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1. How has fly-by-wire technology improved aviation? (5.A)

a. It replaced heavy, conventional flight controls with an electronic interface system to maneuver an aircraft.

b. It replaced heavy, conventional flight controls and levers with lighter cables and thick wires to maneuver an aircraft.

c. It uses computers and satellites which replaced heavy, conventional flight controls to maneuver an aircraft.

d. It helps aircraft better communicate with air traffic controllers and ground crew from high altitudes.

2. Why should government and private industry work together to explore space? (5.B)

a. To create more job opportunities in space exploration

b. To allow more perspectives in space exploration research

c. To keep one organization from developing all of the new technologies

d. To find the most efficient and cost-effective way to explore space

3. After World War II, what technology allowed pilots to confirm position and distance from
electronic checkpoints and instrument panels instead of relying on visual reference to the ground? (5.A)

a. Beacons and windsocks

b. Automatic Dependent Surveillance-Broadcast (ADS-B)

c. Very high frequency omnidirectional range (VOR)

d. Fly-by-wire technology (FBW)

4. Which of the following are some of the benefits gained from space exploration? Select all that apply. (5.B)

a. It promotes peaceful collaboration with other nations.

b. It created a partnership with the Federal Aviation Administration (FAA).

c. It was discovered that humans could not live outside of Earth’s gravity.

d. It expands the development of new technologies.

e. It created fly-by-wire technology.

5. Which of the following are true about Automatic Dependent Surveillance-Broadcast (ADS-B)? Select all that apply. (5.A)

a. It is able to track aircraft at lower altitudes than radar

b. Most aircraft will have to be equipped with the technology by 2020

c. It utilizes radar technology for aircraft tracking

d. It couples with VOR signals to track aircraft

6. A turn-and-bank indicator informs the pilot of\_\_\_\_\_\_\_. (5.A)

a. the rate of change in altitude of the aircraft

b. the rate of change in heading of the aircraft

c. the altitude of the aircraft

d. the orientation of the aircraft relative to the horizon

7. *SpaceX,* a private space company, is contracted with the United States government to \_\_\_\_\_\_\_. (5.B)

a. launch paying passengers for space tourism

b. provide supplies to the International Space Station

c. create a colony on the moon for inhabitation

d. educate and train astronauts

8. Which aviation technology translates a pilot’s movements into electronic signals that manipulates the flight control surfaces? (5.A)

a. Stealth technology

b. Automatic Dependent Surveillance-Broadcast (ADS-B)

c. Very high frequency omnidirectional range (VOR)

d. Fly-by-wire technology (FBW)

9. Which of the following are reasons why composite materials are used to build aircraft? Select all that apply. (5.A)

a. They cost less than aluminum.

b. They are undetectable.

c. They are lightweight.

d. They are durable.

e. They are government-supplied.

10. Glass cockpit technology transitioned many different aircraft instruments and dials to \_\_\_\_\_\_\_. (5.A)

a. the co-pilot

b. digital displays

c. air traffic control

d. the ceiling of the cockpit

**11. Flying “VFR” means that a pilot \_\_\_\_\_\_\_\_\_\_\_\_\_\_. (5.A)**

 a. uses pilotage to navigate

 b. is required to have perfect weather conditions to fly

 c. navigates solely using their instrument panel and communications with ATC

 d. can occasionally fly through clouds or fog, but not intentionally

12. A term commonly used to describe the competition between private companies vying to be successful in space exploration is \_\_\_\_\_\_\_. (5.B)

a. Space Station Collaboration

b. the New Space Shuttle Program

c. the New Space Race

d. Space Economics

13. One of the benefits of reusing rocket components is that it \_\_\_\_\_\_\_. (5.B)

a. requires less fuel

b. is cost-effective

c. aids research

d. promotes collaboration

14. An altimeter is an aircraft instrument that displays \_\_\_\_\_\_\_. (5.A)

a. speed

b. tilt

c. altitude

d. acceleration

15. The most basic kind of navigation tool is \_\_\_\_\_\_\_. (5.A)

a. instrument navigation

b. computer navigation

c. glass cockpit navigation

d. visual navigation

**16. One potential drawback of using GPS for navigation is \_\_\_\_\_\_\_\_\_\_\_\_. (5.A)**

 a. it can’t be used across the entire United States

 b. it relies solely on satellites

 c. it is optional to be used by aircraft in the future

 d. it transmits data every 30 seconds

**17. Composite materials for aircraft \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (5.A)**

 a. need to be able to withstand large fluctuations in temperature and pressure

 b. consist of durable layers of materials that never separate

 c. provide cheaper options to building aircraft with metal and wood

 d. offer easier options to inspect or repair than traditional materials

18. Which of these instruments would be used to determine a pilot’s heading? (5.A)

a. Airspeed indicator

b. Artificial horizon

c. Directional gyro

d. Turn-and-bank coordinator

19. What are challenges faced by the private space industry? Select all that apply. (5.B)

a. It is expensive to get to space.

b. The technology to live in space does not exist.

c. Many private companies are new and inexperienced.

d. Getting to space is dangerous and risky.

e. There are not enough astronauts to serve the space industry.

20. What programs are private space companies currently working on? Select all that apply. (5.B)

a. Sending tourists to new galaxies

b. Transporting supplies to the International Space Station

c. Designing plans to settle a colony on Mars

d. Building new technologies for people to travel to space

e. Mining asteroids for minerals

21. Explain how NASA works with private companies to explore space. (5.B)

It is too costly for NASA to explore space on its own. It requires contributions from private industry
so it can focus space exploration missions in specific areas, such as long duration space flight that is at a distance greater than NASA’s previous attempts. Private space companies seek to work with NASA to develop technologies they hope to use for profit eventually, such as mechanisms for launching humans and supplies into space, space habitats for living and working in space, lower Earth orbit flights, etc.

22. Describe one way in which space exploration is challenging for the private space industry. (5.B)

There are many challenges for private space companies. To begin, they face enormous research and development costs and oftentimes, there is no immediate revenue stream. Many of these companies are also very new and face a steep learning curve. They have very bold visions, but there are many questions about bringing many of their dreams to reality. Finally, getting to space is dangerous and it’s questionable if some of these new companies could withstand a major disaster or accident.

23. Identify three of the six instruments from the “six pack” and describe the function of each. (5.A)

Airspeed indicator - displays speed

Artificial horizon - displays pitch compared to straight and level flight

Altimeter - displays altitude

Vertical speed indicator - displays rate of climb or descent

Directional gyro - displays compass heading

Turn-and-bank coordinator - Indicates rate of turn

24. Explain how Automatic Dependent Surveillance-Broadcast (ADS-B) improves navigation. (5.A)

ADS-B utilizes GPS and will be the backbone technology for the U.S. NextGen Air Transportation System. Automatic Dependent Surveillance-Broadcast (ADS-B) is the GPS-equipped hardware that will be installed on aircraft in order to give air traffic controllers more precise aircraft positions. Nearly all aircraft will be required to have ADS-B equipment installed by 2020. ADS-B equipment receives high-fidelity GPS data from aircraft and distributes that data to air traffic control facilities. ADS-B equipped aircraft also will be able to communicate with each other and anticipate any potential issues to adjust flight paths as necessary to avoid collisions.

25. How do glass cockpits help pilots fly airplanes better and safer? (5.A)

Before glass cockpits, individual dials and indicators were placed in the cockpit, forcing the pilot to study each readout and look at many different locations in the cockpit. Indicators were limited to space within the cockpit. With the introduction of glass cockpits, digital readouts of several indicators could be placed on one screen. This screen also allows the user to select the indicator arrangement based on frequency and importance of use. This increases both pilot efficiency and pilot safety.