AERODYNAMICS AND PERFORMANCE: OPERATIONAL PLANNING

Name _____

Class _____

OBJECTIVE

Conduct preflight performance calculations related to density altitude. Formulas are included for reference.

MATERIALS

- Ruler (or straight edge)

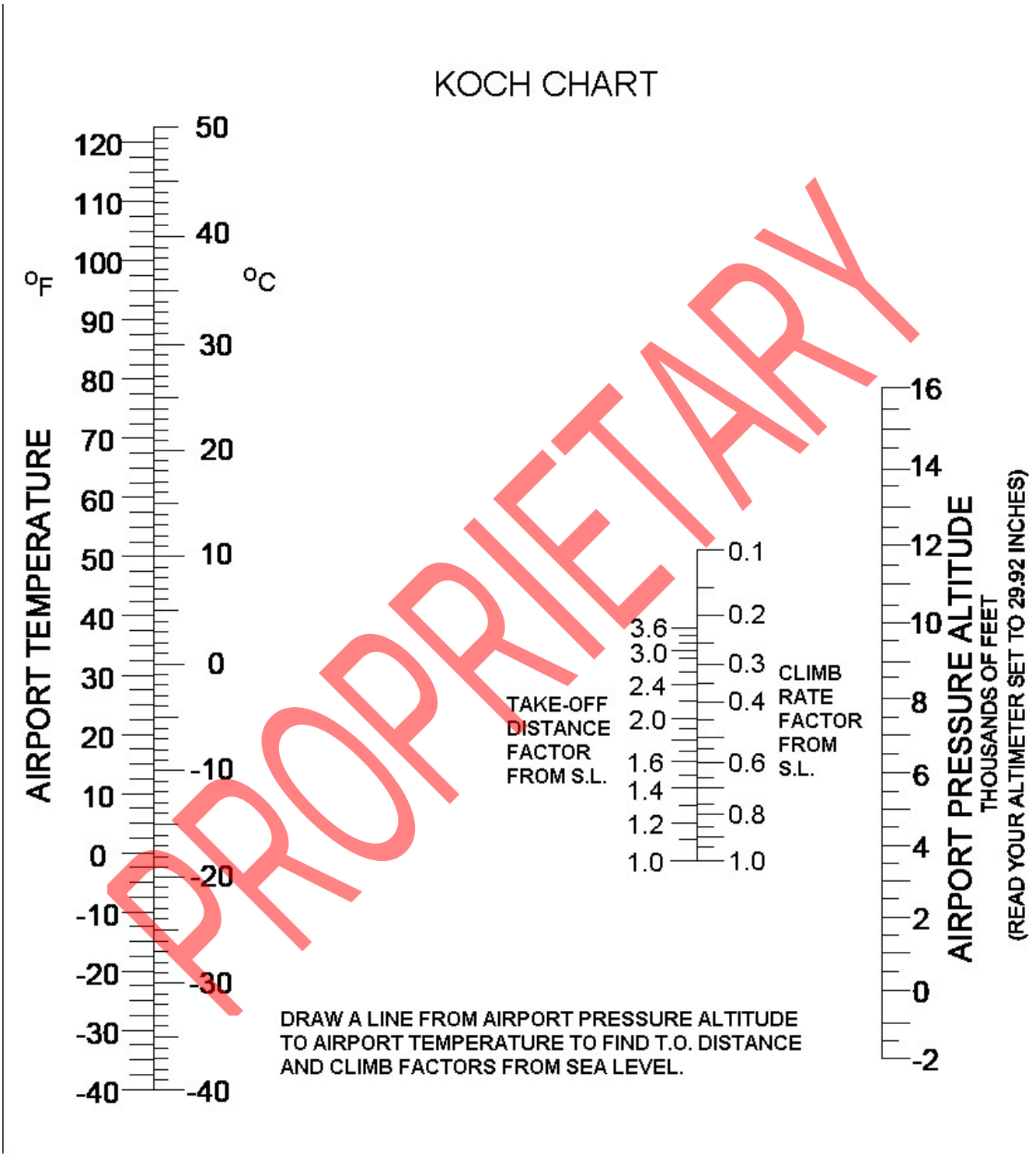
DIRECTIONS

Answer the given questions for each scenario. Ensure that you mark the Koch chart for Scenario 2.

REFERENCES

Pressure altitude = (standard pressure – current pressure) x 1,000 + field elevation

Density altitude = pressure altitude + [120 x (current temperature – ISA temperature for your elevation)]



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SCENARIOS

FLIGHT SCENARIO 1

- Field elevation: 2,000 ft MSL
- Current Pressure: 30.10”Hg
- Temperature: 30°C
- Wind: Calm
- Small, 20-ft round landing and takeoff area surrounded by tall trees and swamps
- Configuration: Quadcopter
- You have a waiver for altitude limits and airspace use.
- Your UAV is rated to fly up to 3,000 ft MSL in standard conditions.

FLIGHT SCENARIO 2

- Field Elevation: 2,000 ft MSL
- Current Pressure: 29.90”Hg
- Temperature: 18°C
- Wind: 090° at 2 knots
- Configuration: Fixed-Wing
- You have a waiver for altitude limits and airspace use.
- Your UAV is rated to fly to 3,000 ft MSL in standard conditions.
- Under standard conditions, takeoff distance for this fixed-wing UAV is 300 ft, and you have a 1,000 ft runway at your disposal.

PERFORMANCE CALCULATIONS

1. Flight Scenario 1

    a. Max flight altitude AGL:

    b. Landing pattern choice (vertical or coil-like) of descent:

    c. Expected performance (better or worse than sea level performance):

2. Flight Scenario 2

    a. Max flight altitude AGL:

b. Takeoff distance:

c. Expected performance (better or worse than sea level performance):

d. Potential for carburetor icing?

e. Preferred direction of takeoff:

f. Preferred direction of landing:

g. Approx. climb rate factor (from Koch chart):