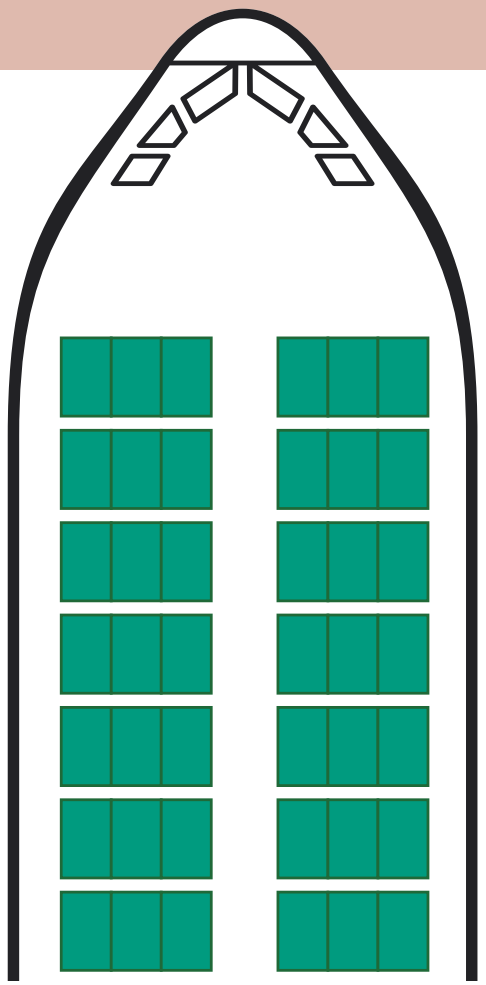
Reasoning in the classroom

Aeroplane

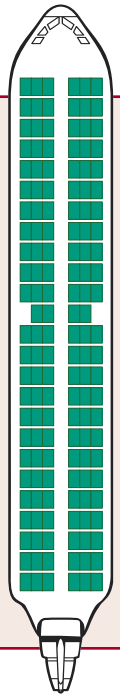


Support materials for teachers

Year 6

Llywodraeth Cymru
Welsh Government

Year 6 Reasoning in the classroom – Aeroplane



These Year 6 activities focus on flight, including the real-life context of air travel.

Activity 1

Aeroplane

Learners answer questions based on the number of seats on an aeroplane and the cost per seat.

Includes:

- Aeroplane question
- Markscheme

Activity 2

Paper aeroplane

They undertake a practical activity that focuses on the data recording of a paper aeroplane competition.

Includes:

- Explain and question – instructions for teachers

Reasoning skills required

Identify

Learners choose their own strategies and consider efficient ways of solving a problem.

Communicate

They decide for themselves what to record.

Review

They interpret their answers and draw conclusions from data.

Procedural skills

- **Multiplication/division**
- **Measurement (length and time)**
- **Collecting and recording data**

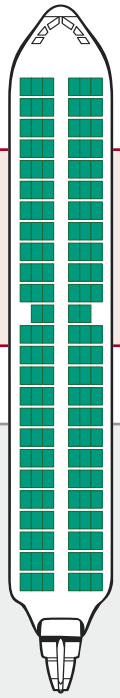
Numerical language

- **Plan**
- **At least**
- **More**
- **Data**

Activity 1

Aeroplane

Activity 1 – Aeroplane



Outline

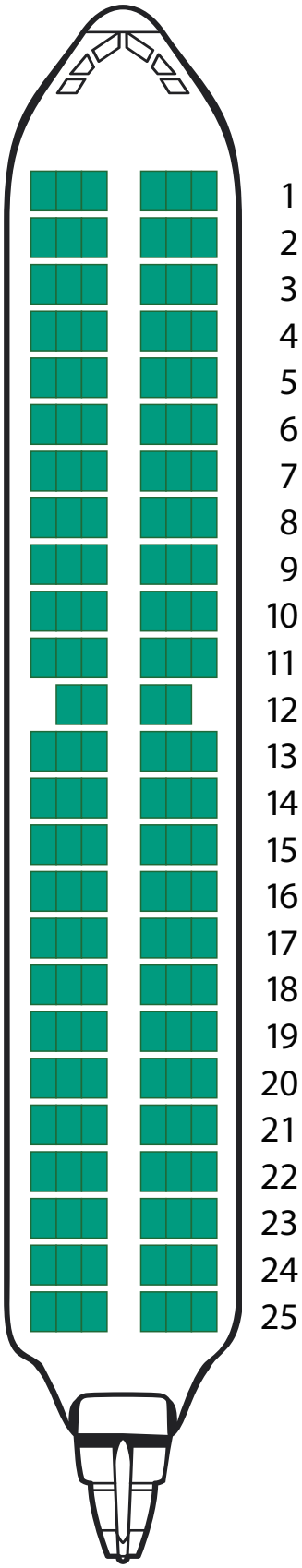
This Year 6 activity requires learners to engage with the real-life context of seat arrangements and the income from selling seats in an aeroplane.

You will need

Aeroplane question
One page for each learner

Markscheme

Plan of the inside of a plane



Each green rectangle ▮ shows a seat.

How many seats are there?

1m

What is the quickest way to work out this number?

1m

It costs a lot of money to fly a plane.

They must get **at least £25 000** for tickets.

So far, **80** people have bought tickets.

Each ticket costs **£250**

How many **more** tickets must they sell to get £25 000?

more tickets

3m

Activity 1 – Aeroplane – Markscheme

Q	Marks	Answer
i	1m	**148**
ii	1m	Shows or implies a method, using multiplication, that would lead to 148 if calculated correctly, e.g. • $25 \times 6 - 2$ [or $50 \times 3 - 2$] • $24 \times 6 + 4$ [or $48 \times 3 + 2 + 2$] • $11 \times 6 + 4 + 13 \times 6$ • $11 \times 3 + 11 \times 3 + 4 + 13 \times 3 + 13 \times 3$
iii	3m	**20**
	Or 2m	Shows 5000 Or Shows a method that would lead to 20 if calculated correctly, e.g. • 25 000 – their answer to 80×250, then ÷ 250 • 25 000 ÷ 250, then – 80
	Or 1m	Shows 20 000 Or Shows $25\,000 \div 250 = 100$ Or Shows 25 000 – their answer to 80×250 Or Shows their total amount left to be sold ÷ 250

◀ **Do not accept repeated addition**

◀ **The total amount left to be sold, in £**

◀ **Total sales to date**

◀ **Total number of tickets that need to be sold**

Activity 1 – Aeroplane – Exemplars

Part ii

Well what I did was 25 x 6 because there are 25 rows with 6 seats in but row 12 is 2 missing so then I took off 2.	Correct; **1 mark** • Although only the calculation is required for the mark, this learner explains their method well.
11 x 3 = 33 then double = 66 then add 13 x 3 = 39 which = 95 then add another 39 which is 134 and 4 more is 138 like I said.	Correct; **1 mark** • This method is correct, even though there is a numerical error.
Add up all the green rectangles.	Incorrect; **0 marks** Common error This learner makes no explicit or implicit reference to multiplication.

Part iii

2 x 250 = 500 2 x 500 = 1000 2 x 1000 = 2000 2000 x 10 = 20,000 so there is 5000 left 2000 is 8 tickets so 4000 is 16 so 5000 is 20 so that is what they need to sell. 20 more tickets	Correct; **3 marks** • This learner explains their method well but by not using a calculator they incur a time penalty.
20 because I worked it out on my calculator and that is what I got. 20 more tickets	Correct; **3 marks** • If this learner had made an error during their working they would have scored 0 marks as no method is shown. Understanding what to write, and why, is an important numerical skill.
25000 ÷ 250 = 1000 so they need to sell 1000 tickets but they have sold 80 so they need another 920. more tickets	Method would lead to 20; **2 marks** • The method is correct but the result of 25 000 ÷ 250 is incorrect. This learner should have realised that there was an error – selling another 920 tickets makes no sense as there are nowhere near enough seats.
25000 80 250 25330 more tickets	Incorrect; **0 marks** Common error This learner adopts the strategy of if in doubt, add!

Activity 2

Paper aeroplane

Activity 2 – Paper aeroplane

Outline

This activity is based on making and flying paper aeroplanes.
It allows Year 6 learners to practise recording and using data.

They make their own decisions on what data to record and how to present it, then explore their findings to draw their own conclusions.

This activity could be extended by looking at the science of flight.

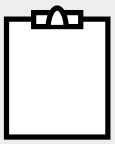
You will need

Each group/pair will need:

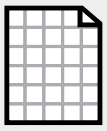
Several sheets of A4 paper (can be used paper)

Glue (optional)

Scissors (optional)

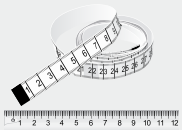


Clipboard



Squared paper (to draw their template)

Masking tape or chalk (to show distances flown)



Tape measure or metre rule (to measure distances flown)

Stopwatch (to record time in flight)

Activity 2 – Paper aeroplane

Explain

Tell the class that they are going to have a competition that involves paper aeroplanes. Ask for suggestions for the focus of the competition *(e.g. distance travelled, time in the air, whether it can carry an object . . .)* and agree the measure(s) you will use.

Groups/pairs then design their aeroplanes, trialling them until they are confident their design is the best it can be. Ask learners to write their own instructions for making their plane. *(Suggestions for making paper aeroplanes are freely available on the web, e.g. www.amazingpaperairplanes.com/Basic_Dart.html and, for a different type of 'plane', www.exploratorium.edu/science_explorer/hoopster.html)*

They then need to decide how they are going to record the results. Give each group/pair a clipboard and paper so they can record as the competition progresses. *(Choosing what data to collect and how to record it are the key points in this activity, so make sure that learners see these as integral to the task.)*

Carry out the competition, with learners taking on the role of measurers, timers and so on, as well as making their own records. Give each group/pair a fixed number of throws *(to allow for faulty throws)*.

After the competition, ask them the second set of questions below, either as a class or in their groups/pairs.

They then complete their recordings and create a display for the classroom. Included in this could be any conclusions they have drawn *(e.g. how much further the winning plane went than their own and why they think that was)*.

Question

- Why is it important to decide in advance what the competition will be measuring?
- How did you decide on the model for your paper aeroplane? Is it symmetrical? Why is that important? What if it isn't symmetrical? What happens then?
- Have you tried your model? What amendments does it need? Why?
- Are your template and instructions clear? Would someone else understand them?
- How will you record the results? Why?

- Why did the winning aeroplane win? What was it about that plane that was so good?
- Does the height of the person throwing the aeroplane make any difference?
- If you could change your aeroplane now, would you? And how would you change it?