The questions below have been kindly set by Geoff Coxon from The SkyLab.

The pictures below show the starboard wing of a 1938 Spitfire and the starboard wing of a 2008 Typhoon. By imagining they are made up of triangles we can work out their surface areas. The surface area of an aircraft's wing can be used to calculate something called *wing loading*.
The higher the wing loading the more lift the wing creates and the better the aircraft's manoeuvrability.
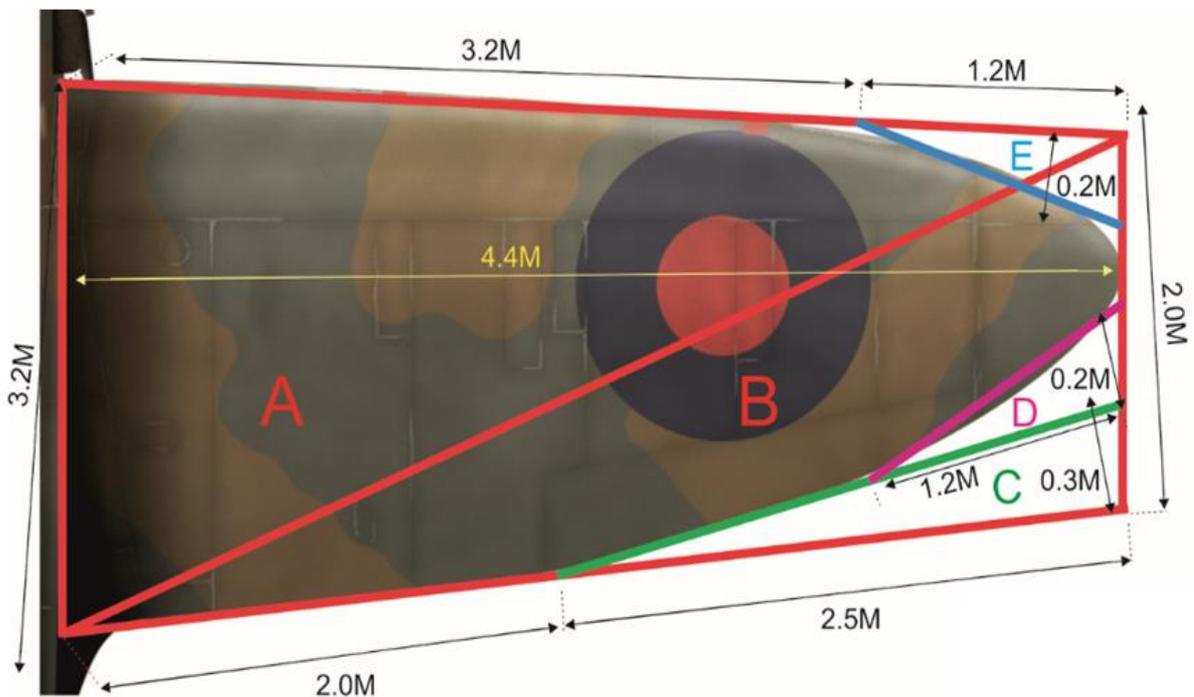
Area of the Spitfire wing = 11 m^2
For both the starboard and the port wings = 2 x 11 = **22 m^2**
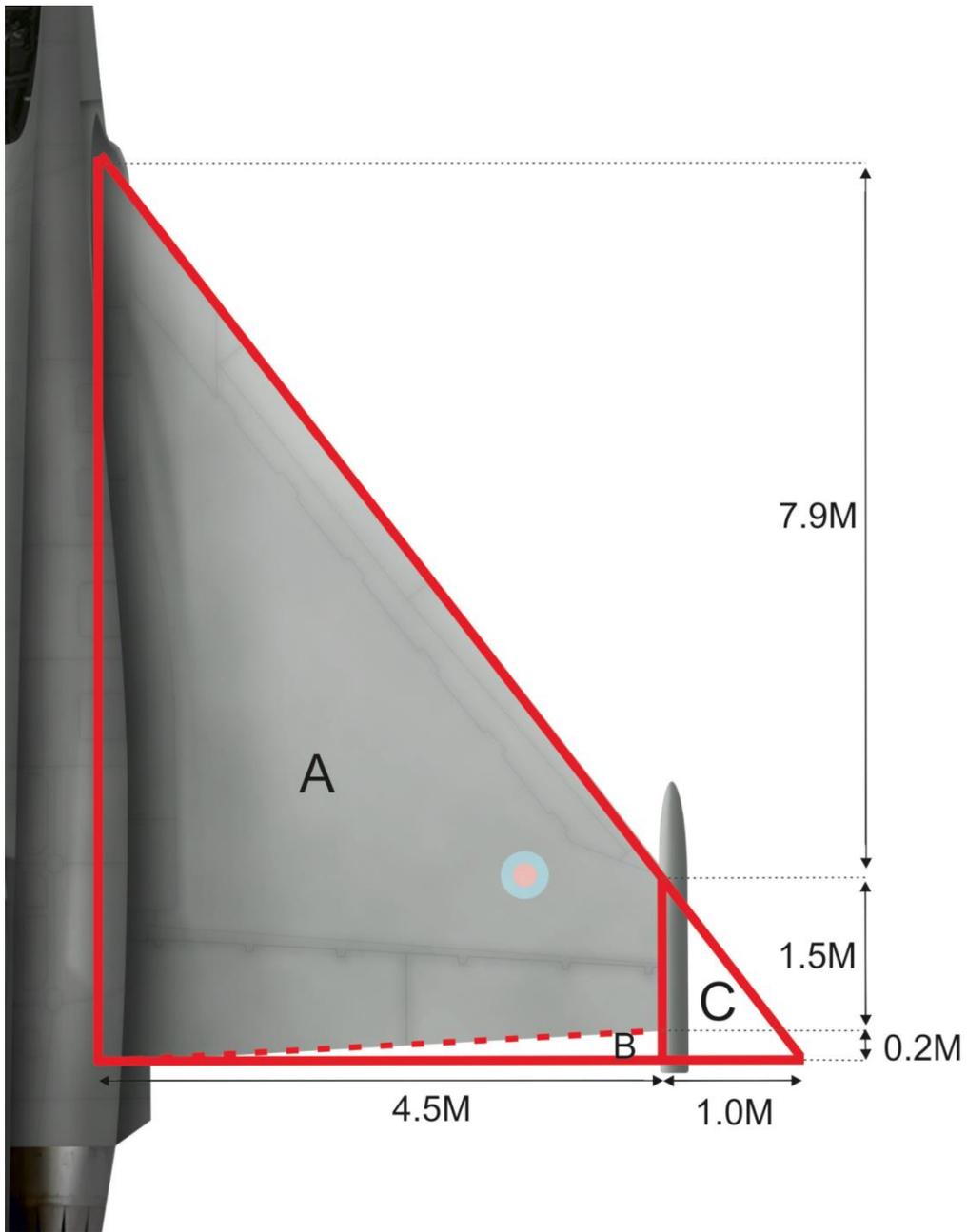
Area of a Tornado wing = 25 m^2
For both the starboard and the port wings = 2 x 25 = **50 m²**

Using the areas of the wings and the data in the aircraft comparison table below, answer the following questions.

Tip: round your answers up or down to the nearest whole number

Parameter	Spitfire Mk2A	Typhoon FGR4
Maximum speed (mph)	354	1320
Maximum rate of climb (m/s)	15	318
Maximum range (miles)	430	1800
Service ceiling (metres)	10500	19800
Maximum take-off mass (kg)	2800	23500
Fuel capacity (kg)	800	5000
Maximum thrust (kN)	6.5	180

Q1. Which aircraft should be the most manoeuvrable?

The greater an aircraft's wing loading, the more manoeuvrable the aircraft will be.

You can work out the wing loading by dividing the take-off mass of the aircraft by the area of the wings.

In aviation wing load is measured in kilogram per square metre (kg/m^2).

1st calculate the wing loadings

The wing load of the Spitfire =

The wing load of a Typhoon =

How many times larger is the wing load of the Typhoon compared to the Spitfire?

The Typhoon wing load is _____ times more than the Spitfire, so the more manoeuvrable aircraft is _____

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Q2. At maximum speed, how many times more powerful is the Typhoon compared to the Spitfire?
Tip: power = thrust

Q3. How many times faster is the Typhoon compared to the Spitfire?
Tip: use the maximum speed

Q4. How many times quicker can the Typhoon climb than the Spitfire?
Tip: use the maximum rate of climb

Q5. How many times more is the Typhoon's fuel capacity compared to the Spitfire's and why do you think it needs so much more?
Tip: Use the fuel capacity

Q5. What subjects at school do you think you would need to use if you wanted to work in aviation technology?

Glossary:
- Port – the pilot's left wing if they are facing forward in the cockpit
- Starboard – the pilot's right wing if they are facing forward in the cockpit
- Weight is the force of gravity. It acts in a downward direction - usually measured in *Newtons* — toward the centre of the Earth
- Thrust is the force that propels an aircraft in the direction of motion. Engines produce thrust
- Drag is the force that acts opposite to the direction of motion. Drag is caused by friction and differences in air pressure
- Lift is the force that acts at a right angle to the direction of motion through the air. Lift is enabled by an aircraft's wings

- kN stands for kilonewton(s)— a Newton is a measurement of pressure and force used in engineering. A kilonewton is 1,000 Newtons.
- Service ceiling – the maximum height a pilot will fly the aircraft before its performance is affected
- Mass is a measure of how much matter is in an object measured in kg
- Max take-off mass – the maximum mass at which the aircraft is certified to take-off
- mph – miles per hour
- m/s – metres per second