

# BALANCED FLIGHT

One of the challenges facing early aircraft designers was how to keep an aircraft steady in flight. In this activity you will be building a glider to explore how the position of an aircraft's centre of mass affects its balance.

## WHAT YOU'LL NEED

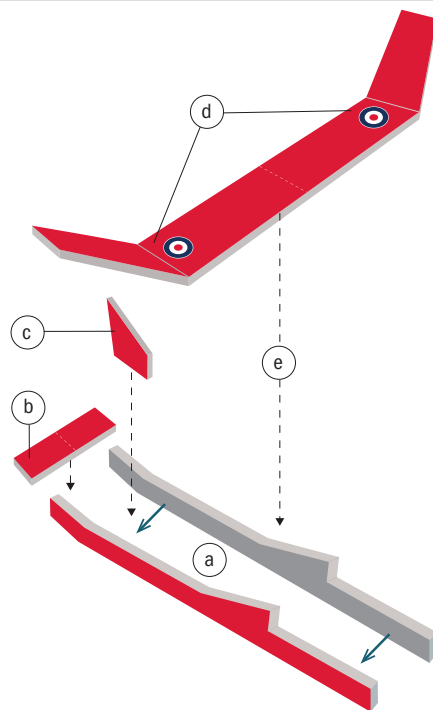
- Glider Sticker Template
- Foam sheet
- Sticky tape or masking tape
- A penny and some blu-tack
- Scissors
- String

## WHAT YOU NEED TO DO

1. Stick the template to the foam. Cut out the wing, tailplane, fin and two fuselage parts from the foam.
2. Build the glider using the steps shown in the diagram.
  - a) Join the two parts of the fuselage together by taping around the front of the nose and centre of the fuselage.
  - b) Stick the tailplane onto the downward sloping section of the fuselage. Make sure it is securely attached.
  - c) Slide the tail fin between the two parts of the fuselage and attach it using tape.
  - d) Place a ruler along each of the dotted lines on the wing. Press gently downwards into the surface of the wing to make a crease.
  - e) Stick the wing onto the upward sloping section of the fuselage. Bend the outer parts of the wing up slightly, along the dotted lines. If the foam cracks, use tape to reinforce it.
3. Find the centre of mass of your glider. If you don't know how to do this ask your teacher.
4. Test fly your glider. Is it balanced?
5. Early aircraft had a heavy engine in their nose. This means that their centre of mass was further forward than in your glider. Change your centre of

## CENTRE OF MASS

Mass is the amount of matter in an object. Every part of an object forms part of its overall mass. But when we try to balance an object at a point, there will only be one place where it will balance. This point is known as the centre of mass.



mass by adding a penny to the nose (the penny can be pushed between the two bits of foam that make the fuselage).

6. Test fly your glider again. Adjust the position of the penny and/or add blu-tack as required until your glider flies level.
7. Find the new position of the glider's centre of mass. What conclusions can you make about how the position of the centre of mass affects the balance of a glider?