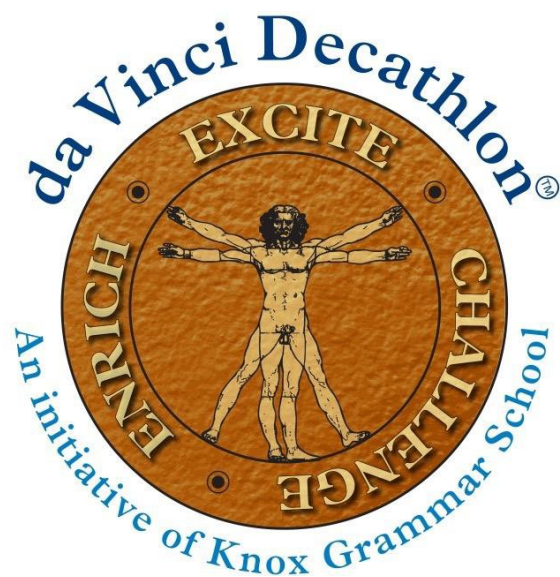




# STATE DA VINCI DECATHLON 2018

CELEBRATING THE ACADEMIC GIFTS OF STUDENTS  
IN YEARS 9,10 & 11



## ENGINEERING

TEAM NUMBER	
TOTAL	/38
RANK	

# Jack-in-the-box

## BACKGROUND

A Jack-in-the-box is a traditional children's toy consisting of a decorated box with a manual crank. When the crank is turned, it plays a tune and near the end of the tune a figure pops out from the top. It is designed to give the user an unexpected surprise. The figure, or Jack, is usually a clown or jester and the traditional tune used is "Pop goes the Weasel".



## THE TASK

Your task is to design and build a simple Jack-in-the-box from the materials provided. Your Jack-in-the-box should be made to appeal to a person of your age. It should be designed to surprise the user in several ways. Your Jack-in-the-box should 'pop' when a lever is pulled/pushed/turned, or when the lid is opened. You could create an extra level of surprise by making it 'pop' randomly once the level is engaged. You may choose a figure that will surprise the user. The unexpected surprise, or surprises, are up to you.

## DESIGN STATEMENT

The Jack-in-the-box must be a self-supporting box and be moveable to the marking area. You will have **TWO** minutes at the marking area to set up your design ready for testing.

Your Jack-in-the-box will need to be a box. The figure must 'pop' out of the box from the top. You will therefore need to design a lever, a latch for the lid and a spring mechanism using the materials provided.

It must be clear to the marker what they need to do to engage the Jack-in-the-box mechanism. i.e. what to pull/push/turn/open.

Complete the design sketch and details on pages 4-6. These will not only be marked independently for the design details marking component, but also to assist with marking the first 7 criteria.

## DESIGN PARAMETERS

You will have **sixty minutes** to design and construct your Jack-in-the-box.

The model will be marked according to:

- The design of the box
- The design of the lever and latch mechanism
- The design of the spring mechanism
- The aesthetic of the box and the figure
- How well it works
- Quality of design and efficient use of materials
- The level of surprise(s)
- Design details (page 4-5)
- Design sketch (page 6)

You will be provided with a number of materials. It will be up to the team to decide which materials to use to construct your Jack-in-the-box. You can select from the following materials:

- 6 pieces of A4 paper
- 2 pieces of A4 card
- 10 straws
- 8 paper fasteners
- sticky tape (your own)

Team No.: \_\_\_\_\_

## MARKING MATRIX

Criteria	Skilful	Effective	Sound	Limited
Box design	4	3	2	1/0
Lever and latch design	4	3	2	1/0
Spring design	4	3	2	1/0
Aesthetics of the box and figure	4	3	2	1/0
Does it work	4	3	2	1/0
Quality of model design (original use of materials, stable and strong, very high attention to detail)	4	3	2	1/0
Level of surprise	4	3	2	1/0
Design details	6	4	2	1/0
Design sketch	4	3	2	1/0

<b>TOTAL</b> <b>/38</b>
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## DESIGN DETAILS (6 MARKS)

1. Explain the design of the lever and latch mechanism used to release the Jack. You may refer to your design sketch when explaining (2 marks)

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2. Explain the spring mechanism that you have designed. You may refer to your design sketch when explaining (2 marks)

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3. Describe the features that you have included to surprise the user.

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**/2**

4.

## DESIGN SKETCH (4 MARKS)

Briefly sketch your design with approximate proportions, labelling any important features.

**/4**