

Math Kangaroo Level 5-6

3D Geometry



Warm Up



Instruction



3D Geometry



Wrap Up

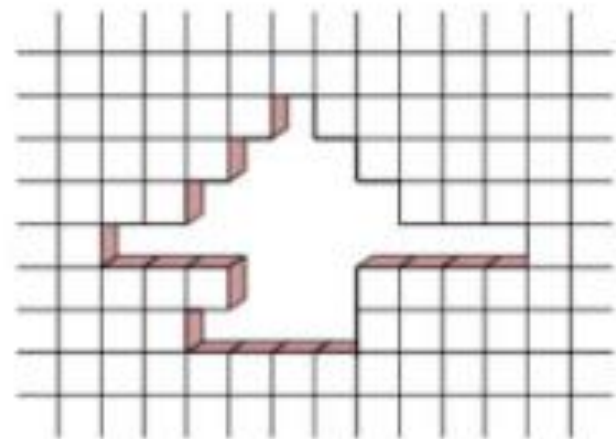


Bonus Slides

Warm up

MK 1999 #10

How many bricks were taken out from the wall shown in the picture?



3D Geometry

What are 3D shapes?



In geometry, a three-dimensional shape can be defined as a solid figure or an object or shape that has three dimensions - **length, width, and height**. Unlike two-dimensional shapes, three-dimensional shapes have **thickness** or **depth**.

- 3D shapes have specific properties such as the number of **edges, faces, and vertices**.
- 3D shapes are **solid**, while 2D shapes are **flat**.
- 3D shapes are usually created by the rotation of the 2D shapes.

3D Geometry

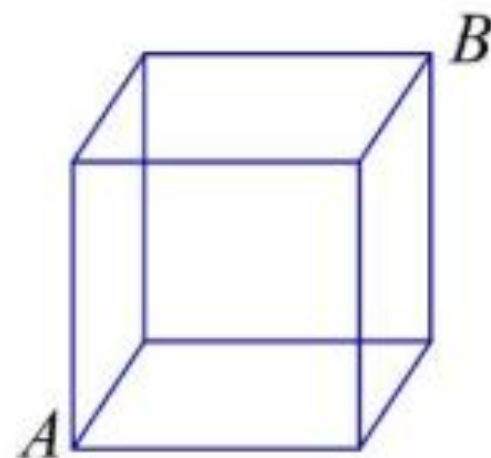
Vocabulary

- Face - a curved or flat surface on the 3D object covered by its edges.
- Vertex - a corner point where the edges meet.
- Edges - a line segment drawn between the faces.
- Net - a flat diagram of the faces that would fold to make a 3D object.
- Surface area - the total area of the surface of a 3D object.
- Volume - the amount of 3-dimensional space an object occupies.
- Base - the surface a solid object stands on, or the bottom line of a shape such as a triangle or rectangle. But, the top is also called a base when it is parallel to the bottom.

Shape	Picture	Faces	Edges	Vertices
Sphere		0	0	0
Cube		6	12	8
Rectangular Prism		6	12	8
Square Pyramid		5	8	5
Cylinder		2	0	0
Cone		1	0	1

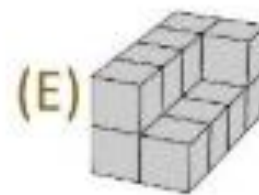
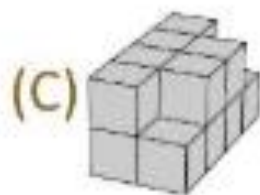
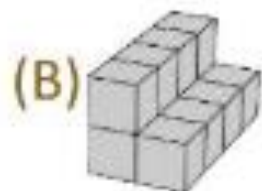
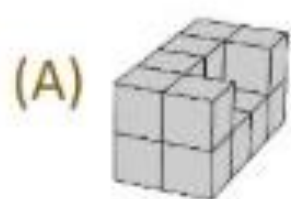
MK 2003 #12

1. How many shortest distances along the edges of the cube are there that connect vertex A with the opposite vertex B ?



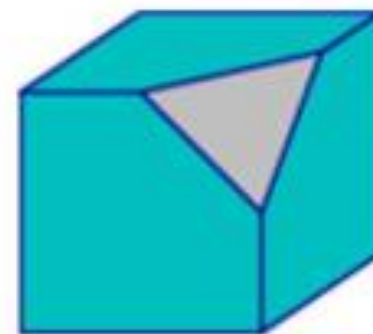
MK 2019 #10

2. Michael paints the following solids made out of identical cubes. Their bases are made of 8 cubes. Which solid needs the most paint?

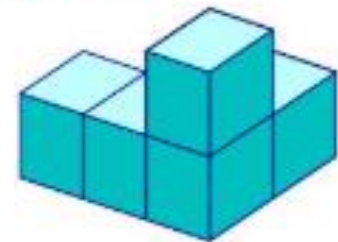
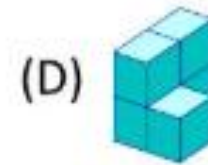
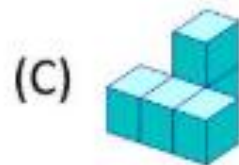
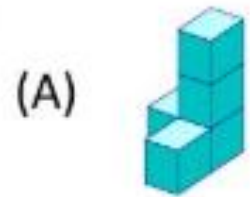


MK 2004 #17

3. One corner of a cube was cut off. Which of the figures below represents the net of the cube after unfolding?



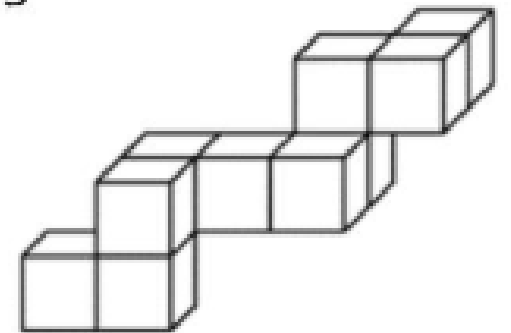
4. Each of the figures (A) to (E) shown below is made of exactly 5 blocks. Which of them can you not make if you start with the figure on the right and are allowed to move only one block?



MK 2017 #14

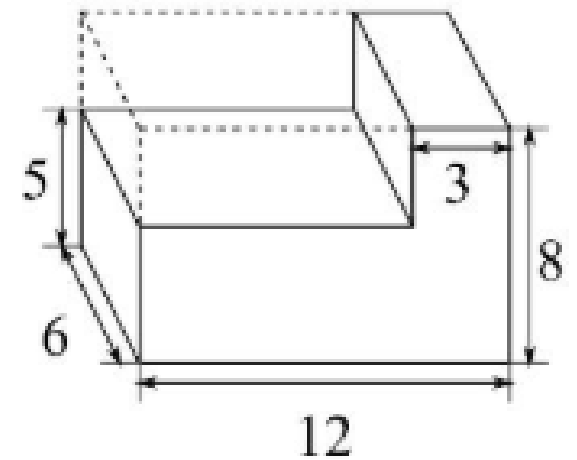
5. Morten wants to put the figure shown on the right into a regular box. Which of the following boxes is the smallest he can use?

- (A) $3 \times 3 \times 4$ (B) $3 \times 5 \times 5$ (C) $3 \times 4 \times 5$ (D) $4 \times 4 \times 4$ (E) $4 \times 4 \times 5$



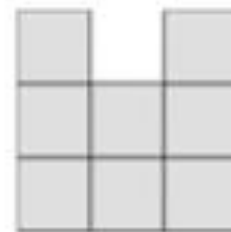
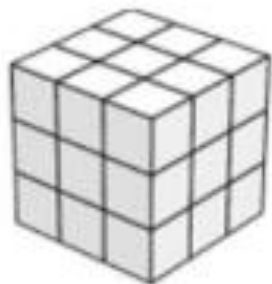
MK 2007 #14

6. By what amount will the surface area of the rectangular block, shown in the picture, decrease if a rectangular section is removed as shown?



MK 2014 #21

7. The $3 \times 3 \times 3$ cube in the picture is made of 27 small cubes. How many small cubes do you have to take away to see the picture on the right as the result when looking from the right, from the above, and from the front?



8. What does the object in the picture look like when viewed from above?

