

**Answers to Sample 11+ Assessment Test  
for CEM (Durham University) Tests  
— 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 and the diamond shape is in the bottom 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 is a 45 degree anticlockwise rotation.

**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 out option D. The figure is four blocks long from front to back. This rules out option C. There are three blocks at the front of the shape, which rules out option B.