Draw a WW1 Biplane: Wings, Struts, and Cockpit

Original tasks 1, 2 / complete keys

Task 1

On a 15 cm tall paper, choose a 3 cm wing gap and a 5 cm chord. Mark the lower and upper wing centerlines and draw both wings aligned. Describe where the leading and trailing edges sit horizontally.

Answer: Baseline at 7.5 cm from the top. Upper wing centerline at 4.5 cm from the top. Both wings span the same horizontal range, for example 5 cm to 10 cm from the left edge, so leading edges align at 5 cm and trailing edges at 10 cm.

Reason: The gap is measured vertically from baseline to upper centerline. Alignment is checked by matching horizontal start and end positions.

Check: Measure the vertical distance between centerlines (3 cm) and confirm both wings start and end at the same horizontal marks.

Task 2

Using a 6 cm chord, place four struts at equal spacing. State the chord positions and the spacing interval. Draw the struts as 0.4 cm wide rectangles connecting matching points.

Answer: Positions at 1.2 cm, 2.4 cm, 3.6 cm, and 4.8 cm from the leading edge. Spacing interval is 1.2 cm. Each strut is 0.4 cm wide and connects the same chord position on both wings.

Reason: Equal spacing divides the chord into equal intervals. Four struts inside a 6 cm chord create five equal 1.2 cm intervals. Matching endpoints ensure vertical alignment.

Check: Measure each interval between strut centers; all should be 1.2 cm. Confirm each strut starts and ends at the same chord mark and stays inside the wing outline.

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Original tasks 3, 4 / complete keys

Task 3

Place a cockpit opening 0.6 cm wide and 0.8 cm deep between the mid-front and mid-rear struts on a biplane with struts at 1.2 cm, 2.4 cm, 3.6 cm, and 4.8 cm from the leading edge. Describe its horizontal position relative to the struts.

Answer: The cockpit center sits between the 2.4 cm and 3.6 cm strut positions, for example centered at 3.0 cm from the leading edge. With 0.5 cm wide struts centered at 2.4 cm and 3.6 cm, the strut edges nearest the cockpit are at 2.65 cm and 3.35 cm. A cockpit 0.6 cm wide centered at 3.0 cm spans 2.7–3.3 cm, leaving 0.05 cm clearance to each strut edge, so it does not overlap either strut.

Reason: The cockpit must be clear of struts and within the wing gap region. Centering between the mid-front and mid-rear struts satisfies both.

Check: Measure from the cockpit edges to the nearest struts; both clearances should be positive and roughly equal. With a 0.6 cm cockpit centered at 3.0 cm and 0.5 cm struts centered at 2.4 cm and 3.6 cm, each clearance should measure about 0.05 cm.

Task 4

A drawing has a 4 cm wing gap but the upper wing is shifted 1 cm forward. State one correction and one measurement to confirm the fix.

Answer: Shift the upper wing back by 1 cm so leading and trailing edges align with the lower wing. Confirm by measuring the horizontal offset between leading edges; it should be 0 cm.

Reason: Alignment requires matching horizontal positions. A 1 cm shift is corrected by an equal opposite shift.

Check: Use a vertical guide from the lower wing leading edge and measure the upper wing leading edge offset; it should read 0 cm.

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Source rubric / reflection

- [ ] Wings are parallel and leading/trailing edges align vertically.
- [ ] Wing gap is consistent and clearly visible.
- [ ] Struts are evenly spaced and connect matching chord positions.
- [ ] Strut width is consistent across all struts.
- [ ] Cockpit sits between the mid-front and mid-rear struts and is clear of struts.
- [ ] Fuselage, tailplane, and fin align with the wing stack.
- [ ] Labels clearly identify the upper wing, lower wing, struts, and cockpit.

Reflection: What did you check, what did you change, and what will you try next?