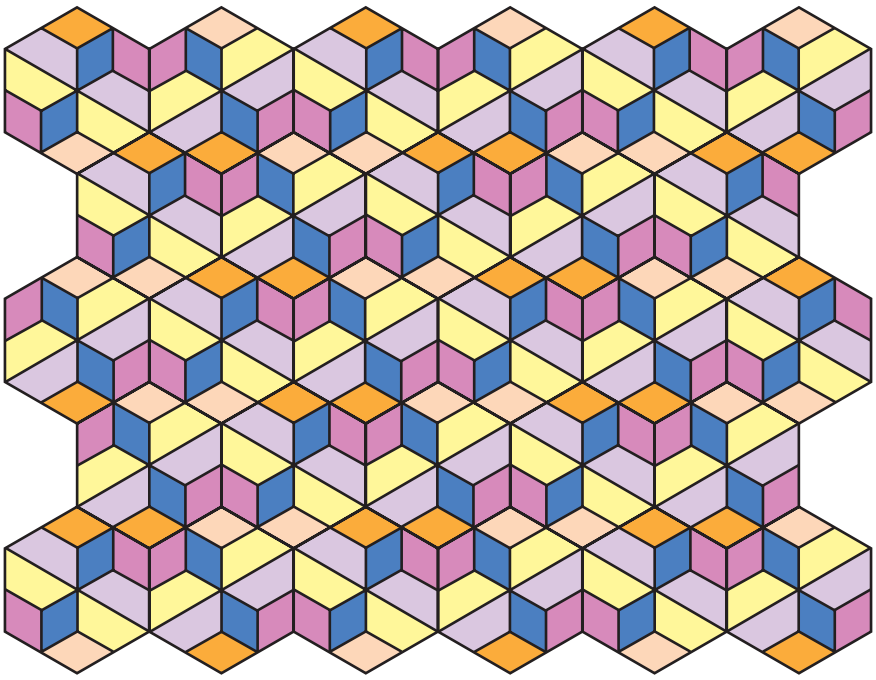
Tessellating shapes (continued)

Combining regular and irregular polygons

Mathomat offers lots of scope for drawing more tessellations. Here different shapes have been combined to make a hexagon (which is a regular polygon).

Alternate hexagons have been flipped. Tessellations can be coloured to create the illusion of being concave or convex.

See 'Get tessellating' and 'Get transforming'.



Using shapes 21 and 31

Schläfi coding the Platonic solids to find their duals

solid	number of sides of each face	number of times repeated at vertex	Schläfi code
 Tetrahedron	3	3	(3,3)
 Hexahedron	4	3	(4,3)
 Octahedron	3	4	(3,4)
 Dodecahedron	5	3	(5,3)
 Icosahedron	3	5	(3,5)

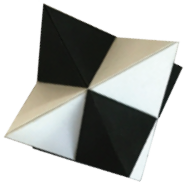
Because the pattern formed at each vertex of any individual Platonic solid is always the same we can use Schläfi coding to describe each solid by describing one of its vertices. For example, the vertex of a tetrahedron is (3,3) meaning that each vertex is comprised of a 3 sided shape repeated 3 times.

The Schläfi codes for the other 4 Platonic solids are shown on the left.

The duals of the Platonic Solids occur when one Platonic solid has as many vertices as another solid has faces.

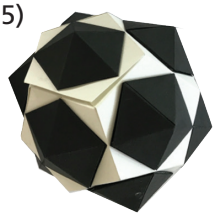
The three duals of the Platonic solids are shown here. See if you can visualise how they comprise two "interpenetrating" Platonic solids each.

Tetrahedron (3,3) "selfdual"



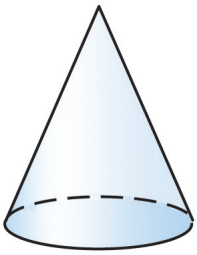
Cube (4,3) and Octahedron (3,4)

Icosahedron (3,5) and Dodecahedron (5,3)

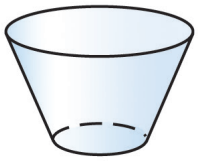


Three dimensional diagrams

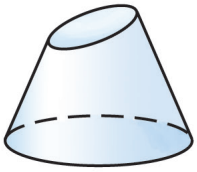
The polygons on Mathomat can be used to draw these 3D diagrams, some with the ellipses as bases.



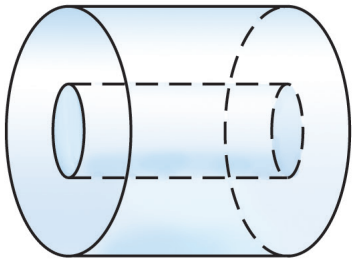
cone
using shapes 42 & 43



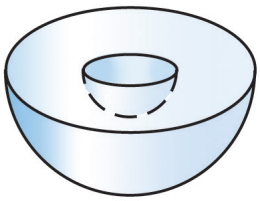
frustrum of cone
using shapes 42, 43 & 39



conic section using
shapes 42, 43 & 39

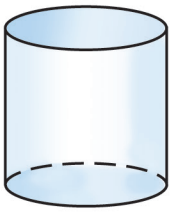


hollow cylinder using
shapes 26 & 39

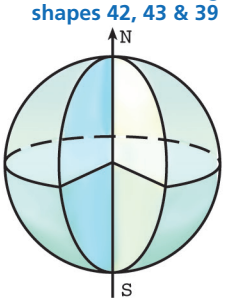


hollow hemisphere
using shapes 11(TGT),
26, 10 & 39

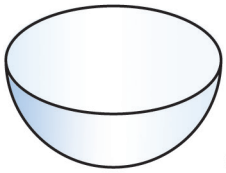
sphere using shapes
11(TGT), 26 & 39



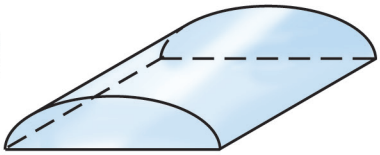
cylinder using
shapes 30 & 39



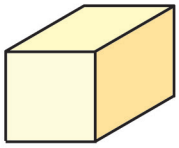
globe using shapes
11(TGT) & 26



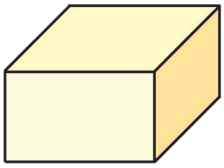
hemisphere using
shapes 18 & 26



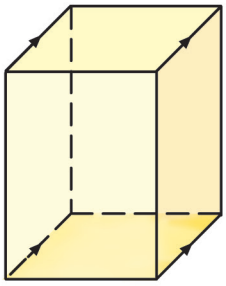
semi-elliptical tank using
shape 15



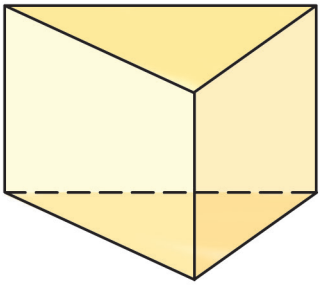
square box or cube using
shapes 21, 22 & 23



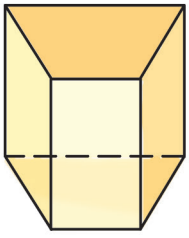
rectangular box or cuboid
using shapes 28, 30 & 40



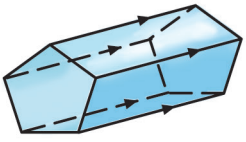
right square prism
using shapes 21, 30 & 40



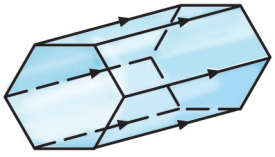
triangular right prism
using shape 36



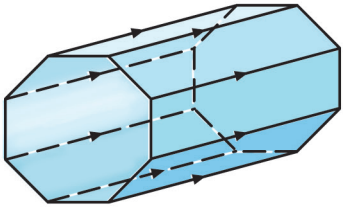
right trapezoidal prism
using shapes 28, 30 & 31



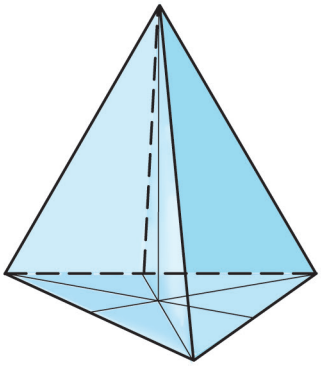
pentagonal prism
using shapes 12 or 13



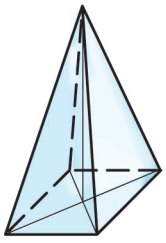
hexagonal prism
using shape 4 or 7



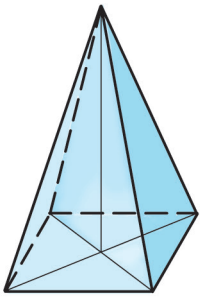
octagonal prism using
shapes 3 or 6



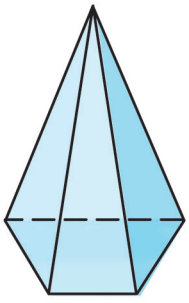
triangular pyramid
using shape 38



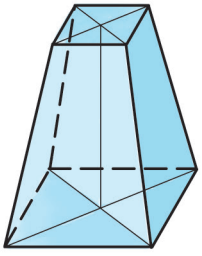
square pyramid
using shape 28



rectangular pyramid
using shape 40



trapezoidal pyramid
using shape 31



frustrum of
rectangular pyramid
using shape 40