

English for Aviation Mechanics

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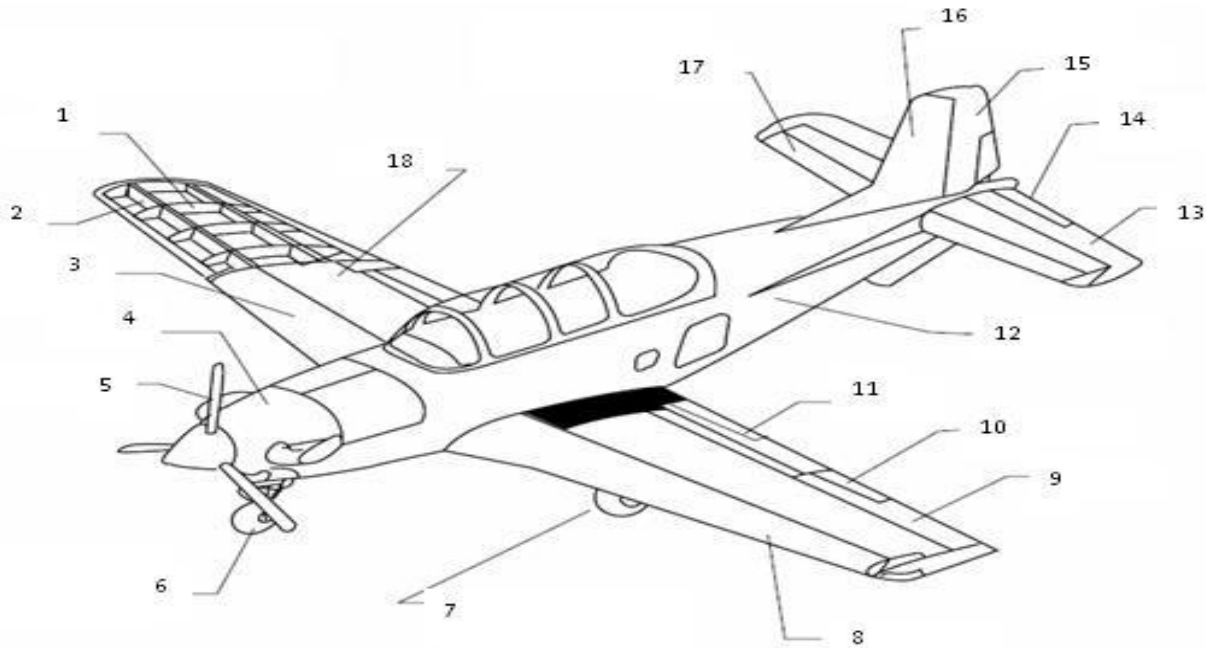
English for Aviation Mechanics

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Parts of the airplane

Vocabulary



Rip	
Spar	
Right wing	
Cowl	
Propeller	
Nose gear	
Main landing gear	
Left wing	
Aileron	
Trim tabs	

Flaps	
Fuselage	
Elevator	
Trim tabs	
Rudder	
Vertical fin	
Horizontal stabilizer	
Skin	

Chose the correct answer :

1- The nose wheel is situated at

- a) the middle
- b) the front
- c) the side
- d) the back of the airplane

2- The spar is a part of the aircraft structure located in the

- a) fuselage
- b) tail
- c) engine
- d) wing

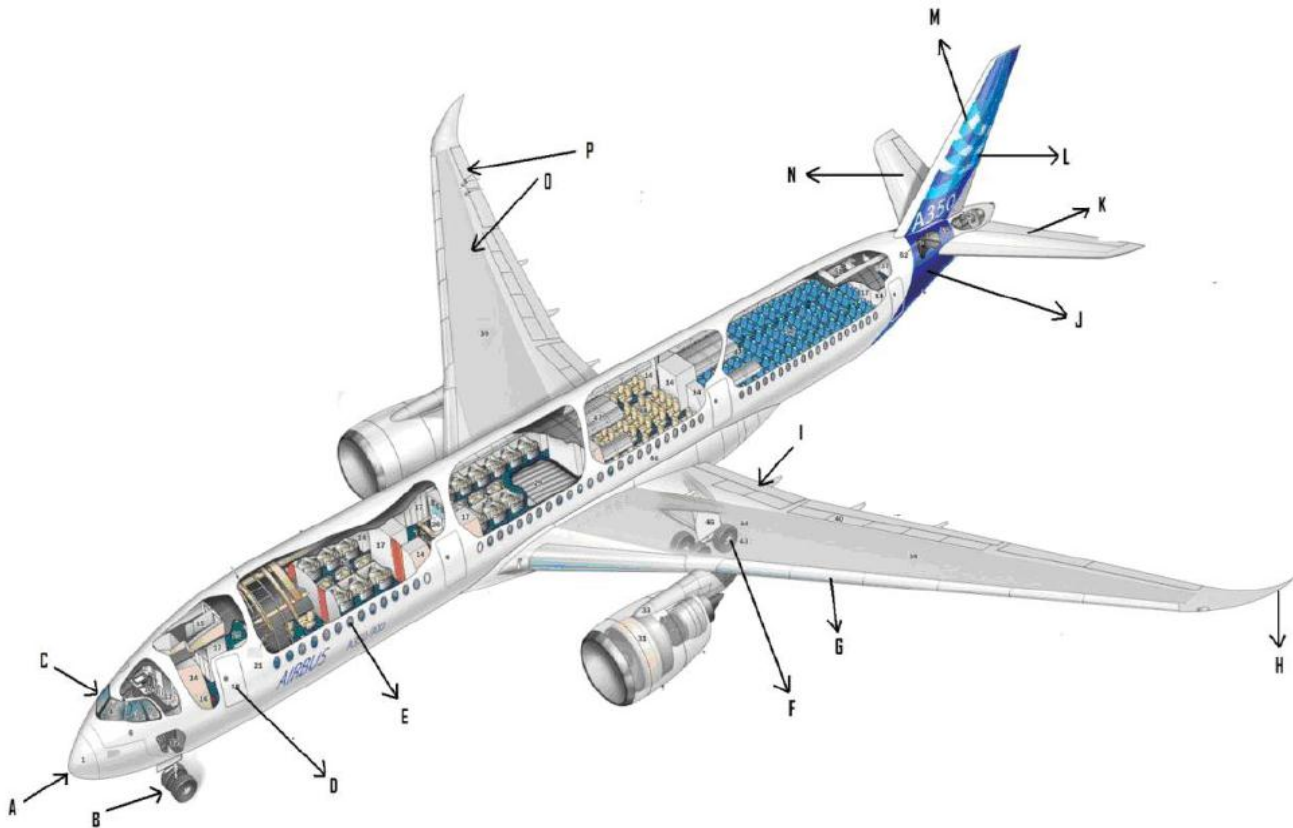
3- The aileron's will make the aircraft

- a) pitch up
- b) roll
- c) descend
- d) increase speed

4- The pilot sits in

- a) the wing

- b) the fuselage
- c) the tail
- d) the cock pit



A : Nose, B : Nose landing gear, C : Windshield, D : Door, E : Window, F : Main landing gear, G : Leading edge, H : Wing tip, I : Flaps, J : Empennage, K : Elevator, L : Rudder, M : Vertical stabilizer, N : Horizontal stabilizer, O : Wing, P : Aileron.

Rudder	Controls the yaw movement of the aircraft
Flaps	Add camber to the wing surface to create more lift
Leading edge	The front section of a wing
Engine	Powers the airplane
Ailerons	Control the bank of an aircraft
Horizontal stabilizer	This structure contains the elevators
Nose	The front section of the aircraft. It is forward of the



	cockpit
Wingtip	The extreme outward points of the wing
Empennage	The aft structure of the aircraft which contains the vertical and horizontal stabilizer
Elevator	Controls an aircraft's pitch
Fuselage	The main body of an aircraft
Door	Where passengers and crew enter and exit an aircraft
Elevator	The principal lifting surface of an airplane
Windshield	The area where pilots see out of the cockpit
Vertical stabilizer	This structure contains the rudder

Conversation :

Person 1: What are the major parts of an airplane and what are their applications?

Person 2: The main parts are as follows, A) engine is the power plant B) wings provide lift C) fuselage is the main body and allows passengers/cargo D) tail plane provide aerodynamic stability

Person 1: Where is the fuel kept?

Person 2: Airplanes keep the majority of the fuel the wings and have an extra fuel tank in the fuselage between the wings, fuel can be transferred between the different tanks using cross-feed system.

Person 1: Why do commercial airplanes fly so high?

Person 2: Airplanes fly at high altitudes to reduce the amount of fuel used, and to fly above most of the turbulent weather.

Person 1: How does the landing gear deploy and retract?

Person 2: A hydraulic fluid system is used, but if this system fails a mechanical crank can be used to open the landing gear doors and allow the landing gear to fall under its own weight and gravity into the down and locked position.

1- Name one reason why airplanes fly at high altitudes.

- a) To fly above the weather
- b) To reduce amount of fuel used
- c) Both of the above
- d) None of the above

2- A mechanicalcan be used if the landing gear hydraulic fluid system fails

3- Name two main parts of an airplane.

- a) Fuselage and wings
- b) Tail plane and engine
- c) Both of the above.
- d) None of the above.

4- Thesystem can be used to transfer fuel between different fuel tanks

5- The majority of the fuel is kept in the airplanes wings.

- 1. False
- 2. True

Grammar

Put the verbs from the box into the correct form in the sentences below.

Jack	Torque	being	get	perform	changing	increase	matching	completing	functioning
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1. The mechanic is about to the broken aileron hinge bracket
3. Put the verbs from the box into the correct form in the sentences below.
4. The hydraulic fluid pressure is too low, it needs
5. The bend profile of the sheet metal skin needs tothe original structure.
6. The mechanic issome more nuts and bolts.
7. The aircraft will need up for the C check.
8. checks are carried out on aircraft.
9. It is important to bolts to the correct value
10. The mechanic'sare a routine 'A' check of the airgraf
11. The mechanic'sare a routine 'A' check of the airgraf
12. The hydraulic system will need a purge
13. The aircraft will have to de-iced prior to takeoff

Check the Incorrect form of the verb in the below sentence.

1- Aircraft that fly/flying over sea water are more likely to have corrosion problems.

- a) fly
- b) flying

2- The stringer has some damage/damaging and it needs to be repaired.

- a) damage**
- b) damaging**

3-The bolt is too long, it needs take/taking out and replacing.

- a) take**
- b) taking**

4- The fuel filter needs changing/change.

- a) changing**
- b) change**

5-We need to replacing/replace the turnbuckle before the aircraft flies.

- a) replace**
- b) replacing**

6- We need to drill/drilling a hole in the skin

- a) drilling**
- b) drill**

7- The rivet tail is too long, it still needs reacting/react

- a) react**
- b) reacting**

Reading

It is important that all pilots thoroughly know the various parts of an aircraft. For example, the wings generate most of the lift to hold the plane in the air. To generate lift, the airplane must be pushed through the air. The air resists the motion in the form of aerodynamic drag. Modern airliners use winglets on the tips of the wings to reduce drag. The

turbine engines, which are located beneath the wings, provide the thrust to overcome drag and push the airplane forward through the air. Smaller, low-speed airplanes use propellers for the propulsion system instead of turbine engines.

To control and maneuver the aircraft, smaller wings are located at the tail of the plane. The tail usually has a fixed horizontal piece, called the horizontal stabilizer, and a fixed vertical piece, called the vertical stabilizer. The stabilizers' job is to provide stability for the aircraft, to keep it flying straight. The vertical stabilizer keeps the nose of the plane from swinging from side to side, which is called yaw. The horizontal stabilizer prevents an up-and-down motion of the nose, which is called pitch.

At the rear of the wings and stabilizers are small moving sections that are attached to the fixed sections by hinges. In the figure, these moving sections are colored brown. Changing the rear portion of a wing will change the amount of force that the wing produces. The ability to change forces gives us a means of controlling and maneuvering the airplane. The hinged part of the vertical stabilizer is called the rudder; it is used to deflect the tail to the left and right as viewed from the front of the fuselage. The hinged part of the horizontal stabilizer is called the elevator; it is used to deflect the tail up and down. The outboard hinged part of the wing is called the aileron; it is used to roll the wings from side to side. Most airliners can also be rolled from side to side by using the spoilers. Spoilers are small plates that are used to disrupt the flow over the wing and to change the amount of force by decreasing the lift when the spoiler is deployed.

The wings have additional hinged, rear sections near the body that are called flaps. Flaps are deployed downward on takeoff and landing to increase the amount of force produced by the wing. On some aircraft, the front part of the wing will also deflect. Slats are used at takeoff and landing to produce additional force. The spoilers are also used during landing to slow the plane down and to

counteract the flaps when the aircraft is on the ground. The next time you fly on an airplane, notice how the wing shape changes during takeoff and landing.

The fuselage or body of the airplane, holds all the pieces together. The pilots sit in the cockpit at the front of the fuselage. Passengers and cargo are carried in the rear of the fuselage. Some aircraft carry fuel in the fuselage; others carry the fuel in the wings.

Answer the following questions about the article:

1. The wings generate most of the _____ to hold the plane in the air.

- a. drag**
- b. thrust**
- c. lift**
- d. None of the above.**

2. The air resists the motion in the form of _____.

- a. aerodynamic thrust**
- b. aerodynamic drag**
- c. aerodynamic lift**
- d. None of the above**

3. Modern airliners use _____ on the tips of the wings to reduce drag.

- a. winglets**
- b. wingtips**
- c. flaps**
- d. ailerons**

4. True or False: The tail usually has a fixed horizontal piece, called the horizontal stabilizer, and a fixed vertical piece, called the rudder.

b. False

a. True

5. Flaps are deployed _____ on takeoff and landing to increase the amount of force produced by the wing.

a. outward

b. inward

c. upward

d. downward

6. Where are slats located?

a. The back of the wing

b. The front part of the wing

c. On the vertical stabilizer

d. On the horizontal stabilizer

Speaking

1. What is your favourite airplane?

2. Do you prefer military or civil aircraft?

3. How many engines does an A320 aircraft have?

Test

1. Name the part(s) of the aircraft that provide lift

a) Engine

b) Wings

c) Wheels

d) Fuselage

2. Where are the elevators on an aircraft ?

a) Wing

b) Landing Gear

c) Horizontal Stabilizer

d) Cock Pit

3. A rib is an important part of what structure

a) Fuselage

b) Tail Plane

c) Nose Cone

d) Wing

4. Aircraft wheels are at the bottom of

a) Landing gear leg

b) Engine

c) Flaps

d) Rudder

5. Aircraft structures are most commonly made from

a) Cotton

b) Aluminium alloy

c) Paper

d) Wood

6. Aircraft _____ above most of the weather.

a) flies

b) flown

c) fly

d) flew

7. Aircraft _____ a hydraulic fluid system to retract and deploy the landing gear.

a) used

b) use

c) uses

d) using

An aircraft engine will _____ power.

- a) provide
- b) provided
- c) provides
- d) providing

8. If the hydraulic system fails the captain can open the landing gear doors _____ a mechanical crank.

- a) using
- b) use
- c) used
- d) uses

9. The mechanic is _____ the engine now.

- a) changed
- b) repaired
- c) fix
- d) fixing

10. Do you want me to _____ the fuselage damage?

- a) changed
- b) repair
- c) tighten
- d) removing

11. The pilot is going to _____ the airplane after lunch.

- a) flies
- b) flown
- c) fly
- d) does fly

12. The avionic technician is going to _____ a new gyroscope.

- a) installing
- b) installed
- c) install
- d) installs

Use the following verbs in the correct form to complete the sentences:

Take

cruise

Fix

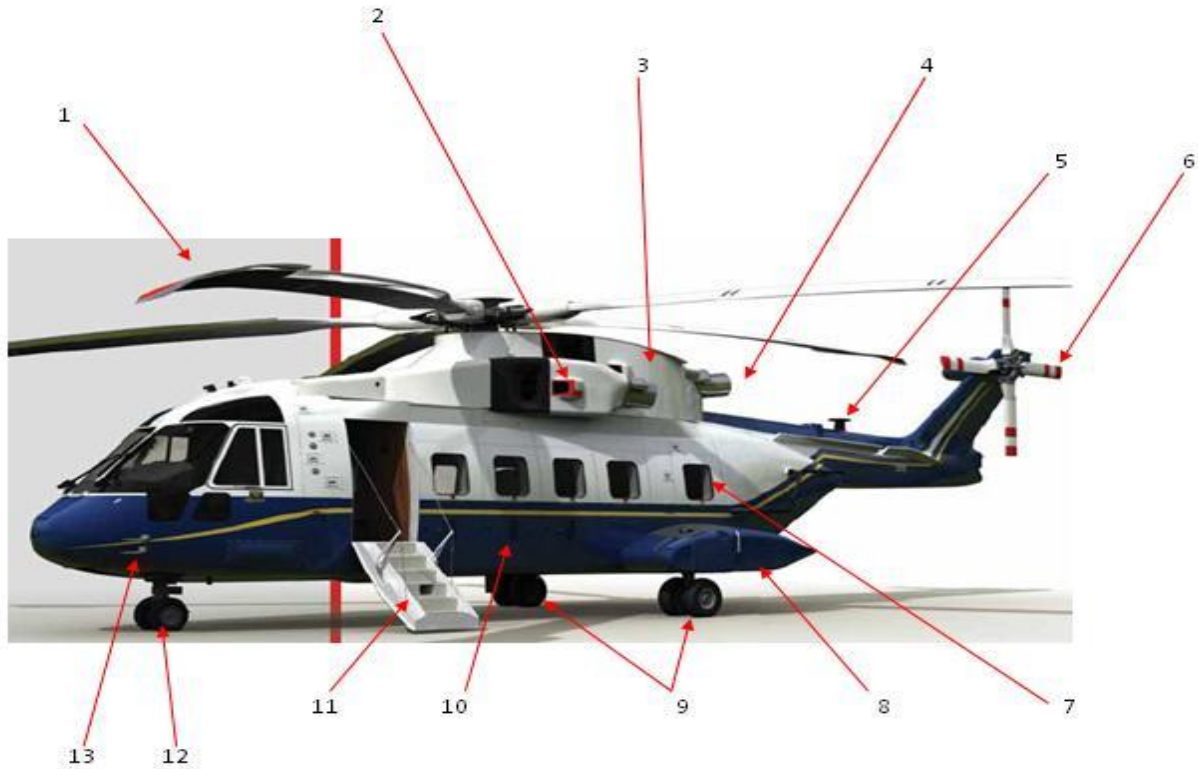
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- 1) Working on aircraft is dangerous; mechanics are always _____ care when working**
- 2) The aircraft was _____ at an altitude of 35,000 feet.**
- 3) The mechanic is _____ the damage on the flap**
- 4) The mechanic is _____ the cable through the fairleads and pulleys.**



Parts of the Helicopter

Vocabulary



Main rotor	
Air intake	
Engine cowling	
Exhaust	
Antenna/aerial	
Tail rotor	
Window	

Sponson	
Main wheels	
Fuselage	
Stairs	
Nose wheel	
Pitot tube	

1. What is the part of the helicopter that provides lift?

- a) Wheel
- b) Door
- c) Engine
- d) Rotor

2. What prevents the helicopter fuselage spinning/rotating?

- a) Tail Rotor
- b) Main rotor
- c) Wheels
- d) Cockpit

Conversation

On arrival of the aircraft the following conversation took place between the pilot and the engineer.

Pilot: The controls were a little stiff when operating on landing and takeoff

Engineer: I will look into the possible cause.

Pilot: What could be wrong?

Engineer: It could be a number of things, 1) lack of lubrication, 2) incorrect cable tension, 3) worn out pulley, 4) cable not sitting correctly on pulley.

Pilot: Will it take long to fix?

Engineer: No, all of the possible causes are easy to fix. It should be fixed in one or two hours.

Pilot: I also noticed some hydraulic fluid around the main landing gear leg.

Engineer: It could be a small hole in one of the pipes, a loose coupling/connection/swaging or a worn out seal. I will fix the hydraulic leak first to avoid losing anymore hydraulic fluid than necessary.

Engineer: Are there any other problems that you noticed while flying?

Pilot: No, everything was operating as normal.

Engineer: Okay, I will start to fix the two problems now and hopefully the aircraft will be airworthy by the end of the day.

Several hours later

Engineer: I have fixed both of the problems, the hydraulic leak took longer than expected because it was a very small leak.

Pilot: And what was the problem with the flight controls?

Engineer: One of the pulleys had excessive wear, I replaced it and the control surfaces were working correctly when we operated them.

1. The pilot.....a hydraulic fluid leak.

- a) noticing
- b) was noticed
- c) notices
- d) noticed

2. The engineer..... the problems.

- a) changed
- b) fixing
- c) fixed
- d) fixes

3. The pilot.....when he realized the control problem.

- a) were flying**
- b) was flying**
- c) is flying**
- d) is flying**

4. The engineer..... the worn out pulley.

- a) was replacing**
- b) replacing**
- c) replaced**
- d) replaces**

5. When the engineer operated the control surfaces they.....correctly.

- a) worked**
- b) works**
- c) working**
- d) work**

Grammar

In this lesson you will learn about simple past/past continuous

Past simple (I did.....)	Past continuous (I was doing.....)
I <u>fixed</u> the tail rotor	I <u>was fixing</u> the tail rotor
I <u>repaired</u> the hydraulic leak	I <u>was repairing</u> the hydraulic problem
I <u>changed</u> the starboard main wheel	I <u>was changing</u> the starboard main wheel.
I <u>tightened</u> the nut	I <u>was tightening</u> the nut
I <u>loosened</u> the pin	I <u>was loosening</u> the pin
I <u>filed</u> the sheet metal into shape	I <u>was filing</u> the metal into shape

Here is a list of some things that the mechanic did yesterday.

8:30 – 9:00 – picked up job card	12:45 – 2:00 – disassembled parts.
9:00 – 12:00 – looked for fuel leak	2:00 – 3:00 changed damaged pipe
12:00 – 12:45 – had lunch	3:00 – 4:30 re-assembled parts.

Now write sentences saying what he was doing at these times:

At 8:30 – 9:00 *he was picking up the job cards*

- 1) At 9:00 – 12:00.....
- 2) At 12:00 – 12:45.....
- 3) At 12:45 – 2:00.....

- 4) At 2:00 – 3:00.....
5) At 3:00 – 4:30.....

Use the following words to make a sentence saying what the person was doing.

Example: (the engineer / fix / the damage / wheel) = The engineer was fixing the damaged wheel

1- The technician / Change / the corrode / panel =

2- The mechanic / repair / the engine / damage =

3- The mechanic / remove / the damage / wheel

4- The technician / fit / a new / pipe

Reading

A helicopter is a type of aircraft that uses a rotor to provide lift and thrust. The rotor spins pushing air downwards (Newton's 3rd law of motion) which then lifts the helicopter vertically; the pitch of the blades can be altered to allow the helicopter to fly forwards, backwards or sideways. The rotor is powered by the engine, which is on the top of the helicopter fuselage. Helicopters range from having one engine to three engines depending on the size and purpose of the helicopter.

Most helicopters have one main rotor, as the blades turn the engine creates torque to counteract the drag, this torque would cause the fuselage to rotate in the opposite direction of the rotor if the anti-torque tail rotor system was not there. The tail rotor is a small, vertical rotor attached to the end of

the tail boom; the purpose is to provide the helicopters yaw (direction of helicopter heading) and to counteract the torque reaction to prevent the helicopter fuselage spinning which keeps it level and steady. The tail rotor is powered by a drive shaft that comes from the engines, which then goes through a gearbox to provide vertical rotation.

Helicopters can take off and land vertically, hover, and to fly forwards, backwards and laterally. This allows helicopters to be used in congested or isolated areas where fixed-wing aircraft would not be able to take off or land.

Put the verb into the past continuous (I was doing) or past simple (I did).

Example: The mechanic was fixing (fix) the helicopter.

- 1) The mechanic was (Change) the non-return value (NRV)**
- 2) The engineer(Repair) the hydraulic actuator.**
- 3) The sheet metal worker was(Bend) the new panel.**
- 4) The technician(Change) the stringer.**
- 5) The rotor spins(Push) air downwards.**
- 6) Blade pitch can be(Alter) to allow the helicopter to fly forwards, backwards or sideways.**
- 7) The rotor is(Power) by the engine.**
- 8) Helicopters range from(Have) one engine to three engines depending (Depend) on the size and purpose of the helicopter.**
- 9) The mechanic(Push) the split pin through the bolt.**
- 10) The engineer was(Loose) the drive shaft fasteners.**

Speaking

- 1) Do you like flying in helicopters?
- 2) Name some advantages of a helicopter over an airplane
- 3) Why are helicopters not pressurized?



Test

2. Where are the engines on a helicopter?
 - a) Wheel
 - b) Cockpit
 - c) Top of the fuselage
 - d) Wing
4. What prevents the fuselage from rotating in flight?
 - a) Hydraulic system
 - b) Electrical system
 - c) Anti-torque system
 - d) Wheels
5. What allows engine fumes to escape?
 - a) Exhaust
 - b) Window

- c) Rotor
- d) Cowling
- 6. How does power get to the tail rotor?
 - a) Wind
 - b) Drive shaft
 - c) Hydraulically
 - d) Electric motor
- 7. The panels that cover the engine are called
 - a) Fence
 - b) Protector
 - c) Guard
 - d) Cowling
- 8. The engineer _____ both of the problems.
 - a) Fix
 - b) Fixes
 - c) Fixed
 - d) Fixing
- 9. The controls _____ stiff when operating.
 - a) Was
 - b) Were
 - c) Is
 - d) Went
- 10. Once the pilot told the engineer about the problems, the engineer started _____ them.
 - a) Fixing
 - b) Fix
 - c) Fixed
 - d) Fixes
- 11. Apart from the two problems, everything else _____ normal.
 - a) Were operated
 - b) Was operating
 - c) Operate
 - d) Operating
- 12. The mechanics job is mainly _____ damaged aircraft.
 - a) Repair
 - b) Repairing

- c) Repaired
d) Repairs
13. Yesterday the mechanic _____ a fuel filter when he found a cracked pipe.
- a) Were replaced
b) Was replacing
c) Replaced
d) Replaces
14. The technician _____ a new frame on the fuselage.
- a) Installing
b) Installed
c) Installs
d) Install
15. The mechanic is _____ the panel to suit the structure.
- a) Bend
b) Bends
c) Bended
d) Bending
16. The tail rotor is _____ To the end of the tail boom.
- a) Attach
b) Attaches
c) Attached
d) Attaching
17. During flight the blade pitch can be _____ to determine flight directions.
- a) Changing
b) Changes
c) Change
d) Changed
18. During the helicopter flight the rotor blades were _____
- a) Rotating
b) Rotates
c) Rotated
d) Rotate

19. The drive shaft _____ power transfer from the engine to the tail rotor.

- a) Provide**
- b) Provided**
- c) Prohibits**
- d) Prohibiting**



The toolbox

Vocabulary



The above are all tool boxes, but have slightly different names, but all can and are commonly called a simple 'toolbox'. Tool boxes come in many different shapes and sizes. The idea is that the mid box would sit on top of the cabinet and the top box sits on top of the mid box, leaving the barn and cantilever boxes for light and easy transportable for jobs where the bigger boxes wouldn't be able to go.

- Cabinet _____
- Top box _____
- Mid box _____
- Barn style box _____
- Cantilever box _____

SPANNERS/WRENCHES



Spanners also called wrenches in America come in many different shapes and forms, above are some examples.

Match the above wrenches with appropriate names.

- Box**_____
- Combination**_____
- Adjustable**_____
- Open end**_____
- Half moon**_____
- Box ratcheting**_____
- Open end & ratchet box**_____
- Offset box ratcheting**_____

PLIERS



Above are some examples of pliers that are commonly used throughout aircraft and engineering in general.

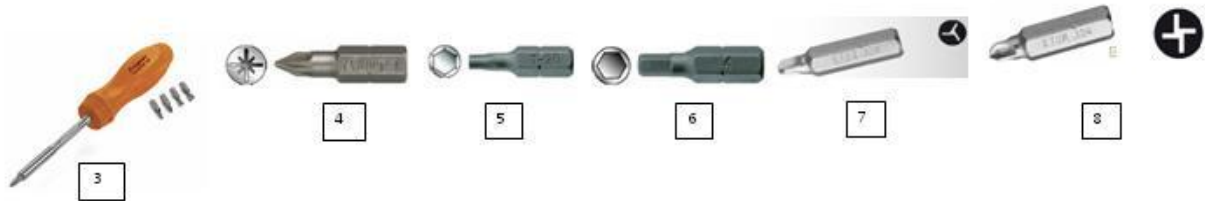
Match the above pliers with appropriate names.

- Wire locking**_____
- Long nose**_____
- Adjustable**_____
- Combination**_____

SCREWDRIVERS



The above two are the most commonly used screwdrivers. Other types mainly come in the form of "bits" that can easily be swapped from a 'bit driver'. Bit drivers can also be ratcheting for faster use



Match the above screwdrivers with appropriate names.

- Phillips ____
- Flat ____
- Pozidriv ____
- Ratcheting bit driver ____
- Hex _____
- Tri-wing _____
- Torq _____
- Torx _____

SOCKETS



Above are the commonly used sockets and accessories, allowing fast and easy use to loosen, tighten fasteners.

Match the above sockets and accessories with appropriate names.

- Speed brace (speedie)_____**
- Ratchet_____**
- Deep sockets_____**
- Standard sockets_____**
- Universal joint_____**
- Flexi extension bar_____**
- Extension bar_____**
- Bit drive socket_____**

OTHER TOOLS USED



Angle drills ____

Hammer ____

Rivet gun ____

Pistol drills ____

Drill bits ____

Files ____

Abrasive flap wheel ____

Abrasive disk ____

Dividers ____

Verniercalipers ____

Micrometer ____

Rule ____

Chose the correct answer

1. Does a spanner

a) drill holes

b) file metal

c) tighten and loosen screws

d) measure length

2. Where are tools kept?

- a) tool hole
- b) toolbox
- c) the floor
- d) on the aircraft

3. What tool produces holes?

- a) drill
- b) screwdriver
- c) spanner
- d) file

4. What does a socket attach to?

- a) hammer
- b) file
- c) spanner
- d) ratchet

5. What do screwdriver bits fit into?

- a) rule
- b) bit driver
- c) spanner
- d) hammer

Conversation

Below is a conversation between a trainee mechanic and an experienced mechanic talking about tools

Trainee mechanic: I have a small budget and I am going to start buying some tools.

Experienced mechanic: What are you going to buy?

Trainee mechanic: I am not sure, what do you think I should buy first?

Experienced mechanic: The majority of civil aircraft are manufactured using imperial (feet, inch) components so you must ensure you buy all imperial tools. The basic's you will need to carry out simple everyday tasks are,

1. **Spanners – combination type ranging from 1/4” to 1’, ratchet box spanners.**
2. **Sockets & ratchets – 1/4”, 1/2” & 3/4” drive ratchets, with standard & deep sockets up to 1” diameter, extension bars and universal joint.**
3. **Screwdrivers – a large flat & Phillips, a bit driver (ratchet if possible) with various bits, Pozidriv, Torq, torx, hex, and tri-wing.**
4. **Pliers – wire locking, combination and long nose.**

Experienced mechanic: Try to get the above tools, as tools can be very expensive if you can't afford the more expensive ratchet types of tools then buy basic non-ratcheting tools.

Trainee mechanic: What about getting a toolbox to stow the tools in?

Experienced mechanic: definitely, buy a small box either a cantilever or a barn style to stow them. When you get more tools you will need to get a bigger toolbox but that is how mechanics build up a good tool selection. It will take you many years to build up a good tool selection but if you start with the basics and then keep adding to that you will be on the right track.

Trainee mechanic: What will I do if I need a certain tool but don't have it?

Experienced mechanic: If that happens then come and ask me, I will let you have access to any of my tools,

Trainee mechanic: What type of tools should I buy after I have got the basics that you told me about?

Experienced mechanic: Smaller and more specific tools i.e. anchor nut drill jigs, dividers, scribe, centre punch, speed brace, de-burring tool, and drill block. Leave the pneumatic tools such as rivet gun, pistol drills, nut runner for now as they can get very expensive.

Trainee mechanic: Where is the best place to buy tools from?

Experienced mechanic: During the week there are always different tool companies coming to the hangar, have a look at each and see what have the best deals, also ask about the life time guarantee on them, that way you can always return them if they break .

- 1. The trainee is going to start buying some tools.**
 - a) False**
 - b) True**

- 2. Once the trainee has got the basic tools, he should then started to buy smaller more specific tools.**
 - a) False**
 - b) True**

- 3. There are always different tool companies coming to the hangar.**
 - a) True**
 - b) False**

- 4. Once the trainee has got the basic tool, he will then need to keep add to it, to build up a good selection.**
 - a) False**
 - b) True**

- 5. It will takes many years for the trainee to build up a wide tool selection.**
 - a) False**
 - b) True**

Grammar

Future simple (are you going to fix it tonight)	Future continuous (are you going to be fixing it tonight)
<u>Will you put</u> the wheel on <u>tonight</u>?	<u>Will you be putting</u> the wheel on <u>tonight</u>?
<u>Are you going to fix</u> the brakes <u>tomorrow</u>?	<u>Are you going to be fixing</u> the brake <u>tomorrow</u>?
<u>Will you wait</u> for the new aircraft to come in <u>later</u>?	<u>Will you be waiting</u> for the new aircraft to come in <u>later</u>?

Complete the following sentence using the words for future simple.

Example – will / put / wheel / on tonight = will you put the wheel on tonight?

Are / go / use / that spanner / late

Will / be react / rivet tail / for me / lunch

Are / help / lift / toolbox / later

When / going / wire lock / fasteners

They / drive / bolts in / rivet gun

Are / repair / crack / after your current job

Are / using / that spanner /later

Will / pass / stores / on your way to the toilet

Lets /start / react /rivets / before lunch

Are / use / screwdriver / tomorrow

Reading

An open-ended spanner is a one-piece wrench with a U-shaped opening that grips two opposite faces of the bolt or nut and can tighten or loosen it. This spanner is often double-ended, with a different-sized opening at each end. The ends are generally oriented at an angle of around 15 degrees to the centre line of the handle. This allows a greater range of movement in enclosed spaces by flipping the spanner over.

Pliers are a hand tool used to hold objects firmly, or for cutting and bending tough materials such as wire. Generally, pliers consist of a pair of metal first-class levers joined at a fulcrum positioned closer to one end of the levers, creating short jaws on one side of the fulcrum, and longer handles on the other side. This arrangement creates a mechanical advantage, allowing the force of the hand's grip to be amplified and focused on an object with precision. The jaws can also be used to hold/move objects too small to hold using your fingers. There are many kinds of pliers made for various general and specific purposes.

A screwdriver is a tool used for inserting or removing screws into an internal hole. The screwdriver is made up of a handle, which is the part held by the hand, a shaft which is fixed to the handle, and head or tip, which fits onto the

screw and is at the bottom of the shaft. The handle and shaft allow the screwdriver to be positioned and supported and, when rotated, to apply torque. Screwdrivers are made in a variety of shapes and sizes to suit the many different types of screws.

The socket ratchet includes a ratcheting mechanism that allows the nut to be tightened or loosened, without the need for the ratchet to be removed and refitted after each turn. A small lever on the ratchet head switches the ratchet between tightening and loosening mode. The sockets are attached to the ratchet through a square fitting that contains a spring loaded ball mechanism to keep the sockets in place. These drive fittings come in four common sizes: 1/4 inch, 3/8 inch, 1/2 inch, and 3/4 inch (referred to as "drives", as in "3/8 drive"). These are international standards and no metric counterparts exist. Larger drive sizes i.e. 3/4 inch, 1 inch and above are usually reserved for use on fasteners used on larger industrial equipment, e.g. in shipyards. The sockets themselves come in a full range of imperial and metric sizes. Users are advised that the two should not be substituted for each other, even if the fit seems "close" - as it may destroy the nut or bolt head. The sole exception is the 3/4" and 19mm sockets, which vary by only one twentieth of one millimeter (less than the width of a human hair). The advantage of the socket ratchet system is speed - it is much faster than a conventional spanner, especially in repetitive bolt-on or bolt-off usage and can usually get to the hard to reach places.

1. What is the main purpose of the screwdriver?

- a) Cut or bend objects**
- b) Inserting or removing screws**
- c) Tighten or loosen nuts & bolts**
- d) None of the above**

2. Why is it important not to use a metric size tool on an imperial component?

- a) So you don't damage the component
- b) So you don't fix the problem.
- c) Both of the above.
- d) None of the above.

3. What part of the screwdriver fits into the screw?

- 1. Handle
- 2. Tip or head
- 3. Bolt
- 4. None of the above

5. Name one advantage of a ratchet over a spanner.

- a) Faster
- b) Less Mistakes
- c) None of the above.

6. What is the main purpose of the spanner?

- a) Cut or bend objects
- b) Fly an airplane.
- c) Tighten or loosen nuts & bolts
- d) None of the above.

7. Pliers are a good tool to use when the object is too small to hold in your.....

8. What part of the screwdriver does the hand hold?

9. Do the ratchets come in imperial or metric sizes?

10. Pliers can be used to hold objects and what else?

- a) To cut heavy metals.
- b) Cut or bend objects
- c) Tighten or loosen screws
- d) None of the above.

11. The ratchet can be switched from tightening to loosening by a small lever on the ratchet head switches.

- a) False
- b) True

Speaking

Why is it important to have to correct tools for the job

You have earned 0 point(s) out of 0 point(s) thus far.

Describe the purpose of a rivet gun.

Describe a bit driver and the bits that fit into it.

Test

1. Tools can be very _____
 - a) Cheap
 - b) Expensive
 - c) Dirty
 - d) Fragile
2. The trainee mechanic has a _____
 - a) Large budget
 - b) Toolbox
 - c) Small budget
 - d) Large tool collection
3. The experienced mechanic suggested buying a _____
 - a) Cabinet toolbox
 - b) Mid box
 - c) Tool bag
 - d) Small box
4. If the trainee hasn't got a certain tool he has to _____
 - a) Ask the experienced mechanic
 - b) Find it
 - c) Has to go buy it
 - d) Go without

5. Are you going to be _____ that wheel later?
- a) Fix
 - b) Fixed
 - c) Fixing
 - d) Fixes
6. Will you _____ me repair the tail plane later?
- a) Help
 - b) Helping
 - c) Helps
 - d) Helped
7. Are you going to be _____ tomorrow?
- a) Work
 - b) Works
 - c) Worked
 - d) Working
8. Are you going to _____ the panel tomorrow?
- a) Repaired
 - b) Repairing
 - c) Repairs
 - d) Repair
9. What angle is the end of a spanner generally offset to from the centre line?
- a) Zero (0)
 - b) Ten (10)
 - c) Fifteen (15)
 - d) Twenty (20)
10. Pliers are normally held together with
- a) Nail
 - b) Glue
 - c) Tie-wrap
 - d) Rivet
11. The part of the screwdriver held is called
- a) Tip
 - b) Handle
 - c) Shaft
 - d) Bottom

12. What keeps the socket in place on the ratchet?

- a) Spring loaded ball**
- b) Nothing**
- c) Glue**
- d) Your hand**



Instruments

Vocabulary

INSTRUMENTS - VOCABULARY



1



2



3



4



5



6



7



8

The above pictures show the main instruments used on aircraft, these give the pilot information on direction, speed, turning and radio

- 1 = _____ Heading indicator
- 2 = _____ Attitude indicator with localizer and glide slope indicators
- 3 = _____ 3-pointer altimeter showing 10,180 feet
- 4 = _____ Airspeed indicator
- 5 = _____ Course deviation indicator
- 6 = _____ Turn indicator
- 7 = _____ Vertical airspeed
- 8 = _____ Radio magnetic indicator

Conversation

3:24:54: *[Flight 1549 cleared for takeoff]*

3:24:58 (LGA): Cactus 1549.

3:25:51 (AWE1549): Cactus 1549 - 700 climbing to 15,000.

3:26:00 (L116): Cactus 1549, New York departure radar contact. Climb and maintain 15,000.

3:26:04 (AWE1549): Maintain 15,000, 1549.

3:27:32 (L116): Cactus 1549, turn left heading 270.

3:27:36 (AWE1549): This is Cactus 1539. Hit birds, we lost thrust in both engines. We're turning back toward LaGuardia.

3:27:42 (L116): Okay, you need to return to LaGuardia. Turn left heading of, uh, 220.

3:27:46 (AWE1549): 220.

3:27:49 (L116): Tower, stop your departures. We got an emergency landing.

3:27:53 (LGA): Who is it?

3:27:54 (L116): It's 1529. He has had a bird strike. He lost all engines. He lost the thrust in the engines. He is returning immediately.

3:27:59 (LGA): Cactus 1529, which engines?

3:28:01 (L116): He lost thrust in both engines, he said.

3:28:03 (LGA): Got it.

3:28:05 (L116): Cactus 1529, if we can get it, do you want to try to land Runway 13?

3:28:11 (AWE1549): We're unable to. We may end up in the Hudson River.

3:28:31 (L116): Alright, Cactus 1549, it's going to be left traffic to Runway 31.

3:28:34 (AWE154): Unable.

3:28:36 (L116): Okay, what do you need to land?

3:28:46 (L116): Cactus 1549, Runway 49-- Runway 4 is available if you want to make left traffic to Runway 4.

3:28:50 (AWE1549): I'm not sure if we can make any runway, what's over to our right? Anything in New Jersey? Maybe Teterboro?

3:28:55 (L116): Okay, yes off to your right side is Teterboro

Airport.

3:29:02 (L116): Do you want to try and go to Teterboro?

3:29:03 (AWE1549): Yes.

3:29:05 (L116): Teterboro, Empire-- actually LaGuardia Departure got an emergency inbound.

3:29:10 (TEB): Okay, go ahead.

3:29:11 (L116): Cactus 1529 over the George Washington Bridge, wants to go to the airport right now.

3:29:14 (TEB): He wants to go to our airport, check. Does he need any assistance?

3:29:17 (L116): Ah, yes. He, ah, he was a bird strike. Can I get him in for Runway 1?

3:29:19 (TEB): Runway 1, that's good.

3:29:21 (L116): Cactus 1529, turn right 280. You can land Runway 1 at Teterboro.

3:29:25 (AWE1549): We can't do it.

3:29:26 (L116): Okay, which runway would you like at Teterboro?

3:29:28 (AWE1549): We're going to be in the Hudson.

3:29:33 (L116): I'm sorry, say again, Cactus.

3:29:51 (L116): Cactus, ah, Cactus 1549, radar contact is lost. You also got Newark Airport off your two o'clock and about 7 miles.

3:30:14 (L116): Cactus 1529, uh, you still on?

3:30:22 (L116): Cactus 1529, if you can, ah, you got, ah, Runway 29 available at Newark off your two o'clock and 7 miles.

3:30:30: *[Splashdown. Radar and tower notify Coast Guard, which responds, "We launched the fleet."]*

1. What was the cause of the problem?

a) No petrol, power lost in both engines

b) bird strike, power lost in both engines

2. After learning that flight AWE1549 couldn't make it back to LaGuardia, what airport did they suggest?

- a) back to LaGuardia
- b) Any airport, which is nearest
- c) Teterboro

3. What altitude was (AWE1549) told to fly to?

- a) 14000
- b) 15,000
- c) 16000
- d) 17000

4. The tower was ordered to do what after hearing about the problem?

- a) To stop arrivals
- b) To start arrivals
- c) To start departures
- d) To stop departures

5. The pilot of (AWE1549) tell the tower he will end up on the Hudson river.

- a) False
- b) True

Grammar

<u>Countable</u>	<u>Uncountable</u>
A bolt (2 bolts, 3 bolts etc)	hydraulic fluid
An airplane (2 airplanes, 3 airplanes etc)	A piece of metal
A rudder (2 rudders, 3 rudders etc)	Much fuel
A wheel (2 wheels, 3 wheels etc)	A piece of structure
A window (2 windows, 3 windows etc)	Some engine oil

Answer the following questions about countable and uncountable nouns.

1. The aircraft was flying through a very good weather / very good weather
 - a) a very good weather
 - b) very good weather
2. The mechanic lubricated the engine using an oil / some oil
 - a) an oil
 - b) some oil
3. The technician has lots of experience / experiences in avionics.
 - a) experience
 - b) experiences
4. The engineer is looking for a work / a job to do.
 - a) a work
 - b) a job
5. There isn't many / much fuel left in the tanks.
 - a) many
 - b) much
6. The mechanic asked for some / an advice.
 - a) some
 - b) an
7. The engineer is degreasing the system using a / some solvent liquid.
 - a) a
 - b) some
8. The aircraft did not have much / some hydraulic fluid left.
 - a) much
 - b) some

Reading

The altimeter shows the aircraft's height above sea-level by measuring the difference between the pressure in a stack of aneroid capsules inside the altimeter and the atmospheric pressure obtained through the static system. It is adjustable for local barometric pressure which must be set correctly to obtain accurate altitude readings. As the aircraft ascends, the capsules expand as the static pressure drops therefore causing the altimeter to indicate a higher altitude. The opposite occurs when descending.

The attitude indicator (also known as an artificial horizon) shows the aircraft's attitude relative to the horizon. From this the pilot can tell whether the wings are level and if the aircraft nose is pointing above or below the horizon. This is a primary instrument for instrument flight and is also useful in conditions of poor visibility. Pilots are trained to use other instruments in combination should this instrument or its power fail.

The airspeed indicator shows the aircraft's speed (usually in knots) relative to the surrounding air. It works by measuring the ram-air pressure in the aircraft's pitot tube. The indicated airspeed must be corrected for air density (which varies with altitude, temperature and humidity) in order to obtain the true airspeed, and for wind conditions in order to obtain the speed over the ground.

The heading indicator (also known as the directional gyro, or DG; sometimes also called the gyrocompass, though usually not in aviation applications) displays the aircraft's heading with respect to geographical north. Principle of operation is a spinning gyroscope, and is therefore subject to drift errors (called precession) which must be periodically corrected by calibrating the instrument to the magnetic compass. In many advanced aircraft (including almost all jet aircraft), the heading indicator is replaced by a Horizontal

Situation Indicator (HSI) which provides the same heading information, but also assists with navigation

The turn indicator displays direction of turn and rate of turn. Internally mounted inclinometer displays 'quality' of turn, i.e. whether the turn is correctly coordinated, as opposed to an uncoordinated turn, wherein the aircraft would be in either a slip or a skid. The original turn and bank indicator was replaced in the late 1960s and early '70s by the newer turn coordinator, which is responsive to roll as well as rate of turn.

The VSI - vertical speed indicator (also sometimes called a variometer). Senses changing air pressure, and displays that information to the pilot as a rate of climb or descent in feet per minute, meters per second or knots.

The CDI (course deviation indicator) is an avionics instrument used in aircraft navigation to determine an aircraft's lateral position in relation to a track, which can be provided by a VOR or an Instrument Landing System. This instrument can also be integrated with the heading indicator in a horizontal situation indicator.

An RMI (radio magnetic indicator) is generally coupled to an automatic direction finder (ADF), which provides bearing for a tuned Non-directional beacon (NDB). While simple ADF displays may have only one needle, a typical RMI has two, coupled to different ADF receivers, allowing for position fixing using one instrument.

Please match the following questions about the article.

- 1) Why is it important to adjust the altimeter to local barometric pressure?**
- 2) How does the airspeed indicator measure pressure?**

- 3) What else can the heading indicator be called?
- 4) What do modern jet liners replace the heading indicator with?
- 5) What is the RMI generally attached to?
- 6) How many needles would a typical RMI have?
- 7) What other instrument can the CDI be used with?
- 8) What is the turn indicator responsible for?
- 9) What is another name for the attitude indicator?
- 10) How does a VSI work?

Speaking

Describe the purpose of an airspeed indicator

Describe the purpose of an altimeter

Describe the purpose of a turn indicator

Test

1. What is used to measure velocity ?
 - a) Altimeter
 - b) Heading indicator
 - c) Airspeed indicator
 - d) Turn indicator
2. What is used to measure height ?
 - a) Airspeed indicator
 - b) Turn indicator
 - c) VSI
 - d) Altimeter
3. What measures banking ?
 - a) Turn indicator
 - b) VSI
 - c) Heading indicator

d) Course deviation indicator

4. What shows the aircraft's attitude relative to the horizon ?

a) VSI

b) Attitude indicator

c) Altimeter

d) Turn indicator

5. What measures rate of climb or descent ?

a) VSI

b) Turn indicator

c) Course deviation indicator

d) Heading indicator

6. What runway was suggested at Teterboro airport?

a) 1

b) 2

c) 3

d) 4

7. After the pilot told the tower they had lost power what heading did the tower give them ?

a) 210

b) 220

c) 270

d) 280

8. What other airport was also suggested?

a) Newark

b) Kansas

c) Detroit

d) JFK

9. After deciding to go to Teterboro what heading was given by the tower?

a) 220

b) 230

c) 250

d) 280

10. The aircraft didn't have _____ fuel left on board.

- a) Lots
- b) Some
- c) Much
- d) Full

11. The aircraft suffered some damage and a _____ metal fell off.

- a) Piece
- b) Some
- c) Part
- d) Full

12. As the aircraft was taking off it gained a _____ of speed.

- a) Much
- b) Some
- c) Lot
- d) Piece

13. The mechanic noticed _____ hydraulic fluid leaking for the pipe.

- a) Some
- b) Much
- c) Lot
- d) Piece

14. From the attitude indicator the pilot can tell

- a) If wings are level
- b) Airspeed
- c) Height
- d) Direction

15. The HSI in aircraft helps with

- a) Airspeed detection
- b) Heading direction
- c) Navigation
- d) Turn rate

16. Airspeed is relative to

- a) Surrounding air
- b) Sea level
- c) Flight path
- d) Horizon

17. Air density alters with

- a) Speed**
 - b) Altitude**
 - c) Climb**
 - d) Turn rate**
-



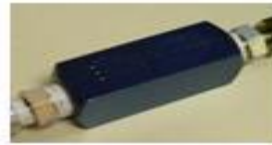
Airplane structures 1



A



B



C



D



E



F



G



H



I



J



K

Match the actual aircraft components from A to K from the diagram above.

A = _____

Pressure gauge

B = _____

Non-return valve

C = _____

Pressure regulator

D = _____

Engine driven pump

E = _____

Filter

F = _____

Accumulator

G = _____

Reservoir

H = _____

Hand pump

I = _____

Pressure relief valve

J = _____

Selector valve

K = _____ **Actuator**

Reading

The function of the aircraft electrical system is to generate, regulate and distribute electrical power throughout the aircraft. New-generation aircraft rely heavily on electrical power because of the wide use of electronic flight instrument systems

* **Aircraft electrical power is used to operate:**

** **Aircraft Flight Instruments**

** **Essential Systems – Essential power is power that the aircraft needs to be able to continue safe operation**

** **Passenger Services**

** **Passenger services power is the power that used for:**

*** **Cabin lighting**

*** **Operation of entertainment systems**

*** **Preparation of food**

Aircraft electrical components operate on many different voltages both AC and DC however, most of the systems use

115 VAC @ 400 Hz & 28 VDC. 26 VAC is also used in some aircraft for lighting.

*** The aircraft's nickel cadmium battery is final source of backup power**

*** The battery provides 28 VDC**

*** It is also possible to change the 28 VDC into 115 VAC 400Hz with the use of a static inverter**

*** When using the battery, power usage is limited by the short life of the battery**

There are several different power sources on large aircraft to be able to handle excessive loads, for redundancy, and for emergency situations these power sources include:

*** Engine driven AC generators**

*** Auxiliary Power Units**

*** External power**

*** Ram Air Turbines**

Each of the engines on an aircraft drives an AC generator. The power produced by these generators is used in normal flight to supply the entire aircraft with power.

Aircraft also come with an APU (auxiliary power unit) and most of the APUs power is used while the aircraft is on the ground during maintenance or for engine starting, however most aircraft can use the APU while in flight as a backup power source if all other power supplies fail. Some aircraft are equipped with Ram Air Turbines, or "RATs, these may be used, in the case of a generator or APU failure, as an

emergency power source when necessary, the RAT may be deployed to be used as an AC power source but will only power basic systems.

External power may only be used with the aircraft on the ground this system utilizes a Ground Power Unit (GPU) to provide AC power through an external plug on the nose of the aircraft. GPUs may be either portable or stationary units.

- 1) What is the main problem when using the aircraft battery alone?
- 2) What does an AC generator do?
- 3) Find out what AC and DC current means.
- 4) Find out what a ram air turbine does.
- 5) When can an external electrical power supply be used?

Grammar

In/On/At place

Lesson 1 -In/On/At place

Prepositions in/on/at time, place

<u>IN</u>	<u>ON</u>	<u>AT</u>
<u>In</u> the fuel tank	Damage <u>on</u> the structure	<u>At</u> the back of the aircraft
A bird <u>in</u> the engine	Ice <u>on</u> the wing	<u>At</u> the front of the engine
The passenger is <u>in</u> his seat	The pilot is <u>on</u> the aircraft	The aircraft is <u>at</u> the edge of the runway
The hydraulic fluid is <u>in</u> the pipe	The mechanic was <u>on</u> time for work	The wheels are <u>at</u> the bottom of the aircraft.

Fill in the blanks using IN / ON / AT:

The mechanic is using a deep socketthe bolt head.

The pilot is sittingthe cockpit of the aircraft.

There is a problem with the aircraftthe end of the taxiway.

There is a lot of corrosionthe front spar.

There is not enough fluidthe hydraulic system.

The passengers are waiting to getthe aircraft.

The mechanic found FODthe engine.

The pilot sitsthe front of the aircraft.

There is ice built upthe aircraft wings.

The mechanic is workingthe fuel system.

There is a dentthe front of the aircraft.

The engineer is changing the main wheelthe starboard side

The rib footthe bottom skin is cracked.

There is a leakthe rear of the aircraft.

There is airthe hydraulic system.

Speaking

Briefly describe how an aircraft jet engine works

Briefly in your own words describe an aircraft hydraulic system purpose

In your own words, give a brief description of the aircraft electrical system

Test

1. This piece of equipment displays system pressure.
 - a) relief valve
 - b) accumulator
 - c) pressure gauge
 - d) non-return valve
2. This item stows energy for when emergency strikes.
 - a) accumulator
 - b) reservoir
 - c) relief valve
 - d) check valve
3. This acts as a fuel tank would do in a fuel system.
 - a) accumulator
 - b) reservoir
 - c) relief valve
 - d) check valve
4. These items can come in two forms, flexible and rigid.
 - a) accumulator
 - b) reservoir
 - c) relief valve
 - d) pipe
5. This acts as a safety valve when the system pressure is too high.
 - a) accumulator
 - b) reservoir
 - c) relief valve
 - d) pipe
6. What power is given by the nickel cadmium battery?
 - a) 115 VAC
 - b) 400 Hz
 - c) 115 Hz
 - d) 28 VDC
7. Pick the answer NOT used for passenger services.
 - a) Preparation of food
 - b) Operation of entertainment systems
 - c) navigation
 - d) cabin lighting

8. Where would an APU be used?

- a) post flight
- b) for ground power
- c) for main power
- d) thrust

9. What do the engines drive?

- a) battery
- b) APU
- c) generators
- d) RATs

10. The engineer is _____ the fuselage changing a frame.

- a) on
- b) is
- c) in
- d) at

11. There is a problem _____ the port main wheel brake.

- a) on
- b) is
- c) in
- d) at

12. The mechanic is working _____ the engine overhaul bay.

- a) on
- b) is
- c) in
- d) at

13. The engineer is _____ The stores getting a new seal.

- a) on
- b) is
- c) in
- d) at

14. How many check valves does the system on page one have?

- a) 1
- b) 2
- c) 3
- d) 4

- 15. A hydraulic actuator will.**
- a) Control system pressure**
 - b) provide fluid flow**
 - c) relief pressure**
- move a part of the aircraft**
- 16. Pipes are attached to other components using.**
- a) valves**
 - b) couplings**
 - c) pipes**
 - d) glue**
- 17. Pipe clearance should be no less than.**
- a) 1mm**
 - b) 3mm**
 - c) 4mm**
 - d) 2mm**



Airplane structures 2



1



2



3



4



5



6



7

- Shut off valve** _____
- Selector valve** _____
- Pump** _____
- Pipe** _____
- Non-return valve** _____
- Tank** _____
- Filters** _____

Conversation

Below is a conversation about aircraft fuel systems.

Student – what is an aircraft fuel system made up of?

Engineer – A basic aircraft fuel systems is made of a number of components such as, tank, pipes, pump, filters, various valve, heater, sensors.

Student – how does it all work?

Engineer – the tanks stow the fuel, the pumps push the fuel to the engine, the pipes are used to transport the fuel around the aircraft, the filters clean any unwanted dirt or other objects, the various valves perform many tasks such as moving fuel from one tank to another, ensuring the fuel travels in the correct direction, the heater will prevent the fuel from freezing and the sensors will detect how much fuel is in the tanks.

Student – how does the fuel filter remove the dirt and other objects from the system?

Engineer – by using foam type of material in a cylinder and the fuel passes through the foam material and collects the dirt and objects.

Student – what happens to the dirt, does it not build up and become blocked.

Engineer – yes, it can become full and blocked, but the fuel filter is replaced often on aircraft.

Student – what other components have to be replaced in the fuel system?

Engineer – many components, each component has a service life measured in hours, and once the component has reached its service life it will have to be replaced or checked to ensure it is still in good working condition.

Student – are fuel leaks common on aircraft?

Engineer – yes, fuel leaks are a common problem and cost a lot of money, due to wasted fuel, time and delays that are incurred. As aircraft carry the majority of the fuel inside the structure of the wings, the actual wings need to be water tight, and with so many access panels, and fastener holes in the wings, it becomes very tricky. A sealant is used to seal

the wing tanks so no fuel will leak, but often the sealant can be perished and cause leaks.

- 1) What is the purpose of a fuel pump?**
- 2) Where is the majority of fuel kept in most aircraft?**
- 3) What is used inside the wing structure to prevent leaks?**
- 4) Are fuel leaks a common occurrence in aviation?**
- 5) What do the pipes do in the system?**

Grammar

Phrasal verbs

We often use verbs with the words below.

**On – of – in – out – up – down – away – back – over – about
– around – forward – through – along**

We often use these words with verbs of *movement*. For example

Get on – The bus was full. We couldn't get on.

Drive off – She got into her car and drove off.

Come back – Tom is leaving tomorrow and coming back on Sunday.

Turn around - When I touch him on the shoulder, he turned around.

Sometime a phrasal verb has an *object*. Usually there are *two possible positions* for the object.

So you can

object object

I turned off the light - or - I turned the light off

Some more examples are:

Could you fill out this form? - or – Could you fill this form out?

It's warm, take off your coat – or - It's warm take your coat off

Please match the following sentences:

Example: The receptionist told me to fill out the form, so I *filled it out*.

**The aircraft fuel was low, so = I filled the tank up
There was hydraulic fluid on the floor, so = I cleaned it up**

The chief mechanic asked me to take off the starboard engine, so = I tightened it up

The bolt on the actuator was loose, so = I took it off

That's incorrect, please try again.

The 3 bolts needed wire locking, so = I wire locked them up

The boss asked me to wear my safety shoes, so = I put it out

There was a small fire onboard the aircraft, so = I put them on.

Match the sentence below using an appropriate phrasal verb from the box. Where necessary use the past tense of the verb. Each time use it/them/me with the verb.

Look up – turn down – wake up – shave off – pick up – cross out – knock out – try on.

The radio is a little loud. Can you, please?

There was a £20 note lying around on the sidewalk, so I

**The children are asleep, don't
If you make a mistake, just
That's not exactly correct, please make another attempt**

**I saw a jacket I liked in the store, so I went in and
.....to see if it fit me.
There was a few words that I didn't understand, so I
..... in my dictionary.
He had a beard for a long time, but he got tired of it. So he
.....
A stone fell on my head and, I was
unconscious for half an hour.**

Reading

Ice accumulates on the leading edge of wings, tailplanes, and vertical stabilizers as an aircraft flies through a cloud containing super-cooled water droplets. Super-cooled water is water that is below freezing, but still a liquid. Normally, this water would turn to ice at 32°F (0°C), but there are no "contaminants" (Ice nucleus) on which the drops can freeze. When the airplane flies through the super-cooled water droplets, the plane becomes the droplet nucleus, allowing the water to freeze on the surface. This process is known as accretion.

Droplets of supercooled water often exist in stratiform and cumulus clouds.

Ice protection systems are designed to keep atmospheric ice from accumulating on aircraft flight surfaces while in flight. The effects of ice accretion on an aircraft can cause loss of control, resulting in a catastrophic flight event.

Types of ice protection systems

- **Pneumatic deicing boots**
- **Thermal**
 - **Electrical heating elements**

- **ThermaWing**
- **Turbine engine bleed air**
- **Electro-mechanical**
- **Weeping Wing**
- **Electro-Mechanical Expulsion Deicing System (EMEDS)**
- **Hybrid Electro-Mechanical Expulsion Deicing System**

Passive (cover system mainly used in the telecoms and offshore domains)

- **Anti icing cover**
- **The pneumatic boot is a rubber device attached to a wing's leading edge. Portions of the boot are inflated to break ice off the boot, de-icing the wing. Rubber boots are used on jets and propeller driven aircraft.**
- **The Thermawing, is an electrical ice protection system. ThermaWing uses a flexible, electrically conductive, graphite foil attached to a wing's leading edge. Electric heaters are usually flexible enough to use as anti-icers or de-icers. Once activated an exact concentration of heat melts the bond between ice and protected surface. Ice no longer sticks to the surface due to aerodynamic forces. As an anti-icer, the heater keeps the surface to the point that the ice does not form.**
- **A bleed air system is used by jet aircraft to keep flight surfaces above the freezing temperature required for ice to accumulate (called anti-icing). The hot air is "bled" off the jet engine into tubes routed through wings, tail surfaces, and engine inlets.**
- **Electro-mechanical Expulsion Deicing Systems use a mechanical force to knock the ice off the flight surface. Typically, actuators are installed underneath the skin of the structure. The actuator is moved to induce a shock wave in the protected surface to dislodge the ice. Innovative Dynamics in Ithaca, NY has developed a system that's light weight and low power using actuators called EIDI.**

- **Hybrid Electro-Mechanical Expulsion Deicing Systems** combine an EMEDS de-icer with an electrical heating element anti-icer. The heater prevents ice accumulation on the leading edge of the airfoil and the actuators of the EMED system remove ice that accumulates aft of the heated portion of the airfoil.
- **A weeping wing system** uses a liquid (such as ethylene glycol) to coat the surface and prevent ice from accumulating.
- **The Passive systems** are a new conceptual non-thermal anti-icing and pollution solution based on textile. This innovative textile has the properties characterized by a high level of water resistance which has a natural self-cleaning effect to repel water. Thereby eliminating the build of ice, with a high resistance to UV radiation and harsh climatic conditions and has a durable protective function.

- 1) **What is the primary function of an ice protection system?**
- 2) **What is super-cooled water?**
- 3) **What material is a pneumatic boot made from?**
- 4) **What is EMEDS an abbreviation of?**
- 5) **Where does ice normally build up of aircraft?**
- 6) **Where is the bleed air taken from?**
- 7) **How does a pneumatic boot work?**
- 8) **Where are the actuators stowed on the EMEDS system?**
- 9) **What is the difference between a de-icing and an anti-ice system?**

10) Which system uses two if the above systems in a combined situation?

Test

2. What determines where the fuel will go?

- a) selector valve**
- b) pipe**
- c) shut off valve**
- d) pump**

4. What part of the systems pushes the fuel around?

- a) selector valve**
- b) pipe**
- c) shut off valve**
- d) pump**

5. What component will stop fuel getting to the engine in case of engine fire/failure?

- a) selector valve**
- b) pipe**
- c) shut off valve**
- d) pump**

6. What component will clean and prevent any objects in the system?

- a) selector valve**
- b) pipe**
- c) shut off valve**
- d) filter**

7. What does the fuel flow down to get to the engine?

- a) selector valve**
- b) pipe**
- c) shut off valve**
- d) pump**

8. What material is used in a fuel filter?

- a) wood**
- b) foam**
- c) steel**
- d) plastic**

- 9. What is aircraft components service life measure in?**
- a) minutes**
 - b) days**
 - c) hours**
 - d) years**
- 10. What was described as a common problem?**
- a) lightening**
 - b) engine**
 - c) landing gear**
 - d) fuel leak**
- 11. What can happen to a fuel filter if not changed?**
- a) get blocked**
 - b) blow up**
 - c) break off**
 - d) function normally**
- 12. Be careful on the wing don't _____.**
- a) fall off**
 - b) break down**
 - c) top up**
 - d) close down**
- 13. What time did the airplane finally _____.**
- a) fall up**
 - b) break down**
 - c) take off**
 - d) close down**
- 14. What did you.....the tire with?**
- a) pump up**
 - b) blow down**
 - c) drain up**
 - d) wipe off**
- 15. There is grease on the windshield, and it will not _____.**
- a) take off**
 - b) clean down**
 - c) close of**
 - d) come off**

16. What is the main system used by jet aircraft?

- a) weeping wing
- b) thermawing
- c) pneumatic boot
- d) bleed air

17. What system uses small actuators to break the ice?

- a) weeping wing
- b) thermawing
- c) pneumatic boot
- d) Electro-mechanical Expulsion Deicing

18. What system used hot air?

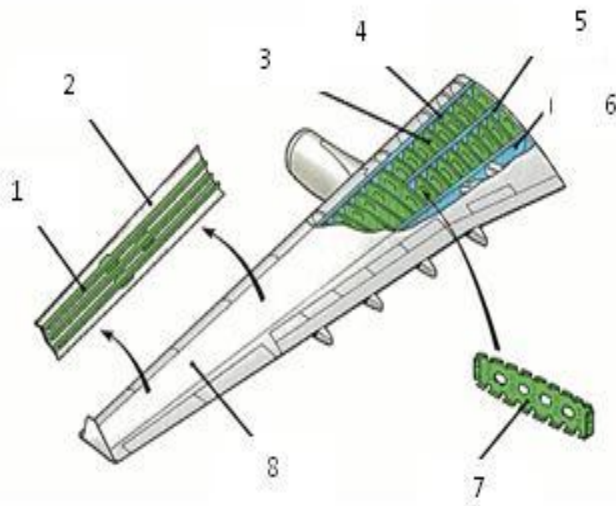
- a) weeping wing
- b) thermawing
- c) pneumatic boot
- d) bleed air

19. What system uses a liquid to prevent ice?

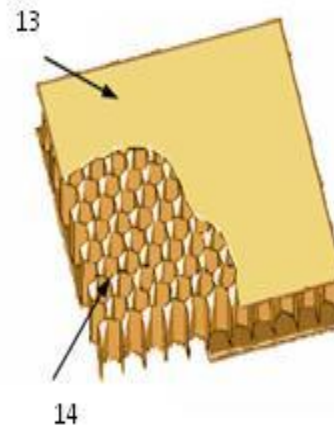
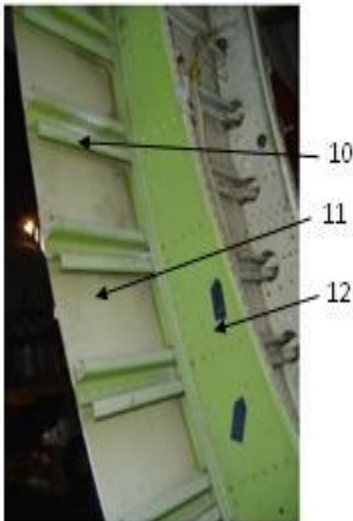
- a) weeping wing
- b) thermawing
- c) pneumatic boot
- d) bleed air



Structures



9



Match the structures from 1 to 14 from the above diagram.:

Ribs

Underside of skin panel

Front spar

Skin panel

Typical Rib

Central spar

Rear spar

Floor beams

Skin

Longeron/ stringer

Frame/former

Facesheet

Honeycomb core

Conversation

Below is a typical conversation about aircraft structures.

Student – what materials are used to manufacture the different parts of the aircraft structure?

Engineer – different parts are made from different materials. Over the last twenty years or so the main structure such as the fuselage, wings, frames, ribs, spars, stringers have been made out of aluminium alloys, commonly 2000, 5000, 6000 and 7000 series of alloy.

Student – how are these components fastened together?

Engineer – again, different parts using different methods. Rivets, screws, bolts, camlocks and pins are all commonly used on aircraft, these are generalised as the term ‘fasteners’. Aircraft use lots of brackets and cleats to join different parts of structure together, mainly using the fasteners mentioned. Also bonding is a common process especially in the carbon fibre and composite structures, utilising epoxy resin as a bonding agent.

Student – what about now with all the new technology that is around with material science, is there any new materials that aircraft are being made from?

Engineer – yes, the empennage has been made for a number of years now using composite material, commonly a honeycomb composite. But now larger sections of aircraft are being made from composite materials such as carbon fibre, glass re-enforced fibre etc.

Student – what are the advantages of using composite materials such as carbon fibre?

Engineer – the main advantage is a weight saving, which in turn will save on fuel, and as the fuel is very expensive that is the area that a lot of engineers have been and will continue to work to try reduce the fuel consumption of an aircraft.

Student – are there any disadvantages?

Engineer – yes there are some. The material is generally more expensive to manufacture and repair. Also as it is a new material then a lot of engineers aren't familiar with the repair and maintenance processes. Also when the carbon fibre receives an impact, for example a mechanic drops a tool onto a carbon fibre panel, the damage caused by the impact is sometimes not visible to the naked eye. The damage is generally inside the material. The way carbon fibre is made is by layering up sheets of carbon fibre and gluing them together using an epoxy resin, these layers can become delaminated if subjected to an impact.

Student – how do you check for delaminating damage?

Engineer – by using NDT (non-destructive testing) this comes in many forms but a common form used to check carbon fibre delaminating is ultrasonic testing, which uses sound waves to check for internal flaws, for example, cracks, de-lamination etc .

Answer the following questions by going through the above conversation.

- 1) In carbon fibre how are the fibres stuck together?
- 2) What part of the aircraft has been made from a composite material for many years already
- 3) What metallic material is used to manufacture most aircraft?
- 4) Name an advantage of composite material.
- 5) Name a disadvantage of composite material.

Grammar

You have earned 0 point(s) out of 0 point(s) thus far.

Lesson 1 -Modal verbs

Please watch the following Video to have the explanation of the following Grammar Point and try to complete the exercises in it.

Lesson 2 - Conditionals

Modals & conditionals

Modals

Can	Could	Be able to	Could (have)	Can't (have)	Might	May	should
He <u>can</u> repair sheet metal.	I <u>could</u> not drill the hole	I haven't <u>been able</u> to work lately	I <u>could have</u> gone out tonight	I <u>can't have</u> any breaks today.	I <u>might</u> buy some new spanners.	I <u>may</u> have to leave work early	I <u>should have</u> tightened the bolt more
He <u>can</u> pick up	I <u>could</u> repair the	I was <u>able</u>	I <u>could have</u> worked today.	I <u>can't have</u> any dairy	I <u>might</u> insert a new	I <u>may</u> have to	I <u>should</u> be able to do it.

heavy things	damage	to go out		products	screws	start again	
--------------	--------	-----------	--	----------	--------	-------------	--

Conditionals

If	Wish	Would	In case	Unless	As long as	Providing
<u>If</u> you go out tonight don't be late home.	I <u>wish</u> I hadn't so much	The engine <u>would</u> not start	<u>In case</u> in rains, take an umbrella	<u>Unless</u> he asks don't mention it.	You can use my spanner, <u>as long as</u> you take care.	You can go, <u>providing</u> you take your phone.
<u>If</u> the nut isn't tight, tighten it.	I <u>wish</u> someone would answer the phone	<u>Would</u> you pick me up after work?	<u>In case</u> of an emergency call 999	Don't remove the pipe, <u>unless</u> the system is safe.	You can work, <u>as long as</u> you drive me there.	You can use my drill, <u>providing</u> you don't break it

Match the blanks for the following questions about the grammar points.

Tomdrive, but doesn't have a car.

I used to stand on my head, but can't do it anymore.

I can't sing now, but Ivery good when I was a child.

I can't run far these days, but ten years ago Irun a marathon.

He hurt his leg so he walk very fast.

He wasn't at home, but Icontact him via email.

The boy fell into the river but fortunately we to rescue him.

His eyesight is getting worse he have to wear glasses soon

Whatever you do, you touch that button, it is very dangerous.

Smoking is bad for you, I think you stop.

Mike has been drinking, he not be driving.

We have installed an alarm on our house someone tries to break in.

You need to go to the information centre you need help.

Insurance is good to have something happens to your car.

The alarm will go off someone tries to break into the house.

2. I'm playing tennis unless/providing it rains.

a) unless

b) providing

3. We're going to start painting the house tomorrow unless/provided it's not raining.

a) unless

b) provided

4. You can smoke in here unless/as long as you open a window.

a) unless

b) as long as

5. Mike won't lend you any money unless/as long as you promise to pay it back.

a) unless

b) as long as

6. The children can stay here unless/providing they don't make too much noise.

a) unless

b) providing

7. I'm going now unless/provided you want me to stay.

a) unless

b) provided

8. I can't understand why he's late, unless/as long as he didn't get our message

a) unless

b) as long as

Reading

Main parts of an aircraft are the fuselage, wings & empennage

Fuselage The fuselage includes the cabin and/or cockpit, which contains seats for passengers and the controls for the airplane. In addition, the fuselage may also provide room for cargo. The cargo would normally be under the floor structure. The floor structure consist of many beams that connect to the frames, using cleats and fasteners. Some aircraft utilize an open truss structure. The truss-type fuselage is constructed of steel or aluminium tubing. Strength and rigidity is achieved by welding the tubing together into a series of triangular shapes, called trusses. Construction of the Warren truss (figure 1) features longerons, as well as diagonal and vertical web members. To reduce weight, small airplanes generally utilize aluminium alloy tubing, which may be riveted or bolted into one piece with cross-bracing members.

As technology progressed, aircraft designers began to enclose the truss members to streamline the airplane and improve performance. This was originally accomplished with cloth fabric, which eventually gave way to lightweight metals such as aluminium. In some cases, the outside skin can support all or a major portion of the flight loads. Most modern aircraft use a form of this stressed skin structure known as monocoque or semimonocoque construction.

(Figure 2)

The monocoque design uses stressed skin to support almost all imposed loads. This structure can be very strong but cannot tolerate dents or deformation of the surface. This characteristic is easily demonstrated by a thin aluminium beverage can. You can exert considerable force to the ends of the can without causing any damage however, if the side of the can is dented only slightly, the can will collapse easily. The true monocoque construction mainly consists of the skin, formers (also called frames) and bulkheads. The frames and bulkheads provide shape for the fuselage. Since no bracing members are present, the skin must be strong enough to keep the fuselage rigid. Thus, a significant problem involved in monocoque construction is maintaining enough strength while keeping the weight within allowable limits. Due to the limitations of the monocoque design, a semi-monocoque structure is used on many of today's aircraft.

The semi-monocoque system uses a substructure to which the airplane's skin is attached. The substructure, which consists of bulkheads and/or formers of various sizes and longerons, reinforces the stressed skin by taking some of the bending stress from the fuselage.

Wings The wings are airfoils attached to each side of the fuselage and are the main lifting surfaces that support the airplane in flight. There are numerous wing designs, sizes, and shapes used by the various manufacturers. Each fulfils a certain need with respect to the expected performance for the particular airplane.

Wings may be attached at the top, middle, or lower portion of the fuselage. These designs are referred to as high-, mid-, and low-wing, respectively. The number of wings can also vary. Airplanes with a single set of wings are referred to as monoplanes, while those with two sets are called biplanes

Many high-wing airplanes have external braces, or wing struts, which transmit the flight and landing loads through the struts to the main fuselage structure. Since the wing

struts are usually attached approximately halfway out on the wing, this type of wing structure is called semi-cantilever. A few high-wing and most low-wing airplanes have a full cantilever wing designed to carry the loads without external struts.

The principal structural parts of the wing are spars, ribs, skin and stringers (figure 3)

The ribs determine the shape and thickness of the wing (airfoil). In most modern airplanes, the fuel tanks either are an integral part of the wing's structure, or consist of flexible containers mounted inside of the wing.

Attached to the rear, or trailing, edges of the wings are two types of control surfaces referred to as ailerons and flaps. Ailerons extend from about the midpoint of each wing outward toward the tip and move in opposite directions to create aerodynamic forces that cause the airplane to roll. Flaps extend outward from the fuselage to near the midpoint of each wing. The flaps are normally flush with the wing's surface during cruising flight. When extended, the flaps move simultaneously downward to increase the lifting force of the wing for takeoffs and landings.

Empennage The correct name for the tail section of an airplane is empennage. The empennage includes the entire tail group, consisting of fixed surfaces such as the vertical stabilizer and the horizontal stabilizer. The movable surfaces include the rudder, the elevator, and one or more trim tabs (figure 4)

A second type of empennage design does not require an elevator (figure 5). Instead, it incorporates a one-piece horizontal stabilizer that pivots from a central hinge point. This type of design is called a stabiliser, and is moved using the control wheel, just as you would the elevator. For example, when you pull back on the control wheel, the stabiliser pivots so the trailing edge moves up. This increases the aerodynamic tail load and causes the nose of the airplane

to move up. Stabilisers have an antiservo tab extending across their trailing edge. The antiservo tab moves in the same direction as the trailing edge of the stabiliser. The antiservo tab also functions as a trim tab to relieve control pressures and helps maintain the stabiliser in the desired position. The rudder is attached to the back of the vertical stabilizer. During flight, it is used to move the airplane's nose left and right. The rudder is used in combination with the ailerons for turns during flight. The elevator, which is attached to the back of the horizontal stabilizer, is used to move the nose of the airplane up and down during flight.

Trim tabs are small, movable portions of the trailing edge of the control surface. These movable trim tabs, which are controlled from the cockpit, reduce control pressures. Trim tabs may be installed on the ailerons, the rudder, and/or the elevator

Match the following questions.

Your answer :

- 1) What does the aircraft floor structure consist of?**
 - 2) What are the principle parts of the wing structure?**
 - 3) What is the correct name for the tail section of the aircraft?**
 - 4) What determines the wings aerofoil shape?**
 - 5) What was originally used to cover the aircraft structure?**
 - 6) Where can trim tabs be installed?**
 - 7) What is an aircraft with 2 sets of wings called?**
 - 8) What is an aircraft with 1 set of wings called**
-

Speaking

1. Describe the aircraft main structure components.
2. Describe what parts of the aircraft structure you have worked on.
3. Describe how the different structural parts are fastened together

Test

2. Name the part of the structure that gives the aerofoil shape.
 - a) stringer
 - b) rib
 - c) spar
 - d) aileron
4. Name the part of structure that runs along the wing span.
 - a) frame
 - b) stringer
 - c) screw
 - d) access panel
5. Name the part of structure that gives the fuselage its shape.
 - a) frame
 - b) longeron
 - c) spar
 - d) rib
6. Name the component that runs the length of the fuselage.
 - a) station
 - b) spar
 - c) rib
 - d) longeron

7. What is the generic word given to the objects that attach the structure together?

- a) fast
- b) faster
- c) fasten
- d) fasteners

8. Which of these is a fastener?

- a) rivet
- b) skin
- c) spar
- d) rib

9. What type of damage can happen to carbon fibre?

- a) laminate
- b) laminated
- c) delaminate
- d) limitation

10. Most aircraft structures are produced using?

- a) lead
- b) aluminium
- c) aluminium alloy
- d) copper

11. An advantage of using composite material is?

- a) heavier
- b) lighter
- c) cheaper
- d) easier to manufacture

12. _____ there is enough sealant, the tank will not leak.

- a) as long as
- b) could
- c) would
- d) in case

13. The structure is damaged, but _____ the frames are ok it will be fine.

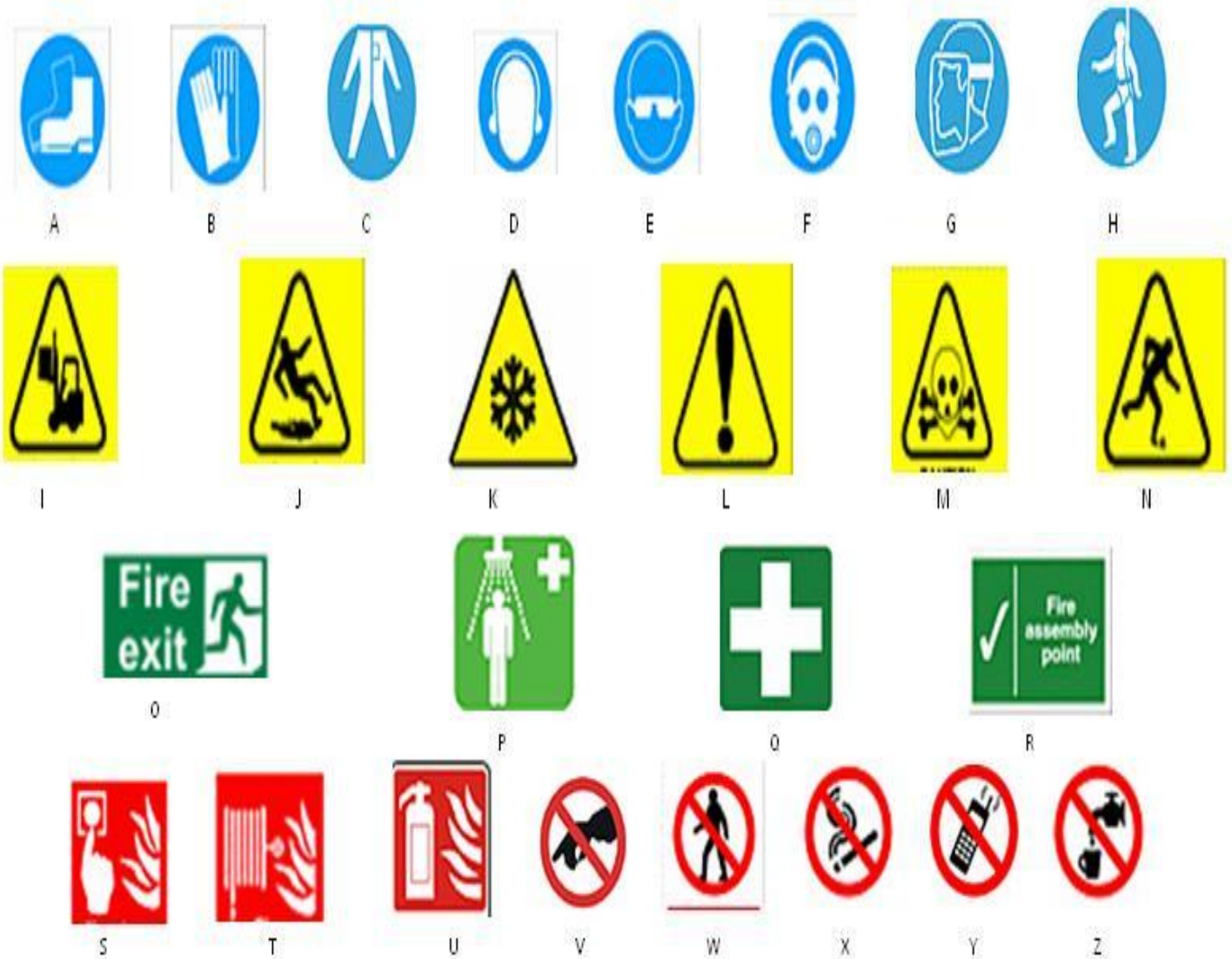
- a) will
- b) would
- c) providing
- d) can

14. The bolts will not come out, but it _____ just be the sealant holding them in.
- a) wish
 - b) would
 - c) in case
 - d) could
15. The skin is cracked, but _____ will drill stop it, it will be fine.
- a) providing
 - b) could
 - c) in case
 - d) can
16. Where is the elevator attached to?
- a) fuselage
 - b) vertical stabilizer
 - c) horizontal stabilizer
 - d) wing
17. A monocoque design uses,
- a) semi stressed skin
 - b) stressed skin
 - c) frames
 - d) longerons
18. Many of today's modern aircraft use _____ structure.
- a) monocoque
 - b) bi-plane
 - c) tri-plane
 - d) semi-monocoque
19. What structure system uses skin, frames and longerons?
- a) semi-monocoque
 - b) truss-structure
 - c) monocoque
 - d) bi-plane



Health and safety

Vocabulary



Match the above safety sign.

- A** = _____ **Overalls**
B = _____ **Safety gloves**
C = _____ **Ear defenders**
D = _____ **Safety shoes**

E = _____ Safety glasses
F = _____ Lifting harness
G = _____ Respiratory equipment
H = _____ Face guard
I = _____ General caution
J = _____ Operating machinery
K = _____ Cold temperatures
L = _____ Slip hazard
M = _____ Fire exit/escape
N = _____ Trip hazard
O = _____ Toxic
P = _____ First aid shower
Q = _____ Fire assembly point
R = _____ Fire hose
S = _____ Fire alarm point
T = _____ First aid box **U = Fire extinguisher**
V = _____ Do not walk
W = _____ Do not touch **X = No mobile/cell phones**
Y = _____ Do not smoke
Z = _____ Not drinking water

Conversation

Below is a typical conversation about the dangers and the health and safety activities that happen within the hangar.

Person 1 – Is working as an aircraft mechanic a dangerous job?

Person 2 – Yes working inside an operating hangar is a very potentially dangerous place to be, and you must always be on the lookout for any potential accidents waiting to happen.

Person 1 – What type of things can you do to prevent accidents?

Person 2 – The simple things make a big difference, for example cover any fluid leaks with grit sand and put a ‘caution – wet floor’ sign around the area, use foam protectors for the corners or any sharp protruding aircraft components that someone could walk into. Also what you need to think about is that your actions can affect other peoples well being at work, this means you need to ensure you obey and adhere to all safety warning signs and use the appropriate equipment when performing operations. For example, when lifting objects too heavy for a manual lift, then ensure the crane is in correct working order and in calibration date.

Person 1 – What type of protective equipment do you need to wear to ensure you are safe at all times? And is any specialized?

Person 2 – The protective equipment used, often called PPE (personal protective equipment) comes in many different shapes and forms. It depends on the job you are doing as to what type of PPE you will need. For example if you are working inside the wingbox then you will need respiratory equipment, overalls and possibly gloves, working at heights will mean you will have to wear a safety harness, safety glasses to be worn when drilling, gloves when handling chemical/fluid substances etc. The majority of the safety equipment needed is basic common sense, but do not take it for granted.

Person 1 – Where can you get all this PPE from?

Person 2 – It can all be bought at general hardware shops, but your employer should supply you with the necessary PPE needed to carry out your daily jobs. It is also very important to ensure the PPE is kept in a good condition. If it is in a bad condition then sometimes it can do more harm than good, for example, dirty and scratched safety glasses could make it hard to see and cause you an accident, so

never accept any worn or any PPE in a bad condition, always ask for new/PPE in good condition.

- 1) What is the name given to the safety equipment
- 2) Why is it important that the equipment is in good condition?
- 3) How would you cover up a hydraulic fluid leak?
- 4) What should you wear if you were working on the rudder of the aircraft?
- 5) What should you do if given a pair of oil soaked overalls?

Grammar

Lesson 1 -Already/yet/still

YET, STILL

Exercise 1: Ask someone questions about a friend, Dave. You haven't seen Dave for a very long time.

When you last saw him:

- 1: he was living on Market street
- 2: he was single
- 3: he was working in a factory
- 4: he had a beard
- 5: he wanted to be a politician
- 6: he smoked a lot

You meet someone who recently met Dave. Ask questions about Dave using *still*.

Example: 1: is he still living on market street

Now answer 2:

Now answer 3:

Now answer 4:

Now answer 5

Now answer 6:

Example: it's still raining. (stopped) *it hasn't stopped raining yet.*

Your answer :

- 1. The Boeing 737 is still here. (gone)**
- 2. The A320 'C' check is still going on (finished)**
- 3. The children are still asleep (woken up)**
- 4. The chief engineer is still on vacation (come back)**

Example: it's still raining. (stopped) *it hasn't stopped raining yet.*

- 5. Mike is still up (gone to bed)**
- 6. We're still waiting for him to reply to our letter (replied)**
- 7. I am still thinking about what colour to paint the aircraft (decided)**

Exercise 3: Use *still and not....anymore*.

Example: tom used to play tennis and soccer (still / tennis but) tom still plays tennis, but he *doesn't* play soccer *anymore*

- 1) Jack used to have long hair and a beard. (Still / long hair but....)**

**2) She was in the hospital and she was in a critical condition.
(Still / hospital but...)**

3) She was a student, and was studying aeronautical engineering. (Still / a student but

4) I was feeling tired and sick. (Still / tired but...)

**5) He was a good mechanic, and the best in the company.
(Still / good mechanic but...)**

6) I used to like George and ken. (Still / George but...)

Reading

The employer's duty of care in practice

All employers, whatever the size of the business, must:

- **make the workplace safe**
- **prevent risks to health**
- **ensure that plant and machinery is safe to use, and that safe working practices are set up and followed**
- **make sure that all materials are handled, stored and used safely**
- **provide adequate first aid facilities**
- **tell you about any potential hazards from the work you do, chemicals and other substances used by the firm, and give you information, instructions, training and supervision as needed**
- **set up emergency plans**
- **make sure that ventilation, temperature, lighting, and toilet, washing and rest facilities all meet health, safety and welfare requirements**
- **check that the right work equipment is provided and is properly used and regularly maintained**
- **prevent or control exposure to substances that may damage your health**

- **take precautions against the risks caused by flammable or explosive hazards, electrical equipment, noise and radiation**
- **avoid potentially dangerous work involving manual handling and if it can't be avoided, take precautions to reduce the risk of injury**
- **provide health supervision as needed**
- **provide protective clothing or equipment free of charge if risks can't be removed or adequately controlled by any other means**
- **ensure that the right warning signs are provided and looked after**
- **report certain accidents, injuries, diseases and dangerous occurrences to either the Health and Safety Executive (HSE) or the local authority, depending on the type of business**

1) If machinery is to be used, what condition should it be in?

2) Should the employees pay for their PPE given to them by their employer?

3) How should the employer keep the environmental conditions of the workplace?

4) How should substances harmful to health be handled?

5) How should items be stored?

6) What is the minimum temperature for a manual job?

7) What is the minimum temperature for an office?

8) How should the workplace equipment be kept?

Speaking

1. Describe some of the PPE that you use in your daily tasks
2. Describe what precautions you take when working with hydraulic fluid skydrol?
3. Have you ever seen an accident occur in the hangar?
4. Explain what happened in as much detail as possible.

Test

2. When working on the rudder of a Boeing 747, what sign should be displayed?

- H
- E
- F
- J

4. When working inside the fuel tank what sign should be displayed?

- H
- E
- F
- J

5. After a big hydraulic leak from the landing gear, what sign should be displayed?

- H
- E
- F
- J

6. When riveting what sign should be displayed?

- D
- E
- F
- J

7. When drilling what sign should be displayed?

- H
- E
- F
- J

8. Working inside a hangar is?

- safe
- potentially dangerous
- unsafe
- cold

9. If there was a skydrol leak would you

- leave it
- pretend you didn't see it
- put grit sand down
- put grit sand down and a wet floor sign up

10. Sharp aircraft edges should be?

- left as they are
- covered with foam protectors
- stand by them and warn people
- tell a manager

11. PPE should be?

- in ok condition
- poor condition
- bad condition
- good condition

12. PPE should be?

- in ok condition
- poor condition
- bad condition
- good condition

13. Where is the mechanic? He isn't here _____, he is on his way.

- still
- already
- now
- yet

14. I have not finished the oil change yet, I am _____ doing it.

- already
- still
- already
- now

15. What are you doing this evening? I don't know _____.

- yet
- already
- now
- still

16. She hasn't gone yet, she is _____ here.

- now
- still
- yet
- already

17. The workplace should be _____ in a safe condition.

- keep
- still
- already
- kept

18. Employers should _____ employees with the appropriate PPE.

- supplying
- supply
- supplies
- supplied

19. PPE should _____ if it is faulty.

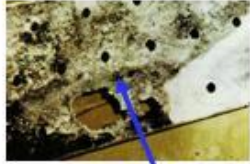
- be used
- not be used
- used only once more
- only used for minor jobs

20. Employees must be allowed to _____ appropriate work breaks.

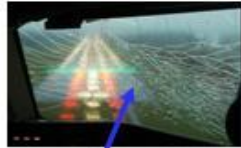
- take
- took
- taken
- told



Damage



A



B



C



D



E



F



G



H



I



J



K



L

Match the types of damage in the above pictures.

- A = _____ Dented nose
 B = _____ Corrosion
 C = _____ Cracked fuselage
 D = _____ Shattered windscreen
 E = _____ Torn off wing tip
 F = _____ Blown out tyre/puncture/flat tyre
 G = _____ Snapped cable
 H = _____ Collapsed nose gear
 I = _____ Squashed or crushed pipe
 J = _____ Twisted pipe

K = _____ Bent pipe

L = _____ Scratched panel

Conversation

Match the following questions about the conversation.

Below is a conversation about types of aircraft damage.

Trainee Mechanic: What are the main types of damage that aircraft suffer?

Experienced mechanic: There are many different types and reason behind aircraft damage, some common types are:-

corrosion – caused by dissimilar metal, salt water, un-protected material, chemical attack from battery acid, moisture in the structure and friction. Impact damage – caused by bird strikes, heavy loadings, collisions, careless workmanship

Metal fatigue – which is the aging of the material, which can lead to cracks and corrosion

Poor maintenance producers, a lack of maintenance can also lead to damage.

Trainee mechanic: how are the different types of damage repaired?

Experienced mechanic: all repairs must be carried out in accordance with the correct manual, but it usually depends on the types and how severe the damage is, sometimes if the damage is too severe then the component may have to be replaced. Aircraft impact damage to the structure is normally repaired by replacing the damaged skin or structure, or both.

Trainee mechanic: what is a skin repair and how do you perform this type of repair?

Experienced mechanic: A skin repair is a repair done to the aircraft skin after it has suffered damage, either corrosion; impact i.e. bird strike or lightning strike. How it is done depends on the area concerned, if it is in a critical aerodynamic area i.e. the wings then an insert plate will be used, this means the damaged part of the skin will be cut out and discarded, the cut out section is filed to shape and a new piece of material (insert plate) put into the cut out section of the skin. There will also be a backing plate to allow the insert plate to be riveted in place, (see diagrams below). This type of repair can also be applied to internal structure components. There is also a scab type of patch that can be used, this is similar to the insert plate, but the new plate is riveted directly on top of the damage, i.e. a crack. But if it is a crack then two small holes must be drilled at either end of the crack, these will prevent the crack from growing, and this is called crack stop drilling.

Trainee mechanic: what about other types of repairs?

Experienced mechanic: again it depends on the severity and area, for example, a leaking fuel pipe; this could be a worn seal, so it would be simply replaced, or if the pipe is damaged then it will be replaced also. Many components are replaced due to shelf life, this means that a component has a limited amount of flying hours before it will need replacing, other components will need inspection after a certain amount of flying hours, if the component is ok, then it is left on the aircraft, if damaged or worn out then it will be replaced.

- 1) Why would you do a skin repair?

- 2) What type of skin repair would you do on the wing leading edge

- 3) How can cracks be prevented from growing?

4) What type of rivets would you use for a wing leading edge skin repair?

5) If the repair is on the fuselage, what does the repair need to be?

Grammar

Direct and indirect speech

Lesson 1 -Direct and indirect speech

Please watch the following Video to have the explanation of the following Grammar Point and try to complete the exercises in it.

You have earned 0 point(s) out of 4 point(s) thus far.

Direct Speech / Quoted Speech

Saying exactly what someone has said is called direct speech (sometimes called quoted speech). Here what a person says appears within quotation marks ("...") and should be word for word.

For example: he said, "Today's lesson is on damage." Or "Today's lesson is on damage," he said

Indirect Speech / Reported Speech

Indirect speech (sometimes called reported speech), doesn't use quotation marks to enclose what the person said and it doesn't have to be word for word.

When reporting speech the tense usually changes. This is because when we use reported speech, we are usually talking about a time in the past (because obviously the person who spoke originally spoke in the past). The verbs therefore usually have to be in the past too.

For example

Direct speech = "I'm going to the cinema", He said

Indirect speech = He said he was going to the cinema

Now match the following 'direct speech' sentences into 'indirect speech' sentences:

- 1) Present simple – He said "It's cold outside" =**
- 2) Present continuous – He said "I'm teaching English online" =**
- 3) Present perfect simple – He said "I've been on the web since 1999" =**
- 4) Present perfect continuous – he said "I've been teaching English for seven years"**
- 5) Past simple – she said "I taught online yesterday"**
- 6) Past continuous – she said "I was teaching earlier"**
- 7) He said – "I live in Rio de Janeiro"**
- 8) He said – "I am cooking dinner"**
- 9) He said – "I have visited London twice"**
- 10) He said – "I went to New York last week"**
- 11) He said – "I have already eaten"**
- 12) He said – "I am going to find a new job"**
- 13) He said – "I will give Jack a call"**
- 14) He said – "I'm going to see my mother tomorrow"**

15) He said – ‘I can’t live here’

Reading

You have earned 0 point(s) out of 4 point(s) thus far.

Read the below article and then answer the questions.

A Boeing aircraft (registration number N73711), took off from Hilo International Airport at 13:25 HST on 28 April 1988, bound for Honolulu. There were 90 passengers and five crew members on board. No unusual occurrences were reported during the take-off and climb

Around 13:48, as the aircraft reached its normal flight altitude of 24,000 feet (7,300 m) about 23 nautical miles (43 km) south-southeast of Kahului, a small section on the left side of the roof ruptured. The resulting explosive decompression tore off a large section of the roof, consisting of the entire top half of the aircraft skin extending from just behind the cockpit to the fore-wing area.

As part of the design of the 737, stress may be alleviated by controlled area breakaway zones. The intent was to provide controlled depressurization that would maintain the integrity of the fuselage structure. The age of the plane and the condition of the fuselage (that had corroded and was stressing the rivets beyond their designed capability) appear to have conspired to render the design a part of the problem; when that first controlled area broke away, the rapid sequence of events resulted in the failure sequence.

Match the following vocabulary.

- 1) Bound = _____ Top section of the fuselage, also the same for a building, house etc.
- 2) Roof = _____ Cracked
- 3) Ruptured = _____ The aircraft is heading to Honolulu
- 4) Alleviated = _____ To reduce
- 5) Intent = _____ Cause to be
- 6) Render = _____ Plan
- 7) Conspired = _____ Work together
- 1) Bang = _____ to take hold of something in a rough way
- 2) Blow = _____ to fall
- 3) Drop = _____ when air or wind moves
- 4) Grab = _____ to knock against something when you are moving

Speaking

1. Explain worst type of damage you have seen?
2. How was the damage repaired?
3. Describe the most common type of damage you encounter.

Test

What type of damage would a bird strike cause?

- shattered windscreen
- bent pipe
- hydraulic loss

- snapped cable

If there was a heavy landing what damage is most likely to occur?

- avionic failure
- hydraulic loss
- broke flap
- tyre blow out

If a cable was to be pulled from both ends, what damage could occur?

- bend
- dent
- snap
- blow up

If an aircraft flew through a heavy hailstorm what could happen.

- dents
- bent fuselage
- punctured tyre
- snapped cable

If the nose landing gear wasn't working correctly what could occur on landing?

- twisted fuselage
- bent pipe
- collapsed gear
- fire

Name the most suitable repair type for a dented wing leading edge.

- scab patch
- insert plate
- new wing

- new engine

What type of rivets would you use to do a scab patch repair?

- countersunk
- blind
- solid mush head
- avdel

If there was a bird strike to the lower fuselage what repair would you do?

- scab patch
- insert plate
- new skin
- new fuselage

What is the stronger type of rivet?

- solid
- blind
- None of the above

Test

What caused the accident?

- torn away fuselage
- cracked fuselage
- dented aircraft
- old aircraft

How many people were on the aircraft?

- 95
- 100
- 105
- 90

Where is the fore-wing area?

- back of the wing

- front of the wing**
- middle of the wing**
- wing tip**

Where was the aircraft heading?

- Hilo**
- Honolulu**
- Kahului**
- Maui**