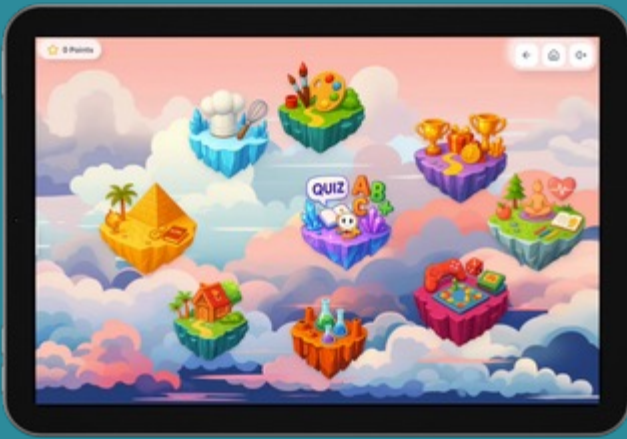


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## Counting What We Observe - Year 3

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# Teacher preparation

## Learning question

How can we count books on each desk and tell a count from a category or a measurement?

## Equipment

Use the twelve desk count cards, pencils, counters if needed, a shared display and real classroom spreadsheet software.

## Lesson 1 · Define what is counted

Show the model and Desks 1–3. Ask whether zero is a record and whether cover colour is a count.

## Lesson 2 · Keep one rule

Agree to count books resting on each desk at the same moment. Use guided practice and correct any missing-zero misconception.

## Lesson 3 · Record raw counts

Use all twelve cards and the partner challenge. Each learner records one desk per observation.

## Lesson 4 · Summarise frequencies

Make a 0–4 count-value table. Use the real spreadsheet steps on the next page. Rehearse with pencil trays.

## Lesson 5 · Compare cautiously

Use a fresh tub case for independent assessment. Mark with the rubric and choose one targeted next step.

# Use a real spreadsheet

The classroom task requires actual spreadsheet entry. A paper grid alone is preparation.

1. Open a blank spreadsheet on the shared display or a learner device. Enter Desk in A1 and Books counted in B1.
2. Enter Desk 1 through Desk 12 in A2:A13. In B2:B13 enter 2, 3, 1, 2, 4, 0, 3, 2, 1, 2, 3, 1 in that order. Keep the zero in Desk 6.
3. In D1 write Count value; in E1 write Frequency. Put 1, 2, 3, 4 in D2:D6. Learners count how often each value appears and enter 1, 3, 4, 3, 1 in E2:E6.
4. Read back the columns aloud: column D is each desk's raw count; column E is how many desks have each count.
5. Check that the frequencies total 12 observations. The raw book counts total 24 books. These answers different questions.

For access, a learner may direct a partner to type, use AAC, or move picture tokens. Keep the learner's recording choices and the real spreadsheet demonstration.

# Support and marking

## Support

Use real books or picture tokens. Supply a partly labelled frequency table. Read prompts aloud when literacy is not the assessed skill.

## Core

Record twelve desk counts, build a correct table, and explain why books per desk is a discrete count.

## Extension

Investigate one missing or duplicate desk record. Explain how that changes the conclusion; do not introduce averages.

## Partner challenge key

1 keep zero; 2 count; 3 category, not measurement; 5 two observations and four books; 6 blank is not zero; 7 three desks; 8 frequency two; 9 four books; 10 two zero-book desks; 11 check duplicate; 12 only these groups, B has higher recorded counts.

## Assessment evidence

Accept an accurate raw record and frequency table, a whole-number count explanation, and a cautious conclusion about the observed tubs. Nine tubs contain twelve blocks in the fresh case; that does not justify a general or causal claim. Use the four rubric criteria and record one next teaching step.

# Counting what we observe<sup>1</sup>

**One desk = one observation.  
Count the books on that desk.**

**Desk 1: 2 books**



**Desk 6: 0 books**



**Keep zero:  
the desk was observed.**

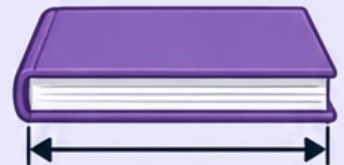
**Books on a desk: a count**



**Cover colour: a category**



**Book length: a measurement**



## We can count what we observe.

**Each desk tells us a number.**



## Desk 1

**Raw count: 2**

What is one observation?

---



## Desk 2

**Raw count: 3**

What is one observation?

---



## Desk 3

**Raw count: 1**

What is one observation?

---

PREVIEW

**Desk 4**



**Raw count: 2**

**How many books?**

**Answer:** \_\_\_\_\_

**Desk 5**



**Raw count: 4**

**How many books?**

**Answer:** \_\_\_\_\_

**Desk 6**



**Raw count: 0**

**Why keep zero?**

**Answer:** \_\_\_\_\_

## Desk 7



Red



Blue



Green

**Raw count: 3**

**Count or category?**

Answer: \_\_\_\_\_

## Desk 8



Yellow



Purple

**Raw count: 2**

**Count or category?**

Answer: \_\_\_\_\_

## Desk 9



Orange

**Raw count: 1**

**Is cover colour a count?**

Answer: \_\_\_\_\_

## Desk 10



**Raw count: 2**

How many books are on this desk?

**Answer:** \_\_\_\_\_

## Desk 11



**Raw count: 3**

How many books are on this desk?

**Answer:** \_\_\_\_\_

## Desk 12



**Raw count: 1**

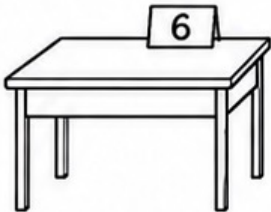
How many books are on this desk?

**Answer:** \_\_\_\_\_

Name: \_\_\_\_\_

# Guided: count what you observe

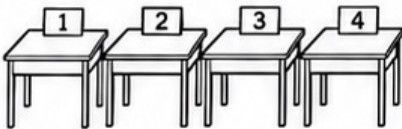
1. Desk 6 has 0 books. Is this still an observation? Why?



2. Which is a count: number of books or cover colour? Explain.



3. Desks 1–4: 2, 3, 1, 2. How many desks were observed?



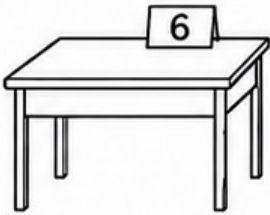
4. Use all 12 raw counts: 2,3,1,2,4,0,3,2,1,2,3,1. Fill the frequency table.

| Count value | Frequency |
|-------------|-----------|
| 0           |           |
| 1           |           |
| 2           |           |
| 3           |           |
| 4           |           |

Name: ANSWERS

# Guided: count what you observe

1. Desk 6 has 0 books. Is this still an observation? Why?



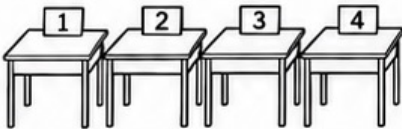
Yes. This desk was observed and has no books.

2. Which is a count: number of books or cover colour? Explain.



Number of books is a count; cover colour is a category.

3. Desks 1–4: 2, 3, 1, 2. How many desks were observed?

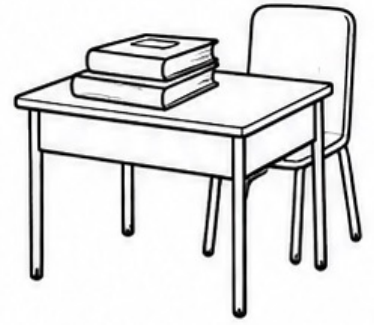


4 desks.

4. Use all 12 raw counts: 2,3,1,2,4,0,3,2,1,2,3,1. Fill the frequency table.

| Count value | Frequency |
|-------------|-----------|
| 0           | 1         |
| 1           | 3         |
| 2           | 4         |
| 3           | 3         |
| 4           | 1         |

Name: \_\_\_\_\_



## Core: record and reason

1. What is one observation in the desk survey?

\_\_\_\_\_

2. Why do we keep Desk 6 = 0?

\_\_\_\_\_

3. Twelve desks hold 24 books. Which number counts desks?

\_\_\_\_\_

4. How many desks have books? Use the raw counts:  
2, 3, 1, 2, 4, 0, 3, 1, 2, 1.

\_\_\_\_\_

5. Is cover colour a count or a category?

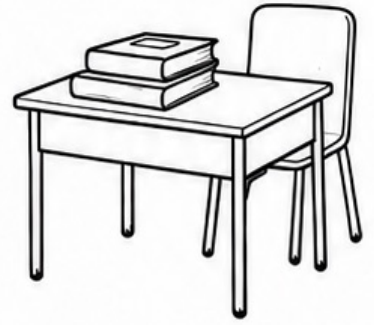
\_\_\_\_\_

6. Is a blank missing record the same as an observed zero? Why?

\_\_\_\_\_



Name: ANSWERS



## Core: record and reason

1. What is one observation in the desk survey?

**One desk.**

---

2. Why do we keep Desk 6 = 0?

**An observed desk with no books is still a record.**

---

3. Twelve desks hold 24 books. Which number counts desks?

**12 counts desks; 24 counts books.**

---

4. How many desks have books? Use the raw counts:

2, 3, 1, 2, 4, 0, 3, 1, 2, 1.

**4 desks.**

---

5. Is cover colour a count or a category?

**Category.**

---

6. Is a blank missing record the same as an observed zero? Why?

**No. Blank may mean missing; zero means observed none.**

---



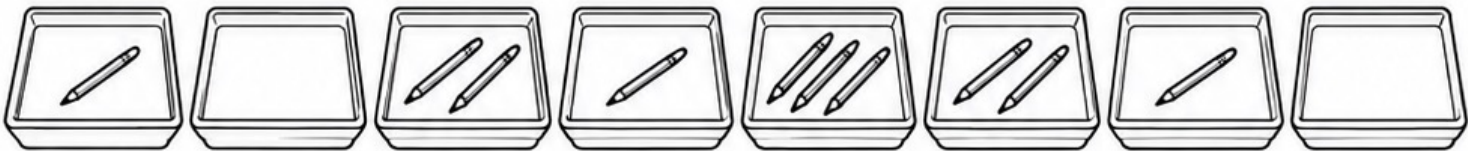
Name: \_\_\_\_\_



# Transfer: pencils in trays

Here are eight trays with pencils. The number of pencils in each tray is:

**1, 0, 2, 1, 3, 2, 1, 0**



1. Make a count-value frequency table.

| Number of pencils<br>in a tray | Frequency<br>(how many trays) |
|--------------------------------|-------------------------------|
| 0                              |                               |
| 1                              |                               |
| 2                              |                               |
| 3                              |                               |

2. What does your table tell you about one-pencil trays? Use evidence.

3. Why is pencils per tray a discrete count, not a length measurement?

Name: **ANSWERS**



## Transfer: pencils in trays

Here are eight trays with pencils. The number of pencils in each tray is:

**1, 0, 2, 1, 3, 2, 1, 0**



Tray 1

Tray 2

Tray 3

Tray 4

Tray 5

Tray 6

Tray 7

Tray 8

1. Make a count-value frequency table.

| Number of pencils<br>in a tray | Frequency<br>(how many trays) |
|--------------------------------|-------------------------------|
| 0                              | 2                             |
| 1                              | 3                             |
| 2                              | 2                             |
| 3                              | 1                             |

2. What does your table tell you about one-pencil trays? Use evidence.

Three of the eight trays have one pencil.

3. Why is pencils per tray a discrete count, not a length measurement?

Pencils in each tray are counted as whole objects; length can vary continuously.

# Observation rule challenge

Look closely. What can we count? What is a category? Can we measure something? Is something missing from the record? Use the picture cards to discuss and decide.

## How to play

- 1 Pick a card.
- 2 State what one observation is.
- 3 Decide count, category, measurement or missing record.
- 4 Explain with evidence; partner checks the key.
- 5 Keep the card for a justified answer.

Finish after 12 cards. The player with the most justified cards wins.

## Key reminder

### Count

How many?

### Category

What group or type?

### Measurement

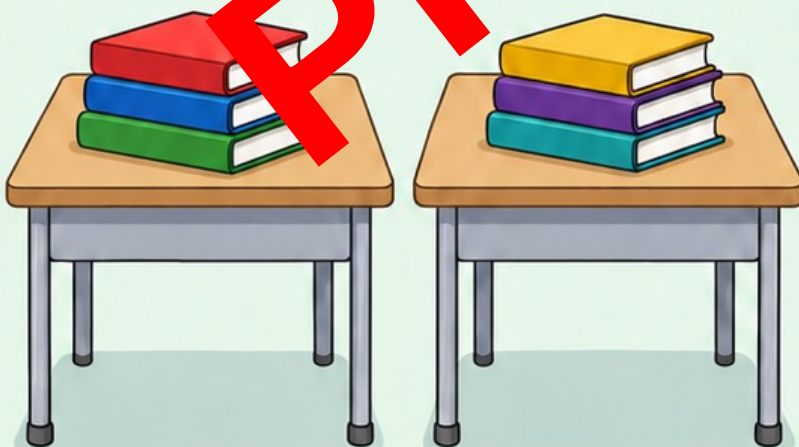
How long, tall, heavy, hot or other amount?

### Missing record

What information is not given but would be helpful?

## Worked turn

Look at the picture. Follow the steps.



Two desks have 3 books each.

### Answer:

2 observations; 6 books in total.  
Number of books per desk is a count.



### Top tip

Use the picture to give clear evidence for your answer.  
Good mathematicians notice, explain and check.

See it.  
Think about it.  
Talk it through!



# Counting What We Observe

Look closely. Talk together. Use the information to think like mathematicians!

Small observations make a big difference!



Cut out the challenge cards. Work with a partner to discuss each one.

- 1** One desk has 0 books.  
Keep the record?



Why? \_\_\_\_\_

- 2** One desk has 3 books.  
Count or category?



Why? \_\_\_\_\_

- 3** A book has a blue cover.  
Count or category?



Why? \_\_\_\_\_

- 4** A book is 27.5 cm long.  
Count or measurement?



Why? \_\_\_\_\_

- 5** Two desks each have 2 books.  
How many observations?  
How many books?



Why? \_\_\_\_\_

- 6** Desk 5 has a blank missing record. Is that zero?

| Desk Books |   |
|------------|---|
| Desk 1     | 2 |
| Desk 2     | 1 |
| Desk 3     | 3 |
| Desk 4     | 0 |
| Desk 5     |   |
| Desk 6     | 1 |

Why? \_\_\_\_\_

# Counting What We Observe

## Year 3 Maths – Partner Activity

Cut out the cards. Work with a partner to read, discuss and answer each question.



Look carefully,  
count clearly,  
think together!

- 7** Three desk counts:  
1, 2, 1.  
How many observations?



- 8** For 1, 2, 1,  
what is the frequency  
of 1?



- 9** For 1, 2, 1,  
how many books  
in total?



- 10** For 0, 2, 0,  
how many zero-book  
desks?



- 11** Desk 3 is entered twice.  
What should you check?



- 12** Group A: 0, 1, 1.  
Group B: 2, 2, 2.  
What cautious comparison  
can you make?

### Group A



### Group B

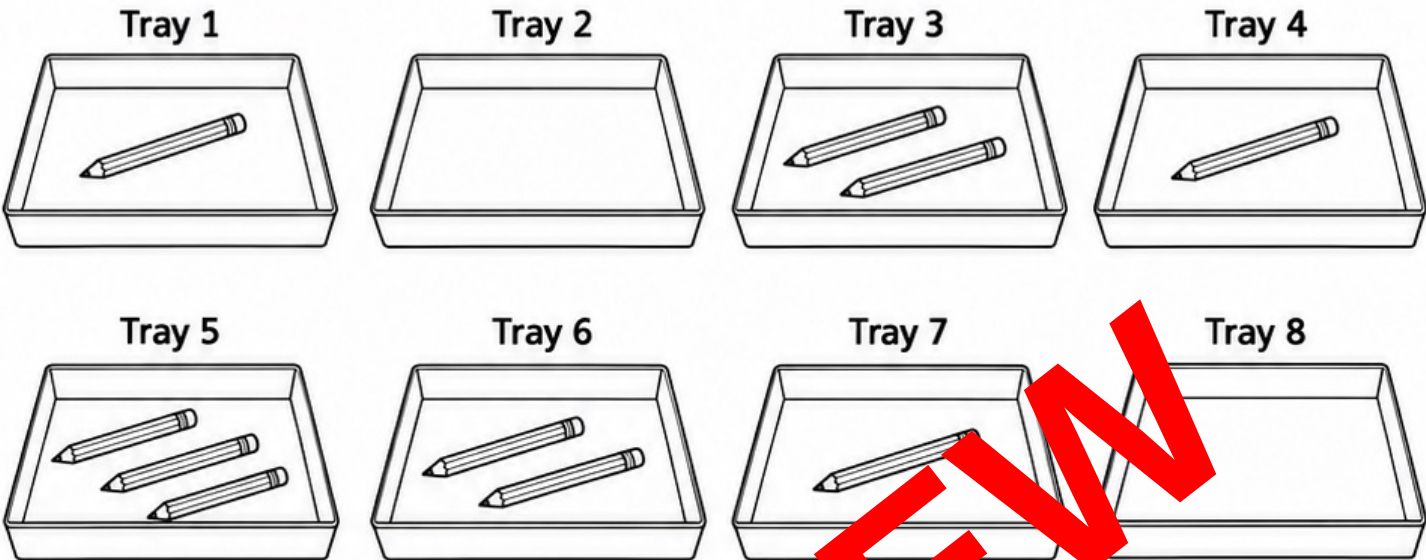


### Teacher check key:

7: 3 desks | 8: 2 | 9: 4 books | 10: 2 desks | 11: check duplicate | 12: only these groups; B has higher recorded counts.

# Rehearsal 1: pencils in trays

Look at the trays and count the pencils in each one.



Make a count-value frequency table for 1, 2 and 3 pencils.

| Number of pencils<br>(count value) | Frequency<br>(how many trays) |
|------------------------------------|-------------------------------|
| 0                                  |                               |
| 1                                  |                               |
| 2                                  |                               |
| 3                                  |                               |

How many trays were observed?

How many pencils altogether?

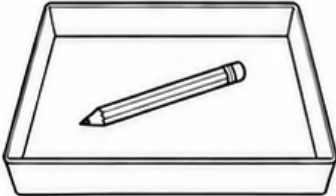
Name: **ANSWERS**

Date: \_\_\_\_\_

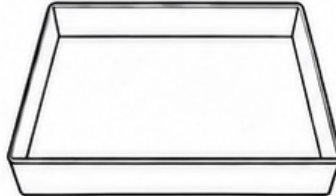
## Rehearsal 1: pencils in trays

Look at the trays and count the pencils in each one.

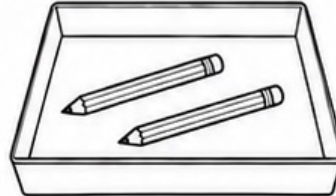
Tray 1



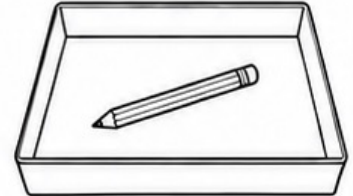
Tray 2



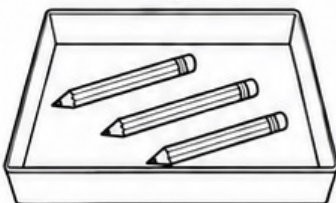
Tray 3



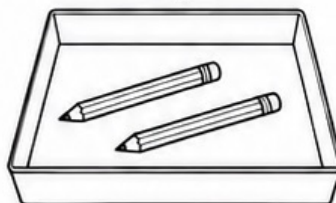
Tray 4



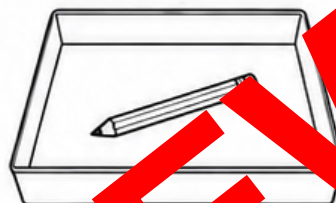
Tray 5



Tray 6



Tray 7



Tray 8



Make a count-value frequency table for 1, 2 and 3 pencils.

| Number of pencils<br>(count value) | Frequency<br>(how many trays) |
|------------------------------------|-------------------------------|
| 0                                  | 2                             |
| 1                                  | 3                             |
| 2                                  | 2                             |
| 3                                  | 1                             |

How many trays were observed?

**8 trays**

How many pencils altogether?

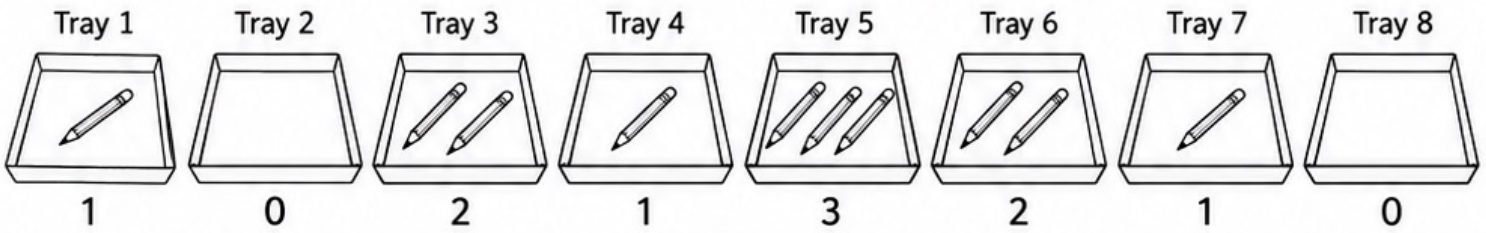
**10 pencils**

Name: \_\_\_\_\_

## Rehearsal 2: explain your data

We counted the number of pencils in each tray.

Eight trays: 1, 0, 2, 1, 3, 2, 1, 0.



1. Why is pencils per tray a discrete count, not a continuous length measurement?

2. A student says, "10 pencils means 10 trays." Explain and correct this claim.

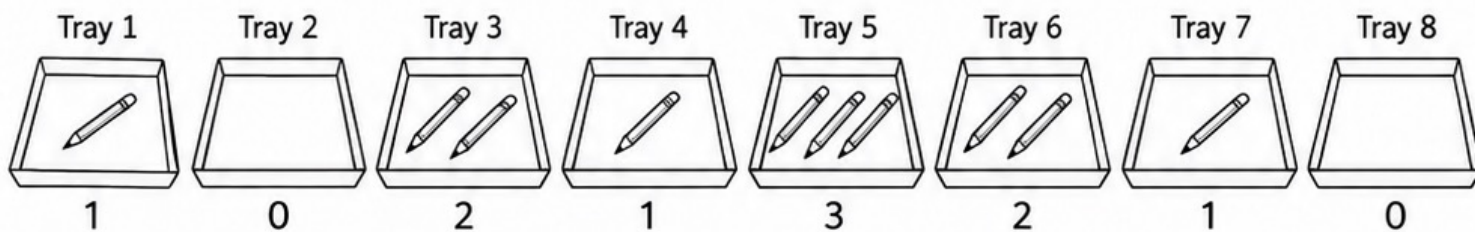
3. Trays 1–4 have counts 1,0,2,1. Trays 5–8 have 3,2,1,0. Compare these observed groups cautiously.

Name: **ANSWERS**

## Rehearsal 2: explain your data

We counted the number of pencils in each tray.

Eight trays: 1, 0, 2, 1, 3, 2, 1, 0.



1. Why is pencils per tray a discrete count, not a continuous length measurement?

Each whole number counts pencils in one tray.  
A length measurement can vary continuously.

2. A student says, "10 pencils means 10 trays." Explain and correct this claim.

There are 8 observed trays and 10 pencils in total.  
These count different things.

3. Trays 1–4 have counts 1,0,2,1. Trays 5–8 have 3,2,1,0. Compare these observed groups cautiously.

For these four trays in each group, Trays 5–8 hold 6 pencils  
and Trays 1–4 hold 4. This says nothing about other trays.

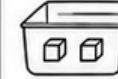
Name: \_\_\_\_\_

Date: \_\_\_\_\_

# Assessment: blocks in tubs

## Counting What We Observe

Nine tubs were checked for blocks. The table shows the number of blocks in each tub.

|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |  |  |  |  |  |
| Tub 1                                                                            | Tub 2                                                                             | Tub 3                                                                             | Tub 4                                                                             | Tub 5                                                                             | Tub 6                                                                              | Tub 7                                                                               | Tub 8                                                                               | Tub 9                                                                               |
| 2                                                                                | 0                                                                                 | 1                                                                                 | 3                                                                                 | 2                                                                                 | 1                                                                                  | 0                                                                                   | 2                                                                                   | 1                                                                                   |

1. Record the raw counts, including zero.

|       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Tub 1 | Tub 2 | Tub 3 | Tub 4 | Tub 5 | Tub 6 | Tub 7 | Tub 8 | Tub 9 |
|       |       |       |       |       |       |       |       |       |

2. Make a count-value frequency table for 0, 1, and 3.

| Number of blocks per tub | Frequency (how many tubs) |
|--------------------------|---------------------------|
| 0                        |                           |
| 1                        |                           |
| 2                        |                           |
| 3                        |                           |

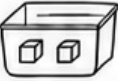
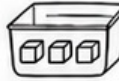
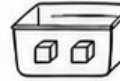
3. Explain why blocks per tub is a count, not a length measurement.

4. Write one conclusion supported by your table. Say which tubs your statement covers.

# Assessment: blocks in tubs

## Counting What We Observe

Nine tubs were checked for blocks. The table shows the number of blocks in each tub.

|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |  |  |  |  |  |
| Tub 1                                                                            | Tub 2                                                                             | Tub 3                                                                             | Tub 4                                                                             | Tub 5                                                                             | Tub 6                                                                              | Tub 7                                                                               | Tub 8                                                                               | Tub 9                                                                               |
| 2                                                                                | 0                                                                                 | 1                                                                                 | 3                                                                                 | 2                                                                                 | 1                                                                                  | 0                                                                                   | 2                                                                                   | 1                                                                                   |

1. Record the raw counts, including zero.

|       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Tub 1 | Tub 2 | Tub 3 | Tub 4 | Tub 5 | Tub 6 | Tub 7 | Tub 8 | Tub 9 |
| 2     | 0     | 1     | 3     | 2     | 1     | 0     | 2     | 1     |

2. Make a count-value frequency table for 0, 1, 2, 3.

| Number of blocks per tub | Frequency (how many tubs) |
|--------------------------|---------------------------|
| 0                        | 2                         |
| 1                        | 3                         |
| 2                        | 3                         |
| 3                        | 1                         |

9 tubs; 12 blocks.

3. Explain why blocks per tub is a count, not a length measurement.

**Blocks per tub is a whole-number count. Length can vary continuously.**

4. Write one conclusion supported by your table. Say which tubs your statement covers.

**Three of the nine observed tubs have two blocks.**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# Learning evidence rubric

## Year 3 – Counting What We Observe

Assessment focus: recording raw counts of blocks in tubs, using a frequency table, and explaining why the variable is a count rather than a length measurement.

| Criterion                | Needs teaching                                             | Developing with support                                     | Target met independently                                                                                 |
|--------------------------|------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Concept / accuracy       | Concept inaccurate; record is incorrect or incomplete.     | Correct for familiar example with prompt.                   | Correct for a fresh case independently.                                                                  |
| Application / procedure  | Cannot record counts or complete a frequency table yet.    | Completes counts and frequency table with model or prompt.  | Accurately records counts and completes frequency table independently.                                   |
| Reason / evidence        | Unsupported guess or no clear reason.                      | Gives relevant detail with prompt.                          | Gives specific evidence and a clear reason why the variable is a count rather than a length measurement. |
| Transfer / communication | Unclear explanation with no transfer to different context. | Clear explanation with support, but fresh context insecure. | Clear, bounded conclusion in a fresh case.                                                               |

Evidence observed:

Next teaching step:

# Counting What We Observe



# Our purpose

Count books on each desk.

Keep every observation, including zero.

Then explain what the table shows.



# Key words

An observation is one desk.

A discrete count is a whole number of books.

Frequency tells how often a count occurs.



# One desk, one record

Ask: How many books rest on this desk?

Desk 1 has 2. Desk 6 has 0.

Both desks were observed



# First four desks

Desks 1–4: 2, 3, 1, 2.

These are four raw records.

The number 2 occurs twice



# A careful contrast

Three books is a count.

Blue cover is a category label.

27.5 cm is a length measurement.



# Keep the zero

Desks 5–8: 4, 0, 3, 2.

How many observations are there?

Why is the zero important?



# Four observations

Four desks were checked.

A zero means one desk had no books.

A blank might mean no record was kept.



# One consistent rule

Count all books resting on each desk at a designated moment.

Record each desk once.

Do not replace a zero with a blank.



# A complete turn

Two desks each have 3 books.

There are 2 observations and 6 books.

Explain which number answers each question.



# Try a new card

Two desks each have 3 books.

How many desk observations?

How many books in total? Explain.



# Different totals

The 12 desks are 12 observations.

They hold 24 books altogether.

Twenty-four is not the number of desks.



# Pencils in trays

Eight tray counts: 1, 0, 2, 1, 3, 2, 1, 0.

Make a count-value frequency table.

Keep the two zero-pencil trays.



# Choose your route

Support: use counters and a partly filled table.

Core: record and table independently.

Extension: investigate a missing or incorrect record.



# Independent evidence

Record every new tub observation.

Make a labelled frequency table

Explain why blocks per tub is a cov



# Reflect with evidence

Name one accurate raw record.

Use a table value to support a conclusion.

What will you check next time?

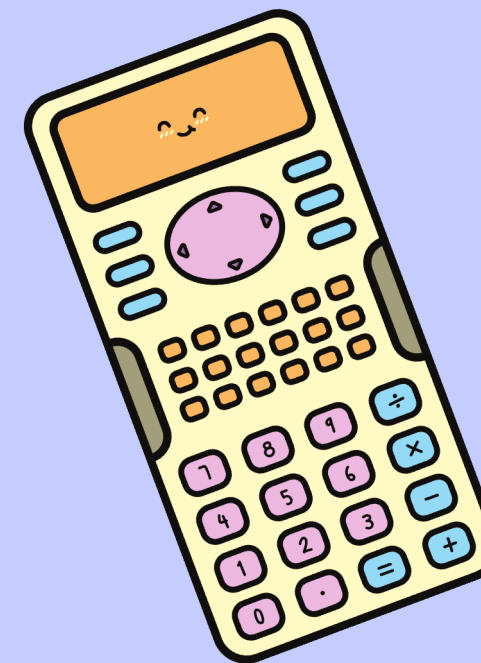
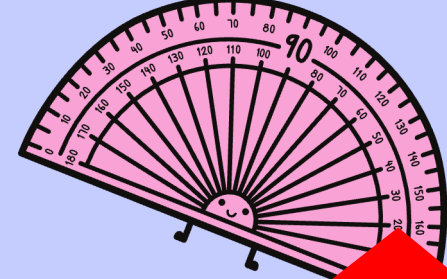
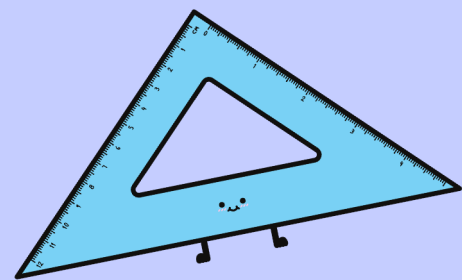
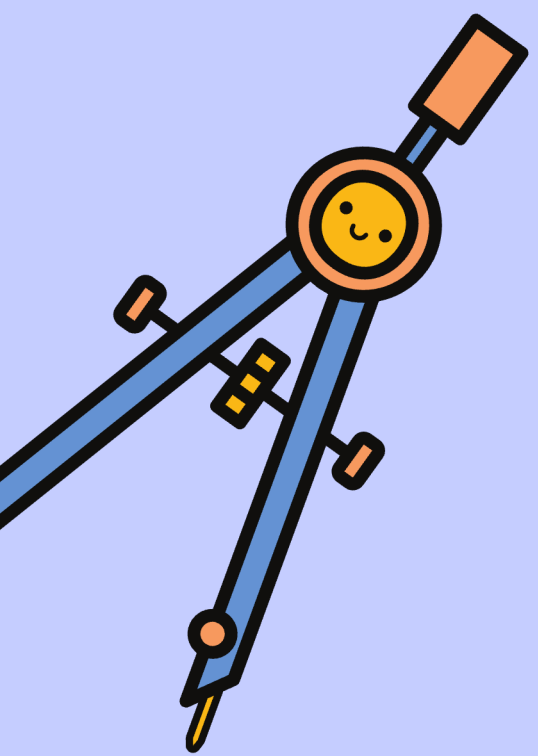


# What we learned

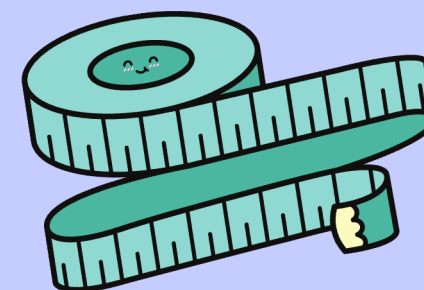
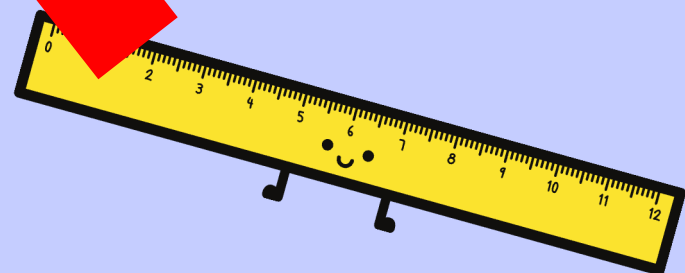
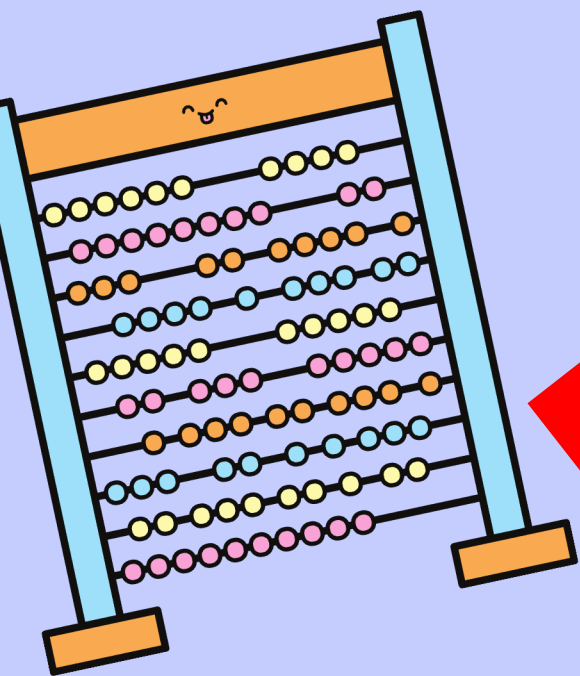
Count value, frequency and total quantities answers for  
different questions.

A result from these desks only, which was  
observed here.





Well Done  
Use the evidence.



# Counting What We Observe Quiz



## Q1: Desks with two books

Raw counts: 2, 3, 1, 2, 4, 0, 3, 2, 1, 2, 3, 1

How many desks have exactly 2 books?



# Answer 1

Four desks. The value 2 appears four times



## Q2: Keep the zero

Why should Desk 6 = 0 remain in the new core?



## Answer 2

It is still an observed desk. It has no books



### Q3: A discrete count

Is number of books on each desk discrete numerical data? Why?



## Answer 3

Yes. It is a whole-number count of books.



## Q4: Four raw records

Desks 5–8 show 4, 0, 3, 2. How many desks were observed?



## Answer 4

Four desks, including the one with zero books.



## Q5: A changed variable

If the variable changes to cover color, is still  
book count?



## Answer 5

No. Cover colour is a category; each desk can be  
one observation.



## Q6: Correct the claim

A learner says: 24 books means 24 decks are observed. What is wrong?



## Answer 6

Twelve desks were observed. Twenty four the total number of books.



## Q7: Two desks

Two desks each have 3 books. How many  
observations and books?



## Answer 7

Two observations. Six books in total.



## Q8: Compare these groups

Group A: 0, 1, 1. Group B: 2, 2, 2. Which has more zero book desks?



## Answer 8

Group A has one; Group B has none. The claim covers  
only these desks.



## Q9: Pencil frequencies

Five tray counts: 0, 2, 1, 2, 0. Give frequencies for 1 and 2.



## Answer 9

Zero occurs 2 times; one occurs 1 time; two occurs 2 times.



## Q10: Give your evidence

Why is the variable in the five-tray question a count?



## Answer 10

Each number records whole pencils in one tray. This is not a length.



## Q1: Blank or zero?

A blank spreadsheet cell is the same as an observed zero. Is that safe?



## Answer II

No. Blank can mean missing information, no means  
observed none.



## Q12: Fresh case

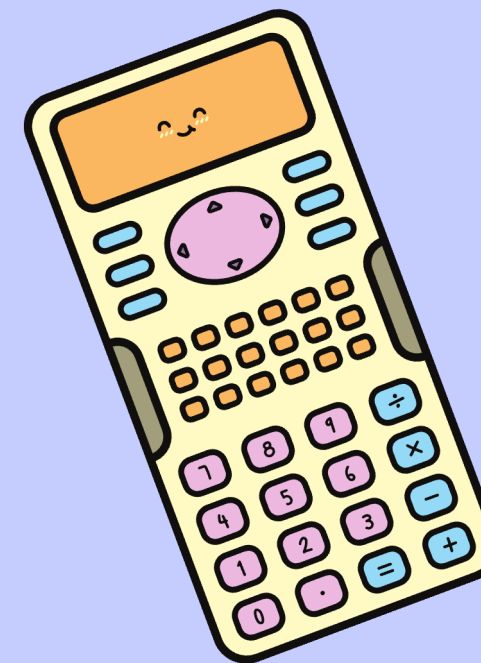
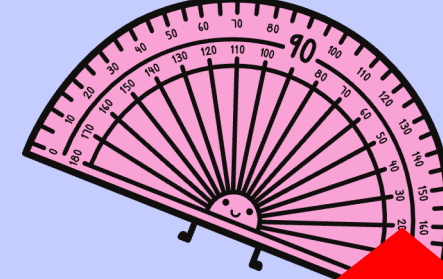
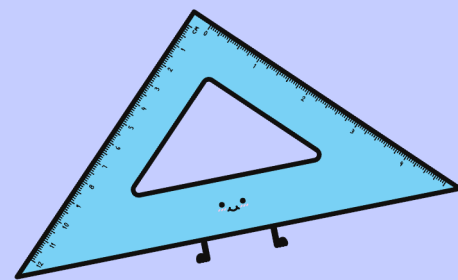
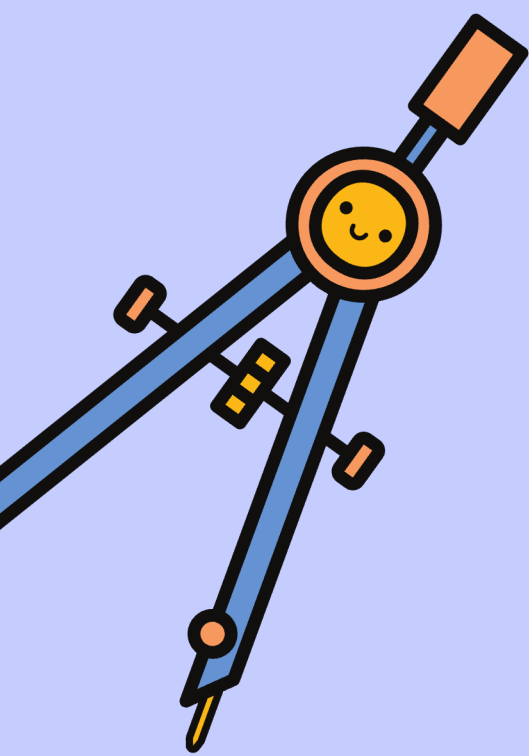
Four desk counts: 1, 0, 1, 2. Make a table and on supported claim.



## Answer 12

$0 \rightarrow 1, 1 \rightarrow 2, 2 \rightarrow 1$ . Two of these four decks have a book.





Well Done  
Keep everything on desk.

