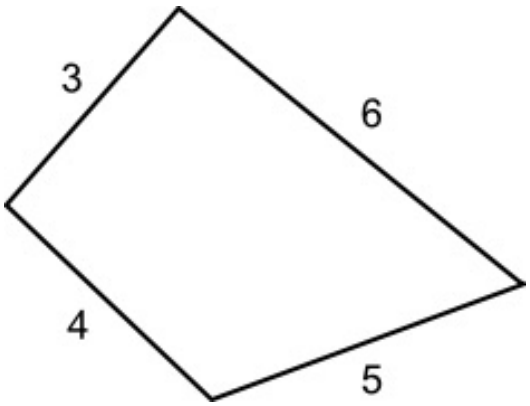
BENDY QUADS

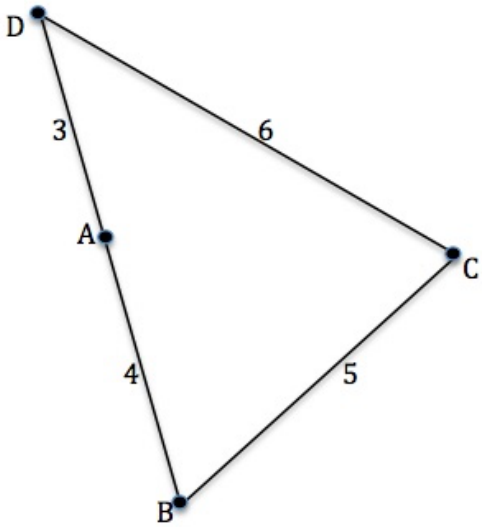
See the Bendy Quads video **https://bit.ly/BendyQuadsVideo**



Four rods are hinged at their ends to form a convex quadrilateral with sides of length 3, 4, 5 and 6 (in that order). Investigate the different shapes that the quadrilateral can take if the polygon is always convex.

How do the angles change as the bendy quad changes shape?

Can any of the angles reduce to zero degrees?

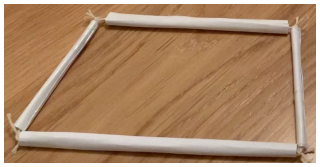


Can any of the angles increase to 180 degrees?

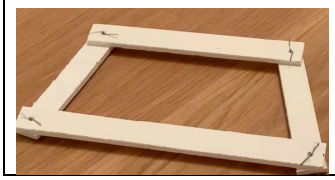
Calculate the size of angle C when the rods form a triangle as shown. If the polygon remains convex, can angle C get any smaller than shown in this diagram? What is the smallest size of angle C and what is the largest?

Find the smallest and largest values that the other angles can take in a similar way.

HELP



You might make a model that you can manipulate and experiment with, changing the angles. You could use 4 paper sticks of lengths 3, 4, 5 and 6 units choosing your own scale. For example, your sticks could be 6 cm, 8 cm, 10 cm and 14 cm (linear scale factor 2).



The special quads in the two pictures, with edge lengths 2, 3, 2 and 5, can both form a symmetric trapezium.

For the stiff quad model cut 4 strips of card and join them to form a quadrilateral of the given dimensions using split pins to link the strips of card.

The final calculations only require the use of cosine and sine rules.

NEXT

You could investigate non-convex quadrilaterals.

You could investigate the area of the quadrilateral and how this changes.

Can you make all the types of quadrilateral with 4 rods, for example a trapezium or a cyclic quadrilateral?

Try a quadrilateral with edges of lengths: 3, 5, 8 and 6. What is special about this quadrilateral?