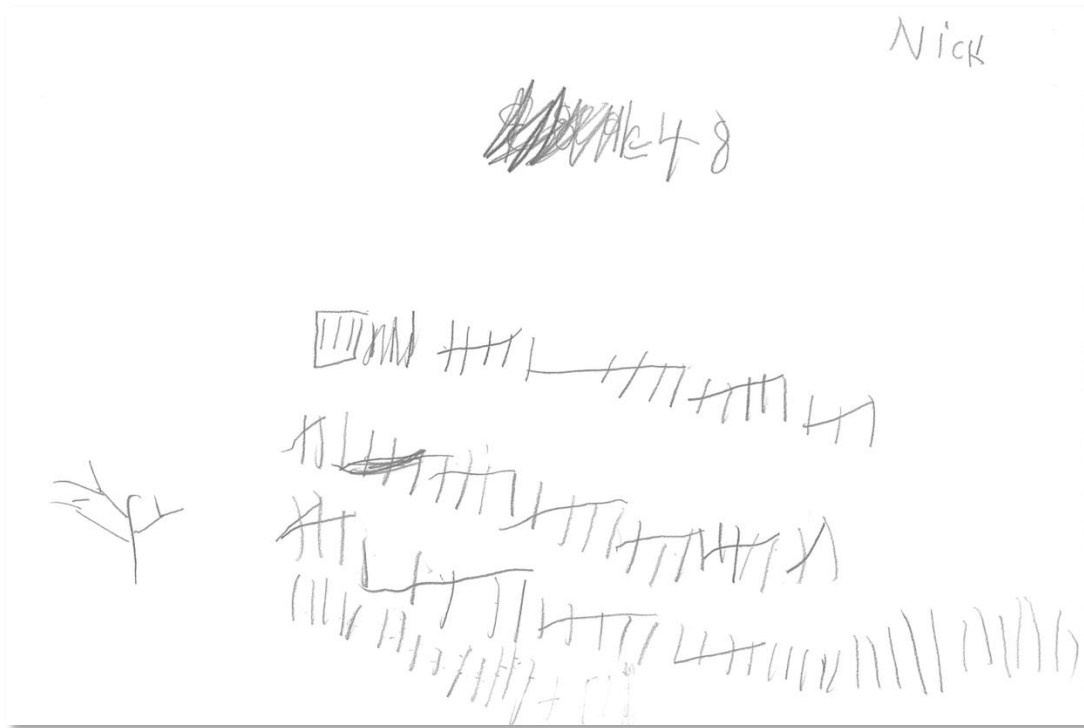
Alex



Alex



Nick (Year 2)



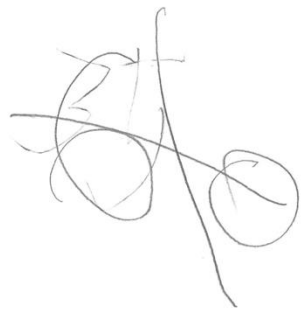
Charlie (Year 2)

charlie

| | |
|-----|-------|
| 111 | 1113m |
| 111 | 6-T |
| 111 | 12-W |
| 111 | 24th |
| 111 | 48f |
| 15 | |

Zach (Year 2)

Zach.



100

$$3 \times 5 = 15$$

Zach

3
monday

6
tuesday

9
wednesday

12
thursday

15
friday

Benedict (Year 2)

Benedict

W
000

T
000

W
000

Th
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F
000 15

15
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0000
0000

Benedict

7 10 20 40 80 160 320
h h h h h h h

Rylee (Year 2)

Rylee

$$3 \times 7 = 21 \quad 3 \times 7 = \del{48} 48$$

| | | | |
|---|---|---|------------------|
| 0 | 0 | 0 | 3 |
| 0 | 0 | 0 | 6 |
| 0 | 0 | 0 | 9 |
| 0 | 0 | 0 | 12 |
| 0 | 0 | 0 | 15 |
| 0 | 0 | 0 | 18 |
| 0 | 0 | 0 | 21 21 |

Rylee

Sunday 5

Monday 10

Tuesday 20

Wednesday 40

Thursday 80

Friday 116

Saturday 132

Elise (Year 2)

1.00 on Monday

| Mon | tus | wed | thu | fri |
|-----|-----|-----|-----|-----|
| 3 | 6 | 12 | 24 | 48 |

3 x 2 = 6 6 x 2 = 12 12 x 2 = 24

Elise



| | |
|---|---|
| 8 | 0 |
| 8 | 0 |

2 00

| | |
|-----------|-----|
| Sunday | 5 |
| Monday | 10 |
| Tuesday | 20 |
| Wednesday | 40 |
| Thursday | 80 |
| Friday | 160 |
| Saturday | £20 |

Odeffe

Monday

3

Friday

48

Wednesday

Thursday

Odette

Sunday
0 0 0 0 0

thursday

monday

Friday

tuesday

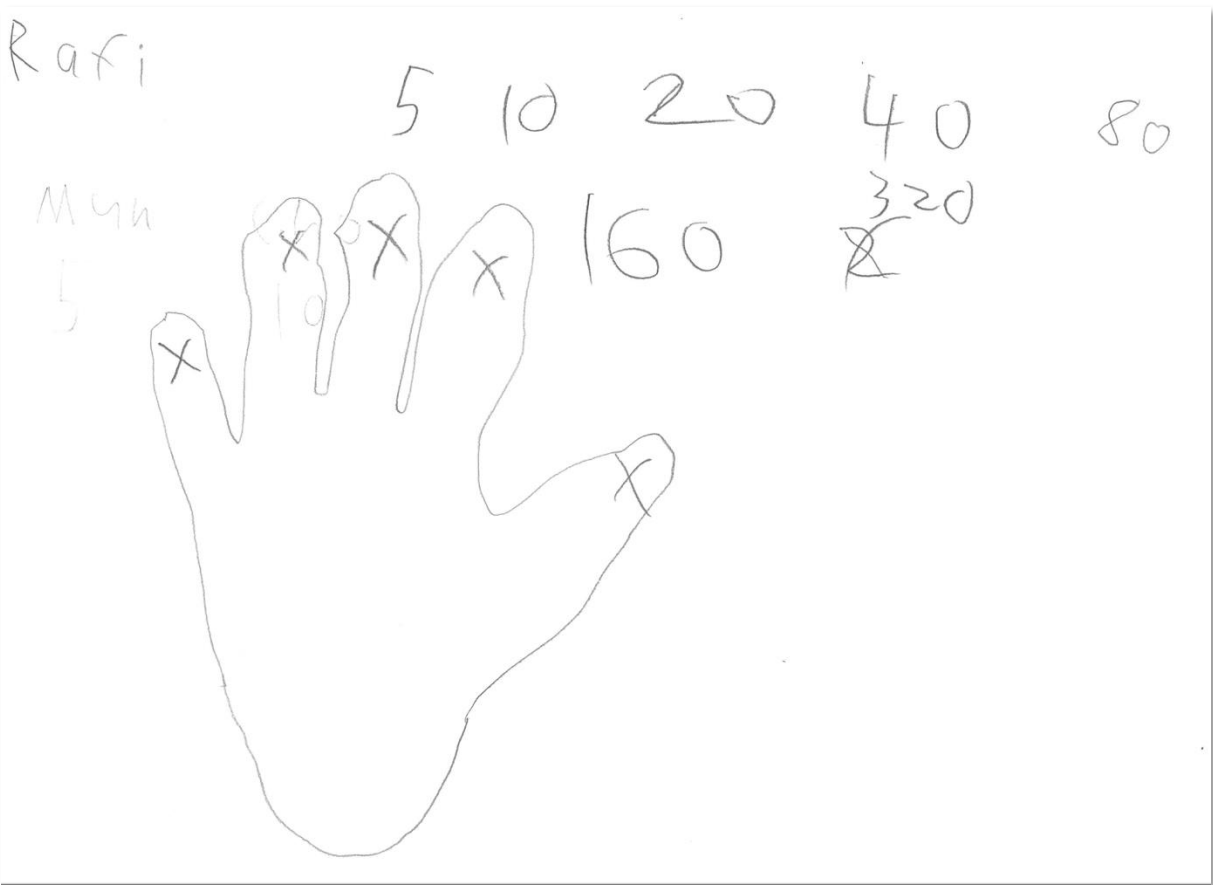
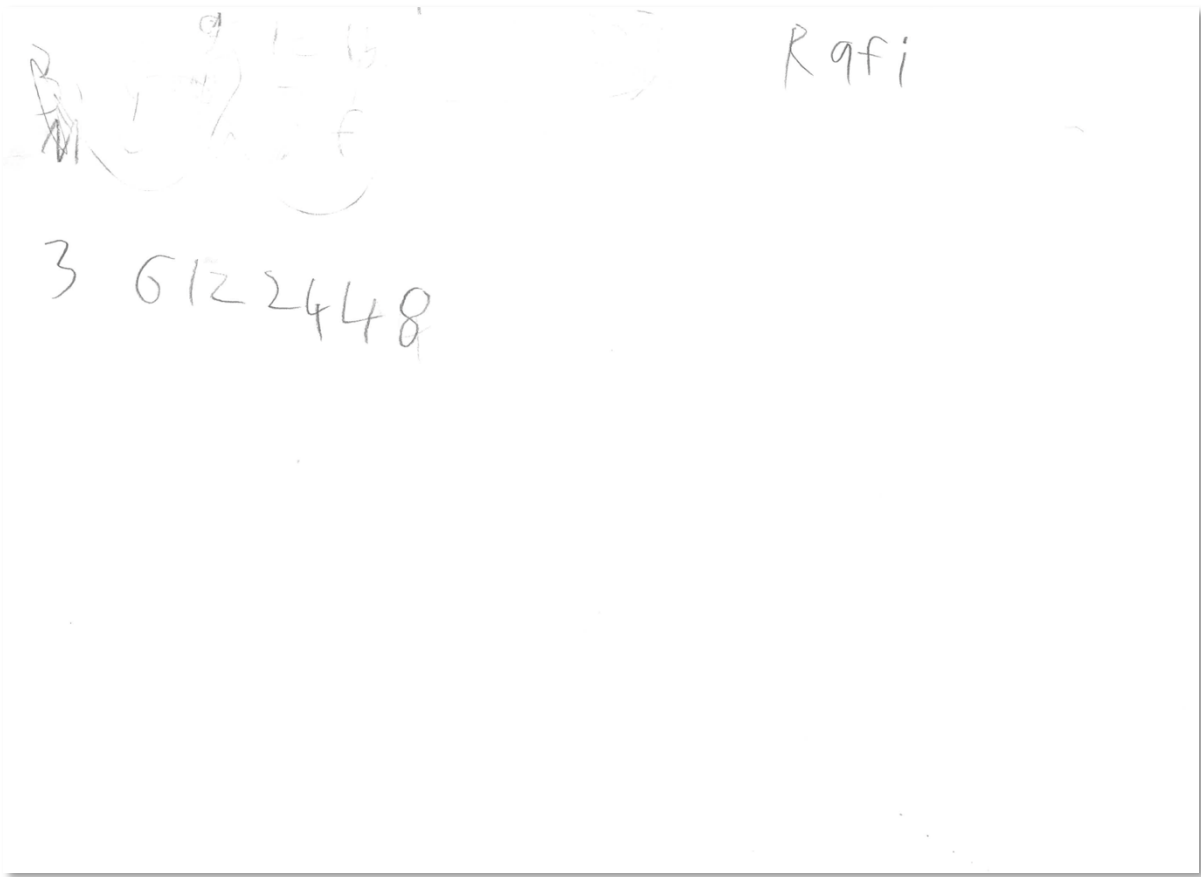
| | | | | |
|---|---|---|---|---|
| o | o | o | o | o |
| o | o | o | o | o |
| o | o | o | o | o |
| o | o | o | o | o |

Handwritten practice of the word "Wednesday" using dot markers. The word is written in a cursive style, with a horizontal line above it. The letters are formed by a series of dots, and the word is underlined. The word is written in a cursive style, with a horizontal line above it. The letters are formed by a series of dots, and the word is underlined.

odette

2
10
20
40
80
106
326

Rafi (Year 2)





Illustrations of Impact: Project Reflections

Consolidating tasks

- drawing and problem-solving
- the power of dialogue
- formative assessment
- engage all learners
- student agency and voice

Illustrations of Impact

Project Reflections

Same but different

- transferability best in a sequence
- familiarity grows risk-taking
- engagement, comfort and struggle
- clarity, understanding, fluency





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you're connected to the same network.
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Apple TV - Year2 B

Learning Intentions:
Students will make connections
between Jesus' healing ministry
and the Church community's
celebration of the Sacrament
of Penance

Success Criteria:
Students will be able to
explain ways in which believers
seek to heal their relationships
through reconciliation
Forgiveness



Illustrations of Impact

Project Reflections

For mathematics leaders

- teacher confidence
- "Are my students ready?" (modelling)
- anticipation (planning)
- co-planning, co-teaching,
co-reflecting, co-debriefing
- assessment

| | | | | | |
|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 |
| 11 | 12 | 13 | 14 | 15 | 16 |
| 21 | 22 | 23 | 24 | 25 | 26 |
| 31 | 32 | 33 | 34 | 35 | 36 |
| 41 | 42 | 43 | 44 | 45 | 46 |
| 51 | 52 | 53 | 54 | 55 | 56 |
| 61 | 62 | 63 | 64 | 65 | 66 |
| 71 | 72 | 73 | 74 | 75 | 76 |
| 81 | 82 | 83 | 84 | 85 | 86 |
| 91 | 92 | 93 | 94 | 95 | 96 |

pinion.

FACT

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Maths Teacher
Lucy M
Charlotte Dwyer
Nicholas Owen

Event App



App Download Instructions

Step 1: Download the App 'Arinex One' from the App Store or Google Play



App Store



Google Play

Step 2: Enter Event Code: **mav**

Step 3: Enter the email you registered with

Step 4: Enter the Passcode you receive via email and click 'Verify'. Please be sure to check your Junk Mail for the email, or see the Registration Desk if you require further assistance.

Be in it to WIN!



A02 – (Year 1 to Year 6) Supporting High Potential and Gifted Learners in Mathematics

Pedagogy

-  Add to Favourite >
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Speaker



Dr Chrissy Monteleone
ACU