

## Can I identify nets for 3-D shapes, visualising corresponding features?

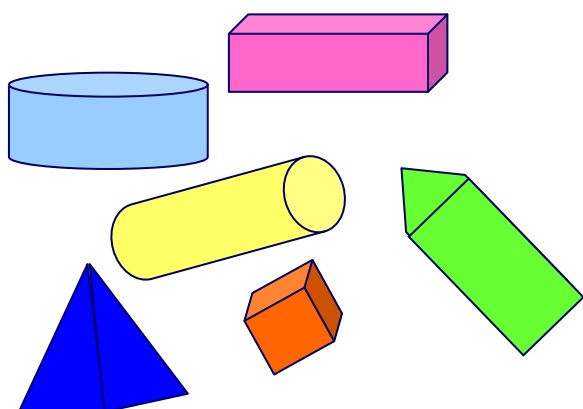
### Teaching guidance

#### Key vocabulary

net, face, vertex, edge, parallel, perpendicular, shape names

#### Models, images and resources

##### 3-D shapes and packaging boxes

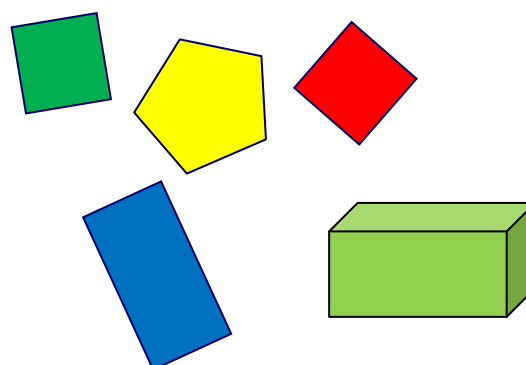


Collect interesting boxes for children to deconstruct. This allows them to find out one possible arrangement of shapes to make a net. They can then draw round each face and test out alternative arrangements.

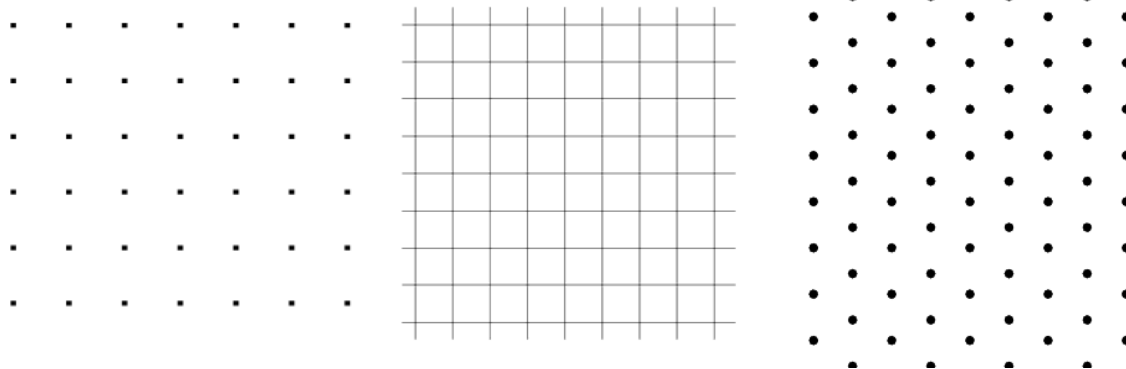
Encourage children to visualise deconstructing 3-D shapes and boxes to decide where to place faces in a net.

##### Construction kits

Giving children opportunities to create nets out of construction kits allows them to test out their suggestions for nets quickly. They can easily correct any errors and try out different arrangements of the faces.



## Squared and isometric paper



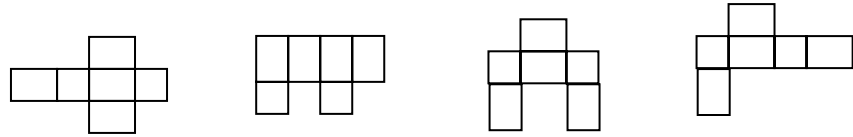
## Teaching tips

- Ensure that children have regular opportunities to handle and deconstruct 3-D shapes and boxes and are able to describe and classify 3-D shapes using criteria such as: number and shape of faces, number of edges, number of vertices and number of pairs of parallel sides.
- Collect interesting boxes for children to deconstruct. This allows them to find out one possible arrangement of shapes to make a net. They can then draw round each face and test out alternative arrangements.
- Model accurate and precise use of mathematical vocabulary to describe 3-D shapes and their nets. Ensure that children's activities promote discussion so that they are encouraged to use accurate shape vocabulary themselves.
- Children will need opportunities to deconstruct 3-D boxes and packaging to create nets before they are able to design nets for themselves. Before pulling boxes apart, ask children to picture unfolding them. Ask questions such as:
  - *Where will the top face stay connected?*
  - *Which faces will need to be separated and which will stay connected?*
- Use of shape construction kits provides an easy way to build shapes from nets and allows children to try alternatives quickly.
- Use of square/triangular grid and isometric paper can help children to draw nets without spending a long time constructing each face.
- Give children regular opportunities to visualise folding up a given net to create a 3-D shape. Make sure they have time to discuss their reasoning. Ask questions such as:
  - *Which face are you intending to leave in place to form the base?*
  - *Will these two faces meet when the net is folded?*
  - *Where will this face be when it is folded up?*
  - *Will any face be parallel to this one?*

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#### Overcoming barriers level 4–5

- Once children have had time to visualise folding up a given net, they need to test out their ideas, folding up one face at a time, discussing whether their predictions were correct and re-adjusting their ideas where necessary.
- Give children opportunities to decide which shapes do and do not form a net for a particular 3-D shape, for example: predicting and then testing which of the shapes below form a net for a cuboid.



- Give children partially complete nets and ask them to identify what shape(s) they could form and where the missing faces could be placed to complete them.
- Once children are able to identify and create nets for common 3-D shapes, include opportunities to decorate nets, for example:
  - Explore the position of the numbers on a dice and place the numbers accordingly on nets for a cube.
  - Colour a net so that parallel faces of the 3-D shapes will be the same colour.
  - Colour nets so that no two adjacent faces on the 3-D shape will be the same colour. Find the fewest number of colours possible.
  - Deconstruct packaging that incorporates a simple design, remove one face and then copy the rest of the net. Ask children to draw and decorate the missing face so that the pattern matches along all edges.