Results of Pocket Flexes

Les Pook

In his recent posting Scott Sherman considers the effects of local flexes, including pocket flexes. I have investigated the effects of pocket flexes on a variety of flexagons. Most of the flexagons have two leaves in each pat and have the same pat structure as the tetrahexaflexagon, but some are more complicated. The photographs below show a selection of positions in which pairs of pats have been converted into flaps by using pocket flexes. Section headings refer to the polygons used to construct the flexagons, and sub-headings to the as assembled appearance. I found that it is possible to have more than one flap attached at the same edge, and also that is possible to have flaps attached to the slant edges of pyramids as well as to the basal edges. As noted by Scott, some hexaflexagons can be flexed using two pocket flexes that are equivalent to a pinch flex. However, it is also possible to apply a double pocket flex to a tetrahexaflexagon that is not equivalent to a pinch flex. This results in three triangles with a common edge. This position looks as if the tetrahexaflexagon is part way through a pinch flex, but the pat structure is different. There are other subtleties, and enumeration of the possible positions resulting from pocket flexes is difficult. Pocket flexing the rhombus flexagons needs a lot of leaf bending, so they look rather bedraggled in some of the photographs.

Equilateral triangles

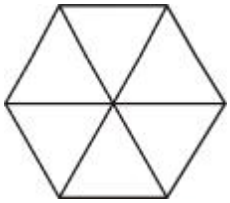
(a) Five triangles in a slant ring

As assembled

One single pocket flex

Double pocket flex

(b) Six triangles in a flat ring (Tetrahexaflexagon)



As assembled (schematic)

One single pocket flex

Double pocket flex

(c) Seven triangles in a skew ring

As assembled

One single pocket flex

Two double pocket flexes

One double pocket flex

Two single pocket flexes and one double pocket flex

(d) Nine triangles in a skew ring

As assembled

Two single pocket flexes

Three single pocket flexes

Isosceles triangles

(a) Five triangles in a flat ring

As assembled

One single pocket flex

(b) Seven triangles in a flat ring

As assembled

One single pocket flex

Two single pocket flexes

Two single pocket flexes

(c) Nine triangles in a folded ring (Thrice three-fold flexagon)

As assembled

One single pocket flex

Three single pocket flexes

Squares

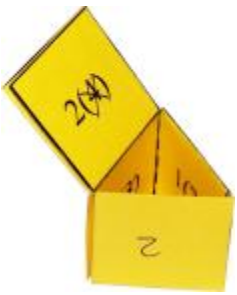
(a) Five squares in a skew ring

As assembled

One single pocket flex

(b) Five squares in a box ring

As assembled



One single pocket flex

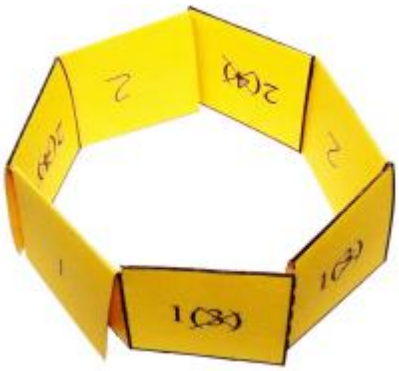
(c) Six squares in a box ring

As assembled

One single pocket flex

One double pocket flex

(d) Seven squares in a box ring



As assembled

One single pocket flex

Rhombi

(a) Five rhombi in a flat ring

As assembled

One single pocket flex

(b) Seven rhombi in a flat ring

As assembled

One single pocket flex

Two single pocket flexes

(c) Nine rhombi in a flat ring

As assembled

One single pocket flex

Two single pocket flexes

Regular pentagons

(a) Five pentagons in a skew ring

As assembled

One single pocket flex

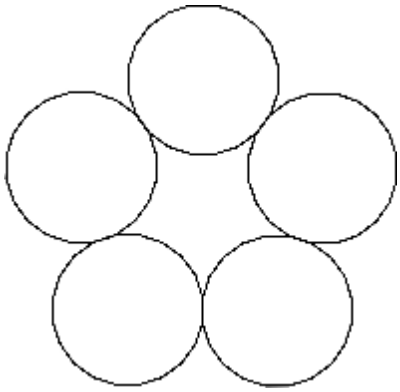
(b) Five pentagons in a slant ring

As assembled

One single pocket flex

Regular 20-gons

Five 20-gons in a flat ring



As assembled (schematic)

One single pocket flex