

# Unmanned Aircraft Systems, Advanced (2023)

## Demonstrating Personal Qualities and Abilities

**1 Demonstrate creativity and innovation. 1**

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**2 Demonstrate critical thinking and problem solving. 2**

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**3 Demonstrate initiative and self-direction. 3**

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**4 Demonstrate integrity. 4**

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**5 Demonstrate work ethic. 5**

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## Demonstrating Interpersonal Skills

**6 Demonstrate conflict-resolution skills. 6**

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**7 Demonstrate listening and speaking skills. 7**

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**8 Demonstrate respect for diversity. 8**

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**9 Demonstrate customer service skills. 9**

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**10 Collaborate with team members. 10**

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## Demonstrating Professional Competencies

**11 Demonstrate big-picture thinking. 11**

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**12 Demonstrate career- and life-management skills. 12**

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**13 Demonstrate continuous learning and adaptability. 13**

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**14 Manage time and resources. 14**

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**15 Demonstrate information-literacy skills. 15**

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**16 Demonstrate an understanding of information security. 16**

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**17 Maintain working knowledge of current information-technology (IT) systems. 17**

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**18 Demonstrate proficiency with technologies, tools, and machines common to a specific occupation. 18**

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**19 Apply mathematical skills to job-specific tasks. 19**

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**20 Demonstrate professionalism.** 20

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**21 Demonstrate reading and writing skills.** 21

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**22 Demonstrate workplace safety.** 22

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**Examining All Aspects of an Industry**

**23 Examine aspects of planning within an industry/organization.** 23

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**24 Examine aspects of management within an industry/organization.** 24

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**25 Examine aspects of financial responsibility within an industry/organization.** 25

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**26 Examine technical and production skills required of workers within an industry/organization.** 26

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**27 Examine principles of technology that underlie an industry/organization.** 27

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**28 Examine labor issues related to an industry/organization.** 28

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**29 Examine community issues related to an industry/organization.** 29

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**30 Examine health, safety, and environmental issues related to an industry/organization.** 30

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**Addressing Elements of Student Life**

**31 Identify the purposes and goals of the student organization.** 31

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**32 Explain the benefits and responsibilities of membership in the student organization as a student and in professional/civic organizations as an adult.** 32

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**33 Demonstrate leadership skills through participation in student organization activities, such as meetings, programs, and projects.** 33

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**34 Identify Internet safety issues and procedures for complying with acceptable use standards.** 34

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**Exploring Work-Based Learning**

**35 Identify the types of work-based learning (WBL) opportunities.** 35

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**36 Reflect on lessons learned during the WBL experience.** 36

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**37 Explore career opportunities related to the WBL experience.** 37

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**38 Participate in a WBL experience, when appropriate.** 38

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**Introduction to Unmanned Systems**

**39 Describe the goals of an unmanned system.** 39

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**40 Describe the types of UxS.** 40

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**41 Research careers related to UxS.** 41

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## Introducing Unmanned Aircraft Systems (UAS)

**42 Explain the design of UAS. 42**

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**43 Identify elements of UAS. 43**

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**44 Research careers related to UAS. 44**

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**45 Identify milestones in the history of UAS. 45**

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## Flying a UAS

**46 Devise a UAS flight plan. 46**

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**47 Demonstrate a safe UAS flight. 47**

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**48 Explain how flight planning prevents flight problems. 48**

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**49 Describe UAS registration. 49**

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**50 Identify appropriate UAS credentials. 50**

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**51 Identify support technology for UAS flight. 51**

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## Understanding the Subsystems of UAS

**52 Identify the subsystems of a UAS. 52**

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**53 Identify types of air vehicles. 53**

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**54 Describe the essential elements needed to maintain vehicle control. 54**

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## Identify the Components and Subcomponents of UAS

**55 Describe the powerplant components of UAS. 55**

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**56 Describe the avionics components of UAS. 56**

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**57 Describe the function of the powerplant components. 57**

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**58 Describe the function of the avionics components. 58**

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**59 Identify the airframe and landing gear. 59**

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**60 Examine different airframe configurations. 60**

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## Understanding the Basics of National Airspace

**61 Describe the role of the FAA. 61**

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**62 Use Low Altitude Authorization and Notification Capability (LAANC) to identify controlled airspace. 62**

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**63 Describe waivers. 63**

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**64 Explain the requirements and process for registering sUAS vehicles with the FAA. 64**

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**65 Identify penalties for a drone operator for failure to adhere to Part 107 regulations. 65**

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**66 Identify the three classifications of flying in airspace. 66**

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**Understanding the Basics of Weather**

**67 Demonstrate how to interpret a current weather report when planning UAS flight. 67**

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**68 Explain the weather's effect on flight performance. 68**

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**Understanding the Basics of UAS Sensors**

**69 Define sensors. 69**

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**70 Research sensor types. 70**

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**71 Infer sensor requirements from scenarios. 71**

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**Collecting, Analyzing, and Editing Data**

**72 Capture data using a UAS platform. 72**

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**73 Edit data collected from a UAS platform. 73**

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**74 Demonstrate how to download data from sensors. 74**

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**75 Analyze data from sensors. 75**

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**76 Create a defined deliverable. 76**

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**Exploring Solutions for Flight Problems**

**77 Create solutions for common flight problems. 77**

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**78 Perform mission planning. 78**

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**Identifying Motors and Batteries**

**79 Describe the motors used on UAS. 79**

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**80 Describe the use of battery connector and wires. 80**

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**81 Describe lithium polymer (LiPo) batteries. 81**

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**82 Describe how to safely use LiPo batteries. 82**

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**Soldering and Building a Drone**

**83 Explain the need for soldering. 83**

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**84 Demonstrate the proper use of soldering tools. 84**

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**Troubleshooting and Repairing**

**85 Describe safe practices in repair and handling of UAS components. 85**

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**86 Repair circuits. 86**

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## Designing and Building UAS

**87 Compute the thrust-to-weight ratio goal of the UAS.** 87

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**88 Design a UAS.** 88

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**89 Build a UAS.** 89

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## Mounting Payload and Sensors

**90 Select a UAS to meet objectives.** 90

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**91 Identify necessary sensors for a mission.** 91

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**92 Describe the payload sensor's effect on performance.** 92

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**93 Demonstrate the attachment of a sensor.** 93

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**94 Describe advanced payload deployment.** 94

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## Recordkeeping and Maintaining Logs

**95 Document configuration changes in a maintenance log.** 95

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**96 Document the mission in the flight log.** 96

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## Managing Security Threats

**97 Describe the importance of identifying cybersecurity threats on sUAS.** 97

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**98 Maintain proper storage of all components.** 98

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## Demonstrating Autonomous Flight

**99 Identify the benefits of using autonomous flight modes.** 99

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**100 Meet with stakeholders/clients.** 100

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**101 Determine what software will be used.** 101

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**102 Update the software and firmware, if necessary.** 102

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**103 Perform autonomous flight.** 103

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**104 Process data.** 104

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**105 Create a model from data.** 105

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**106 Provide customer with deliverables.** 106

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## Analyzing Advanced Data Products

**107 Analyze red, green, blue (RGB) sensor data.** 107

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**108 Analyze near-infrared (NIR) sensor data.** 108

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**109 Analyze multispectral sensor data.** 109

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**110 Analyze thermal sensor data.** 110

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**111 Analyze LIDAR, radar, or sonar sensor data.** 111

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**112 Review processed maps and data.** 112

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**113 Prepare technical report.** 113