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PRACTICE PAPERS · QUESTION BOOKLETS · MARK SCHEMES & ANSWERS · PAPER NOTES

11+ PRACTICE PACK

CEM 11+ Non-Verbal Reasoning

Complete Practice Pack

CONTENTS

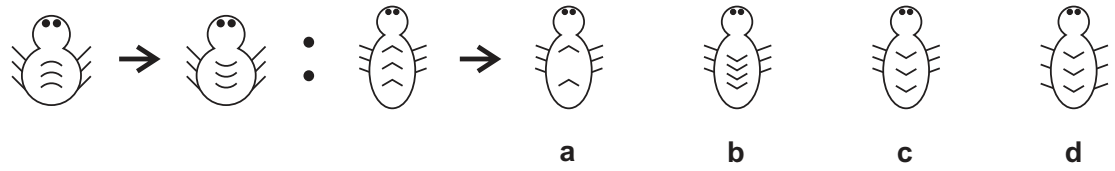
Sample 11+ Assessment Test — Non-Verbal Reasoning

The test should take around 20 minutes. If you want to answer these questions in multiple-choice format, use the separate multiple-choice answer sheet. If you'd prefer to answer them in standard write-in format, circle the correct answer.

Section 1 — Changing Bugs

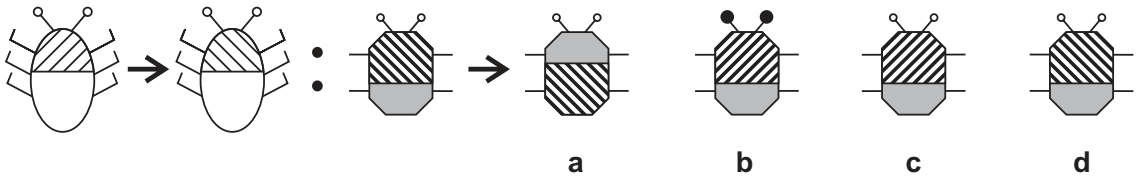
Look at how the first bug changes to become the second bug.
Then work out which option would look like the third bug if you changed it in the same way.

Example:

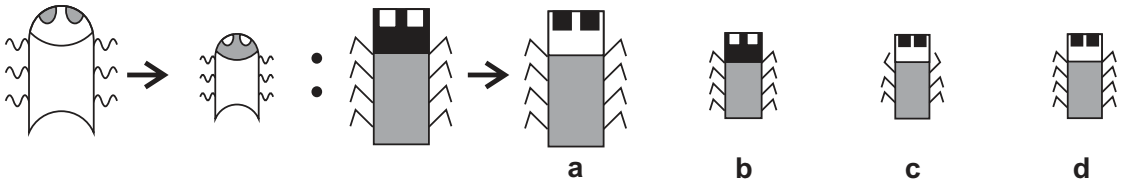


Answer: c

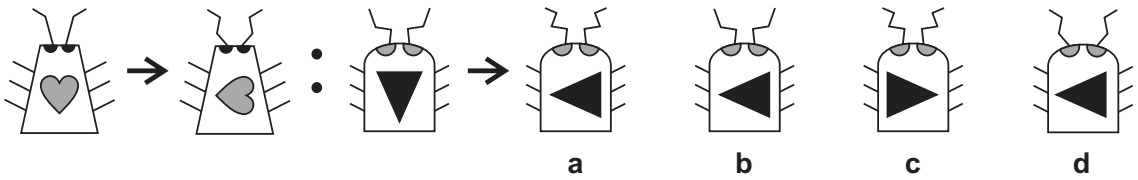
1



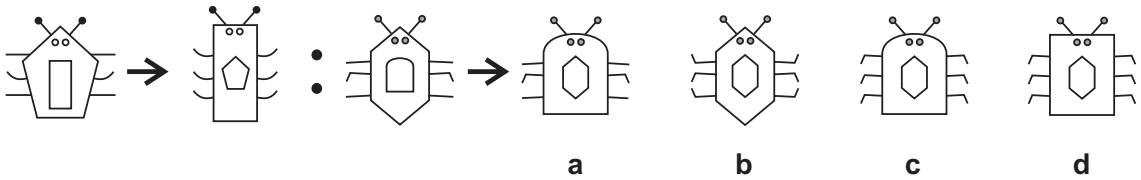
2



3

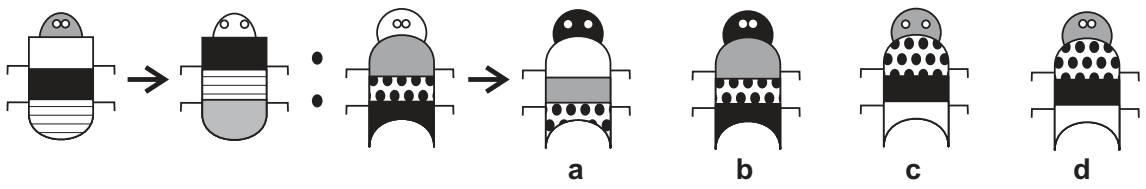


4

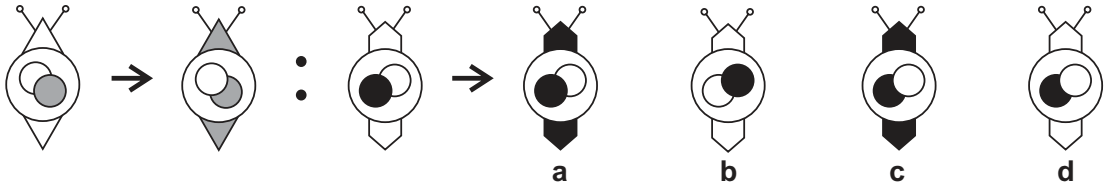


Carry on to the next question → →

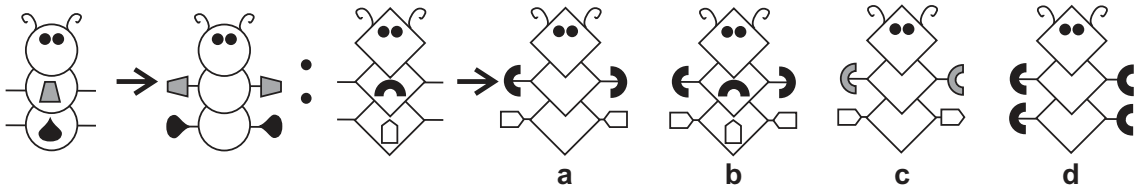
5



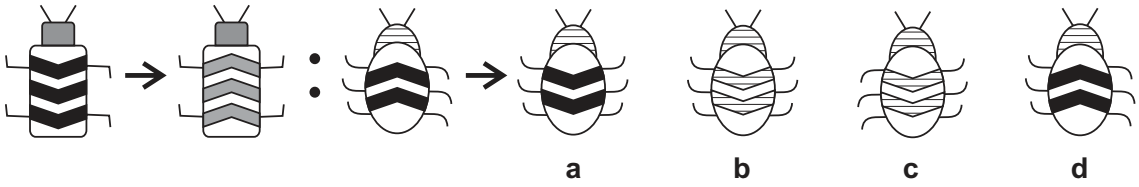
6



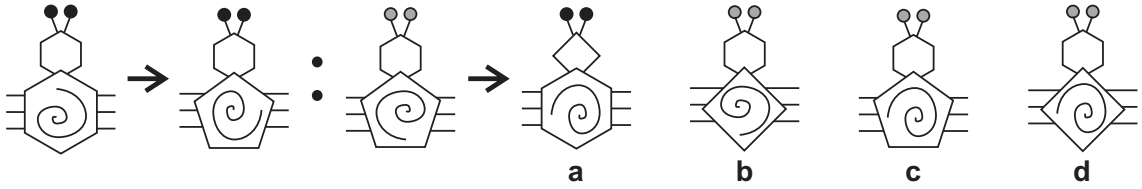
7



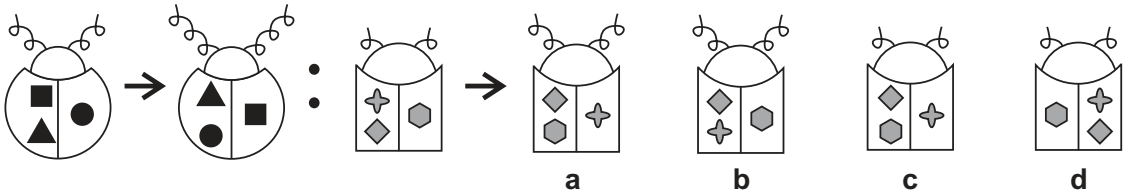
8



9



10



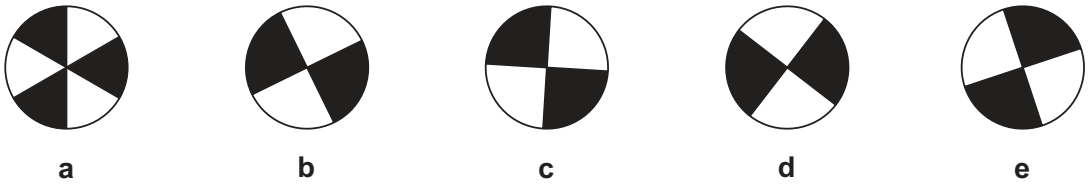
/ 10

Carry on to the next question → →

Section 2 — Odd One Out

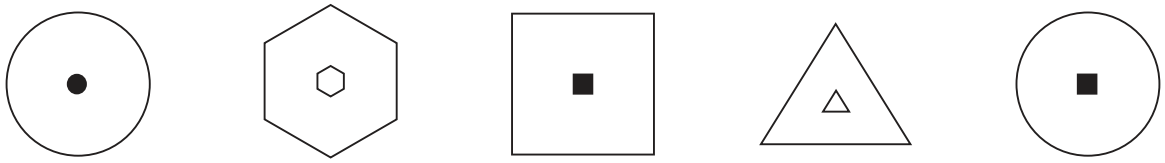
Find the figure in each row that is most unlike the other figures.

Example:

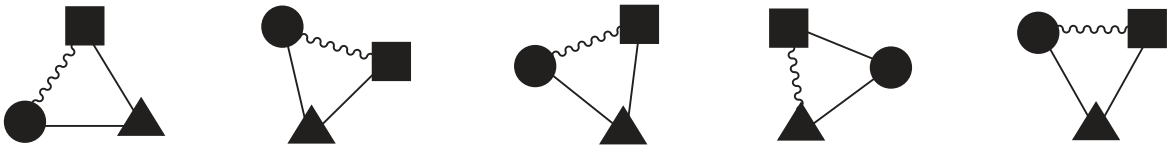


Answer: a

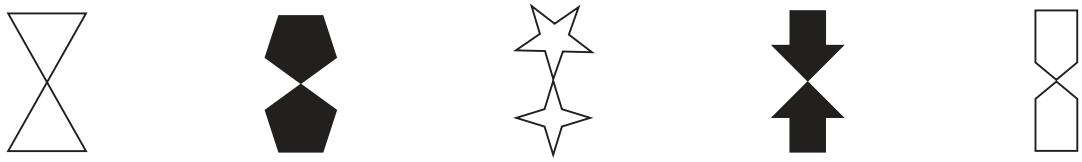
1



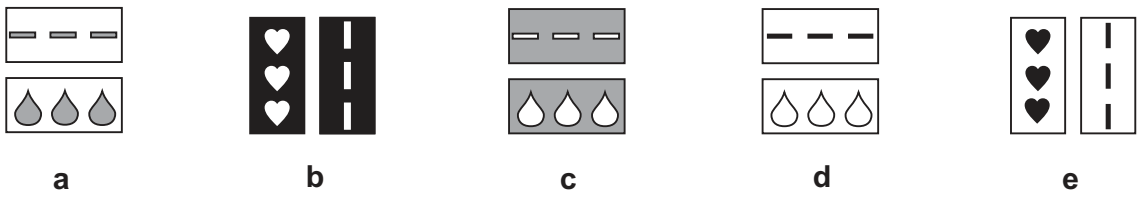
2



3



4

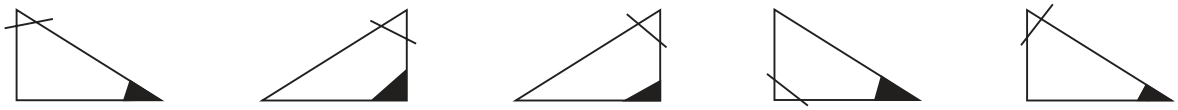


Carry on to the next question →→

5

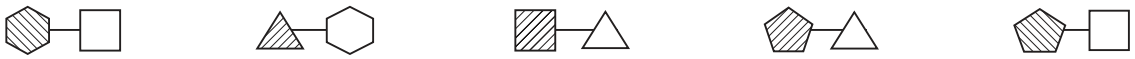
a b c d e

6



a b c d e

7

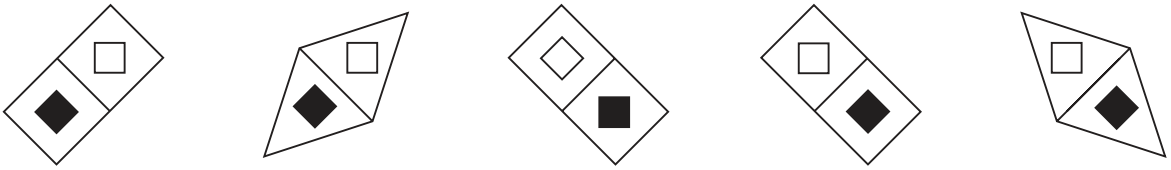


a b c d e

8

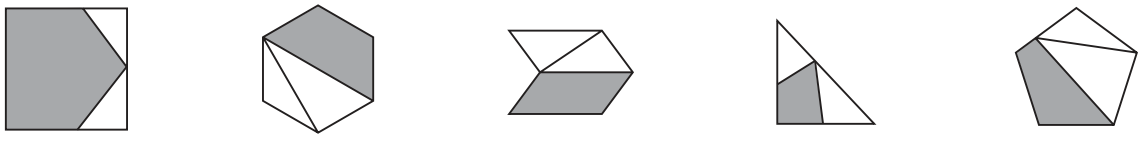
a b c d e

9



a b c d e

10



a b c d e

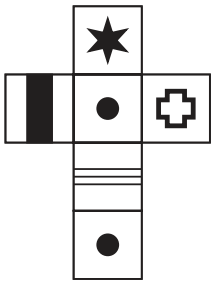
/ 10

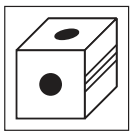
Carry on to the next question → →

Section 3 — Cubes and Nets

Work out which of the six cubes can be made from the net.

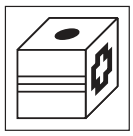
Example:



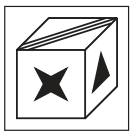


a

b



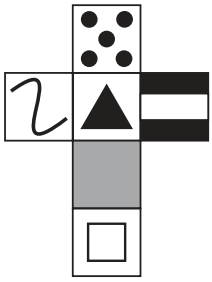
c

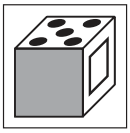


d

Answer: c

1





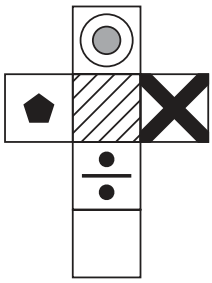
a

b

c

d

2



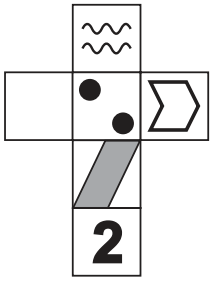
a

b

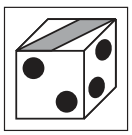
c

d

3

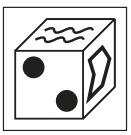


a



b

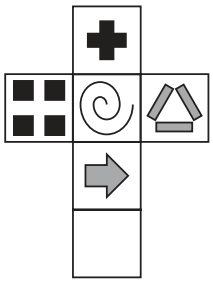
c



d

Carry on to the next question → →

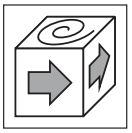
4



a

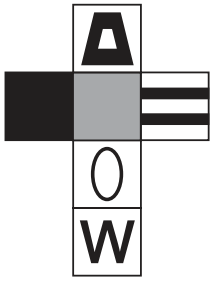
b

c



d

5



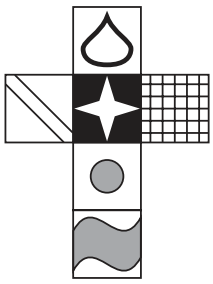
a

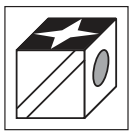
b

c

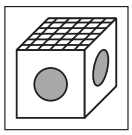
d

6





a

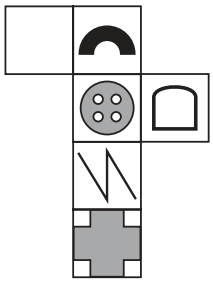


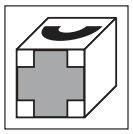
b

c

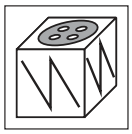
d

7





a

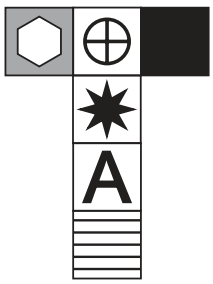


b

c

d

8



a

b

c

d

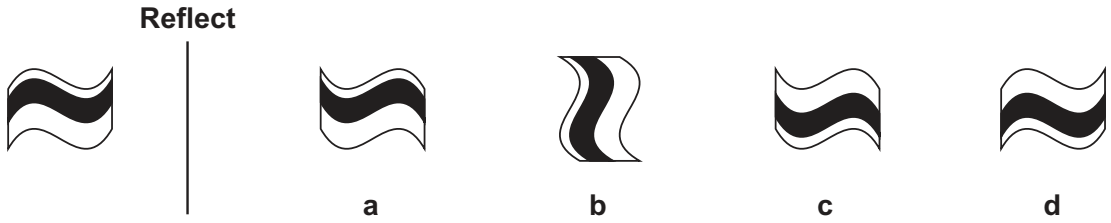
/ 8

Carry on to the next question → →

Section 4 — Reflect the Figure

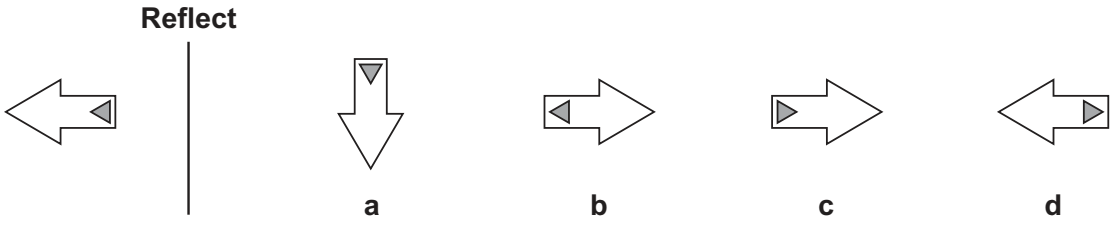
Work out which option would look like the figure on the left if it was reflected over the line.

Example:

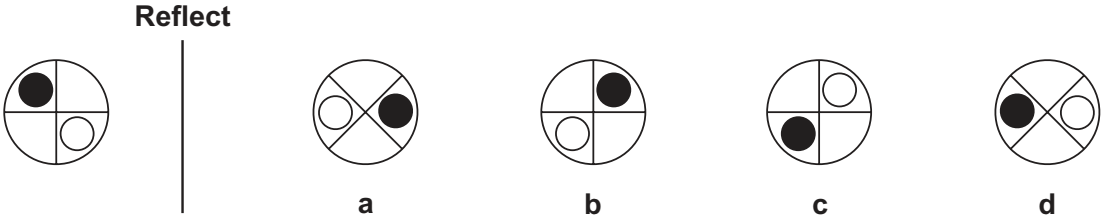


Answer: a

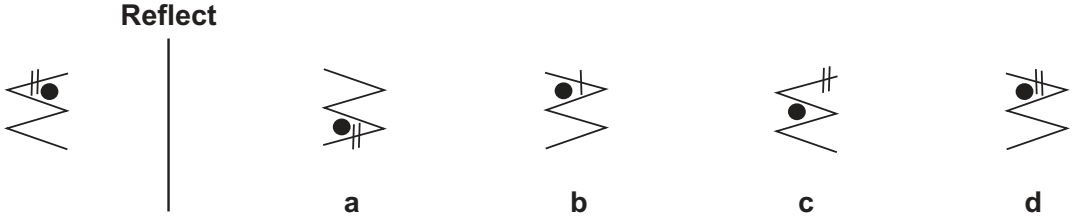
1



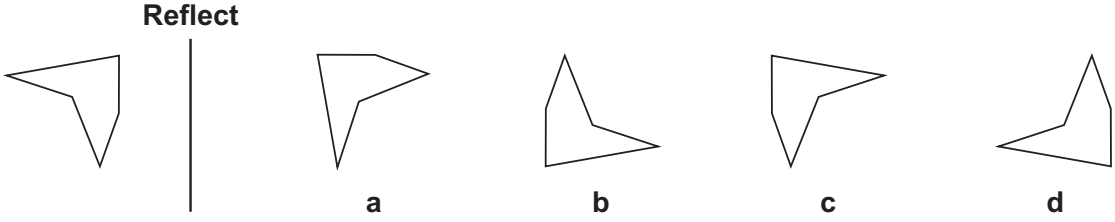
2



3

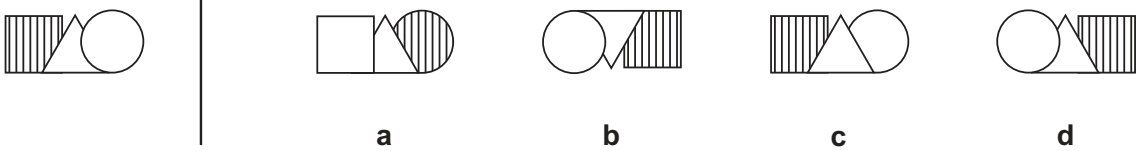


4



Carry on to the next question → →

5 Reflect



a b c d

---

6 Reflect

a b c d

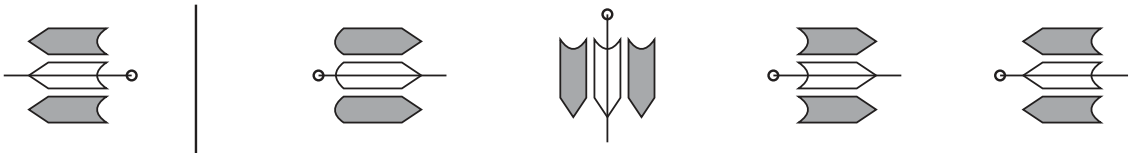
---

7 Reflect

a b c d

---

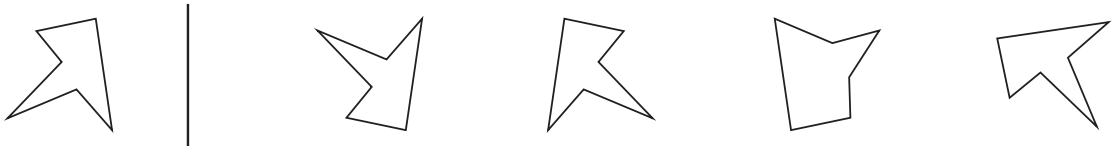
8 Reflect



a b c d

---

9 Reflect



a b c d

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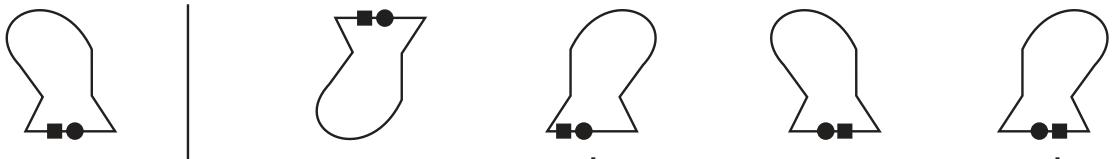
10 Reflect



a b c d

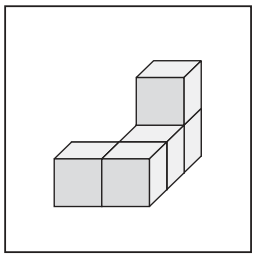
/ 10

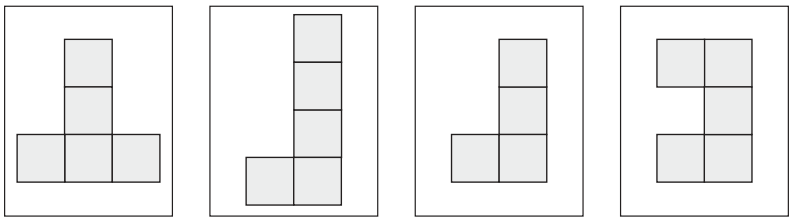
Carry on to the next question →→

Section 5 — 2D Views of 3D Shapes

Work out which option is a top-down 2D view of the 3D figure on the left.

Example:

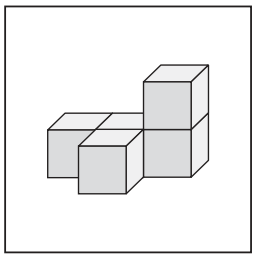


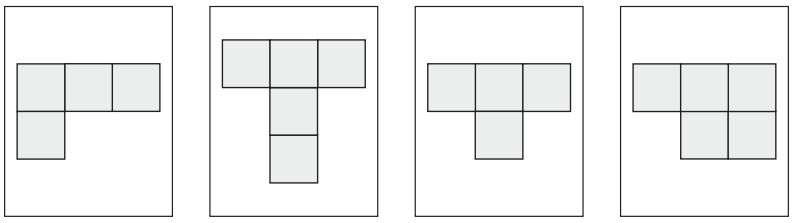


a b c d

Answer: c

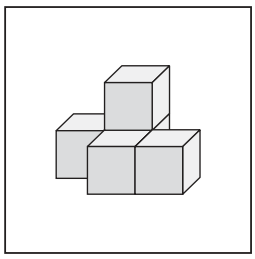
1

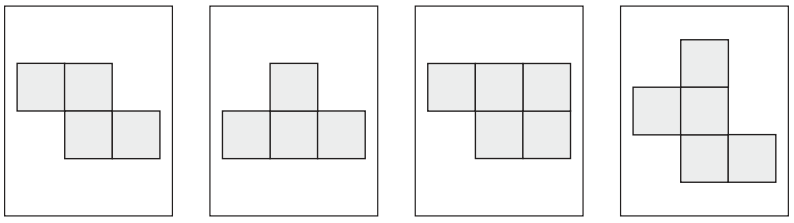




a b c d

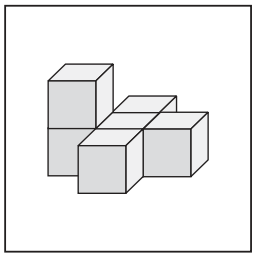
2

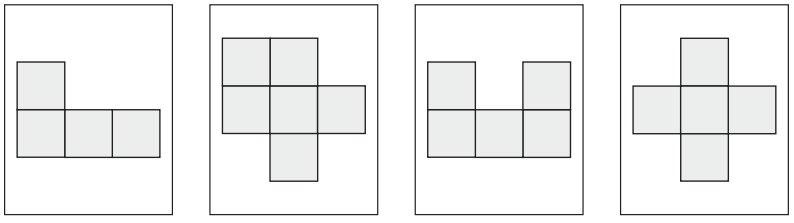




a b c d

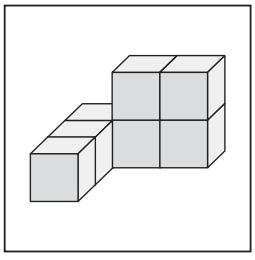
3

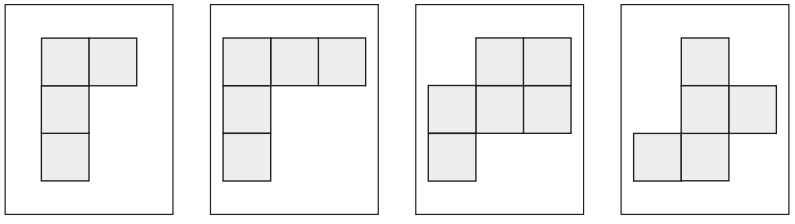




a b c d

4

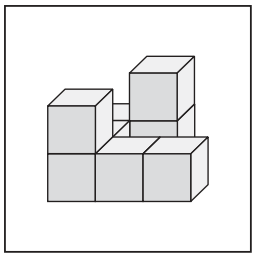


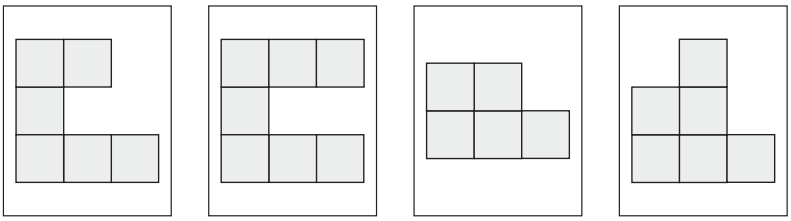


a b c d

Carry on to the next question →→

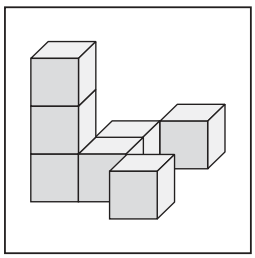
5

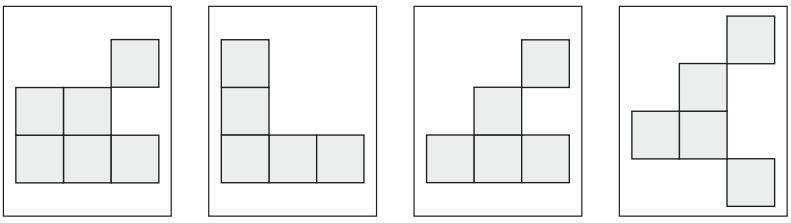




a b c d

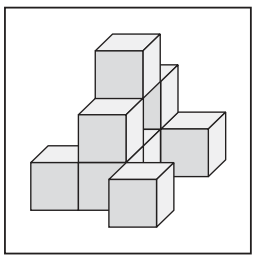
6

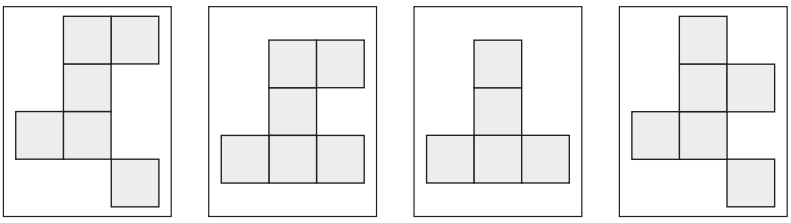




a b c d

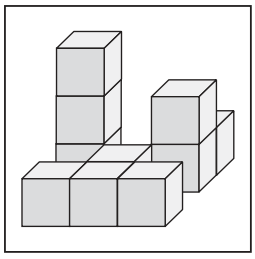
7

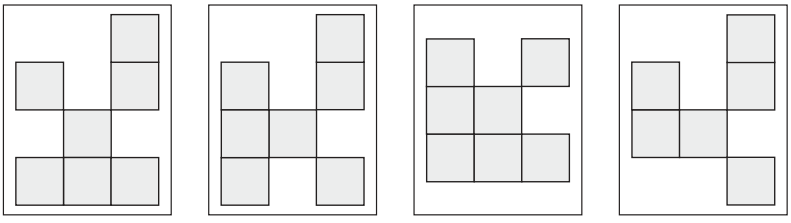




a b c d

8





a b c d

/ 8

Total / 46

End of Test

Paper Notes: 11+ Non-Verbal Reasoning Question Booklet

Compiled by SATs-Papers.co.uk to help you get the most from this paper.

Overview

This is a **CGP** non-verbal reasoning practice paper designed for pupils preparing for **11+ CEM entrance examinations**. It contains **46 questions** across five distinct sections, testing core visual reasoning skills that are essential for the CEM format. The paper should be completed in approximately **20 minutes**, mirroring the time pressure of the actual exam.

The question types include changing patterns (bugs), odd one out, cubes and nets, reflections, and 2D views of 3D shapes. All questions are **multiple-choice**, with students selecting from four options (a-d) in most sections and five options (a-e) in the odd one out section. This format replicates the CEM 11+ style, where speed and accuracy are both critical.

This paper is suitable for pupils in Year 5 or Year 6 who are building familiarity with non-verbal reasoning under timed conditions. It can be used as a diagnostic tool to identify strengths and weaknesses, or as part of a regular practice routine to develop fluency in visual problem-solving. The variety of question types ensures broad coverage of the NVR skills assessed in CEM exams.

How this paper is organised

The paper is divided into **five sections**, each testing a different non-verbal reasoning skill. **Section 1 (Changing Bugs)** contains 10 questions where pupils must identify a transformation applied to a figure and apply the same rule to a new figure. **Section 2 (Odd One Out)** also has 10 questions, requiring students to spot which of five figures does not share a common property with the others.

Section 3 (Cubes and Nets) presents 8 questions where pupils must match a net to the cube it would form when folded. **Section 4 (Reflect the Figure)** contains 10 questions on line symmetry, asking students to identify the correct reflection of a shape across a vertical line. **Section 5 (2D Views of 3D Shapes)** has 8 questions requiring pupils to visualise the top-down view of a three-dimensional structure.

Each section begins with a worked example to clarify the task. The paper can be completed on a separate multiple-choice answer sheet or by circling answers directly on the question paper. The total of **46 marks** allows for clear percentage scoring and comparison with other practice attempts.

Topics covered

- Transformation rules: identifying how a pattern changes (rotation, reflection, shading inversion, shape substitution) and applying the same rule to a different figure
- Odd one out: spotting the figure that differs from the others based on properties such as shape count, symmetry, line type, shading pattern or spatial arrangement
- Cubes and nets: matching a 2D net to the 3D cube it would create, requiring visualisation of how adjacent faces relate when folded
- Reflection over a vertical line: determining the correct mirror image of a figure, with attention to orientation of asymmetric details
- Top-down 2D views of 3D shapes: interpreting stacked cube arrangements and identifying the correct overhead plan view
- Spatial reasoning: mentally manipulating shapes through folding, rotating and reflecting
- Pattern recognition: identifying consistent rules across sequences of abstract figures
- Visual discrimination: distinguishing subtle differences in orientation, shading and internal detail
- Logical deduction: eliminating incorrect options by testing hypotheses against given constraints
- Speed and accuracy under timed conditions: completing 46 questions in approximately 20 minutes

How to use this paper for revision

- Work through the example at the start of each section carefully before attempting the questions, as it reveals the exact type of reasoning required.
- In changing bugs questions, write down the transformations you spot (e.g. 'rotated 90° clockwise, shading reversed') to avoid confusion when applying them to the third figure.
- For odd one out, check each figure against multiple properties (number of shapes, symmetry, line style, shading) rather than assuming the first difference you spot is the correct answer.
- When tackling cubes and nets, trace adjacent faces with your finger to visualise how they would meet when folded, and eliminate options that show impossible face arrangements.
- In reflection questions, mark the position of distinctive features (such as arrows, dots or asymmetric shapes) on the line of symmetry to check that distances are equal on both sides.
- For 2D views of 3D shapes, count the maximum extent of the structure in each direction (left-right and front-back) to eliminate options that are the wrong size or shape.
- Time yourself strictly on practice attempts to build the stamina and pacing needed for the real exam, where spending too long on difficult questions can cost easy marks later.

Common mistakes to avoid

- Applying only part of a transformation rule in changing bugs questions, for example noticing that stripes change orientation but missing that shading also inverts.
- In odd one out, fixating on an irrelevant feature (such as which way a shape faces) when the actual criterion is a structural property like symmetry or the number of enclosed areas.
- Folding nets incorrectly by assuming opposite faces must show certain symbols, when in fact the net structure determines which faces are opposite and which are adjacent.
- Confusing reflection with rotation, particularly when a shape looks similar after a 180° turn; reflections reverse left-right order of features, rotations do not.
- In 2D views of 3D shapes, failing to account for hidden blocks that are stacked behind or beneath visible cubes, leading to an incomplete overhead view.
- Rushing through questions without checking all four options, sometimes missing that option d is a better match than an earlier choice that seemed plausible at first glance.

Exam technique

Begin each section by reading the instructions and studying the worked example, even if the question type is familiar. Under exam pressure, misreading the task (for example, selecting the figure that matches rather than the odd one out) wastes time and marks. Aim to spend roughly **two minutes per section** as a guide, but be prepared to move on from a question that is taking too long.

In multiple-choice questions, use elimination to improve your odds. Cross out options that clearly violate the rule or criterion, then compare the remaining choices carefully. If you are unsure, make an educated guess rather than leaving a blank, as there is no negative marking in CEM exams. Mark any questions you skip so you can return to them if time permits.

Practise this paper multiple times, reviewing your errors after each attempt. For questions you get wrong, try to articulate the rule or reasoning you should have applied. Over time, you will recognise common patterns (such as typical net layouts or frequent transformation combinations) and your speed will improve. Use a stopwatch to simulate exam conditions and track your progress over successive practice sessions.

What to revise alongside this paper

Pupils working on this paper should also practise **verbal reasoning analogies** and **code-breaking tasks**, as the CEM 11+ often combines verbal and non-verbal sections

in a single test. Understanding how to spot patterns and apply rules in a verbal context strengthens the same logical skills used in NVR. Familiarity with **basic geometric vocabulary** (parallel, perpendicular, diagonal, vertex) helps when describing transformations, even though the questions themselves do not require written explanations.

For pupils who find cubes and nets challenging, additional practice with **isometric drawing** and **3D visualisation puzzles** (such as pentominoes or soma cubes) builds the spatial awareness needed to predict how flat patterns fold into solids. Similarly, working on **tangram puzzles** or **pattern block activities** develops the mental rotation and shape manipulation skills tested in the changing bugs and reflection sections.

Once comfortable with this paper, progress to **full-length CEM practice papers** that combine non-verbal reasoning with other question types under stricter time limits. This helps pupils develop the exam stamina and section-switching skills needed for the real test, where they must adapt quickly to different question formats without losing focus or accuracy.

Key terms

> **Transformation**, **Rotation**, **Reflection**, **Translation**, **Shading inversion**, **Symmetry**, **Congruent**, **Adjacent faces**, **Opposite faces**, **Net**, **Line of symmetry**, **Plan view**, **Elevation**, **Spatial reasoning**, **Visual discrimination**

Sample 11+ Assessment Test for the CEM Test — Non-Verbal Reasoning

CGP

Pupil's name:

Test date:

School name:

Please mark like this: ▬

Sample Test

Pupil Number	School Number
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[2] [2] [2] [2] [2] [2]	[2] [2] [2] [2] [2] [2] [2]
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Date of Birth

Day	Month	Year
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[1] [1]	February	2006
[2] [2]	March	2007
[3] [3]	April	2008
[4]	May	2009
[5]	June	2010
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	November	2015
	December	2016

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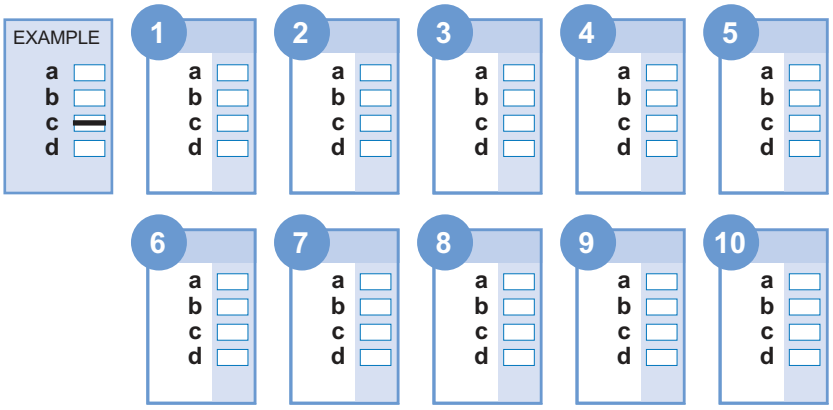

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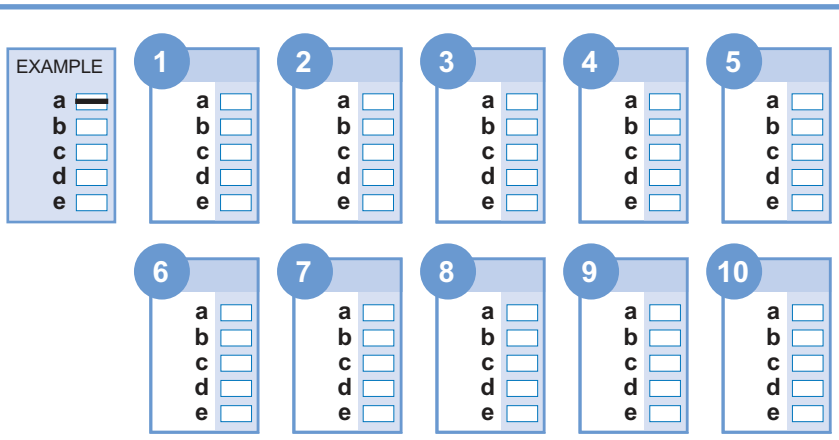

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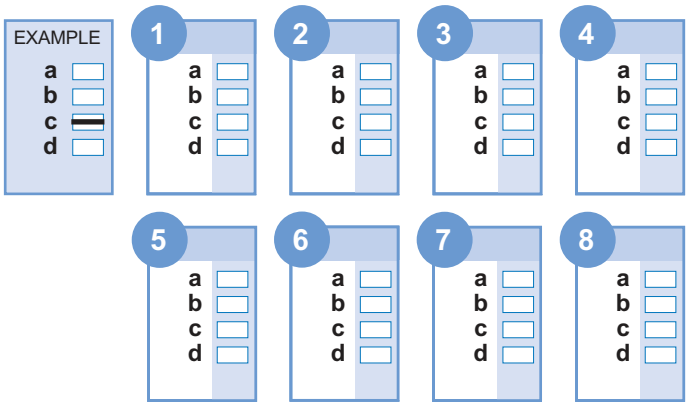

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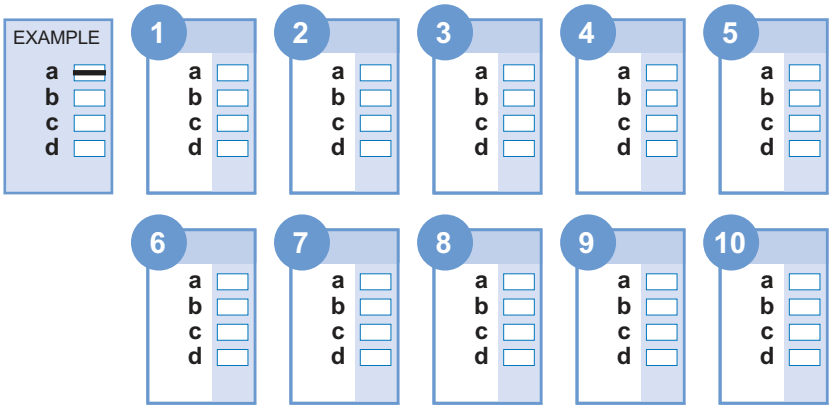

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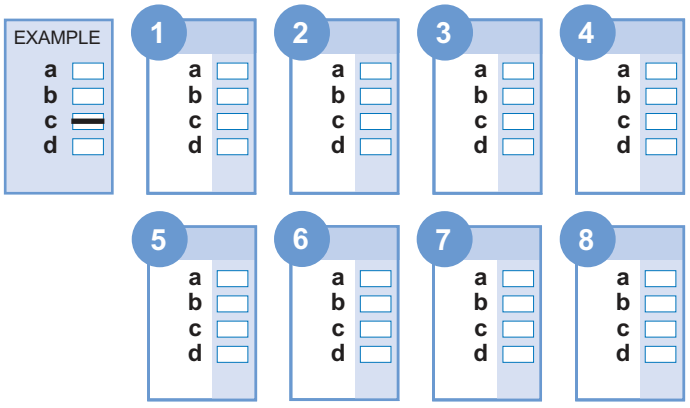

Paper Notes: 11+ Non-Verbal Reasoning Answer Sheet

Compiled by SATs-Papers.co.uk to help you get the most from this paper.

Overview

This is a **CGP sample answer sheet** designed to accompany a Non-Verbal Reasoning practice test for the **11+ entrance examination**. The sheet provides a standardised bubble-sheet format for recording answers to **46 multiple-choice questions** spread across five distinct sections, mirroring the style used in **CEM-format 11+ assessments**.

The answer sheet includes space for pupil and school details, date of birth, and unique identification numbers, all of which must be filled in using the bubble-marking system shown. Each section offers between four and five answer options per question (sections vary between four-option and five-option responses), ensuring students become familiar with the optical mark recognition format commonly used in formal 11+ testing.

This resource is particularly valuable for students preparing for CEM-style 11+ entrance exams, as it helps them practise the crucial skill of transferring answers accurately under timed conditions. Parents and tutors can use this sheet alongside the corresponding question paper to simulate realistic exam conditions and assess performance objectively.

How this paper is organised

The answer sheet is organised into **five distinct sections**, each corresponding to a different part of the accompanying Non-Verbal Reasoning test paper. **Section 1** contains an example question plus questions 1 to 10, all with four answer options (a, b, c, d). **Section 2** follows the same structure but offers five answer options (a, b, c, d, e) for its example and questions 1 to 10.

Sections 3 and 5 each contain an example question followed by questions 1 to 8, with four answer options per question. **Section 4** provides an example question plus questions 1 to 10, again with four answer options. In total, the sheet accommodates **46 questions** across the five sections, not counting the example questions which are for practice only.

At the top of the sheet, there are fields for recording personal information including pupil name, school name, test date, date of birth, pupil number, and school number. The bubble-marking system requires students to fill ovals completely, as demonstrated by the example marking at the top of the page.

Topics covered

- Pattern recognition tasks requiring identification of rules governing sequences of abstract shapes and figures
- Shape analysis involving rotation, reflection, and transformation of two-dimensional geometric forms
- Visual logic puzzles testing the ability to identify odd-one-out figures based on visual properties
- Spatial reasoning challenges including mental manipulation of shapes and understanding of spatial relationships
- Sequential reasoning questions where students must determine the next item in a visual progression
- Matrix completion problems requiring identification of missing elements in grids of shapes
- Code-breaking exercises involving matching symbols or shapes to underlying patterns
- Visual analogies testing understanding of relationships between pairs of abstract figures

How to use this paper for revision

- Practise filling in bubble-sheet answers quickly and accurately, as errors in transferring answers can cost marks even when the reasoning is correct.
- Work through the example question in each section carefully to understand the question type before attempting the numbered questions.
- If using this sheet for timed practice, allocate roughly equal time per section and mark your answers directly rather than planning to transfer them later.
- Check that you have filled only one bubble per question and that your marks are dark enough to be clearly visible.
- Keep the answer sheet flat and unfolded during practice to simulate real exam conditions and avoid accidental creasing.
- After completing a practice test, use the corresponding mark scheme to identify which question types you find most challenging.
- Review any questions where you changed your answer, as this may indicate uncertainty about a particular pattern or rule type.

Common mistakes to avoid

- Filling in multiple bubbles for a single question, which in formal testing conditions would result in the answer being marked incorrect.
- Making marks that are too faint or incomplete, causing optical scanners to fail to register the answer.
- Misaligning answers by accidentally skipping a question number on the answer sheet while working through the question paper.
- Forgetting to transfer answers from rough working space on the question paper to the answer sheet before time runs out.
- Failing to complete the personal details section accurately, particularly the pupil and school identification numbers which must be bubbled correctly.
- Spending too long deliberating over difficult questions and running out of time to fill in easier answers towards the end of the paper.

Exam technique

When using this answer sheet during timed practice, work methodically through each section in order, filling in your chosen answer immediately after deciding on it. This reduces the risk of misalignment and ensures you do not run out of time at the end. If you are uncertain about a question, make your best guess and fill in one bubble rather than leaving it blank, as there is no negative marking in 11+ exams.

Pace yourself by dividing your available time roughly equally across the five sections, allowing slightly more time for sections with ten questions compared to those with eight. Keep track of time using a watch or clock, and if you find yourself spending more than 30 seconds on any single question, move on and return to it if time permits. The example questions are not scored, so use them to understand the question format but do not spend excessive time on them.

After completing a practice test, use the answer sheet to mark your responses against the corresponding mark scheme. Identify patterns in the types of questions you answered incorrectly and focus your revision on those specific areas. Check that your bubble marks are neat and complete, as developing this habit now will prevent costly errors during the actual examination.

What to revise alongside this paper

Students preparing for CEM-format 11+ Non-Verbal Reasoning should also practise **Verbal Reasoning** sections, as many CEM papers combine both in a single assessment. Familiarity with shuffled question formats, where verbal and non-verbal items are

interspersed, will help build the mental flexibility required on test day. Practising under timed conditions using multiple-choice answer sheets from different publishers will reinforce accurate bubble-filling technique.

Beyond Non-Verbal Reasoning, students should revise core mathematical concepts such as **symmetry, angles, and geometric properties**, as these underpin many spatial reasoning tasks. Working on puzzles involving tangrams, tessellations, and polyominoes can develop the visual manipulation skills needed for advanced Non-Verbal Reasoning questions. Reading comprehension and numerical reasoning are also typically tested in CEM 11+ papers, so balanced preparation across all three areas is essential.

For students finding the material challenging, it may be helpful to revisit foundational skills such as identifying simple patterns in sequences and understanding basic transformations. Conversely, students who complete this paper comfortably should progress to more complex **3D reasoning tasks** and timed full-length CEM practice papers to simulate the pressure and stamina required on examination day.

Key terms

> **Pattern recognition**, **Spatial reasoning**, **Visual logic**, **Sequential reasoning**, **Shape transformation**, **Rotation**, **Reflection**, **Matrix completion**, **Odd-one-out**, **Visual analogy**, **Code-breaking**, **Abstract reasoning**, **Optical mark recognition**, **Bubble sheet**, **CEM format**

Answers to Sample 11+ Assessment Test for the CEM Test — Non-Verbal Reasoning

Section 1 — Changing Bugs

1) C
The bug reflects across.

2) D
The bug gets smaller and the shading of its eyes swaps with the shading of its head.

3) A
The shape on the bug's back rotates 90 degrees clockwise. Each of the bug's antennae gains an extra line.

4) C
The shape of the bug's body swaps with the smaller shape on its back. The top and bottom pairs of legs become the same as the middle pair of legs.

5) C
All the different types of shading move up one body segment (including the shading of the bug's head). The bug's eyes move apart.

6) C
On the bug's shell, the small white circle moves to the front. The bug's body then becomes the same colour as the circle at the back.

7) A
Each of the bug's legs gains a foot. The shape of the foot is the same as the small shape inside the section of the body that the leg is attached to. The small inner shapes then disappear.

8) B
The pattern on the bug's back reflects downwards and its shading changes to match the bug's head. Its right-hand legs change to match the left-hand legs.

9) D
The spiral on the bug's body rotates 90 degrees clockwise. The bug's body loses a side.

10) A
Each antenna gains an extra loop and the three different shapes on its back each move one position clockwise.

Section 2 — Odd One Out

1) E
In all other figures, the inner and outer shapes are the same shape.

2) D
In all other figures, the shapes go clockwise in the order: circle, square, triangle, and the wavy line is between the circle and the square.

3) C
In all other figures, the two shapes are identical apart from rotation.

4) D
In all other figures, the dashed line inside the rectangle has the same shading as the shapes inside the other rectangle.

5) B
In all other figures, the arrow goes in an anticlockwise direction.

6) D
In all other figures, the small line crosses over the top corner of the triangle.

7) B
In all other figures, the shape with the fewest sides is white.

8) D
All other figures have the same number of lines as black hexagons.

9) C
In all other figures, the square is in the top half

10) A
In all other figures, the grey shape has four sides.

Section 3 — Cubes and Nets

1) C
Option A is ruled out because the cube face with five dots and the grey cube face must be on opposite sides. Option B is ruled out because the net doesn't have two identical faces. Option D is ruled out because the cube face with the wavy line and the black cube face with the white stripe must be on opposite sides.

2) B
Option A is ruled out because the cube face with the circles and the cube face with the division sign must be on opposite sides. Options C and D are both ruled out because the cube face with the hatched shading and the white cube face must be on opposite sides.

3) D
Option A is ruled out because the cube face with the arrow shape and the white cube face must be on opposite sides. Option B is ruled out because the net doesn't have two identical faces. Option C is ruled out because the cube face with the wavy lines and the cube face with the grey stripe must be on opposite sides.

4) C
Option A is ruled out because the cube face with the spiral and the white cube face must be on opposite sides. Option B is ruled out because the cube face with the four black squares and the cube face with the three grey rectangles must be on opposite sides. Option D is ruled out because the net doesn't have two identical faces.

5) A
Option B is ruled out because the grey cube face and the cube face with the letter W must be on opposite sides. Option C is ruled out because the cube face with the two black lines and the black cube face must be on opposite sides. Option D is ruled out because the letter V does not appear on the net.

6) A
Option B is ruled out because the net doesn't have two identical faces. Option C is ruled out because the black cube face with the white star and the cube face with the grey wavy stripe must be on opposite sides. Option D is ruled out because the cross-hatched cube face and the cube face with the two diagonal lines must be on opposite sides.

7) A
Option B is ruled out because the net doesn't have two identical faces. Option C is ruled out because the white cube face and the cube face with the shield shape must be on opposite sides. Option D is ruled out because the cube face with the black arch and the cube face with the zig-zag line must be on opposite sides.

8) C
Option A is ruled out because the black cube face and the grey face with the white hexagon must be on opposite sides. Option B is ruled out because the cube face with the black star and the cube face with the lines must be on opposite sides. Option D is ruled out because if the cube face with the circle and the cross was on the top and the cube face with the black star was at the front, the cube face on the right would be the black face.

Section 4 — Reflect the Figure

1) C
Option A is a 90 degree anticlockwise rotation. In option B, the grey triangle has not been reflected. In option D, the arrow has not been reflected.

2) B
Option A is a 135 degree clockwise rotation. Option C is a downwards reflection. Option D

3) D

Option A is a 180 degree rotation. Option B has been reflected but it is missing a small line. Option C has not been reflected and the lines and the black dot are positioned incorrectly.

4) C

Option A is a 90 degree anticlockwise rotation. Option B is a 180 degree rotation. Option D is a downwards reflection.

5) D

Option A has not been reflected and has incorrect shading. Option B is a downwards reflection and the circle and square have swapped places. Option C has not been reflected and the circle has moved behind the triangle.

6) A

Option B has been reflected but the horizontal rectangle has moved to the front. Option C is a downwards reflection. Option D has not been reflected and the horizontal rectangle has moved to the front.

7) B

Option A is a 180 degree rotation. Option C is a downwards reflection. In option D the top two triangles have been reflected across but the bottom two triangles have been reflected downwards.

8) C

In option A, the shield shapes are wrong. Option B is a 90 degree anticlockwise rotation. In option D, the shield shapes have not been reflected.

9) B

Option A is a rotated reflection. Option C is the wrong shape. Option D is a 90 degree anticlockwise rotation.

10) D

Option A is a downwards reflection. In option B, the black shapes have swapped places. In option C, the small shapes have swapped places but the large shape has not been reflected.

Section 5 — 2D Views of 3D Shapes

1) C

There should be four blocks visible from above, which rules out options B and D. The block at the front of the shape is in the middle, which rules out option A.

2) A

There should be four blocks visible from above, which rules out options C and D. There are two blocks at the front of the shape, which rules out option B.

3) D

There should be five blocks visible from above, which rules out options A and B. There is only one block at the front, which rules out option C.

4) B

There should be five blocks visible from above, which rules out options A and C. There is only one block at the front of the shape, which rules out option D.

5) A

There should be six blocks visible from above, which rules out options B and C. There are three blocks visible on the left-hand side of the shape, which rules out option D.

6) D

On the right-hand side of the shape there is a gap the size of two blocks between the block at the front of the shape and the block at the back of the shape. This rules out options A, B and C.

7) A

On the right-hand side of the shape there is a gap the size of two blocks between the block at the front of the shape and the block at the back of the shape. This rules out options B, C and D.

8) A

There should be seven blocks visible from above. which rules

at the front of the shape, which rules out option D.

Answer-Key Notes: 11+ Non-Verbal Reasoning Answers

Compiled by SATs-Papers.co.uk to help you mark this paper and learn from each answer.

How to use this answer key

This answer key lists the correct option for each question, together with a short explanation of why the other options fail. When marking, award one mark per question only if the circled letter matches exactly. A common error is to circle two options when unsure; this scores zero. Where an answer is wrong, look at the explanation to decide whether the mistake was careless (misreading 'clockwise' as 'anticlockwise', forgetting to check all cube faces) or a gap in spatial reasoning (not visualising rotation, reflection or 3D views accurately). If more than three mistakes cluster in one section, work through the relevant examples below before moving on.

Use the worked examples to understand **why an answer is correct**, not just which letter to circle. Each explanation highlights the feature, transformation or rule that separates the right answer from the distractors. Revisit any question where the reasoning surprised you or where you guessed; that signals a concept worth practising further.

Score interpretation

This paper has 46 marks in total: 10 for Changing Bugs, 10 for Odd One Out, 8 for Cubes and Nets, 10 for Reflect the Figure and 8 for 2D Views of 3D Shapes. A score of 37 or above (80 per cent) suggests strong spatial reasoning and the ability to spot patterns, transformations and structural rules under time pressure. Mistakes at this level are usually careless rather than conceptual, so slow down and double-check each option before deciding.

Between 28 and 36 marks (roughly 60 to 80 per cent) indicates solid foundations but room to improve accuracy. Review the sections where you lost most marks; if errors are spread evenly, work on exam technique (eliminating wrong answers first, sketching nets mentally). If one section stands out, that topic needs targeted practice. Below 28 marks means spatial skills are still developing. Focus on one question type at a time, using physical models (drawing reflections on tracing paper, building cube nets from card) to make abstract transformations concrete.

Scores vary by section difficulty. Changing Bugs and Odd One Out reward careful observation of detail; Cubes and Nets and 2D Views test 3D visualisation; Reflect the

Figure punishes confusion between reflection and rotation. A low score in one section does not mean weakness across the board.

Worked examples

Changing Bugs, Q1–10

Each question applies the same transformation shown in the example pair to a new bug. Marks are lost when students identify only **part of the rule** (noticing the body change but missing the leg or antenna detail) or confuse similar transformations (reflection versus rotation, swap versus move). Always check every feature: body, legs, antennae, eyes, shell patterns and any shapes or shading. The correct answer will match the example transformation in every respect; the distractors typically get one or two features right but fail on others.

> **Q3** : A
>
> The example shows the shape on the bug's back rotating 90° clockwise and each antenna gaining an extra line. Option A applies both changes. Option B rotates the shape but the antennae are unchanged. Option C adds lines to the antennae but the back shape is wrong. Option D changes neither feature correctly.

> **Q7** : A
>
> The example reveals that each leg gains a foot whose shape matches the small inner shape in the body segment to which that leg is attached; the inner shapes then vanish. Option A shows three different foot shapes (triangle, square, circle) copied from the corresponding body segments, and those segments are now empty. The distractors either use the wrong foot shapes or leave the inner shapes visible.

> **Q10** : A
>
> Two transformations occur: each antenna gains an extra loop, and the three shapes on the bug's back each move one position clockwise (top moves to right, right to bottom, bottom to top). Option A performs both steps. Option B moves the shapes but the antennae are unchanged. Options C and D fail on one or both counts.

Odd One Out, Q1–10

Four figures follow a consistent rule; one breaks it. Marks are lost by choosing a figure that **looks different** rather than the one that defies the shared rule. Test each candidate rule (number of sides, position of elements, direction of arrows, shading pattern, symmetry) against all five figures. The correct odd-one-out will be the only figure to violate the rule that

the other four obey. Do not rush; some distractors are designed to catch students who spot a superficial difference without checking whether it is the rule that matters.

> **Q2** : D
>
> In options A, B, C and E the shapes proceed clockwise in the order circle, square, triangle, with the wavy line between the circle and square. Option D places the wavy line between the square and triangle, breaking the pattern. Students who focus on the shapes themselves without checking their sequence will miss this.

> **Q6** : D
>
> In options A, B, C and E the small line crosses over the top corner of the triangle. In option D it crosses a side edge instead. This is easy to overlook if you compare only the triangles' orientations rather than the exact position of the crossing line.

> **Q8** : D
>
> Every other figure has the same number of lines as black hexagons. Option A has two of each, B has two of each, C has three of each, E has four of each. Option D has three hexagons but four lines, so it is the odd one out. Counting carefully is essential.

Cubes and Nets, Q1–8

You must decide which cube can be made by folding the given net. The net shows six faces; when folded, **opposite faces never appear adjacent** on the cube. Eliminate options by checking whether faces shown next to each other on the cube would be opposite on the net (impossible) or whether a face appears on the cube but not on the net. Also check that no two faces are identical unless the net itself has duplicates. Most distractors fail one of these tests. Mentally folding the net or sketching the layout of opposite pairs saves time.

> **Q1** : C
>
> Option A is impossible because the five-dot face and the grey face are opposite on the net (count squares) yet adjacent on the cube. Option B shows two identical faces, but the net has none. Option D places the wavy-line face next to the black-with-white-stripe face; these are also opposite on the net. Only option C respects all adjacency rules.

Q5 : A

Option B fails because the grey face and the W face are opposite on the net but adjacent on the cube. Option C places the two-black-lines face next to the solid black face; again, these are opposite. Option D includes a letter V that does not appear anywhere on the net. Process of elimination leaves option A.

Q8 : C

Option A puts the solid black face next to the grey-with-white-hexagon face (opposite on the net). Option B puts the black-star face next to the lined face (also opposite). Option D would show the black face on the right if the circle-and-cross face were on top and the star face at the front, but the cube shows a different face there. Option C avoids all these contradictions.

Reflect the Figure, Q1–10

Reflection over the given line produces a mirror image. Marks are lost by confusing reflection with rotation (especially 90° or 180°) or by reflecting only part of the figure. **Every point must swap sides** perpendicular to the mirror line while keeping its distance from that line unchanged. Check the direction the figure faces, the position of any internal shapes and any asymmetric details (arrows, shading patterns). Distractors often show a correct transformation of one element but leave another element unaffected or apply a rotation instead.

Q5 : D

Option A has neither been reflected nor corrected for shading. Option B is a downwards reflection (wrong axis) and the circle and square have swapped places. Option C is not reflected and the circle has moved behind the triangle. Only option D correctly mirrors every element across the vertical line, preserving distances and angles.

Q7 : B

Option A is a 180° rotation, not a reflection. Option C reflects downwards instead of across the line. Option D reflects the top two triangles correctly across the vertical but reflects the bottom two downwards, mixing two different axes. Option B reflects all four triangles consistently over the vertical line.

> **Q10** : D
>
> Option A reflects downwards (wrong axis). In option B the two black circles have swapped places (a rotation clue). In option C the small shapes swap but the outline has not been reflected. Option D mirrors the entire figure, including the position of the black circles, across the vertical line.

2D Views of 3D Shapes, Q1–8

Each question asks for the top-down view of a 3D block arrangement. **Count the number of squares visible from directly above**, then check their layout (how many at the front, any gaps). Distractors usually show the wrong total number of blocks, place blocks in the wrong row or fail to represent gaps correctly. Imagine looking straight down; any block hidden completely beneath another block will not appear in the 2D view. Eliminate options by counting, then by checking front-to-back and left-to-right alignment.

> **Q3** : D
>
> From above, five blocks are visible (eliminating A and B, which show more). There is only one block at the front of the shape (eliminating C, which shows two). Option D correctly places one block at front centre, two in the middle row and two at the back, matching the 3D figure.

> **Q6** : D
>
> On the right-hand side of the 3D shape there is a two-block gap between the front and back blocks. Options A, B and C all show continuous right-hand columns with no gap. Only option D represents the gap correctly while also matching the total count and left-side layout.

> **Q8** : A
>
> Seven blocks are visible from above (ruling out D, which shows only six). The shape is four blocks deep from front to back (ruling out C, which is three deep). Three blocks sit at the front (ruling out B, which shows two). Option A satisfies all three constraints and matches the 3D structure exactly.

Next steps

After marking, separate careless errors (misread the question, ticked the wrong box, missed one detail) from knowledge gaps (could not visualise the net folding, confused reflection with rotation). For careless mistakes, agree a checking routine: re-read the

example transformation, eliminate obviously wrong options first, double-check your circled answer against every part of the rule. For knowledge gaps, practise that question type in isolation using physical aids (trace reflections on acetate, fold paper nets, build block towers and photograph them from above) until the concept clicks.

If you scored below 28, retake this paper in a week after focused practice on your weakest section; aim for a ten-mark improvement rather than perfection. Between 28 and 36, work through past papers that isolate your problem areas (more nets questions, more reflection grids) and time yourself to build speed. Above 37, challenge yourself with harder non-verbal reasoning papers or timed conditions (18 minutes for the full paper) to maintain accuracy under pressure. Keep a log of recurring mistake types so you know exactly what to watch for in the real exam.
