Moonlit Garden

Spatial thinking, at your own pace



Six guided activities for adults

Look carefully. Draw your ideas. Talk through a solution.

- Reflection & symmetry
- Find a hidden shape
- Same shape or mirror?
- Unfold the paper
- See another view
- Follow the route

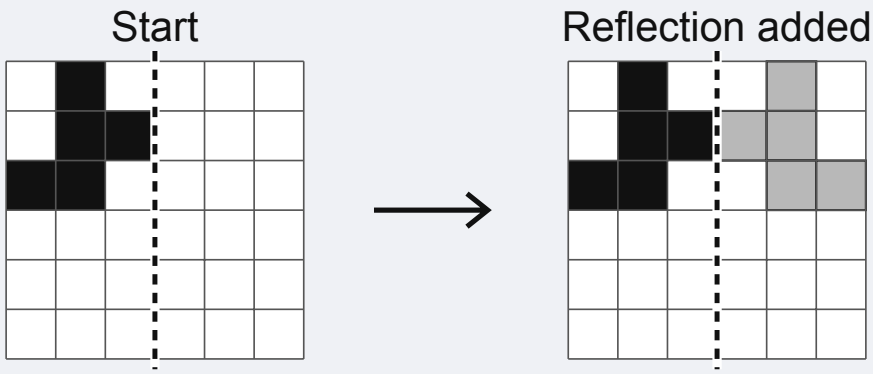
Choose a few activities. There is no timer.

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Complete the reflection

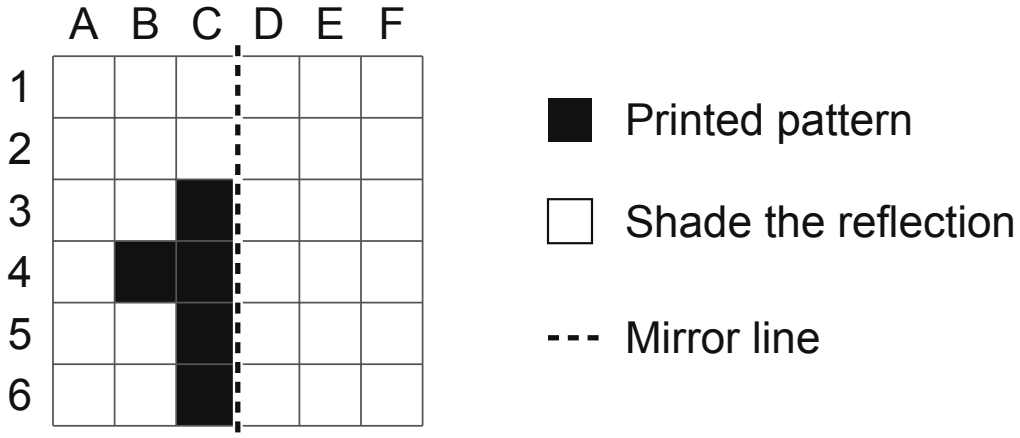
For each black box, shade its mirror position across the dotted line. Keep both boxes the same distance from the line.

Worked example



Keep each square in the same row, equally far from the mirror line.

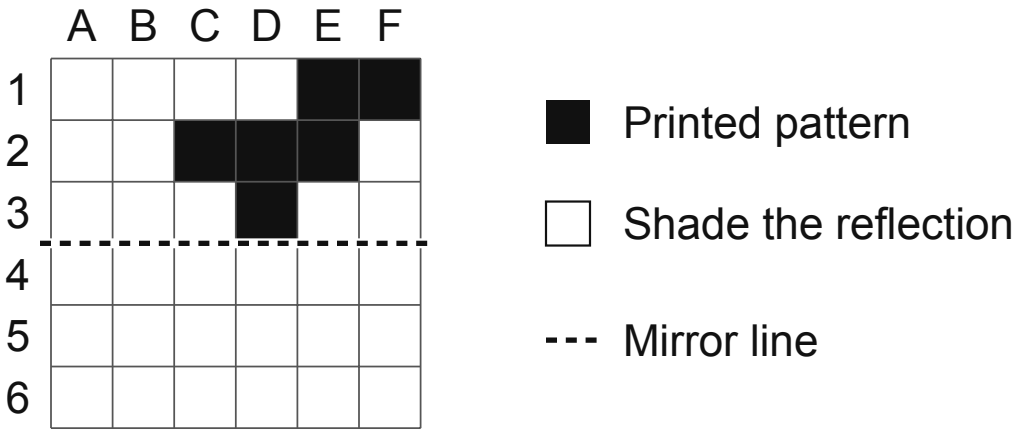
1. Complete the left-to-right reflection.



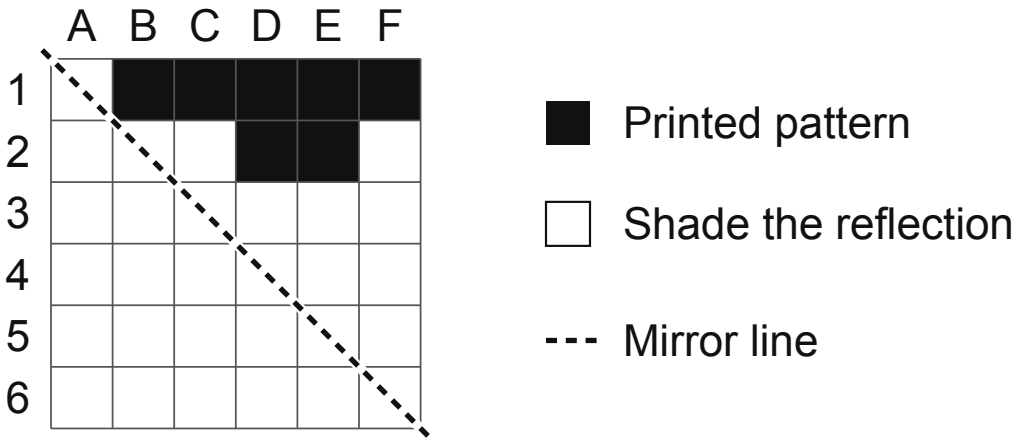
Complete the reflection

For each black box, shade its mirror position across the dotted line. Keep both boxes the same distance from the line.

2. Complete the top-to-bottom reflection.



3. Optional challenge: Complete the diagonal reflection.



Find the hidden shape

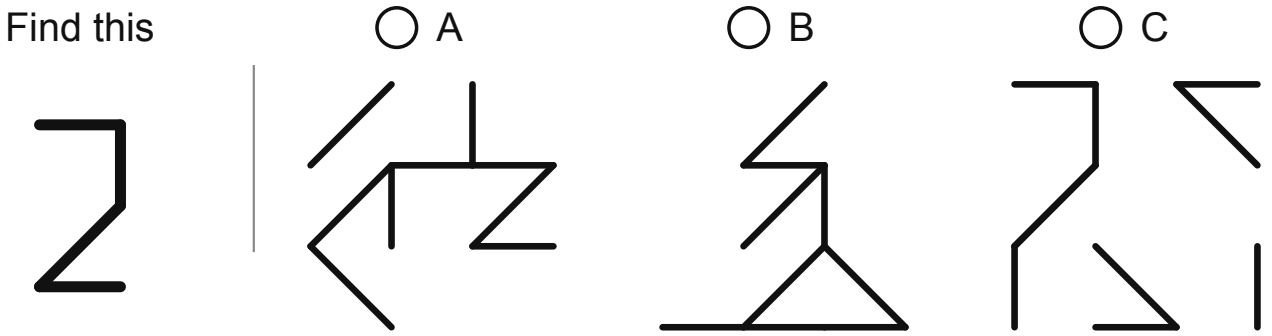
Circle A, B or C. Find the whole target without changing its size, turning it or flipping it. Extra lines may cross it.

Worked example



B contains the whole target at the same size and angle. Extra lines may cross or join it.

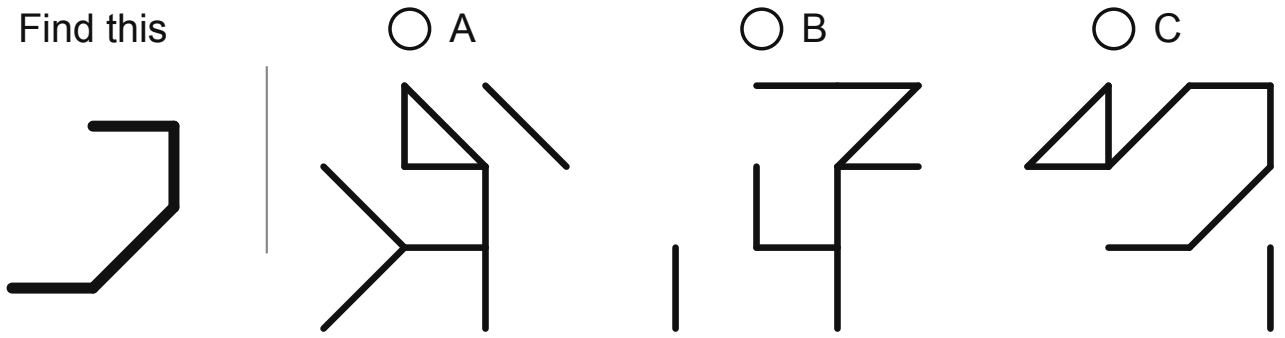
1. Circle A, B or C.



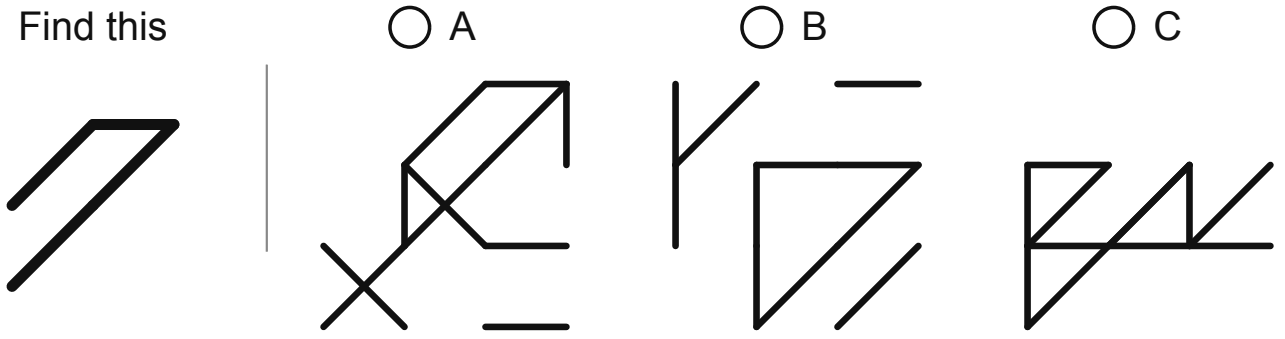
Find the hidden shape

Circle A, B or C. Find the whole target without changing its size, turning it or flipping it. Extra lines may cross it.

2. Circle A, B or C.



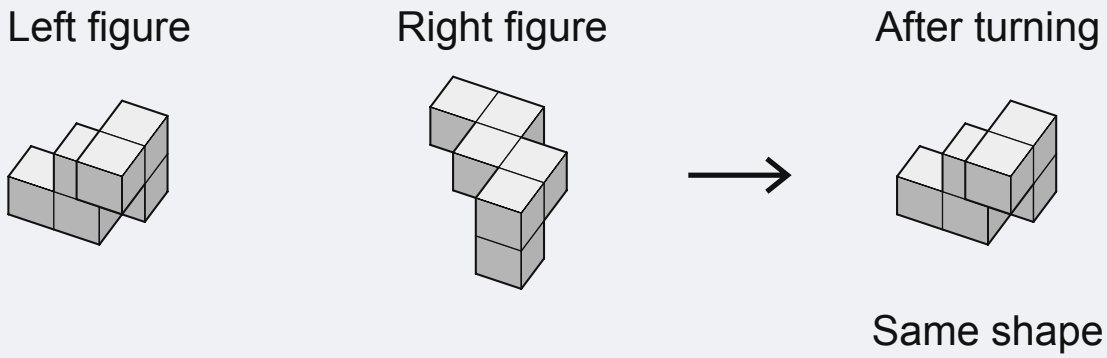
3. Optional challenge: Circle A, B or C.



Turn it in your mind

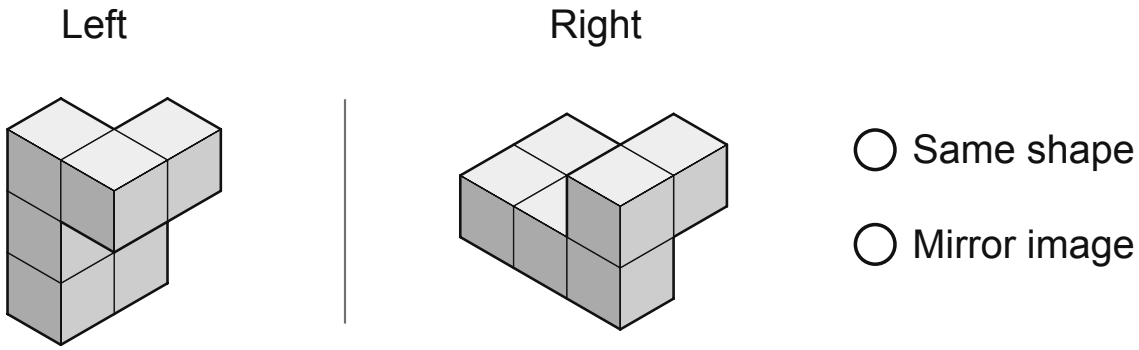
Imagine turning or tipping the whole right figure. Circle Same shape if every cube could match. Otherwise, circle Mirror image.

Worked example



Turning the right figure makes every cube line up with the left figure.

1. Could a turn make these the same shape?

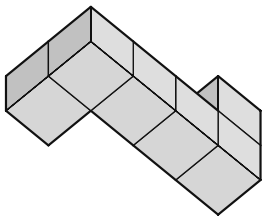


Turn it in your mind

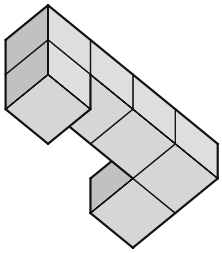
Imagine turning or tipping the whole right figure. Circle Same shape if every cube could match. Otherwise, circle Mirror image.

2. Could a turn make these the same shape?

Left



Right

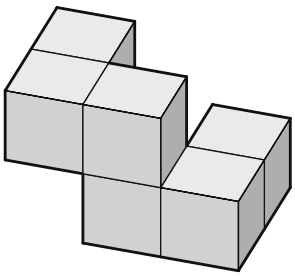


◯ Same shape

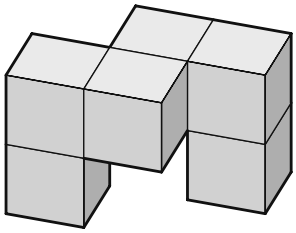
◯ Mirror image

3. Optional practice: Could a turn make these the same shape?

Left



Right



◯ Same shape

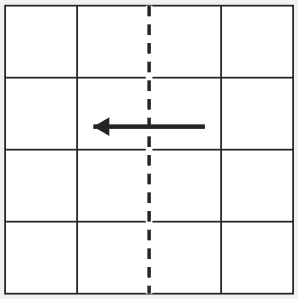
◯ Mirror image

Open the folded paper

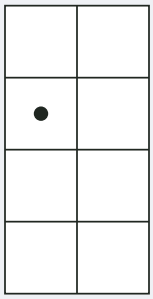
Imagine folding in the numbered order, then punching through every layer at the dot. Unfold the sheet and mark every hole.

Worked example

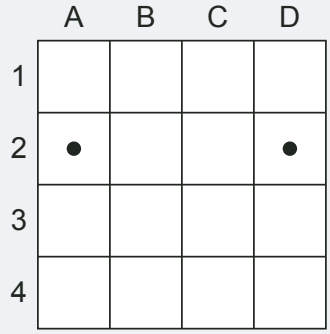
1. Fold right half to left



2. Punch once Through all layers



Open the sheet Answer

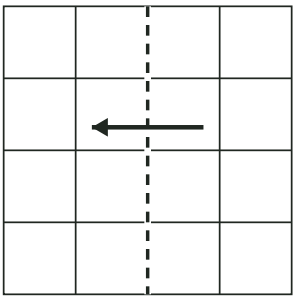


Fold line

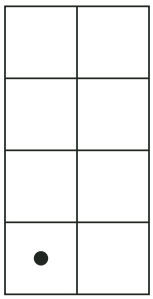
Opening the fold makes a mirror hole on the other side of the crease.

1. Mark every hole on the opened sheet.

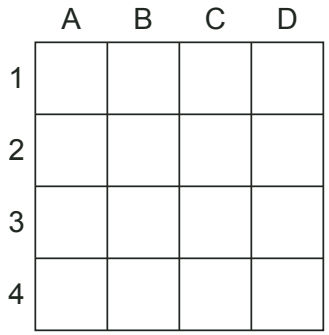
1. Fold right half to left



2. Punch once Through all layers



Open the sheet Mark every hole

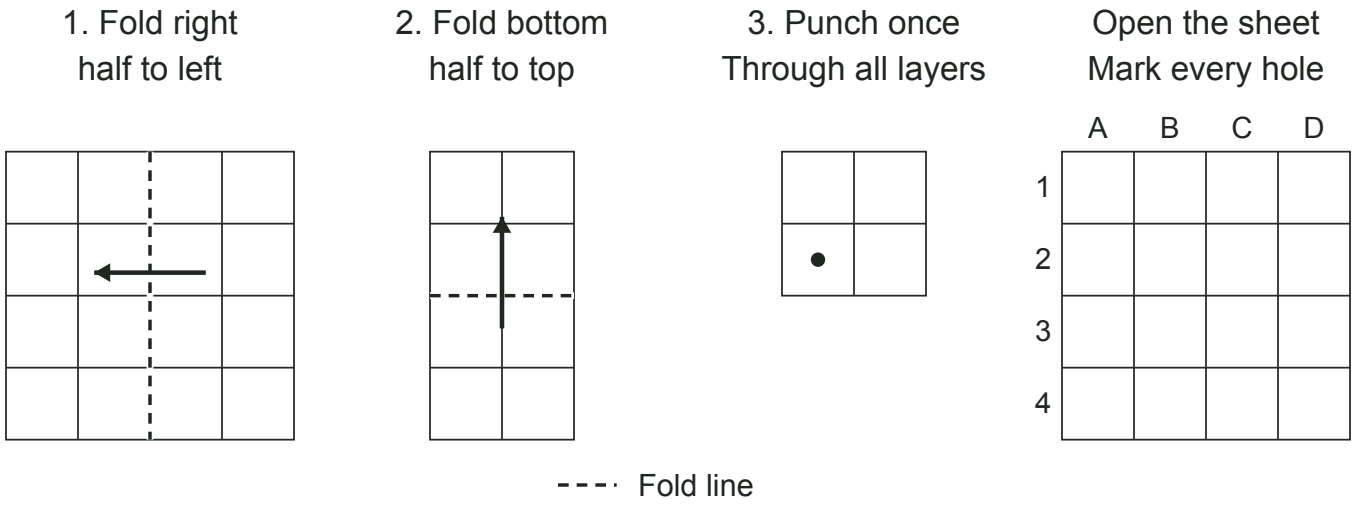


Fold line

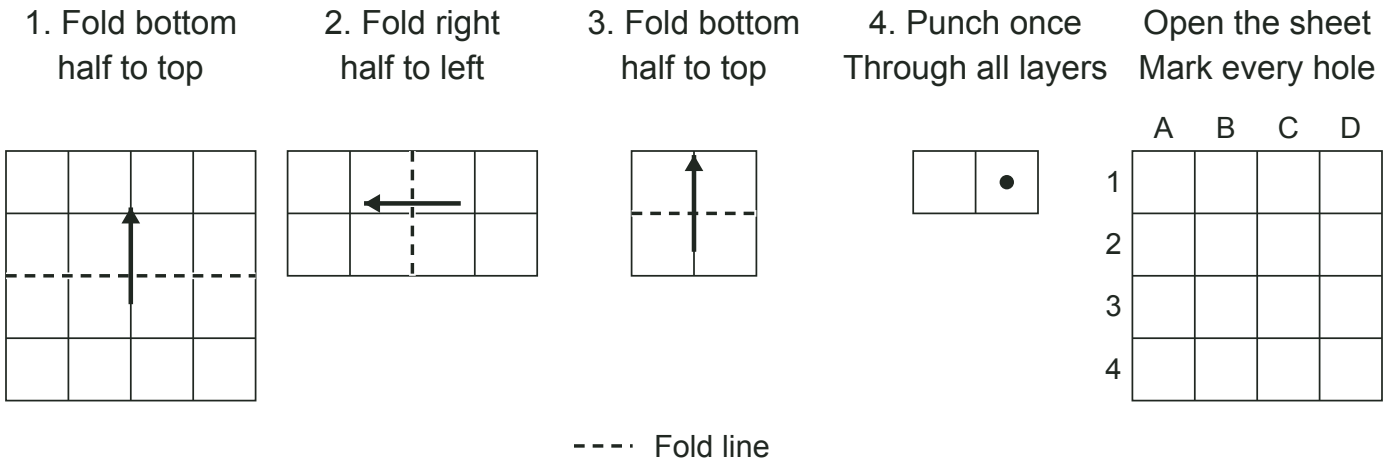
Open the folded paper

Imagine folding in the numbered order, then punching through every layer at the dot. Unfold the sheet and mark every hole.

2. Mark every hole on the opened sheet.



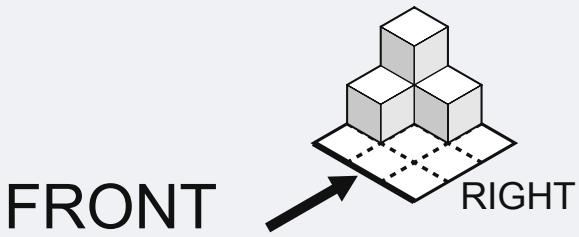
3. Optional challenge: Mark every hole on the opened sheet.



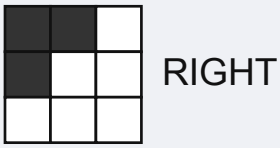
See another view

A view is a flat picture from one direction. Shade the boxes the cubes cover. Leave empty places white.

Worked example



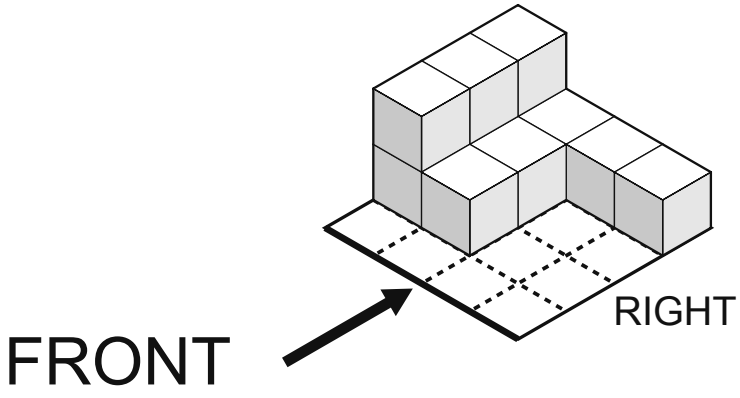
Answer: top view



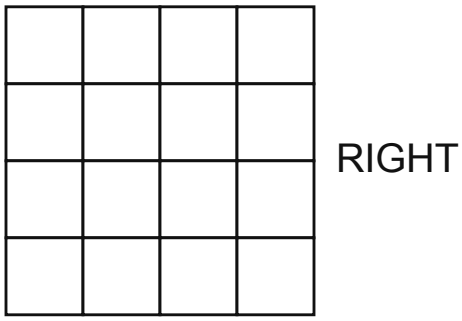
FRONT

From above, shade one box for each stack, whatever its height.

1. Shade the top view. Keep FRONT at the bottom.



Shade: top view

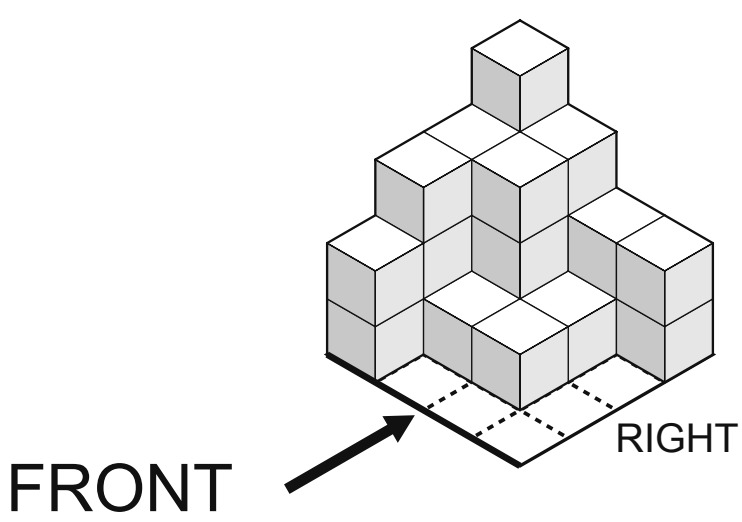


FRONT

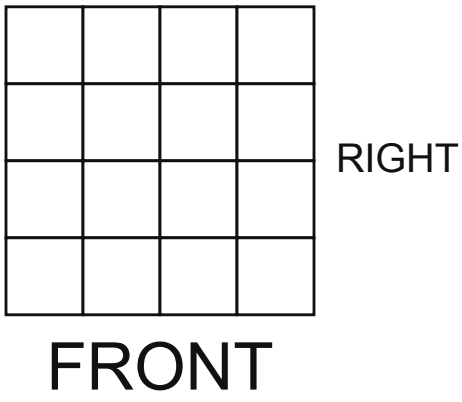
See another view

Check the viewing direction before you shade each grid.

2. Shade the top view. Keep FRONT at the bottom.

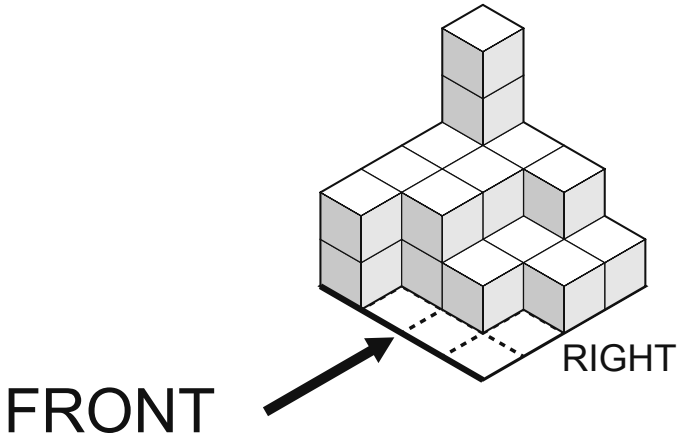


Shade: top view

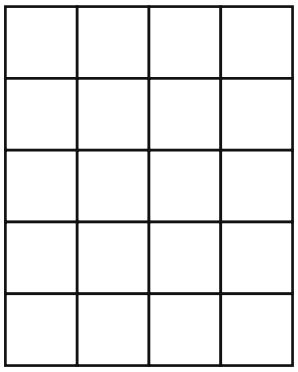


3. Optional: Look along the FRONT arrow. Shade the front view.

Look straight at the model. For each column, shade from the ground up to the tallest stack behind it.



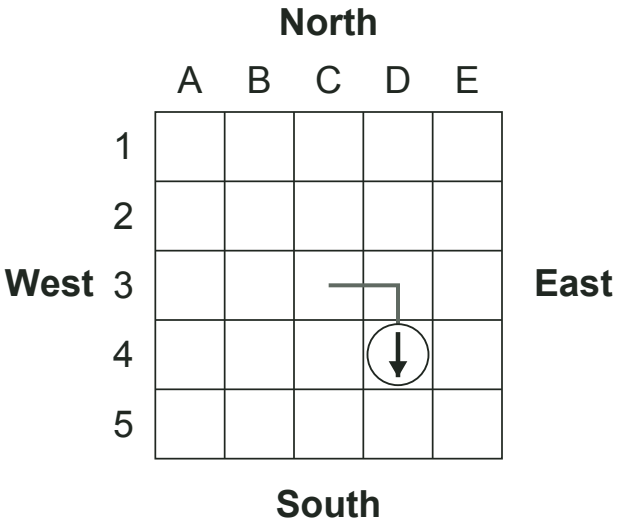
Shade: front view



Follow the route

Move forward in the direction you are looking.
Turn left or right by a quarter turn (90 degrees), without moving.
Imagine you are standing on the map when you turn.
C3 means column C, row 3.

Example: Start at C3. Look east.

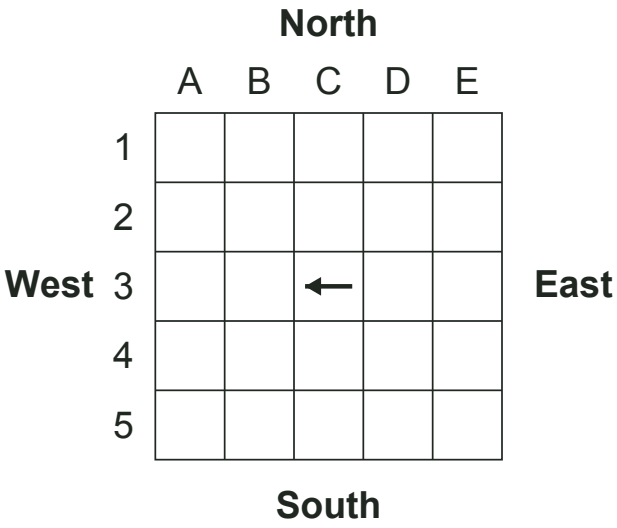


1. Move forward 1 box.
2. Turn right.
3. Move forward 1 box.

You finish at D4.

You are looking south.

1. Start at C3. Look west.



1. Move forward 1 box.
2. Turn right.
3. Move forward 2 boxes.
4. Turn right.

Where did you finish? _____ Write the letter and number.

Which direction are you looking? Circle one.

◯ North ◯ East ◯ South ◯ West

Follow the route

Start at C3 each time. Move forward in the direction you look.
Turn left or right by a quarter turn, without moving.

2. Start at C3. Look north.

North

	A	B	C	D	E
1					
2					
West 3			↑		
4					
5					

East

South

1. Turn left.
2. Move forward 2 boxes.
3. Turn left.
4. Move forward 1 box.
5. Turn left.
6. Move forward 3 boxes.

Where did you finish? _____ Write the letter and number.

Which direction are you looking? Circle one.

◯ North ◯ East ◯ South ◯ West

3. Optional: Start at C3. Look east.

North

	A	B	C	D	E
1					
2					
West 3			→		
4					
5					

East

South

1. Move forward 2 boxes.
2. Turn left.
3. Move forward 2 boxes.
4. Turn left.
5. Move forward 3 boxes.
6. Turn left.
7. Move forward 1 box.

Where did you finish? _____ Write the letter and number.

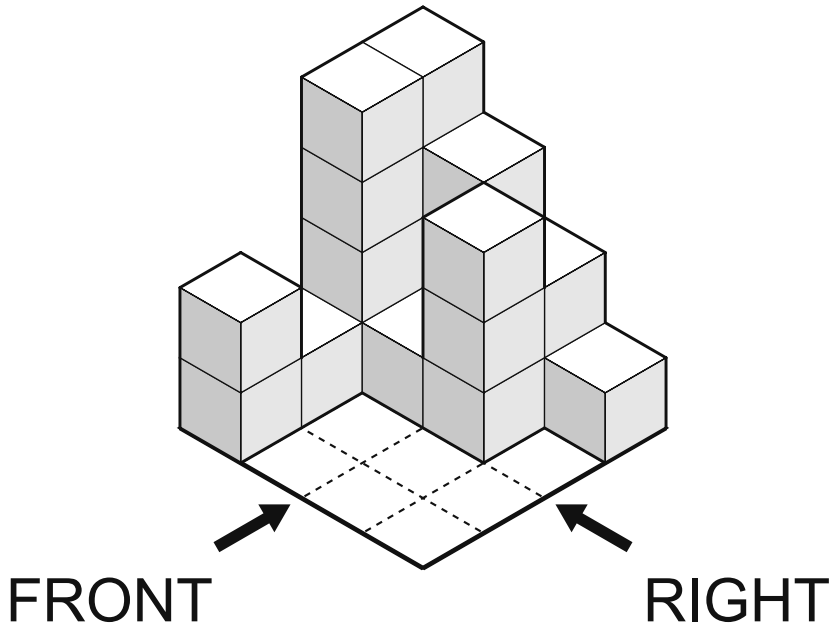
Which direction are you looking? Circle one.

◯ North ◯ East ◯ South ◯ West

1. Turn the stack

Optional. Turn the upright model a quarter turn so RIGHT becomes FRONT.

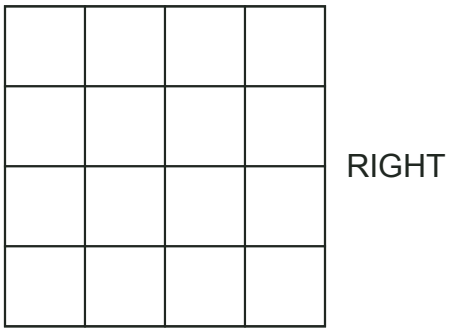
Keep the base flat and the page still. Shade the new top and front views.



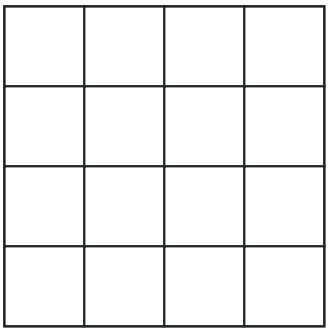
Reading the views

From above, shade one square per stack. From the front or right, shade up from the ground to the tallest stack along each line of sight.

New top view



New front view



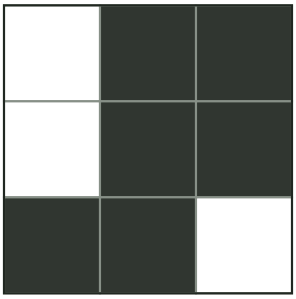
2. Find the missing view

Optional. The model has exactly 18 cubes, stacked from the ground with no gaps.

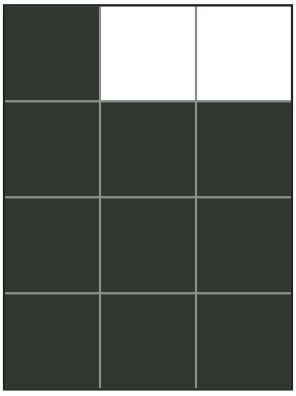
In the top view, shaded boxes contain stacks. White boxes are empty.

Use both views to shade how the model looks from the right.

Top view

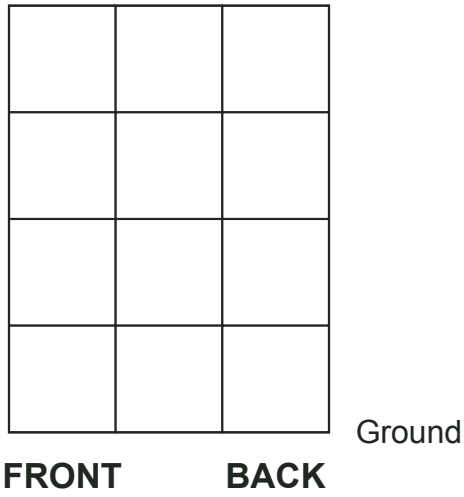


Front view



A side view shows the tallest stack along each line of sight.
Read the right view from FRONT at the left to BACK at the right.

Right view



Explain your answer

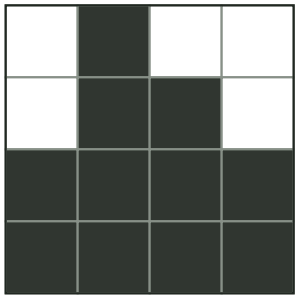
How did you use the 18-cube total?

3. Use the fewest and most cubes

Optional. Make two models on a 4 by 4 base with these front and right views.
Every stack starts on the ground, with no gaps. Spaces may be empty.
Stacks may stand apart. Find the fewest cubes possible, then the most.

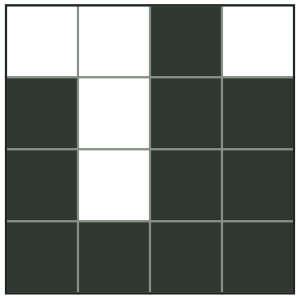
Use the tallest stack in each line of sight. Read the right view FRONT to BACK.

Given front view



GROUND

Given right view

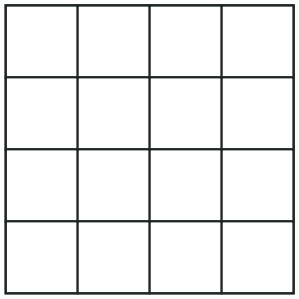


Ground

FRONT **BACK**

Write the number of cubes in each stack. Use 0 for an empty space.

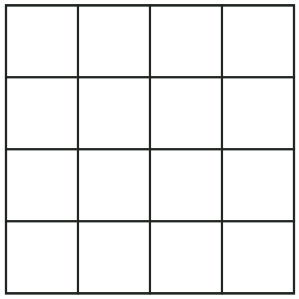
Fewest cubes: _____



RIGHT

FRONT

Most cubes: _____



RIGHT

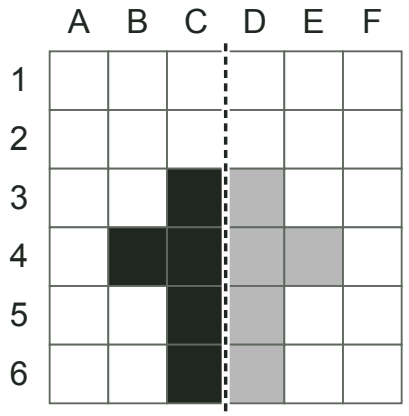
FRONT

These grids show your models from above. Add the numbers for each total.

Answers: Complete the reflection

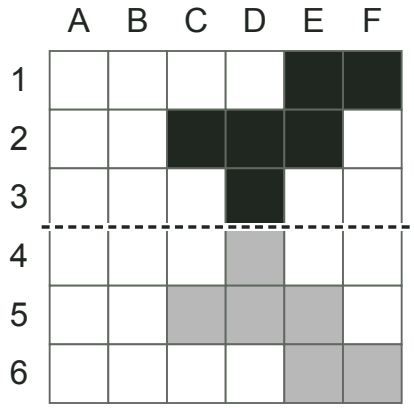
Check the drawings and the method.

1. Shade D3, D4, E4, D5, D6.



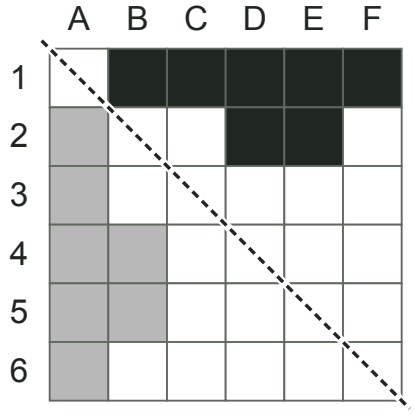
Gray boxes show what to add. Keep each square in the same row, equally far from the mirror line.

2. Shade D4, C5, D5, E5, E6, F6.



Gray boxes show what to add. Keep each square in the same column, equally far above or below the mirror line.

3. Shade A2, A3, A4, B4, A5, B5, A6.

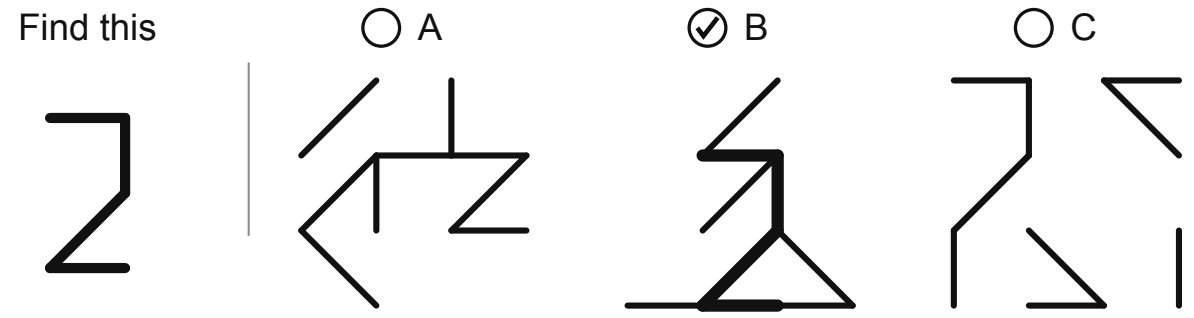


Gray boxes show what to add. Swap row and column positions across the sloping line. For example, E1 reflects to A5.

Answers: Find the hidden shape

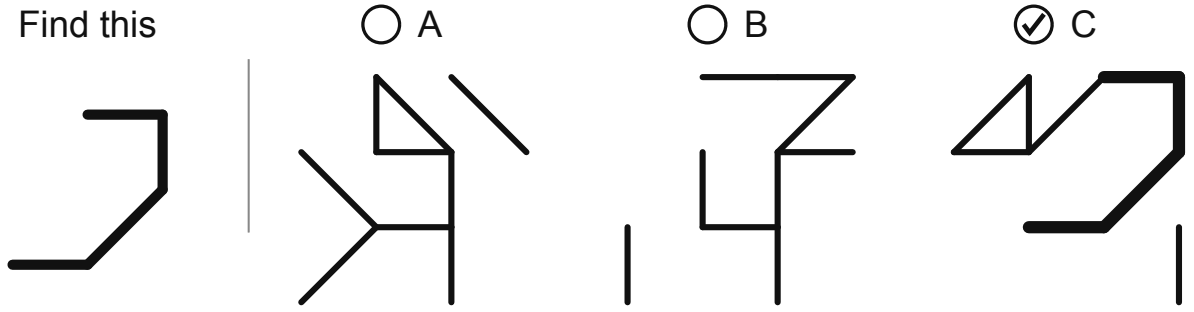
Check the drawings and the method.

1. B.



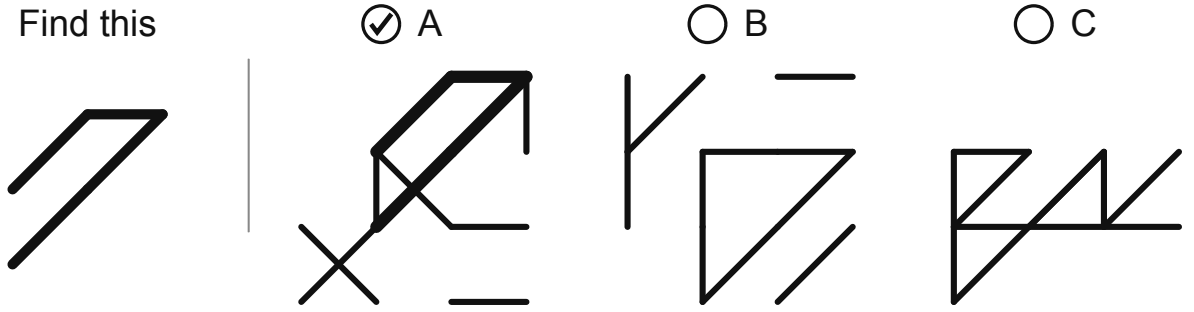
B contains the whole target at the same size and angle. Extra lines may cross or join it.

2. C.



C contains the whole target at the same size and angle. Extra lines may cross or join it.

3. A.



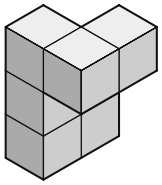
A contains the whole target at the same size and angle. Extra lines may cross or join it.

Answers: Turn it in your mind

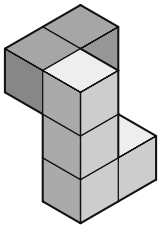
Check the drawings and the method.

1. Mirror image.

Left



Turned back



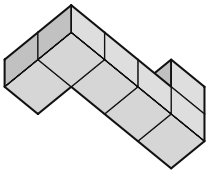
◯ Same shape

⊘ Mirror image

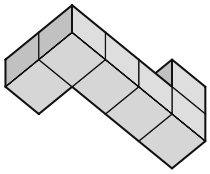
Even after turning, the bends do not match. This is a mirror image.

2. Same shape.

Left



Turned back



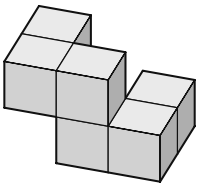
⊘ Same shape

◯ Mirror image

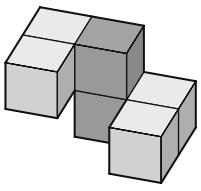
Turning the right figure makes every cube line up with the left figure.

3. Mirror image.

Left



Turned back



◯ Same shape

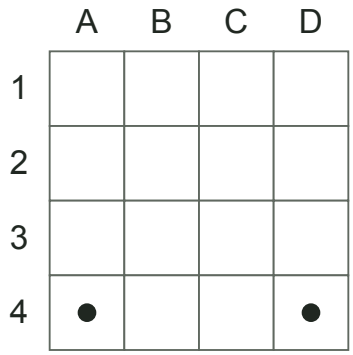
⊘ Mirror image

Even after turning, the bends do not match. This is a mirror image.

Answers: Open the folded paper

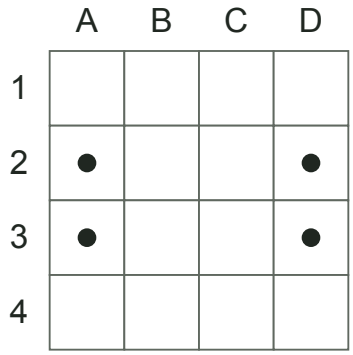
Check the drawings and the method.

1. 2 holes: A4, D4.



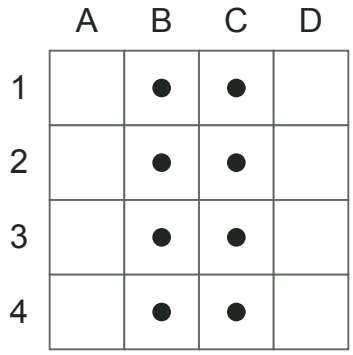
Each dot marks a hole. Opening the fold makes a mirror hole on the other side of the crease.

2. 4 holes: A2, D2, A3, D3.



Each dot marks a hole. Open the last fold first. Mirror every hole across that crease, then repeat for the remaining folds.

3. 8 holes: B1, C1, B2, C2, B3, C3, B4, C4.

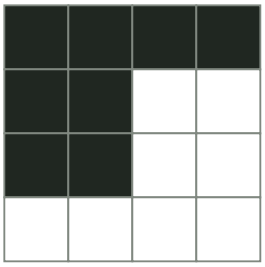


Each dot marks a hole. Open the last fold first. Mirror every hole across that crease, then repeat for the remaining folds.

Answers: See another view

Check the drawings and the method.

1. Top view shown below.

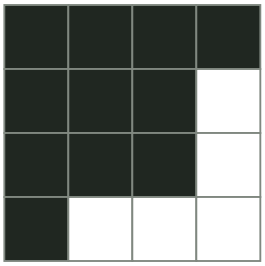


RIGHT

FRONT

Shade one box for each place with cubes. Leave empty places blank.

2. Top view shown below.

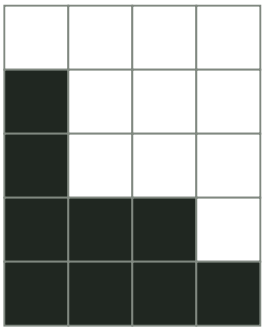


RIGHT

FRONT

Shade one box for each place with cubes. Leave empty places blank.

3. Front view shown below.



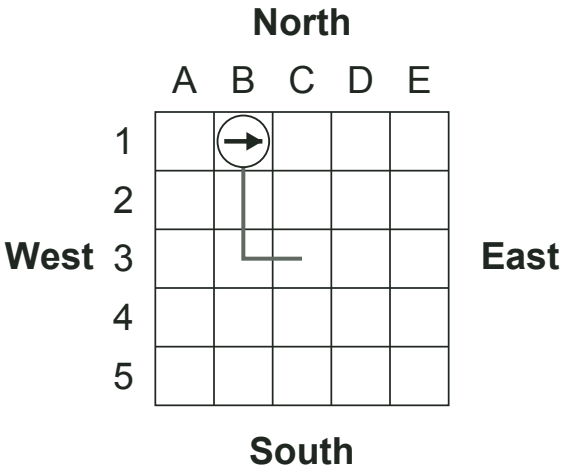
GROUND

For each column, shade from the bottom up to the tallest stack.

Answers: Follow the route

Check the drawings and the method.

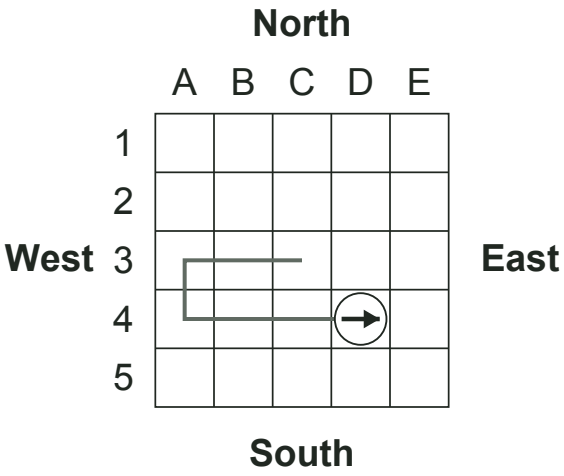
1. B1, looking east.



Follow the line from C3. The arrow shows your final direction.

Route: C3, B3, B2, B1.

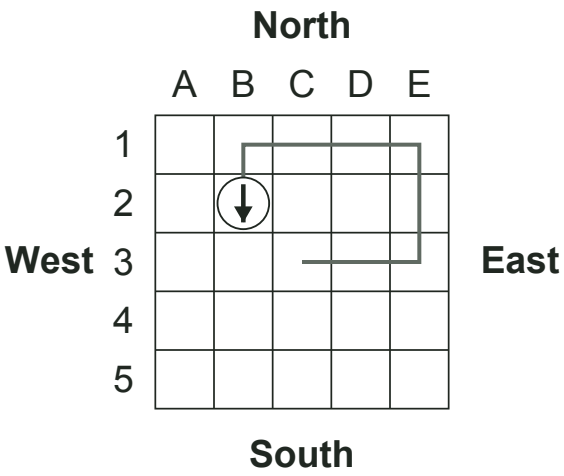
2. D4, looking east.



Follow the line from C3. The arrow shows your final direction.

Route: C3, B3, A3, A4, B4, C4, D4.

3. B2, looking south.



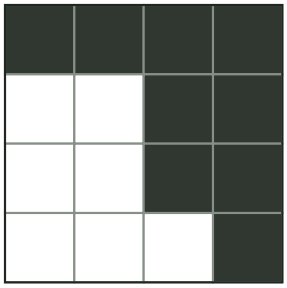
Follow the line from C3. The arrow shows your final direction.

Route: C3, D3, E3, E2, E1, D1, C1, B1, B2.

Answers: turn and missing view

1. Turn the stack

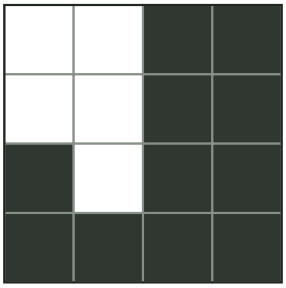
New top view



RIGHT

FRONT

New front view

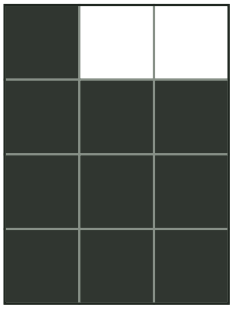


GROUND

The old right side faces you after the turn. The new front columns are 2, 1, 4 and 4 cubes high, from left to right.

2. Find the missing view

Right view



FRONT **BACK**

The front-left stack must be 4 cubes tall. It is the only stack in its column. The other five stacks can hold at most 3 cubes each, for 19 cubes altogether. With 18 cubes, just one of those stacks loses a cube. Both rows behind the front still have a stack of 3. The right view is 4, 3, 3, from front to back.

Answers: fewest and most cubes

Both arrangements below match the given front and right views.

The numbers show stack heights. A zero means no cubes.

Fewest: 15 cubes

0	0	3	0
0	4	0	0
0	0	0	1
2	0	3	2

RIGHT

FRONT

Most: 35 cubes

2	3	3	2
2	4	3	2
1	1	1	1
2	3	3	2

RIGHT

FRONT

Why 15 is the fewest

Each depth row needs a tallest stack: 3 + 4 + 1 + 3 = 11 cubes. The two columns with height 2 each need a stack of 2. Neither can share one of those row-tallest stacks, so add 4 cubes. This gives a minimum of 15 cubes.

Why 35 is the most

Each stack can be no taller than either of its two views. Use the smaller of the front-column and right-row heights. The row totals, back to front, are 10, 11, 4 and 10. They add to 35 cubes.

Other 15-cube models are correct if both views match. The 35-cube model is unique.

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A guide for the instructor

Choose one or two activities to begin. Work through each example together, then try question 1. There is no timer.

Choose the next step together

Continue with question 2 when the method is clear. Question 3 and the separate cube challenges are optional. These are different skills, not one test that gets harder on every page.

Print and prepare

Use the edition that matches your paper: A4 or US Letter. Print at 100% (Actual size). Black-and-white printing is fine. Have a pencil and eraser ready; check one printed page before making copies.

Offer a hint before showing the answer

Reflection: Choose one square next to the mirror line and find its partner first.

Hidden shape: Start at a distinctive corner, then follow all the target strokes.

Turning shapes: Follow the cubes from one end. Turn or tip the whole figure, keeping its bends in the same order.

Paper folding: Open the last fold first. Each opening makes a matching hole across that fold line.

Cube views: In a top view, a tall stack and a single cube each cover one square.

Routes: After each turn, point in the new direction before moving.

Before the cube challenges

First practice top and front views. Then try a right view: look from the RIGHT side and read its columns from front to back. Try turning a stack before the missing-view and cube-count tasks.

Participants may draw, point or explain aloud. Ask: "How did you check?" Give time to think, and stop or switch activities when needed.