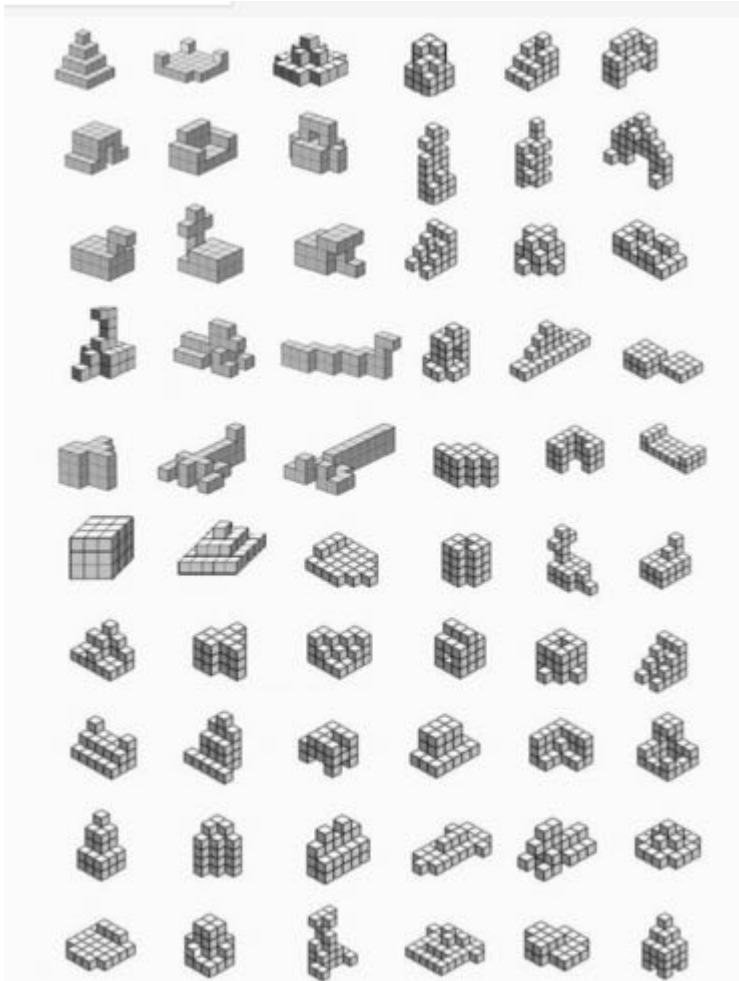


SOMA CUBE



The picture shows the 7 pieces of the Soma Cube Puzzle. They are made from cubes glued together. Contrasting colours make the puzzle easier to solve as the aim is to assemble the pieces to give a checkerboard effect.



If you make your own puzzle then you can enjoy solving many more challenges.

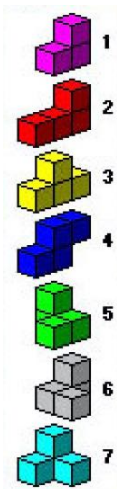
HELP



You will find it helpful to number the pieces so that you can make your own notes about how to solve the puzzles.

Other than the cube itself the chequerboard pattern is not important and you may prefer to use a set in which the pieces are all the same colour.

You could use the following notation so that you can share ideas with others.



There are 4 planar pieces which we name after letters of the alphabet and the number of small cubes in them:

1. L3
2. L4
3. T4
4. Z4

There are pieces that we imagine as three little people (2-level pieces).

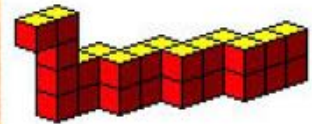
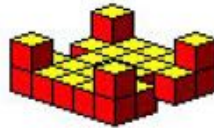
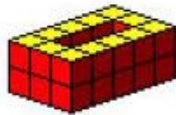
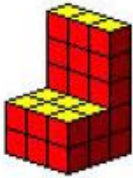
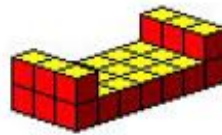
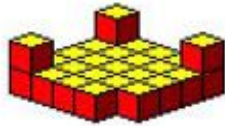
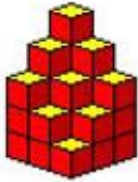
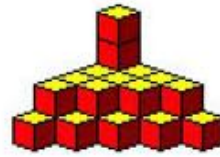
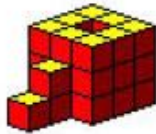
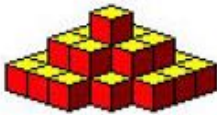
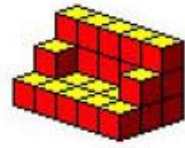
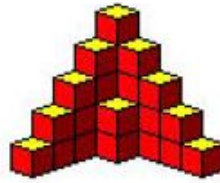
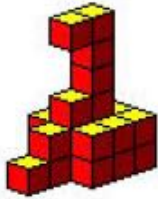
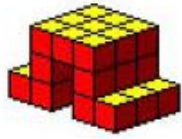
When facing you they point West and East and reach out with both arms to give you a hug.

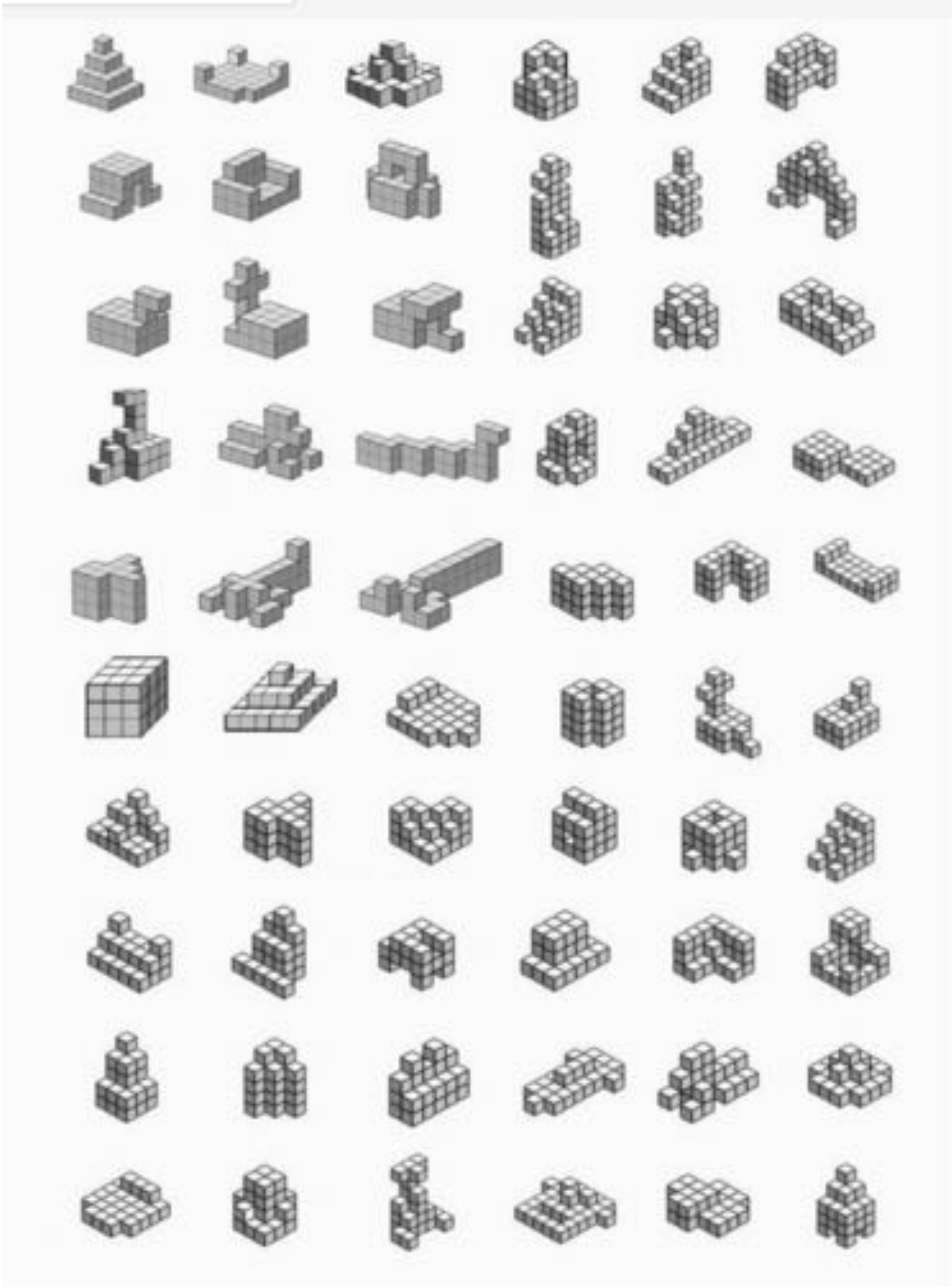
5. West
6. East
7. Hug

If you get to recognise the 7 pieces, and become familiar with their names and properties, it will help you to work systematically to solve the puzzles.

NEXT

More challenges.





NOTES FOR TEACHERS

DIAGNOSTIC ASSESSMENT This should take about 10 minutes.

Write the question on the board, say to the class:

“Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 for D”.

1. Notice how the learners respond. Ask a learner who gave answer A to explain why he or she gave that answer. DO NOT say whether it is right or wrong but simply thank the learner for giving the answer.
2. It is important for learners to explain the reasons for their answers. Putting thoughts into words may help them to gain better understanding and improve their communication skills.
3. Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.
4. Ask the class to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers.
5. If the concept is needed for the lesson to follow, explain the right answer or give a remedial task.

The correct answers are:


Front elevation: C

Plan elevation: A

Right-side elevation: B

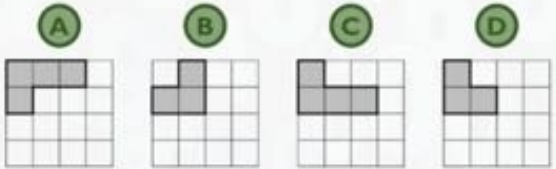
Plans and Elevations

Which is the correct front elevation for the solid?




Front

(A) (B) (C) (D)



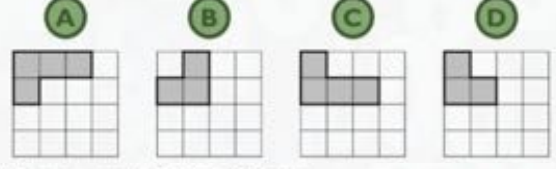
Plans and Elevations

Which is the correct plan view for the solid?




Front

(A) (B) (C) (D)



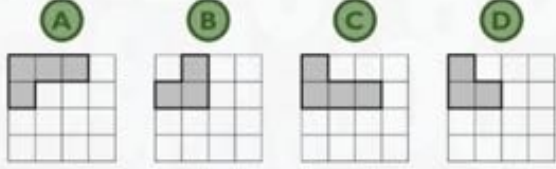
Plans and Elevations

Which is the correct right-side elevation for the solid?

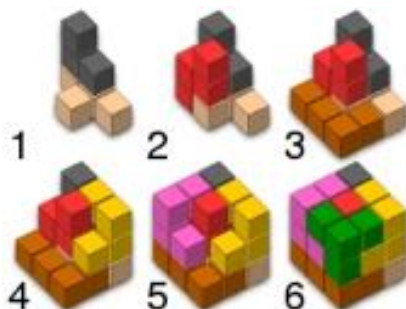


Front

(A) (B) (C) (D)



SOLUTION



Why do this activity?

Visual perception of 3D objects is an important life-skill and this puzzle enables learners to develop that skill in an enjoyable way. For example engineers and architects use this skill in all their work.

In addition, if learners are encouraged to develop their own methods of recording how to put the pieces together to solve the various puzzles, and also to discuss methods of recording those solutions, they will develop another very important skill that is fundamentally important in mathematics and in life. Recording is important because it is a method of communication of your ideas to other people. This is crucially important in design, craft work and interpreting manuals of instructions.

Learning objectives

In doing this activity students will have an opportunity to:

- develop the skill of visualization;
- learn properties of 3D shapes.








Generic competences

In doing this activity students will have an opportunity to:

- **think flexibly**, be creative and innovative and apply knowledge and skills;
- develop the **skill of visualization**;
- develop the **skill of working systematically** to solve a problem;
- **develop the skill of communicating ideas** relating to 3D design.

Suggestions for teaching

Each learner needs their own puzzle pieces, but they could work in pairs to develop a system for recording instructions for the solutions. You could agree on the following notation so that the class can share their ideas.

	1	There are 4 planar pieces which we call after letters of the alphabet and the number of cubes in them:
	2	
	3	
	4	
	5	There are three little people 2-level pieces, pointing West and East when facing you, and reaching out with both arms to give you a hug.
	6	
	7	

When one of the pairs has developed a method of recording a solution to the cube-puzzle, or to one of the other puzzles, they could present and explain their method to the rest of the class. They should invite suggestions from their classmates that might help them to improve their method of recording and communicating their ideas.

Key questions

- How many little cubes are there in that puzzle piece?
- Which puzzle pieces have all the cubes in one plane (planar)?
- Which puzzle pieces have cubes in two planes (non-planar)?
- How many small cubes are there altogether?
- How many small cubes should there be on the bottom layer?
- How many small cubes should there be on the 2nd layer up?
- How many small cubes should there be on the 3rd layer up?
- How many layers are there in that construction?

Follow up

How do you see it? <https://aiminghigh.aimssec.ac.za/years-4-to-9-how-do-you-see-it/>

Three views <https://aiminghigh.aimssec.ac.za/years-4-8-three-views/>

Painted cube <https://aiminghigh.aimssec.ac.za/grades-7-to-10-painted-cube/>

Viewing cubes <https://aiminghigh.aimssec.ac.za/years-4-6-viewing-cubes/>

Viewing cubes again

<https://aiminghigh.aimssec.ac.za/years-4-6-viewing-cubes-again/>

Go to the **AIMSSEC AIMING HIGH** website for lesson ideas, solutions and curriculum



links: <http://aiminghigh.aimssec.ac.za>

Subscribe to the **MATHS TOYS YouTube Channel**

<https://www.youtube.com/c/mathstoys>

Download the whole AIMSSEC collection of resources to use offline with the **AIMSSEC App** see <https://aimssec.app> or find it on Google Play.

Note: The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and school years up to Secondary 5 in East Africa.

New material will be added for Secondary 6.

For resources for teaching A level mathematics (Years 12 and 13) see <https://nrich.maths.org/12339>

Mathematics taught in Year 13 (UK) & Secondary 6 (East Africa) is beyond the SA CAPS curriculum for Grade 12

	Lower Primary Approx. Age 5 to 8	Upper Primary Age 8 to 11	Lower Secondary Age 11 to 15	Upper Secondary Age 15+
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
East Africa	Nursery and Primary 1 to 3	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6
USA	Kindergarten and G1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
UK	Reception and Years 1 to 3	Years 4 to 6	Years 7 to 9	Years 10 to 13