

# BIRTHDAY PRESENTS MATH

You have 1m ribbon, and you want to wrap (as customary) a package that is a cube of side 10cm, leaving 20cm for the bow. Is the ribbon sufficient?

(Suppose for simplicity that the length is not affected by the twists of the ribbon.)



There is the happiest ending: one needs 8 segments of 10 cm and 20cm for the bow, so 1m ribbon is precisely what one needs.

*What is the formula for the length of the ribbon that is needed (without the bow)?*

- For a cube (of side length  $L$ ):  $8L$
- For a square cuboid (basis square of side length  $L$ , and height  $H$ ):  $4(L+H)$
- For a cuboid (basis rectangle of side lengths  $L$  and  $L'$ , and height  $H$ ):  $2L+2L'+4H$

**Hyperbole:** Challenge the pupil to invent the most difficult ribbon exercise they can solve, with freedom in the packaging style.

**Exploration:** with the standard packaging, it does not matter if the bow is in the middle.

The pupils should be able to provide a proof of this fact. Indeed, no matter the position of the bow, on the upper (respectively, lower) face, the length of each of the two crossing segments does not change.