

# SMILE WORKCARDS

## 3-D Pack Three

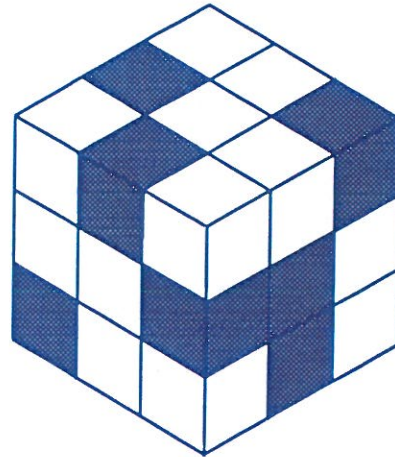
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# Blue in the face

You will need *at least* 9 blue cubes and 18 white cubes.

Use 9 blue cubes and 18 white cubes to build a  $3 \times 3 \times 3$  cube.



How many blue faces are showing on your cube?

**26** is the **maximum** number of blue faces.  
Rearrange your cube to have 26 blue faces showing.  
Explain where the blue cubes were placed.

Rearrange your cube to have the **minimum** number of blue faces showing.  
How did you place your blue cubes this time?

Investigate the **maximum** and **minimum** number of blue faces of  $3 \times 3 \times 3$  cubes with different proportions of blue and white cubes.

*Investigate cubes of different sizes.*

*Investigate cuboids of different sizes.*

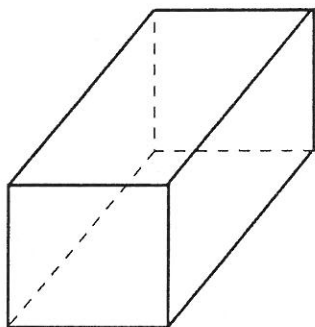
# Cutting Corners

Solids have **F**aces, **V**ertices and **E**des.

How many before and after cutting?

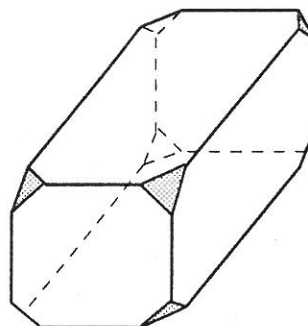
## Cuboid

Before



$$\begin{aligned} F &= 6 \\ V &= 8 \\ E &= 12 \end{aligned}$$

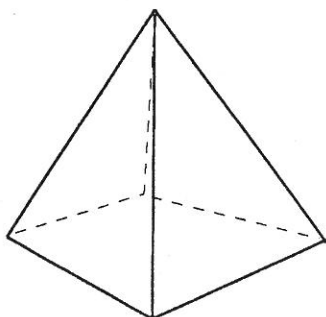
After



$$\begin{aligned} F &= 14 \\ V &= 24 \\ E &= 36 \end{aligned}$$

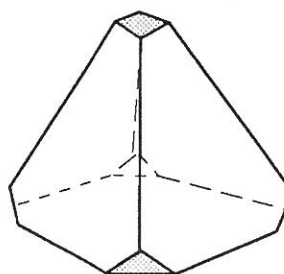
## Rectangular Pyramid

Before



$$\begin{aligned} F &= 5 \\ V &= 5 \\ E &= 8 \end{aligned}$$

After



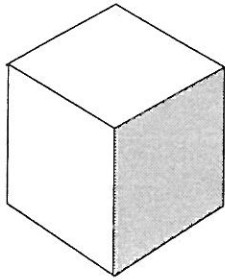
$$\begin{aligned} F &= 10 \\ V &= 16 \\ E &= 24 \end{aligned}$$

Investigate for other solids.

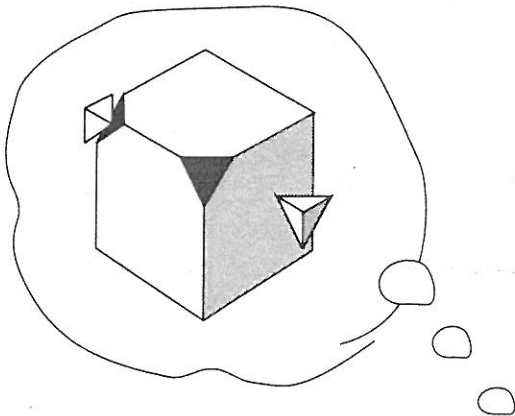
# Cut a Cube

You will need a box of solids and ATM Mats or plasticine.

- Place a cube on the table in front of you.



- *Imagine* cutting off every corner of the cube.



- Sketch the new solid you have imagined.
- Draw its net accurately and make the solid.  
*The solid will depend on how much you 'cut off'.*

## Try these

*'After the corners are cut off **one-third** of the original edge length is left.'*

*'After the corners are cut off **none** of the original cube's edges are left.'*

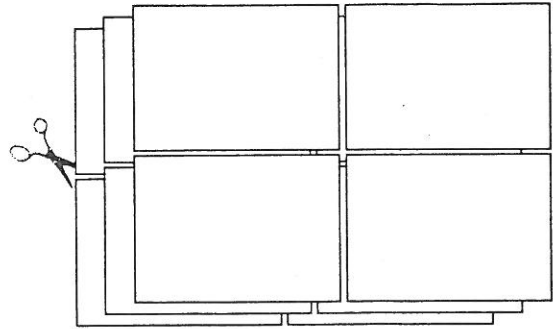
- Try 'cutting corners' from:  
a tetrahedron - an octahedron - other solids.

# Origami Dodecahedron

Smile 2218

You will need:  
three A4 sheets of paper  
and scissors.

Cut the paper into quarters to make  
12 rectangles.



Take each rectangle and follow steps 1 to 7.

**1.**

**2.**

**3.**

You will get  
a hexagon.

**4.**

Fold in half.  
Tuck the ★ under the ■.

**5.**

This line is to be parallel to this line.

**6.**

This should be a regular pentagon.

**7.**

Open out.

Using these 12 pieces follow steps 8 to 10 to construct a dodecahedron.

**8.**

Make 4 of these.

**9.**

Join 3 together.

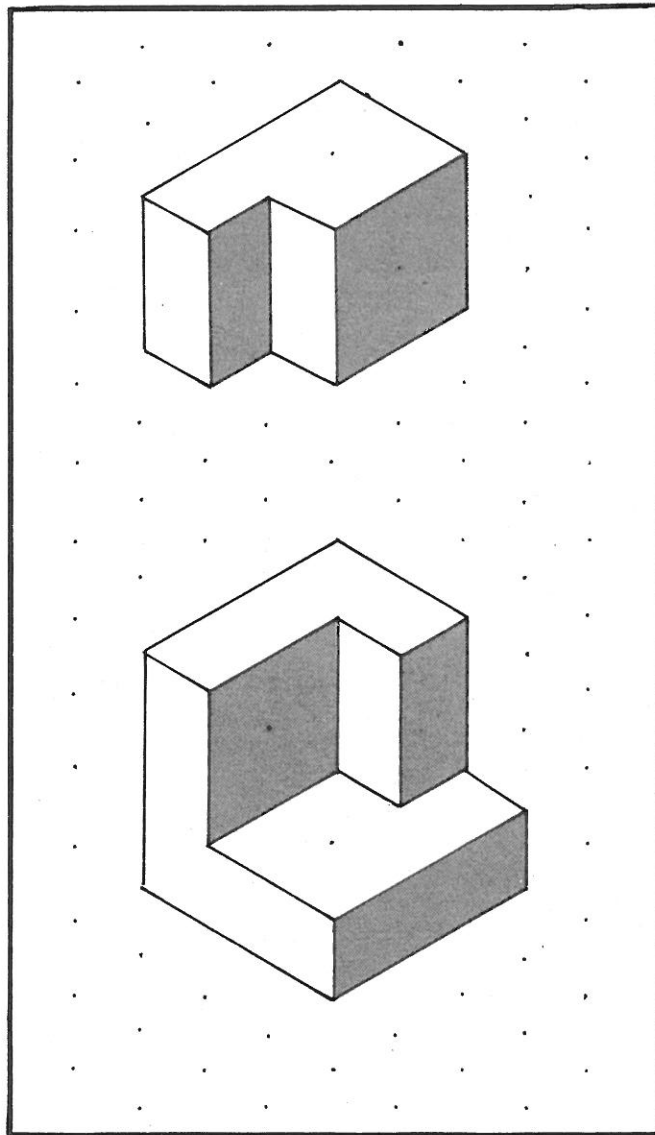
**10.**

Add the final piece.

THE

RIGHT

SIDE

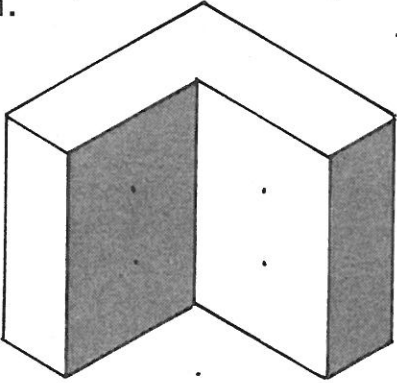


These two pieces will fit together to form a  $3 \times 3 \times 3$  cube.

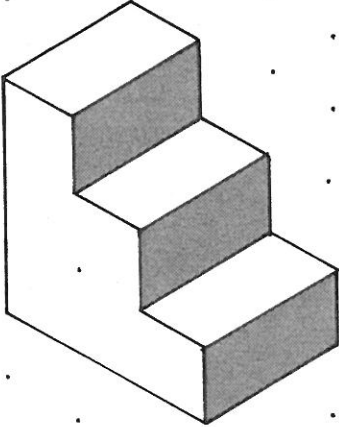
Draw pieces which will fit with each of these shapes to form a  $3 \times 3 \times 3$  cube.

In each case show the inside view.

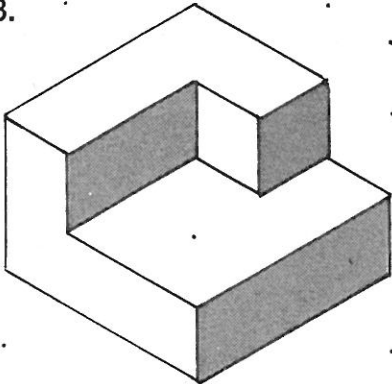
1.



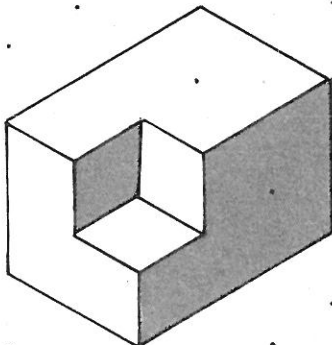
2.



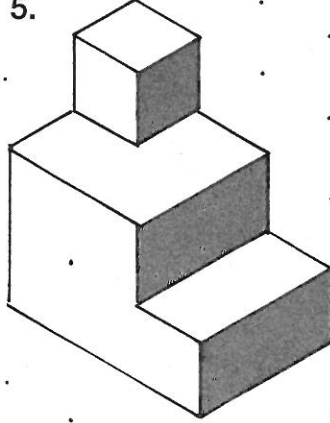
3.



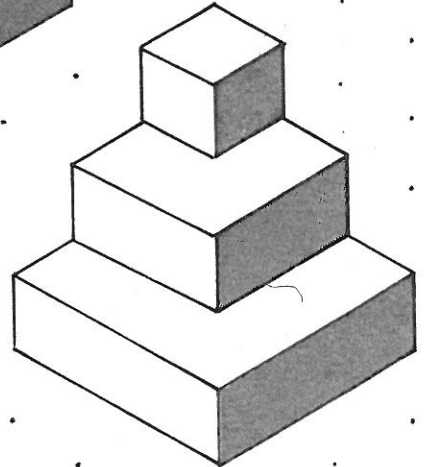
4.



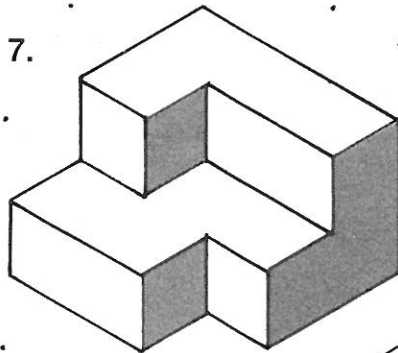
5.



6.



7.



8.

