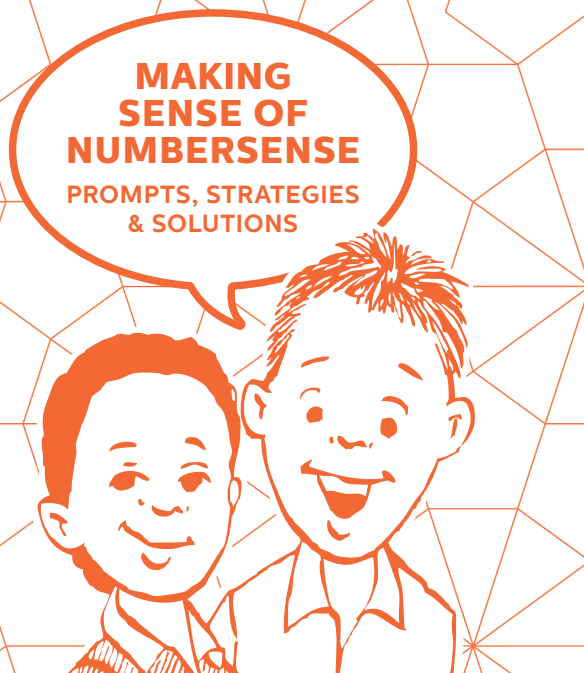
19 NumberSense

COMPREHENSIVE WORKBOOK

English

Teacher Guide

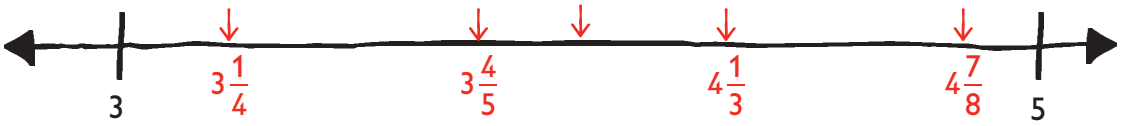


p.20

Compare number lines with your friend. Discuss similarities and differences.

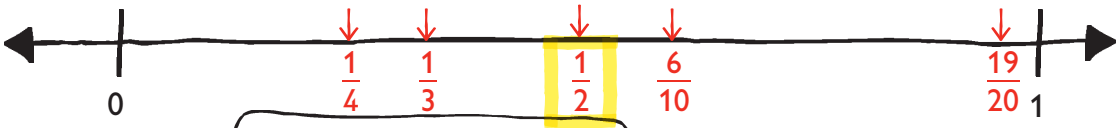
1. Place these numbers on the number line as carefully as you can.

$3\frac{4}{5}$ $3\frac{1}{4}$ $4\frac{7}{8}$ $4\frac{1}{3}$



2. Place these numbers on the number line as carefully as you can.

$\frac{6}{10}$ $\frac{19}{20}$ $\frac{1}{4}$ $\frac{1}{3}$



3. a.

Dan

$\frac{1}{3}$ is smaller than $\frac{1}{4}$ because 3 is less than 4.

Vusi

I disagree. $\frac{1}{4}$ is smaller than $\frac{1}{3}$ because if I cut a pizza into 4 equal pieces, the pieces will be smaller than if I cut it into 3 equal pieces.

Who is correct, Dan or Vusi? Explain.

b.

Dan

In that case twentieths are smaller than tenths and so $\frac{19}{20}$ is smaller than $\frac{6}{10}$.

Vusi

I think you forgot about the number of pieces. $\frac{19}{20}$ is almost 1, because it is $\frac{1}{20}$ less than 1. But $\frac{6}{10}$ is $\frac{4}{10}$ less than 1. So $\frac{19}{20}$ is actually larger.

Who is correct, Dan or Vusi? Explain.

Workbook 13 p.4
Workbook 17 p.27
Workbook 18 p.29

How did you decide which fraction is bigger?

Vusi looks at the number pieces to determine which is closer to a whole/half etc...

How would Vusi decide which fraction is bigger?

4. Which is larger? Explain.

a. $\frac{2}{5}$ or $\frac{4}{7}$

b. $\frac{2}{5}$ or $\frac{2}{7}$

c. $\frac{5}{7}$ or $\frac{7}{9}$

d. $\frac{2}{3}$ or $\frac{5}{6}$

Vusi would think about size of the parts. $\frac{2}{7}$ taken away from the whole. $\frac{2}{9}$ taken away from the whole. Ninths are smaller than sevenths, so $\frac{7}{9} > \frac{5}{9}$

Things to think about

Question 1 and 2

Placing the fractions on a number line could be challenging for some children, despite having had previous experience doing this (Workbook 14 page 5, Workbook 15 page 13, Workbook 17 page 24). To support children with this activity, teachers could:

- Remind them of what they did when they were expected to place whole numbers on the number line.
- Prepare a parallel problem that makes the activity simpler by considering one type of fraction for each number line. Then discuss what would happen if all the fractions were placed on one number line.

a) Approximately, where would you put these numbers on this number line?

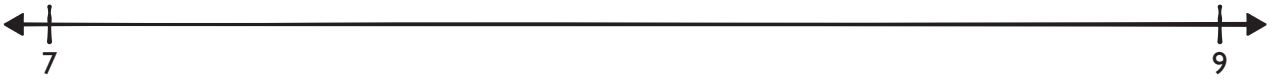
$8 \qquad 8\frac{1}{3} \qquad 7\frac{2}{3}$

b) Approximately, where would you put these numbers on this number line?

$8 \qquad 8\frac{3}{4} \qquad 7\frac{2}{4}$

b) Approximately, where would you put these numbers on this number line?

$8 \qquad 7\frac{2}{6} \qquad 8\frac{5}{6}$



Workbook 18 p.8 & 24

What is the same between the tables and the flow diagrams?

1. a. Complete.

The tables all add 3.

The flow diagrams are all × 3

Input → × 3 → Output

Input	4	5	6	7	8
Output	12	15	18	21	24

(+1 +1 +1 +1 above; +3 +3 +3 +3 below)

What is different

Input → × 3 → − 5 → Output

Input	4	5	6	7	8
Output	7	10	13	16	19

(+1 +1 +1 +1 above; +3 +3 +3 +3 below)

The difference is 5 → 12 − 7, 15 − 10, 18 − 13

Input → − 2 → × 3 → Output

Input	4	5	6	7	8
Output	6	9	12	15	18

(+1 +1 +1 +1 above; +3 +3 +3 +3 below)

What is different

The same pattern (counting in 3's) but starting at a different point.

b. For each of the tables, determine by how much the output number increases if the input number increases by 1.

2. Complete.

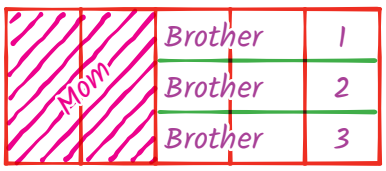
Input	1	2	3	4	5
Output	2	4	6	8	10

(+1 +1 +1 +1 above; — — — — below)

Input → ☐ → Output

3. Three brothers buy a log of stinkwood. They decide to give two-fifths to their mother and to share the remaining log among themselves.
What fraction of the original log does each brother get?
Use a diagram to explain your answer.

Compare your digram with a friend's diagram.



Each brother gets 3 of 15 pieces.
$\frac{3}{5}$ of the original log of stinkwood.

Notes

Workbook 16 p.3

Here we build on the knowledge of decimal fractions.

Another way to write $\frac{1}{10}$ is 0,1

So, $3\frac{3}{10} = 3{,}3$ and $8\frac{1}{5} = 8\frac{2}{10} = 8{,}2$

Another way to write $\frac{1}{100}$ is 0,01

So $\frac{35}{100} = 0{,}35$ and $\frac{75}{100} = 0{,}75$ and $\frac{30}{100} = 0{,}30 = 0{,}3$

Another way to write 0,80 is 0,8

and $0{,}5 = \frac{5}{10}$ or $0{,}5 = 0{,}50 = \frac{50}{100}$

How did we complete the table on page 12?

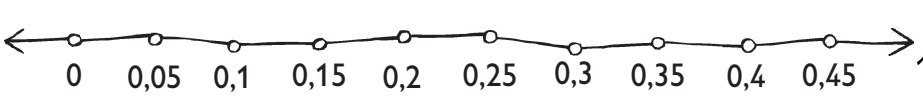
We made sure all our fractions were either tenths or hundredths.

1. Complete.

Common fraction	Decimal fraction	Common fraction	Decimal fraction
$\frac{1}{2}$			0,83
	0,9		0,75
$\frac{1}{5}$		$\frac{4}{5}$	
	0,25	$\frac{28}{100}$	

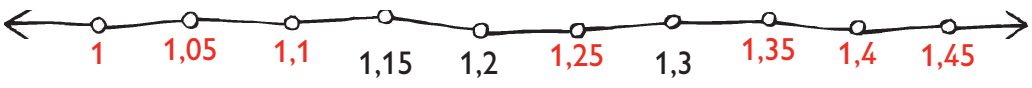
$\frac{30}{100} < \frac{35}{100} < \frac{40}{100}$ so $0{,}3 < 0{,}35 < 0{,}4$

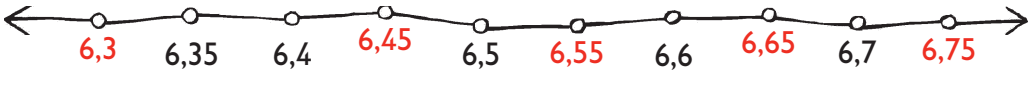
So 0,35 must lie between 0,3 and 0,4 on a number line.



2. Complete.

How are these number lines different (and the same) to the number line on page 16?



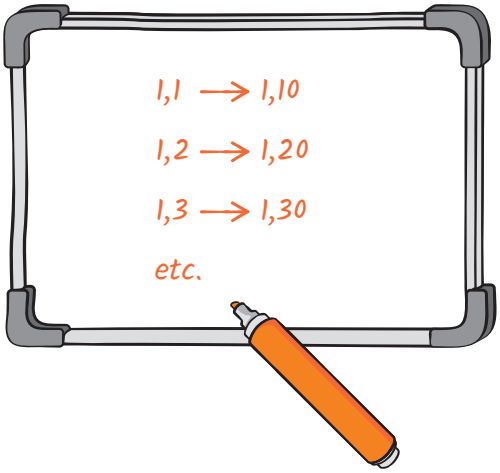


Ideas for teaching

Scaffolding Idea

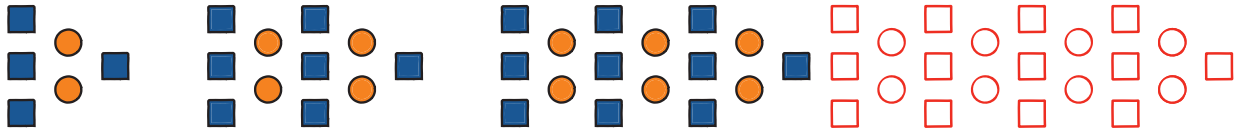
If you have children in your class who are finding decimal fractions to be a challenge try some of these subtle changes to build on their existing knowledge:

- *Using common fractions as a means to bridge their understanding*
- *"adding" a zero to make the pattern more recognisable.*



Workbook 9
p.10

1. Bulani makes pictures with squares and circles like this. The first three pictures make a pattern.



Picture 1 Picture 2 Picture 3 Picture 4

a. Draw the fourth picture in the pattern.

b. Complete.

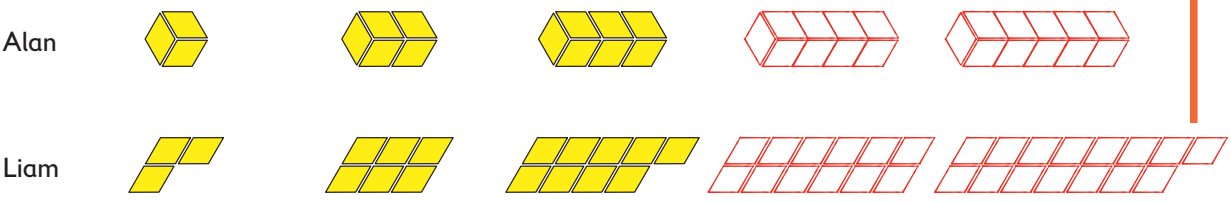
		+1	+1	+1	+4
Picture no.	1	2	3	4	8
No. of circles	2	4	6	8	16
		+2	+2	+2	+8

Picture no. → ×2 → No. of circles

		+1	+1	+1	+4
Picture no.	1	2	3	4	8
No. of squares	4	7	10	13	25
		+3	+3	+3	+12

Picture no. → ×3 → +1 → No. of squares

2. Alan and Liam make pictures with tiles like this  . The first three pictures make a pattern. The patterns start with three tiles in picture 1.



Picture 1 Picture 2 Picture 3 Picture 4 Picture 5

a. Draw the fourth and fifth pictures in each pattern.

b. Select and complete the appropriate flow diagram for the number of tiles in Alan and Liam's patterns. Explain.

Picture no. → ×2 → +1 → No. of tiles

Alan 's pattern.

Picture no. → ×3 → No. of tiles

Liam 's pattern.

Question 1

This page could be considered for an assessment to determine the following:

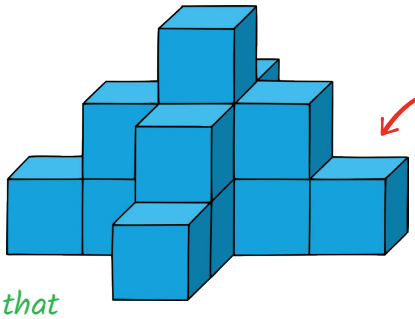
- *Are children able to draw the next picture in the pattern?*
- *Are children able to complete a table that represents the picture pattern?*
- *Are children able to determine the flow diagram that represents the picture pattern?*

	0	1	2	Total
Question 1 a	Cannot draw the next picture in a pattern.	Can draw the next picture for some but not all the patterns.	Can draw the next picture in all the patterns.	2
Question 1 b	Cannot complete the tables that represent a picture pattern.	Can partially complete the tables that represent a picture pattern.	Can complete the tables that represent all the picture patterns.	2
Question 1 b	Cannot determine the flow diagram that represents the picture pattern.	Can determine the flow diagram that represents some but not all the picture patterns.	Can determine the flow diagram that represents all the picture patterns.	2
Question 2 a	Cannot draw the next picture in a pattern.	Can draw the next picture for some but not all the patterns.	Can draw the next picture in all the patterns.	2
Question 2 b	Cannot complete the tables that represent a picture pattern.	Can partially complete the tables that represent a picture pattern.	Can complete the tables that represent all the picture patterns.	2
Question 2 b	Cannot determine the flow diagram that represents the picture pattern.	Can determine the flow diagram that represents some but not all the picture patterns.	Can determine the flow diagram that represents all the picture patterns.	2

[12]

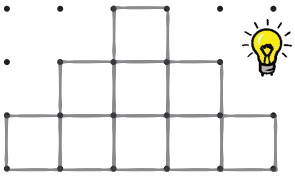
Practical activity. Prepare your resources.

1. a. Use cubes to build this object.

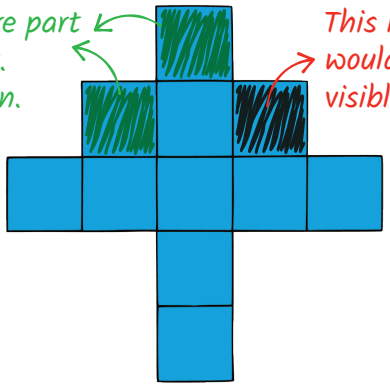


b. How many cubes did you use? 14

c. Draw a sketch of the front view of this object.



It is possible that these blocks are part of these object. They are hidden.



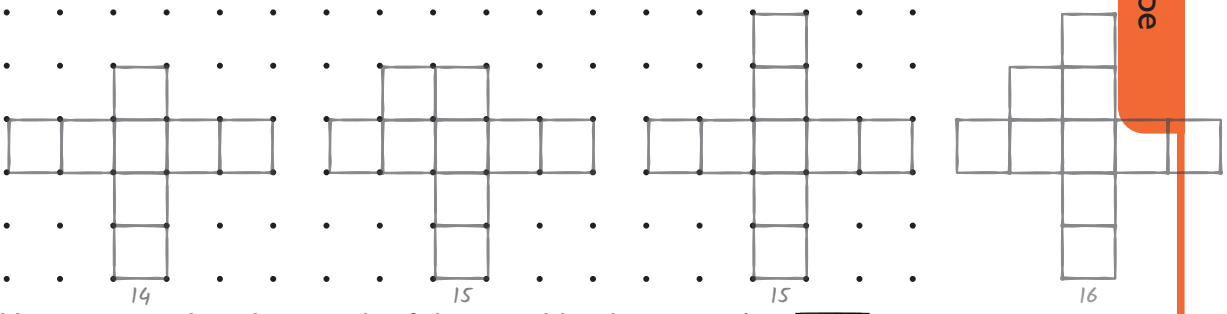
This block would be visible.

d. Ronewa drew this top view of the object.

Is Ronewa correct? Discuss.

No

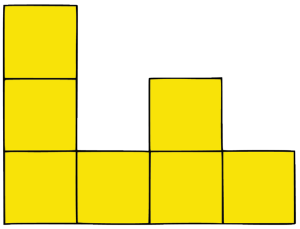
e. Draw sketches of all the different possible top views of the object.



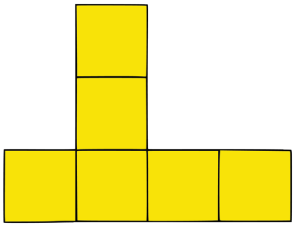
f. How many cubes does each of the possible objects use?

14; 15; 15 and 16

2. Investigate how many different objects you can build with these views.



Front view

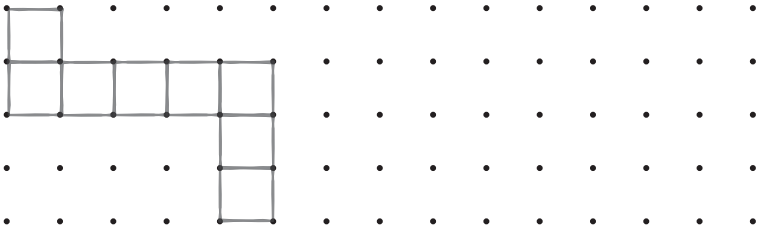


Left view

a. Either sketch the objects or stick in pictures of them.

b. Describe how you determined all the different objects that you built.

c. Draw the top view of each object that you built.



Things to think about

What we want children to notice

The questions on this page are deliberate and guide the children's attention towards cubes that are not visible from certain views or perspectives.

Question 1

The least number of cubes needed to build this object is 14. However, we must consider the fact that there are possible hidden cubes that cannot be seen from this angle. This unknown element opens the door for rich discussion and discovery.

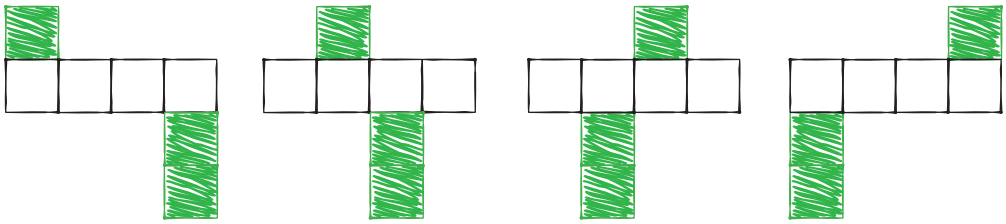
- What is the least number of cubes needed to build this object?
- What is the most number of cubes needed to build this object?
- How many 'hidden' cubes does your object have? Compare it with the person sitting next to you.

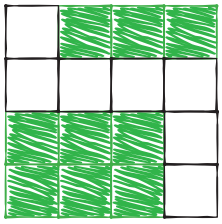
Question 2

In the same way that the children must think about the possible hidden cubes in question 1, here they must also realize that knowing only the left and front view of an object is not enough information to reach a conclusion on what the object looks like in reality. More information is needed to make a final judgment. In this case the minimum number of cubes that can be used to build these views is 10. The maximum number of cubes will be 19. The discussion should centre around the possible hidden cubes, the different positions they will be placed and the top views of the objects.

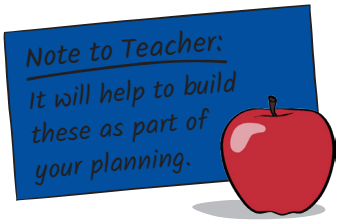
These possibilities and all their combinations work.

If I move these blocks; the front and left views are not impacted.





If I add bocks to the bottom layer, the front and side views will stay the same.

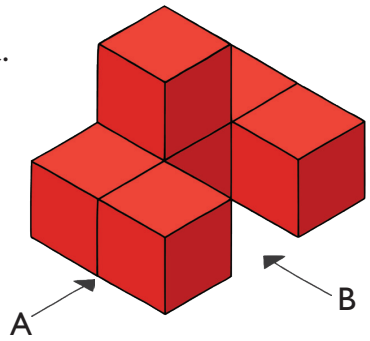


- What is the least number of cubes needed to build an object with these front and left views?
- What is the most number of cubes needed to build an object with these front and left views?
- Choose two of your top views and draw the objects in perspective view.

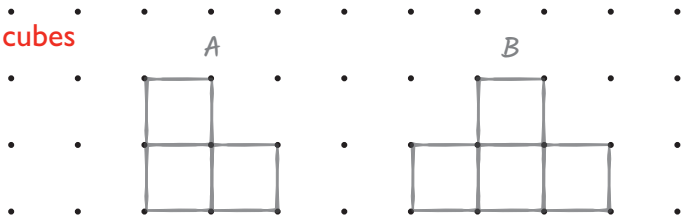
Practical activity. Prepare your resources.

1. For each structure:
   - Use cubes to build the object, and record how many cubes you used.
   - Draw the view of the object from position A. Use the grid to help you.
   - Draw the view of the object from position B. Use the grid to help you.
   - Draw the top view of the object. Use the grid to help you.

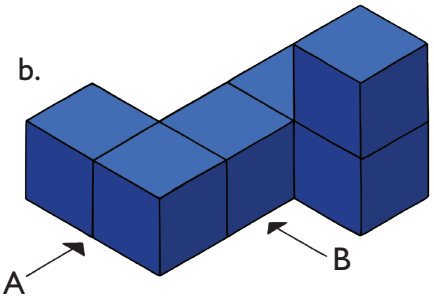
a.



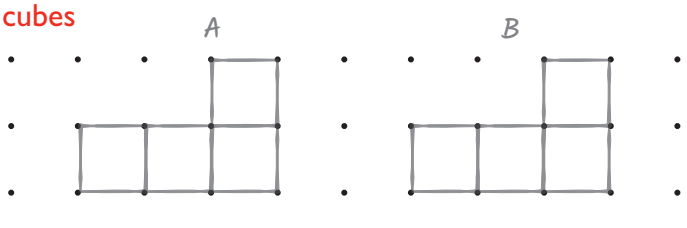
6 cubes



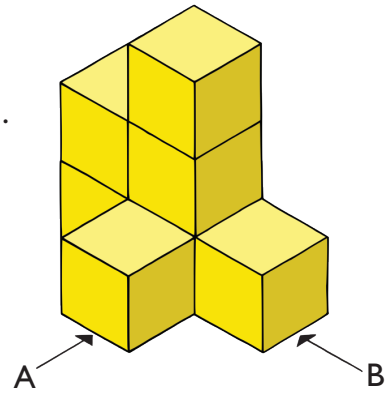
b.



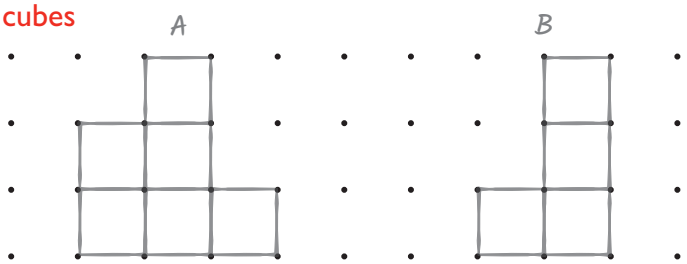
6 cubes



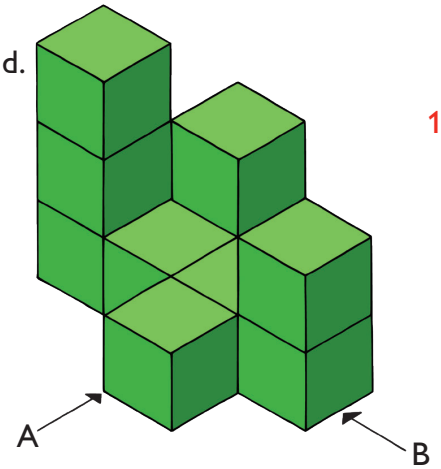
c.



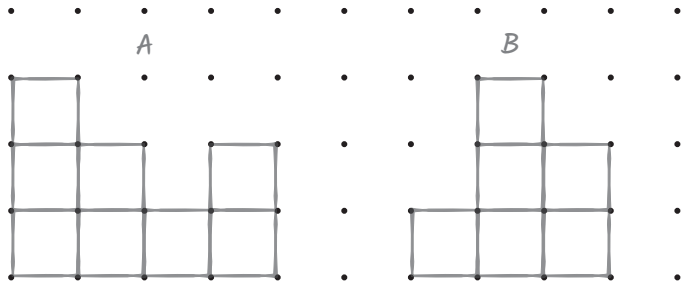
7 cubes



d.

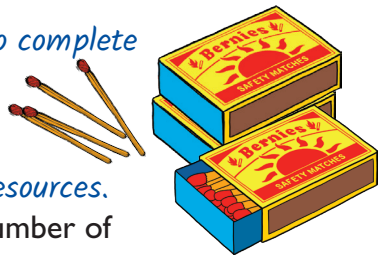


10 cubes



Objects (c) and (d) have cubes that may not be visible. Allow opportunity for discussion and justification. Asking the children to also draw their top views will aid this discussion.

Pages 48 - 50 form a unit. Teachers might want to complete these 3 pages over the course of 1 - 2 days.



For this activity you will need 10 new boxes of matches.

Practical activity. Prepare your resources.

1. For each matchbox, empty the box and count the number of matches in the box. For each box, record the number of matches in the table.

Box	1	2	3	4	5	6	7	8	9	10
No. of matches										

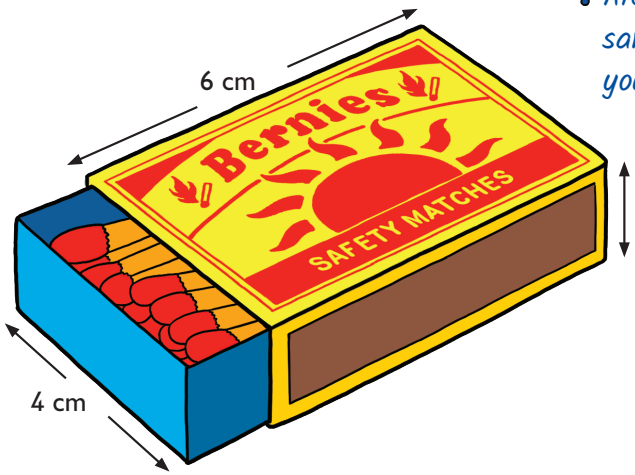
Based on the table of values, what number best represents the number of matches in a box? We will refer to this as the number of matches in a matchbox.

2. For each box, add extra matches to the box so that the box cannot hold any more matches. For each box, record the total number of matches in the table.

Box	1	2	3	4	5	6	7	8	9	10
No. of matches										

Based on the table of values, what number best represents the number of matches that a box could hold, when full? We will refer to this as the capacity of a matchbox.

For the rest of this activity the dimensions of a matchbox will be.



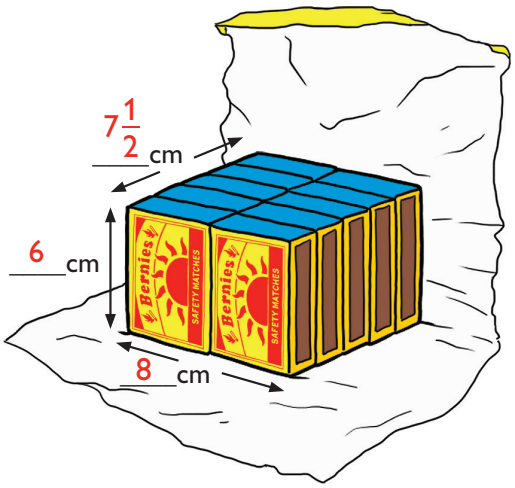
? Are these dimensions the same as the dimensions of your matchbox? If not, what are the dimensions of your box.

NOTE: *These dimensions may be different from the matchbox that you used.*

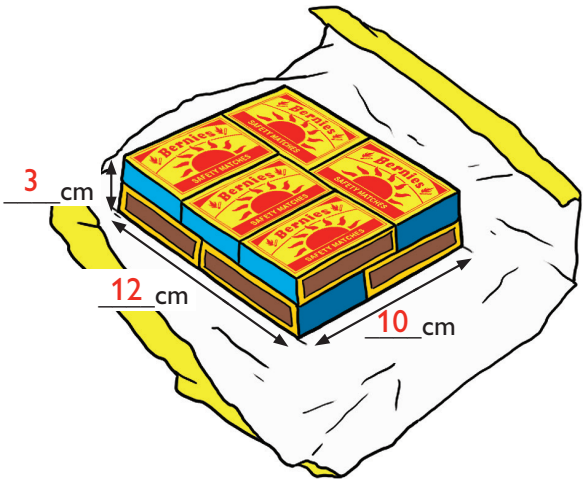
Continued from p.48

3. Matchboxes are typically wrapped in packs of 10 boxes. There are two different ways in which this can be done:

Pack 1

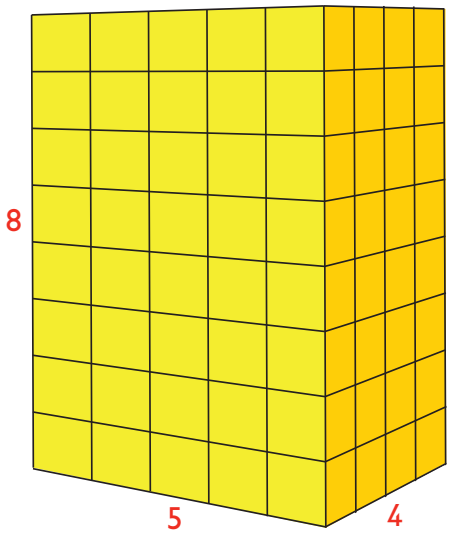


Pack 2



Add the dimensions of the packs of boxes to the two diagrams.

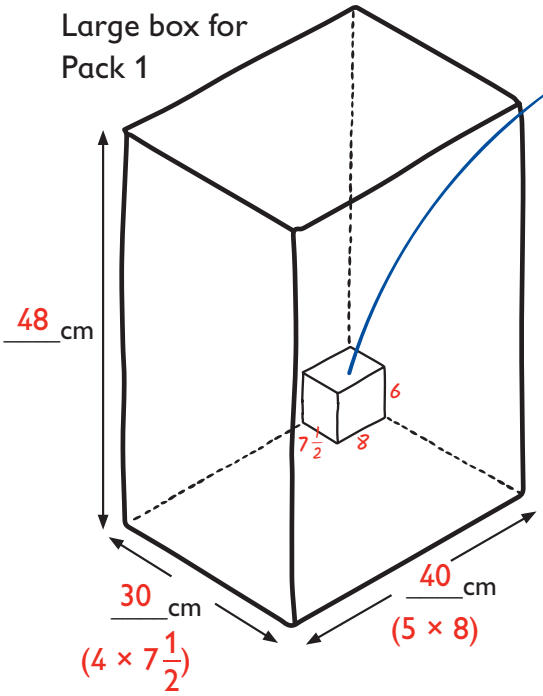
Packs are typically transported in large boxes with 200 packs per box as shown:



Continued from p.49

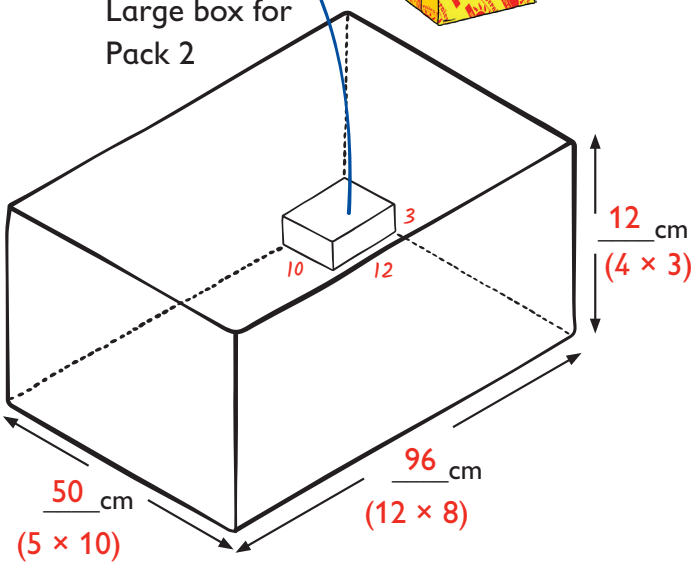
4. For each of the packs in Question 3, determine the dimensions of the large box that holds 200 packs and add these to the diagrams.

Large box for Pack 1



? *Do you think it will make a difference to the calculations if the box is "turned" in a different position?*

Large box for Pack 2



5. How many matchboxes are there in each large box?

Pack 1: 10 × 200
= 2 000 matchboxes

Pack 2: 10 × 200
= 2 000 matchboxes

6. Based on your findings in questions 1 and 2 determine:

   a. The typical number of matches in each large box.

   b. The typical capacity of matches in each large box.

7. As best as possible, try to express the actual number of matches in a large box as a fraction of the capacity of the large box.

Questions 6 and 7 are dependent on the quantities in questions 1 and 2.