Prepare your students for the Science Alive! STEM DAY OUT Student Cadet Rocket Adventure Program (SCRAP) Challenge. Ignite the engineering and design creativity of your students by having them design, construct, and launch a paper rocket using the guide provided. ***Students are encouraged to construct their rocket at school and bring it with them to Science Alive!*** but may also construct their rocket when attending the SCRAP Challenge launch zone.

Can you design and construct a rocket that will launch successfully?

At school activity

The purpose of this activity is to familiarise students with concepts of aerodynamic design and propulsion, prior to attending the Science Alive! STEM Day Out. Students should be given the opportunity to design and construct a paper rocket with the aim of achieving the greatest launch distance. Variations in design and construction may affect the performance of each rocket. Students should be involved in the collection and comparison of launch distance measurements and use these data to inform design and construction choice refinements. Extend the activity to have your students build their own launcher system, or by competing in a launch competition to measure and compare achieved launch distances of each design.

Objectives:

- Utilise design and engineering processes
- Learn about propulsion, ballistic trajectories and aerodynamic effects
- Collect and use data to inform iterative design
- Provide a practical, hands-on learning experience

What you will need:

- A4 paper (various colours)
- Markers
- Sticky Tape
- Scissors

Teacher materials:

- Paper rocket build instruction sheet (provided)
- Rocket design template (provided – optional)
- Data sheet to record launch distances including name, date, distance achieved for each launch and mean calculation (not provided – for extension activities).

Curriculum Links:

Maths

Students solve authentic problems using numbers and measurements, working with transformations and identifying symmetry, calculating angles and interpreting sets of data collected through investigations

Science

Science Understanding - Year 7 Physical science

Students can represent and predict the effects of unbalanced forces, including Earth's gravity, on changes in an object's motion.

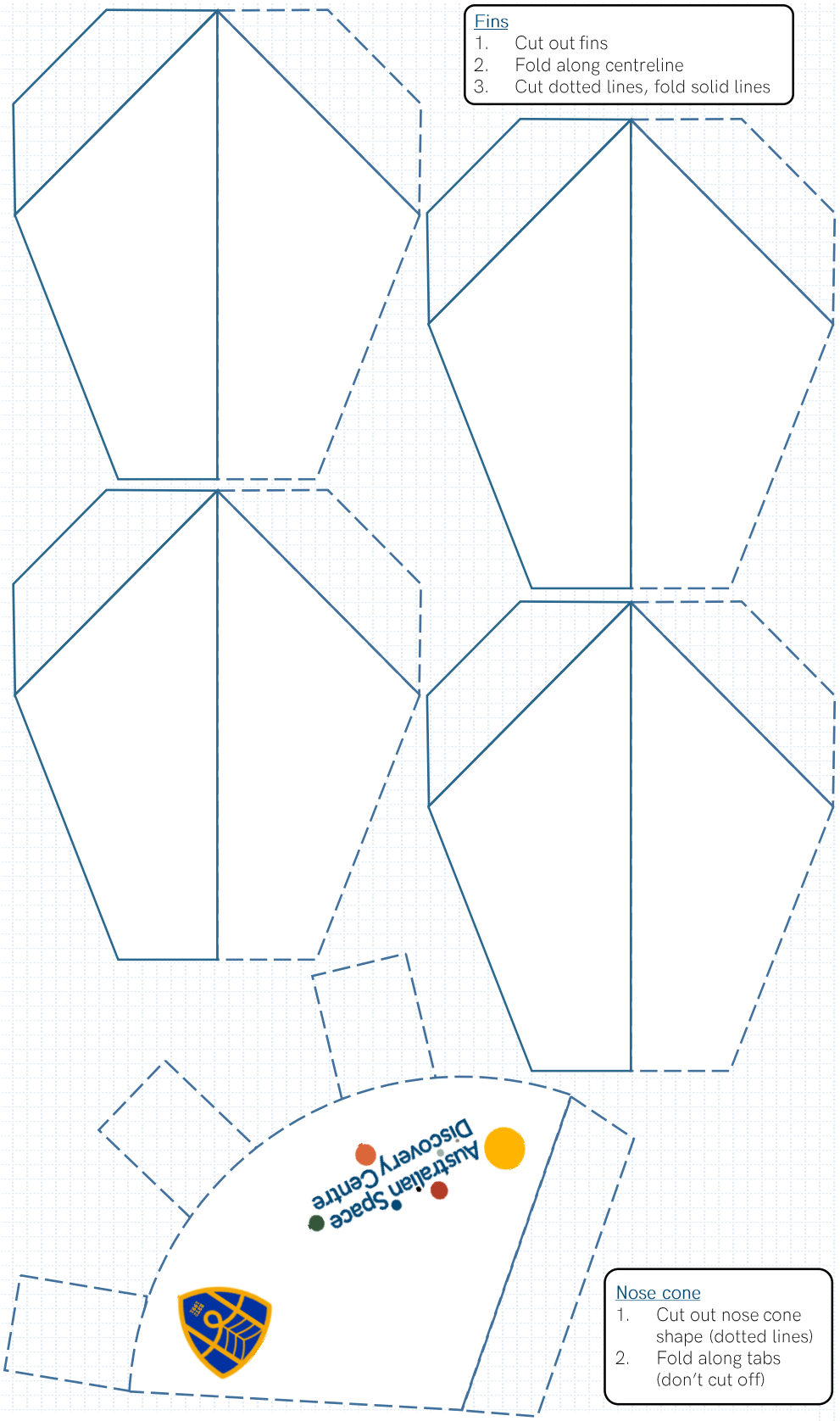
Science Inquiry Skills - Years 7-9

Students can make accurate measurements and control variables to analyse relationships between system components.

Students summarise data, from their investigation, and use scientific understanding to identify relationships and draw conclusions based on evidence.

Students reflect on scientific investigations including evaluating the quality of the data collected, and identifying improvements

Schematics



ScienceAlive!
SCRAP Challenge

For Internal Routing Only

Draw some rocket designs including *fuselage*, *nose cone* and *fins* OR use this schematics template to build your rocket model.

Rocket Parameters:

Diameter: 31 mm

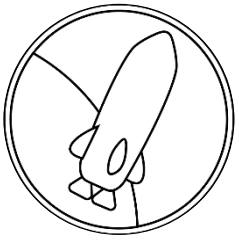
Circumference: 97 mm

Length (Body): 180 mm

Are there any changes you can make to your rocket to increase the maximum distance?

Agent: _____

Rocket: _____



Glossary

Fuselage	Body of the rocket that connects engines, fins and nose cone.
Nose cone	Top-most part of the rocket that guides the direction of flight and increases the aerodynamics of the spacecraft.
Fins	Provide stability and control of the rocket to keep the nose pointing straight.

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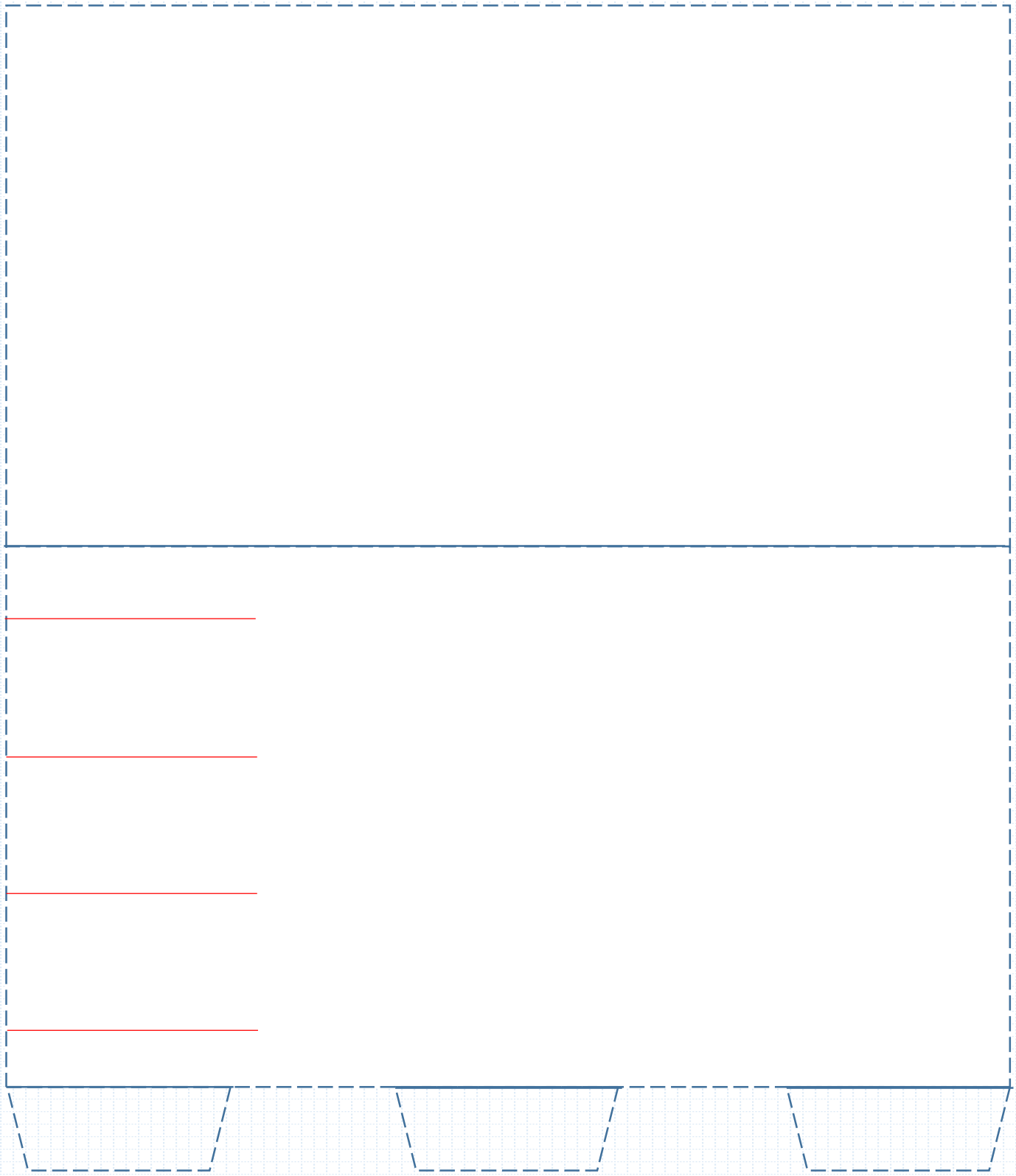
Schematics



Fuselage

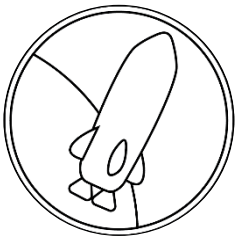
1. Cut out fuselage shape (along dotted lines)
2. Fold along solid blue lines
3. Roll into tube

Note:

- fins align to red lines
- nosecone attaches to top (opposite fins)

Agent: _____

Rocket: _____



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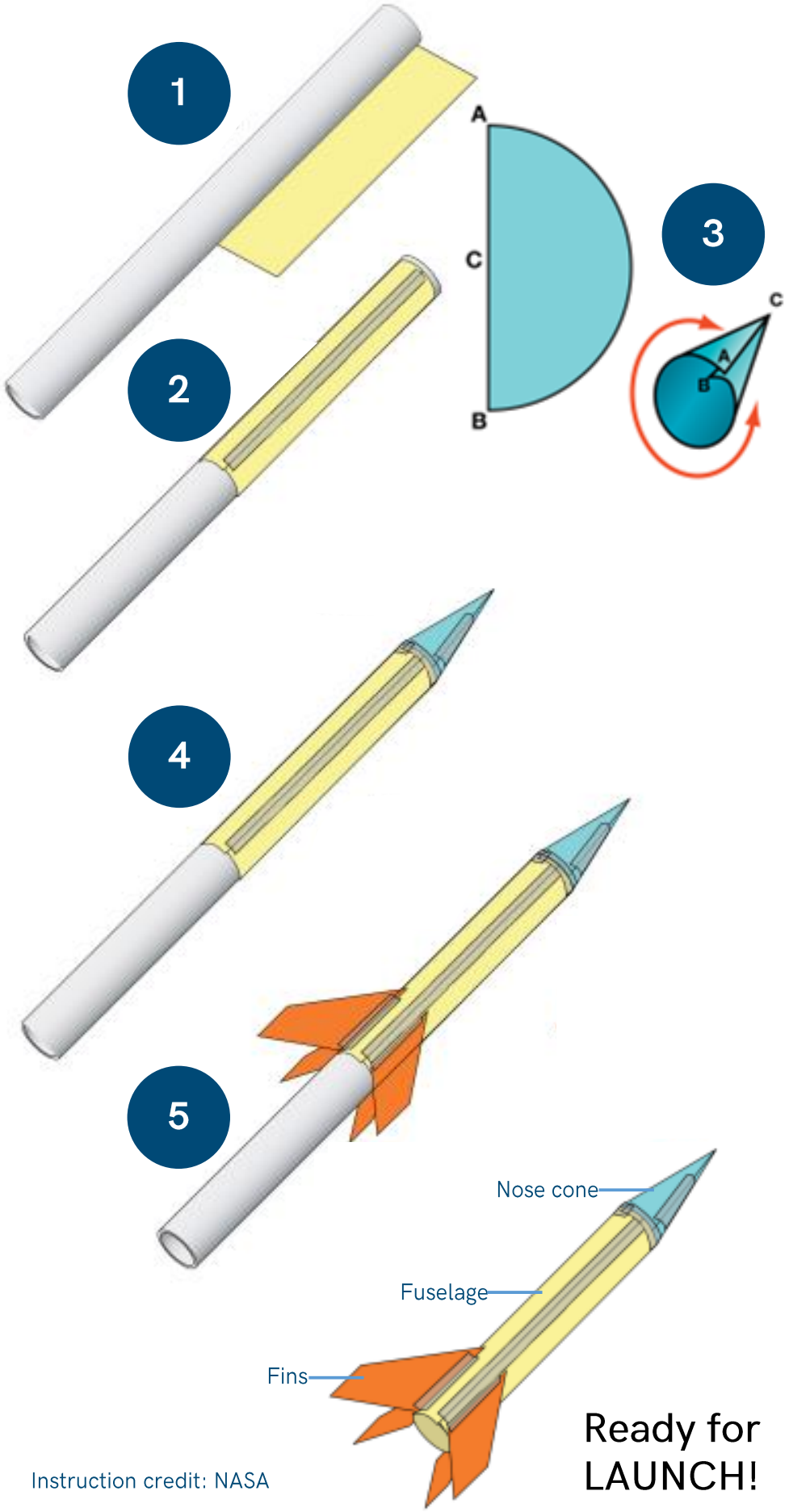
Assembly Guide



Instruction credit: NASA

Ready for LAUNCH!

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SCRAP Challenge

For Internal Routing Only

Fuselage

1. Roll a piece of paper around a 30 mm diameter pipe (don't make it too tight!).
2. Tape the paper ends together. Make sure you create a seal along the seam, making it airtight. This is the body, or *fuselage*, of your rocket.

Test that the *fuselage* slides on and off the foam pipe easily. If not, adjust how tightly the *fuselage* fits to the foam pipe.

Nose cone

3. Cut out a semi-circle shape and curl it to create a cone shape. This is the *nose cone*.
4. Seal the seam of the *nose cone* and then attach it to the *fuselage* with sticky tape.

Blow into the *fuselage* from the bottom to check for any air leaks, sealing them with tape.

Fins

5. Design and cut out *fins* of any shape and attach them to the base of the *fuselage*.

Name your rocket. Add any finishing touches such as drawings or stripes.

Agent: _____

Rocket: _____