

Student Worksheet: How far can you glide? - Calculating Glide Ratio

Do you know about gliding?

Do you know what a glider can do? It's an awesome way to fly, and glider pilots fly hundreds of kilometres at speeds of over 100kph, just using renewable energy from the sun and the wind. To get into the air, they have to be launched using a winch, a bungee or be towed by a light aircraft. Once in the air, they have to find rising air, generally in the form of 'thermals' – a bubble of rising air in which the pilot circles to climb. Between climbs the glider descends, some gliders descend more steeply than others, and the measure of how far a glider goes horizontally compared to the height lost is known as the gliders' GLIDE RATIO. A glider with a better glide ratio will go further for the same height loss, and this better performance means you don't have to climb as far to fly a distance across country. As the glider is usually climbing by circling in a thermal and effectively staying in one place as it does it, this means you can go further and faster.

Your challenge: Build a glider, fly it and calculate its Glide Ratio

**Templates for the 'standard' designs of glider are attached. These match the designs shown in the photographs.*

What you need:

- A4 paper to make the glider plus paperclips to ballast the nose of the glider to make it fly properly
- An elastic band to launch with so you get a consistent launch as in the video
- Measuring tape

The Experiment:

- First watch the video to learn a bit about gliding and the experiment you are going to do.
- Make your glider according to one of the designs at the back of the worksheet. Make sure that between the class, all the designs get made so you can see which performs the best. If you have a foam glider or one you've made previously, why not bring that along and test it. Once you have made the glider, give it a name! This is called its 'call sign', as it is how we identify the gliders when we are talking to each other or air traffic control on the radio.
- Launch your glider and find out whether it flies in a controlled manner. If it does not fly smoothly try putting paper clips on the nose to ballast it until it flies smoothly without pitching up and stalling.
- Once your glider is flying properly, launch it from a known height and see how far it flies - measure horizontally from where you launched it to the point that it touches the ground.
- Calculate the glide ratio which is:
$$\frac{\text{Horizontal distance flown in metres}}{\text{Launch height in metres}}$$
- Launch it two or three times and write your results into a table.
- Calculate the average glide ratio that your glider achieved.

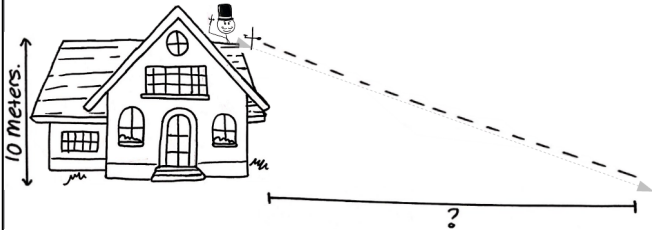
Launch	Launch height (m)	Flight distance (m)	Glide Ratio ??:1
1			
2			
3			

Now you are ready for the Challenge Questions!

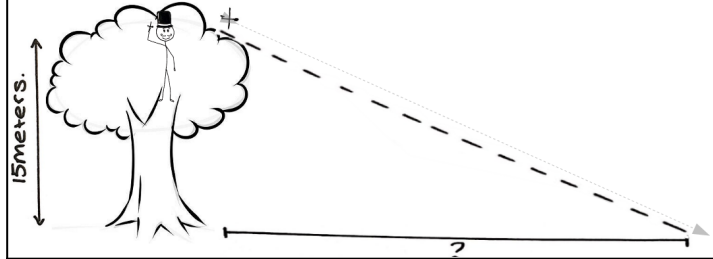
...Turn the page...

Challenge Questions

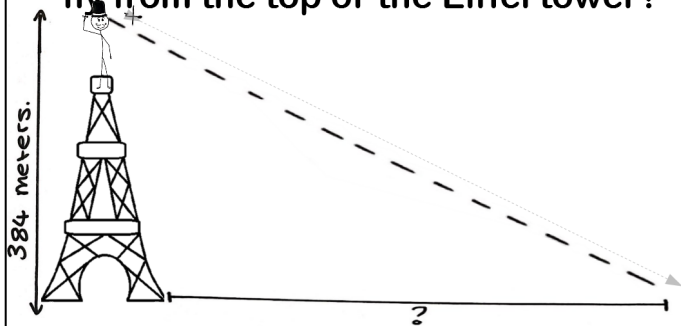
Question 1: how far will your glider fly from 10m high?



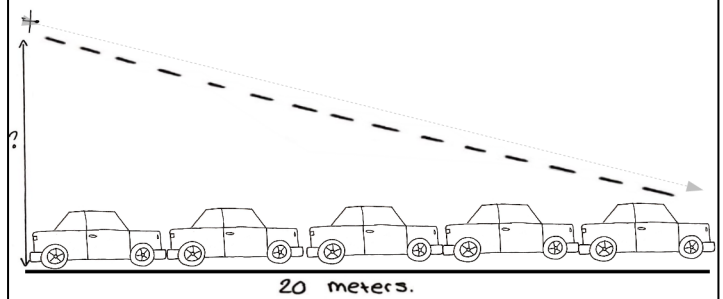
Question 2: how far can your glider fly from the height of a tree?



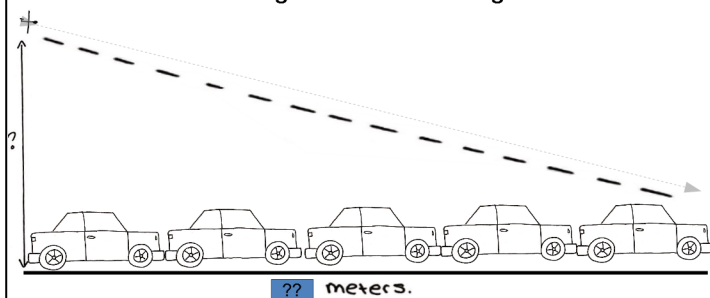
Question 3: how far will your glider fly from the top of the Eiffel tower?



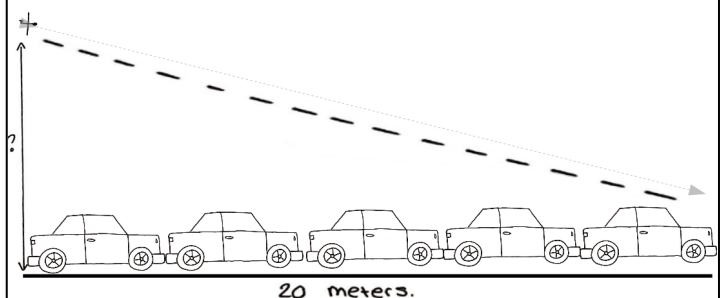
Question 4: how high does your glider need to start to fly the length of 5 cars?



Question 5: What's the *minimum* height it needs to fly over 5 cars if you have more cars to choose from – 3 are 4m long and 3 are 3.5m long?



Question 6: What height would a Nimbus 4 with a glide ratio of 60:1 need to fly over 5 cars 4m long?



We hope you had fun learning about gliding and calculating your glider's glide ratio!

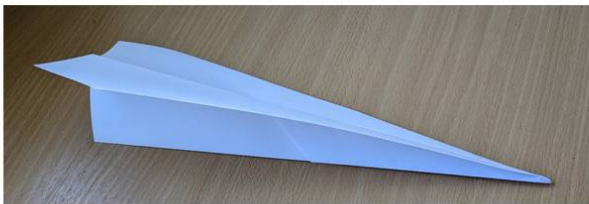
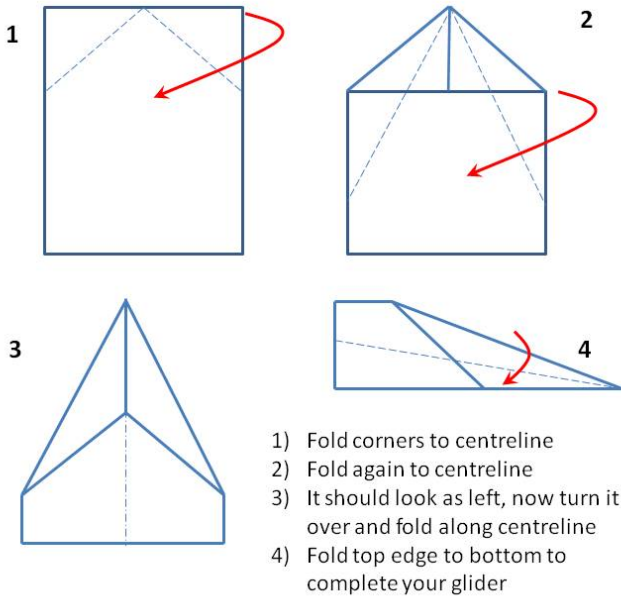
You can find lots of information on flying with and without an engine at gliding.co.uk, womengliding.co.uk and airleague.co.uk. And remember that **Aviation is not just about being a pilot!** - there's information about the huge range of careers in aviation and aerospace at stem.caa.co.uk/careers-in-aviation-and-aerospace as well as on the Air League site.

***Now you've found out a bit about gliding, why not pop along, see it happening and maybe have a go!
Find your nearest Gliding Club at gliding.co.uk/club-finder/***

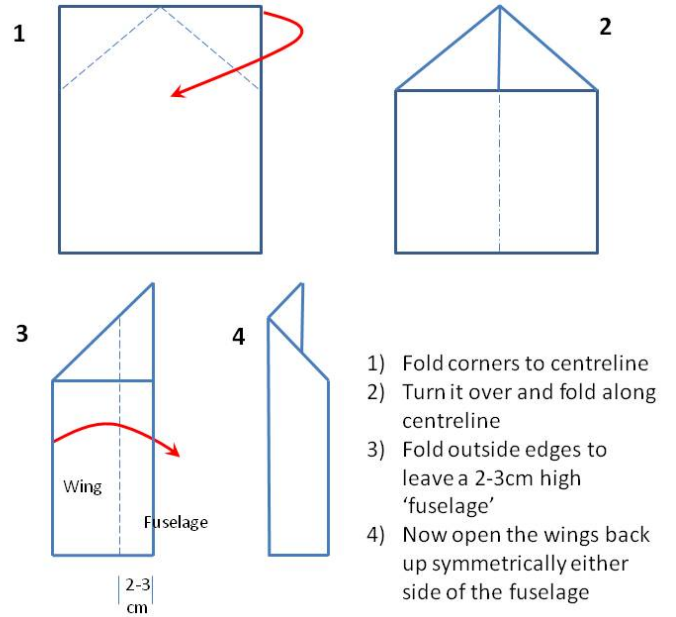
We really hope to see you on an airfield soon!

3 GLIDER DESIGNS:

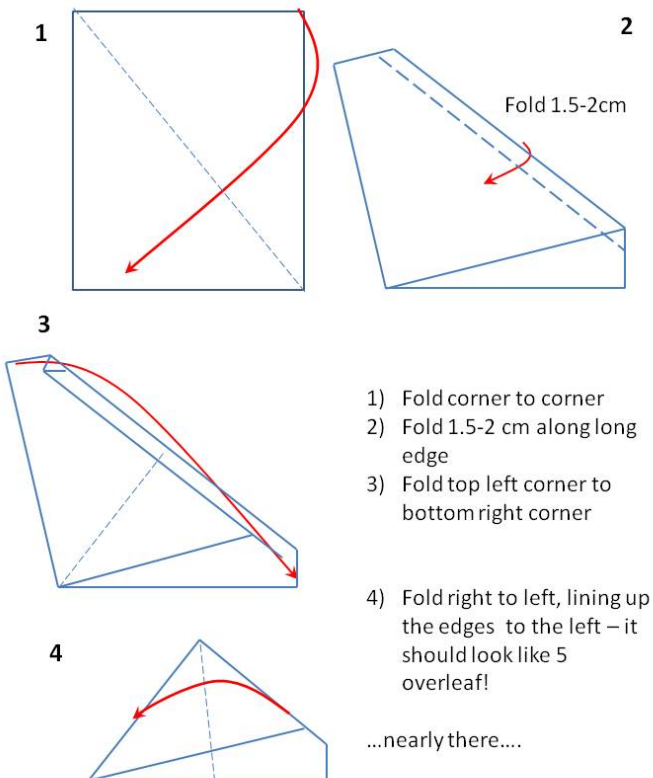
Glider Design 1



Glider Design 2



Glider Design 3



Glider Design 3

