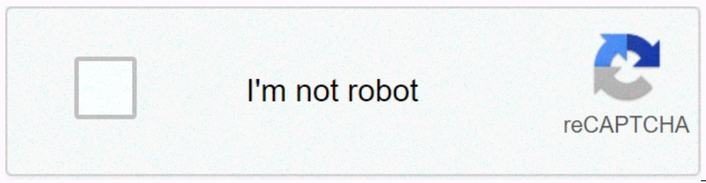

Continue

Boy scout aviation merit badge answers

January 2014 Do the following: Define 'aircraft'. Describe today some kinds and use of airplanes. Explain the operation of piston, turboprop and jet engines. Point to a model plane the forces that act on a plane in flight. Explain how an airfoil lift generates, how the primary control surfaces (ailerons, lifts and rudders) affect the aircraft's posture, and how a propeller produces thrust. Show how an aircraft's control surfaces are used for takeoff, straight climb, flat bend, climbing, descending exit, straight descent and landing. Explain the following: the sports pilot, the recreational pilot and the private pilot certificates; instrument classification. Do two of the following: Take a flight on a plane, with your parents' permission. Write down the date, location, type of aircraft and duration of the flight and report on your flight impressions. Under supervision, carry out a preflight inspection of a light aircraft. Obtain and learn how to read an aviation chart. Measure a real price on the chart. Correct for magnetic variation, compass deviation and wind drift to determine a compass head. Using one of the many flight simulator software packages available for computers, 'fly' the course and heading you set in requirement 2c or any other course you have plotted. Explain the purposes and functions of the various instruments found in a typical single-engine aircraft: posture indicator, head indicator, altimeter, air speed indicator, turn and bank indicator, vertical speed indicator, compass, navigation (GPS and VOR) and communication radios, rev counter, oil pressure gauge, and oil temperature meter. Create an original poster of an airplane instrument panel. Include and identify the instruments and radios discussed in requirement 2nd. Do one of the following: Build and fly a fuel-powered or battery-powered electric model airplane. Describe the safety rules for building and flying model aircraft. Tell us the safety rules for using glue, paint, drugs, plastics, fuel and batteries. Build a model FPG-9 (Foam Plate Glider). Get others in your troop or patrol to create their own model, then organize a competition to test the precision of the flight and the landing of the models. Do one of the following: Visit an airport. After the visit, we will report on how the facilities are used, how runways are numbered and how runways are defined as 'active'. Visit a facility for the Federal Aviation Administration - a control tower, a terminal radar control facility, an airway traffic controller or flight standards district office. (Phone directory are under U.S. government offices, Transportation Department, Federal Aviation Administration. Call in advance.) Report on the operation and your impressions of the facility. Visit an aviation museum or attend an air show. Report your impressions of the museum or the show. Find about three career opportunities in aviation. Choose one and discover the training, training and experience needed for this profession. Discuss this with your advisor, and explain why this profession might interest you. Aviation Worksheet FPG-9 Instructions Notes: Apr 30, 2013 - zacharyit very confusing the way the screen says itMar 20, 2016 - Gary J clewsIs there a video out there that explains the aerodynamics I could show in a classroom setting of scouts? April 8, 2016 - Chi NguyenWith this video The Aerodynamics of Flight atwww.youtube.com/watch?v=5ltjFEei3AIAug 13, 2017 - Kim JurgensAs a pilot and an Eagle Scout we are always looking to help young scouts learn more about aviation. You contact your nearest EAA, Experimental Aircraft Association, chapter and they will help you in not only your basic requirements, but give you a flight with our Young Eagles Program. Visit EAA.com for your chapter location. May 1, 2018 - anthonyDoes this helps and there's something else I can be called so I can get the right learning resources so I can teach younger scout members the right ways so they learn how to fly a plane. December 11, 2019 - Kieran baldwinthank you for setting up this site up Contest - Ask a question - Add ContentThis site is not officially associated with the Boy Scouts of America Follow Me, Scouts Here are some sample answers posted by Troop 107 Greensboro NC While working on the Aviation merit badge, Scouts learn about aircraft and the forces acting on them. They learn about maintaining planes and planning a flight. They build and fly a model airplane and explore careers related to aviation. Printable helps for requirements:Printable requirements for Aviation Merit BadgePrintable checkoff sheet for Aviation Merit BadgePrintable note sheet for Aviation Merit BadgePrintable checkoff sheet for all Scouts BSA merit badgesFly higher with these related ideas and achievements: Dr. Bernard Harris Supernova Helps and Documents Thomas Edison Supernova Award Helps and Documents Whoosh! Scouts BSA Nova Award (Engineering) Helps and documents Ride the Wind Day Up and Away Scouts BSA Nova Award (Fluid Dynamics) Helps and documents 1 Aviation Merit Badge 2 Aviation MB RequirementsDo the following: Define aircraft. Describe today some kinds and use of airplanes. Explain the operation of piston, turboprop and jet engines. Point to a model plane the forces that act on a plane in flight. Explain how an airfoil lift generates, how the primary control surfaces (ailerons, lifts and rudders) affect the aircraft's posture, and how a propeller produces thrust. Show how an aircraft's control surfaces become for take-off, straight climb, flat bend, climbing, descending exit, straight descent and landing. Explain the following: the sports pilot, the recreational pilot and private pilot certificates; instrument classification. 3 Aviation requirements MBDo TWO of the following: Take a flight on an airplane, with the permission of your parents. Write down the date, location, type of aircraft and duration of the flight and report on your flight impressions. Under supervision, carry out a preflight inspection of a light aircraft. Obtain and learn how to read an aviation chart. Measure a real price on the chart. Correct it for magnetic variation, compass deviation and wind drift to determine a compass head. Using one of the many flight simulator software packages available for computers. fly the course and heading you set in requirement 2c or any other course you have plotted. Explain the purposes and functions of the various instruments found in a typical single-engine aircraft: posture indicator, head indicator, altimeter, air speed indicator, turn and bank indicator, vertical speed indicator, compass, navigation (GPS and VOR) and communication radios, rev counter, oil pressure gauge, and oil temperature meter. Create an original poster of an airplane instrument panel. The instruments and radios record and identify those in requirement 2nd. 4 Aviation MB RequirementsDo ONE of the following: a. Build and fly a fuel-powered or battery powered electric model aircraft. Describe the safety rules for building and flying model aircraft Tell the safety rules for the use of glue, paint, drugs, plastics, fuel and battery pack. B. Build an FPG-9 model. Get others in your troop or patrol to create their own model, then organize a competition to test the precision of the flight and the landing of the models. 5 Aviation MB RequirementsDo ONE of the following: Visit an airport. After the visit, report on how the facilities are used, how runways are numbered, and how runways are determined to be active. Visit a facility control tower from the Federal Aviation Administration, a terminal radar control facility, an air route traffic control center, or flight standards district office. (Phone directory lists are among U.S. government offices, Transportation Department, Federal Aviation Administration. Call in advance.) Report on the operation and your impressions of the facility. Visit an aviation museum or attend an air show. Report your impressions of the museum or the show. 6 Aviation MB RequirementsFind about three career opportunities in aviation. Choose one and discover the training, training and experience needed for this profession. Discuss this with your advisor, and explain why this profession might interest you. 7 Demand 1a a. Define 'aircraft'. Describe today some kinds and use of airplanes. Explain the operation of turboprop and jet engines. 8 What is an airplane An aircraft is a vehicle that can fly by being supported by air Two main types are lighter than air vehicles and heavier than air vehicles Aircraft can also be powered powered non-powered aircraft can also be manned or unmanned 9 Requirement 1b b. Point to a model plane the forces that act on a plane in flight. 10 Flight is the result of the balance of these forcesForces on an airplane flight is the result of the balance of these forces 11 How is Lift made? 12 Lighter Than Air AircraftLift is made by hot air or gases that are less dense than air. 13 Heavier than Air AircraftWings produce lift 14 Required 1c c. Explain how an airfoil lift generates, how the primary control surfaces (ailerons, lifts and rudders) affect the aircraft's posture, and how a propeller produces thrust. 15 How do wings produce LiftBernoulli's Principle 16 How is Thrust made? 17 Un-Powered Aircraft No Thrust 18 Thrust is created by the PowerplantPowered Aircraft Thrust is Created By the Powerplant 19 Types of Powerplants Piston Prop Engines Similar to a car engineThrust is produced by propeller 20 Types of Powerplants Jet Engines is produced by jet exhaustion 21 Types of Powerplants Turboprop Engines Mix of propeller and jet engineThrust is produced mostly propeller by propeller 22 Caused by Flow Flow Caused by Flow Over Surfaces 23 How are aircraft monitored? 24 Forces Acting on AircraftLIFT THRUST Here's a photo of a U.S. Air Force F-16 to help highlight the main forces that act on an aircraft. Lift is produced by a lower pressure made on the upper surface of an aircraft's wing compared to the pressure on the lower surface of the wing, causing the wing to be lifted up. The special shape of the aircraft wing (airfoil) is designed so that the air flowing over it has to travel a greater distance more quickly, resulting in a lower pressure area (see illustration) which lifts the wing up. Lift is that force that resists the force of gravity (or weight). Thrust is a force created by a power source that gives an aircraft forward movement. It can either pull or push a plane forward. Thrust is that force that overcomes drag. Conventional aircraft use engines and propellers to obtain thrust. Drag is the force that slows down or slows down the forward movement of an aircraft through the air when the air flow direction is opposite to the direction of motion of the aircraft. It is the friction of the air as it meets and passes over and over an airplane and its components. The more surface area exposed to rushing air, the greater the air resistance. The streamlined shape of an aircraft helps it go through the air more easily. If the plane flies with a tail wind, that is, a wind of which the also works in the same direction as the direction of movement of the aircraft, the drag actually helps the plane to move in the direction it wants to go. However, during takeoffs and landings, planes normally fly in the wind. DRAG WEIGHT (gravity) 25 How does an airfoil work? Airfoil? PrincipleDaniel Bernoulli, an eighteenth-century Swiss scientist, discovered that as the speed of a liquid increases, the pressure decreases. How and why does this work, and what does it have to do with airplanes in flight? Bernoulli's principle is easiest to see by using a venturi tube. A venturi tube is just a tube that is narrower in the middle than it is at the ends. When the liquid passing through the tube reaches the narrow part, it accelerates. According to bernoulli's principle, it would then have to exert less pressure. Let's see how this works. As the liquid passes over the central part of the tube, more energy is consumed as the molecules accelerate. This allows less energy to apply pressure, and so the pressure decreases. One way to describe this drop in pressure is to call it a differential pressure. This simply means that the pressure at one point is different from the pressure at another point. For this reason, the principle is also called Bernoulli's Law of Pressure differential. Bernoulli's principle states that an increase in the speed of a liquid is always accompanied by a decrease in pressure. Air is a liquid. If you make sure that the air on one side of a surface moves quickly, the pressure on that side of the surface is less than that on the other. Bernoulli's principle works with an airplane wing. In motion, the air touches the front edge (front edge) of the wing. Some of the air moves under the wing, and some of it goes over the top. The air moving over the top of the curved wing must travel further to reach the back of the wing; In consequence it must travel faster than the air moving under the wing, in order to reach the lingering edge (rear edge) at the same time. Therefore, the air pressure on the top of the wing is less than that at the bottom of the wing. Bernoulli's principle applies to every liquid, and since air is a liquid, it applies to air. The camber of an airfoil causes an increase in the speed of air flying over the airfoil. This results in a decrease in the pressure in the flow of air moving over the airfoil. This drop in pressure on the top of the airfoil causes lift. 26 How do control surfaces work? Control surfaces are the movable outer surfaces of an airplane. These surfaces regulate the air flow over the different parts of the aircraft, allowing it to move in different ways. On the aircraft, pilots control the movement of the surfaces with their hands or feet by pushing, pulling or turning the steering to make the aircraft move properly. By learning the names and functions of the different surfaces, you will enjoy the construction, design and aerodynamics of the aircraft. AIRPLANE An aircraft is a vehicle heavier than air, powered by an engine, which travels through the air by the reaction of air passing over its wings. HULL The hull is the body part of an airplane, adjusting the crew and passengers or the load. COCKPIT In general airplane plane, the cockpit is usually space in the fuselage for the pilot and passengers: in some aircraft it is just the compartment of the pilot. LANDING GEAR The landing gear, located under the aircraft, supports it while it is on the ground. WINGS Wings are the components of aircraft that lift and support the entire weight of the aircraft and its contents in flight. PROPELLER A propeller is a rotating blade at the front of the aircraft. The engine rotates the propeller that most often pulls the plane through the air. FLAPS Flaps are the movable parts of an aircraft's wings closest to the fuselage. They are moved in the same direction (downwards) and allow the aircraft to fly more slowly. AILERONS Ailerons are the outgoing movable parts of an airplane's wings moving in opposite directions (one up, one down). They are used when making turns. STIR The rudder is the movable vertical part of the tail that controls lateral movements. HORIZONTAL STABILIZER The horizontal stabilizer is the horizontal surface of the rear part of the fuselage used to balance the aircraft. LIFT The lift is the movable horizontal part of the tail through which it moves flat up and down. 27 Directional Control YAW - stirring PITCH - lifts ROLL - aileronsA plane in flight changes direction by moving around one or more of its three rotation axes: lateral axis, vertical axis and longitude axis. These axes are imaginary lines that run perpendicular to each other through the exact weight center of the aircraft. The rotation of the plane around them is called pitch, roll and yaw. The pilot accompanies the plane by checking pitch, roll, and yaw, and by using the elevators, ailerons, and rudder. YAW Rudder rotates the plane around vertical axis. ROLL Ailerons rotate the plane around the longitudinal axis. PITCH Elevators rotate plane around side axle. 28 YAW Rudder – The foot pedals are connected to the rudder of the tail section by means of wires or hydraulics. The rudder is the vertical part of the tail that can move from left to right. Stir: The foot pedals are connected to the rudder of the tail section by means of wires or hydraulics. The rudder is the vertical part of the tail that can move from left to right. When the foot pressure on the left rudder pedal moves the rudder to the left, causing the nose of the plane to move to the left. 29 ROLL The stick is connected to the ailerons of the wings by means of wires or hydraulics. By turning the stick, the pilot can position the ailerons When the steering wheel is turned to the right, the right aileron goes up and the left aileron goes down, rolling the plane to the right. When the steering wheel is turned to the left, goes down and the left aileron goes up, rolling the plane to the left. Ailerons – The stick is connected by means of wires or hydraulics with the ailerons of

the wings. By turning the stick, the pilot can change the positions of the ailerons. 30 PITCH Lifts – The stick (joy stick) is connected to the lifts of the tail section via wires or hydraulics. By moving the stick, the pilot can change the position of the lifts. The stick (joy stick) is connected to the lifts of the tail section by means of wires or hydraulics. By moving the stick, the pilot can change the position of the lifts. When the control column is pushed in, the elevators move down, throwing the tail of the plane up and the nose down, rolling the plane down. When pulling the control column back the elevators move up, pitching the tail of the plane down and nose up, rolling the plane up. Cars only go left or right, but planes must also be sent up or down. An aircraft has parts on its wings and tail called control surfaces to help it. These can be demonstrated by using folded paper gliders and balsa gliders. Let's start with an experiment to illustrate how an aircraft is controlled. 31 Demand 1d d. Show how an aircraft's control surfaces are used for takeoff, straight climb, flat bend, climbing, descending exit, straight descent and landing. 32 Takeoff & Climb After taxiing to the runway, a pre-start checklist is carried out. This control should ensure that all systems operate normally. When this is completed, the aircraft is taxied to the center of the runway and aligned with it. The accelerator pedal is fully opened to start the start run (also called take off roll). During this take-off run, the steering wheel, or stick, is usually held in the neutral position, but the rudder pedals are used to keep the aircraft on the midline of the runway. When takeoff speed is approached, soft counterpressure on the handlebar increases the lift, causing the nose of the plane to throw up slightly. This lifts the nose wheel off the runway. Once the nose wheel is off the track, the right rudder is applied to counter the left-turning tendency, which is present under low air speed and high-power flight conditions. Since the plane lifts off the runway best, the pilot varies the pressure on the control wheel. First, the pressure is eased slightly to gain the air speed while it is still in the ground (additional lift provided by compression of air between the wings of the aircraft and the ground). As air speed increases to the best of the climbing speed, the counter-pressure on the handlebar is adjusted to maintain that air speed until the first desired height is reached. (The best climbing speed provides the most altitude for a certain time unit.) Climbs to other and higher altitudes are made at air speeds determined by the pilot, pilot, the desired cruising height is reached. Upon reaching cruising altitude, the plane's pitch position is reduced and the plane accelerates to cruising speed. Power is reduced and adjusted to maintain the selected cruising speed. Almost simultaneously, the pilot adjusts the lift and possibly the rudder to keep the aircraft at the desired altitude and course (direction). If the flight goes to a remote airport, the aircraft will be kept in the configuration of the cruise flight until the destination is nearby. If the pilot only wants to perform basic flight maneuvers in a training area, the configuration of the cruise flight will necessarily be changed fairly quickly. 33 Countries A good landing starts with a good approach. Before the final approach has begun, the pilot performs a landing checklist to ensure that critical items such as fuel flow, landing gear down and carburettor heat are not forgotten. Flaps are used for most landings because they allow a lower approach speed and a steeper angle of inclination. This gives the pilot a better view of the landing area. The air speed and speed of the descent have stabilized, and the aircraft is aligned with the runway center line as the final approach has begun. When the airplane sinks over the approach end (threshold) of the runway, the power is reduced further (probably to useless). At this time, the pilot slows down the speed of the descent and the air speed by gradually applying more counterpressure to the steering wheel. The airplane is held aligned with the center of the runway mainly by use of the rudder. Continued backpressure on the steering wheel, as the plane enters ground effect and closer and closer to the runway, further slows its forward speed and speed of descent. The pilot's goal is to fly the plane safely just a few inches above the surface of the runway until it loses flight speed. In this condition, the main wheels of the aircraft will either beep or hit the runway with a soft bump. With the wheels of the main landing gear firmly on the track, the pilot applies more and more back pressure to the steering wheel. This keeps the airplane in a nose-high position, which keeps the nose wheel from hitting the runway until the forward speed is much slower. The goal here is to avoid overloading and damaging the nose gear when the nose wheel touches the track. The landing is a transition from flying to taxiing. It requires more judgment and technique than any other maneuver. There are more accidents during the landing phase than any other stage of flying. Variables such as wind shear and design to add to the problem of landing. Good pilots are easy to spot. They land smoothly on the main wheels in the middle of the runway and retain positive directional control as the plane slows down to taxiing speed. 34 Demand 1st e. Explain the following: the sport the recreational pilot and private pilot certificates; instrument classification. 35 Types of pilot certificateSport cannot carry more than one passenger, who is only allowed to fly during the day with light sports aircraft, can only fly recreationally with aircraft up to 180 hp (130 kW) and 4 seats during the day for fun, only be allowed to fly privately for fun or personal matters. Private pilots cannot be paid, compensated to fly or hired by an operator. Instrument rating An add-on on the private pilot certificate that allows the pilot to fly in limited visibility conditions 36 Required 2 Do two of the following: Take a flight in an aircraft, with your parent's permission. Write down the date, location, type of aircraft and duration of the flight and report on your flight impressions. Under supervision, carry out a preflight inspection of a light aircraft. Obtain and learn how to read an aviation chart. Measure a real price on the chart. Correct it for magnetic variation, compass deviation and wind drift to determine a compass head. Using one of the many flight simulator software packages available for computers. fly the course and heading you set in requirement 2c or any other course you have plotted. Explain the purposes and functions of the various instruments found in a typical single-engine aircraft: posture indicator, head indicator, altimeter, air speed indicator, turn and bank indicator, vertical speed indicator, compass, navigation (GPS and VOR) and communication radios, rev counter, oil pressure gauge, and oil temperature meter. Create an original poster of an airplane instrument panel. Include and identify the instruments and radios discussed in requirement 2nd. 37 Instruments 38 Instruments Airspeed indicator This indicates the speed at which the aircraft moves through the air. The air speed indicator is one of the pressure instruments that use the pitotstatic system. Most air speed indicators use a combination of impact air pressure (from the pitot tube) and static air pressure (of static ports) to give a correct measurement. The air speed indicator in the figure is indicating an air speed of 135 knots (nautical miles per hour). Most modern aircraft use buttons to measure speed. A nautical mile is 6,076 feet. Your family car uses the miles per hour. A statute mile equals 5,280 feet. Attitude indicator This is also called the Artificial Horizon. This shows the attitude of the airplane (nose up, nose down, wings banked) in relation to the horizon. The posture indicator is a gyroscopic instrument; that means it uses a gyroscope to maintain its relative position. In most smaller, private aircraft, gyroscope of posture is spun by high speed air generated by a suction (vacuum) pump mounted on the engine of the aircraft. The posture indicator in the figure indicates level flight (nose and wings are flat in to the horizon). Altimeter This shows the altitude of the aircraft above the average sea level (MSL) when it is well matched to the current pressure setting. The altimeter uses static air pressure provided by the static gates of the pitotstatic system. The small button you see adjusts the altimeter to the local barometer pressure to provide an accurate reading. The pilot adjusts the altimeter easily until the correct air pressure is set in the small window (the Kollsman window). The altimeter in the figure indicates a height of 14,500 ft. MSL. Turn and Bank Indicator This is also called the Turn Coordinator, or sometimes Turn and Slip Indicator. The Turn and Bank indicator shows the speed at which a turn is made. The Turn section of the indicator is a gyroscopic instrument. If you have a vacuum driven posture indicator, you might want to have this important backup tool use another energy source (usually the aircraft electric system). The miniature plane banks in the direction of the turn. At the bottom of the instrument is a ball in a glass tube called an inclinometer. The inclinometer uses gravity and inertia to indicate aircraft movements, so-called slips and skids. The inclinometer indicates whether the aircraft is in a coordinated flight (centered) or uncoordinated flight. The turn coordinator in the figure is indicating wings level and coordinated flight. Header indicator Shows the course (direction) that the plane flies. This is also a gyroscopic instrument. The indicator is not a compass, so it needs to be set to agree with the aircraft's magnetic compass. Compasses are notoriously unreliable when an aircraft is running, changing pitch, or air speed. For this reason, pilots use a system that maintains accuracy at all stages of flight, a gyroscopic-driven indicator. In most smaller, private aircraft, the gyroscope of the head indicator is also spun by high-speed air supplied by a suction pump (vacuum) mounted on the aircraft engine. The heading indicator in the figure indicates a course of the north. Vertical speed indicator also known as the VSI or VVI for military pilots. The VSI uses static pressure from the pitot-static system to give its readings. The VSI indicates whether the aircraft is in level flight, climbing or descending. The speed of the climb or descent is indicated in hundreds of meters per minute. The VSI in the figure indicates flat flight. 39 (b). Build an FPG-9 model. Get others in your troop or patrol to create their own model, then organize a competition to determine the precision of flight and landing models. 40 Model FPG-9 See handout for template and instructions. 41 Demand 4 Do one of the following:Visit an airport. After the visit, report on how the facilities are used, how runways are numbered, and how runways are determined to be active. Visit a Federal Aviation Administration Administration control tower, terminal radar control facility, airway traffic control center, or Flight Standards District Office. (Phone directory lists are among U.S. government offices, Transportation Department, Federal Aviation Administration. Call in advance.) Report on the operation and your impressions of the facility. Visit an aviation museum or attend an air show. Report your impressions of the museum or the show. 42 Demand 5 Discover three career opportunities in aviation. Choose one and discover the training, training and experience needed for this profession. Discuss this with your advisor, and explain why this profession might interest you. 43 Jobs Career at the Airlines Landing FacilitiesEngineering Research & Development General Aviation Government Aviation Aviation Aerospace Industries Military Aerospace Industries Military Aerospace (USAF, USN, USMC, USA, NOAA) National Aeronautics & Space Administration (NASA) Careers with the Airlines: Pilot, MX Technician, Reservation Vendor, Flight Attendant and Aeronist Landing Facilities Airport Manager, Other Airport Careers (Firefighter, Security, Emergency Services, MX Employees, servants, restaurant workers, concessionary employees), permanent base operator Engineering Research & Development R&D specialist General Aviation Business flying, executive flying, commercial aviation (air taxi / charter operator, rental use, air applications{crop dusting}), personal aviation, instructional flying, aircraft sales Government Aviation Federal aviation administration (FAA), air traffic controller, FAA operations and mx inspection, engineering and testing, civil aviation security specialist Aerospace Industries Manufacturing Of Major Aviation A/C (Boeing , McDonnell Douglas , Lockheed), General Aviation Manufacturing (Cessna, Learjet, Beech, Gulfstream, Piper), A/C engine manufactures, military and space manufacturing Military Aerospace USAF, USN, USMC, USA, National oceanic & atmospheric administration (NOAA) NASA - Space sciences, life sciences, fluid and flight mechanics, materials and structures, propulsion systems, flight systems, measurement and instrumentation, data systems, experimental facilities, equipment and operations, administration and management management