Team Spitfire!

Anna Walker’s Design Your Own Display Challenge

This is Anna Walker. She is a pilot who flies planes for cinema and television productions and at air shows all over the world. She regularly flies Spitfires.

Anna will be flying a Spitfire at the next Duxford air show and needs your help. She has asked you to plan out a 12 minute display for her on a piece of paper that will not only wow the audience but is also safe. You must be mindful of how much fuel her stunts will use to make sure she has enough to land safely back on the ground.

What you will need:
- Paper
- A pencil
- A calculator (If you get stuck)

To get you started you first need to understand how much fuel a spitfire burns when flying and how long some of the manoeuvres take. Answer these questions to get your engines running.

Q1:
The IWM Spitfire Mark 1 uses 4.5 litres of fuel per minute while it takes off and climbs to its display height, this takes 3 minutes. How much fuel in litres is used for take-off and climbing?

________________________________________

A_______________________
Q2. The Spitfire uses **4.5 litres** of fuel **per minute** during its **10-minute** display flight at Duxford. How much fuel will it use during the **10-minute** display?

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A____________________________

Q3. While it is cooling down and taxiing back to the hangar the Spitfire uses **2.25 litres** of fuel **per minute**. If this takes **3 minutes**, then how much fuel is used in these 3 minutes?

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A____________________________

Q4. How much fuel will the spitfire have used for these **three combined parts** of its display flight?

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A____________________________

Q5. If the Spitfire started with **320 litres** of fuel in its tank how much will it have left at the end of the display?

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A____________________________

Q6: During this 10-minute aerobatic display the pilot performs a loop which takes **20 seconds**. If the fuel burn is **4.5 litres per minute** how many litres will it have used to complete this loop?

______________________________

A____________________________
Q7:
The Spitfire Mk1 has two fuel tanks; the top tank holds **220 litres**, while the bottom tank holds **170 litres**.
How much fuel in total do the tanks hold?

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A____________________________

Q8:
The Spitfire takes off with full tanks and the plan is to land with **100 litres** of fuel in reserve.
If you allow **20 litres** to start, taxi and take-off how much fuel can the Spitfire use during the display?

______________________________

A____________________________

Now you’re an expert on how much fuel a Spitfire needs to fly, it’s time for you to plan Anna’s 12 minute display. Anna wants you to incorporate victory rolls, loops, low-pass flyovers and climbs and dives – stunts which the crowd will love.

Anna’s Spitfire is ready to fly with 200 litres of fuel in its tanks. Remember you must work out exactly how much fuel Anna uses during her flight. And don’t forget to include take-off!

On the Display Plan sheet use lines and arrows to draw out your display. Remember to log how much time and fuel each of your manoeuvres use, and how much you have left as reserve fuel. Good luck!

Here’s a suggested way for you to draw manoeuvres:

<table>
<thead>
<tr>
<th>Loop</th>
<th>Victory Roll</th>
<th>Climb and Dive</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Loop" /></td>
<td><img src="image2.png" alt="Victory Roll" /></td>
<td><img src="image3.png" alt="Climb and Dive" /></td>
</tr>
</tbody>
</table>
Tip: Use the table below to work out how much time and fuel each stunt uses

**Manoeuvre, time and fuel planner:**

<table>
<thead>
<tr>
<th>Manoeuvre</th>
<th>Time</th>
<th>Fuel Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-off and climb</td>
<td>3 minutes</td>
<td>4.5L per minute</td>
</tr>
<tr>
<td>Loop</td>
<td>20 seconds</td>
<td>4.5L per minute</td>
</tr>
<tr>
<td>Victory Roll</td>
<td>30 seconds</td>
<td>4.5L per minute</td>
</tr>
<tr>
<td>Climb and dive</td>
<td>1 minute</td>
<td>4.5L per minute</td>
</tr>
<tr>
<td>Fly pass</td>
<td>30 seconds</td>
<td>4L per minute</td>
</tr>
<tr>
<td>Land, cool and taxi</td>
<td>3 minutes</td>
<td>2.25L per minute</td>
</tr>
<tr>
<td>Manoeuvre</td>
<td>Time Taken</td>
<td>Time Left</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Take off &amp; climb</td>
<td>3 mins</td>
<td>9 mins</td>
</tr>
</tbody>
</table>

**Diagram:**
- Control Tower
- Hangar
- Runway