



## ANGLAIS

### Those Incredible Flying Machines

FLYING a helicopter is tricky, especially when hovering. You use your left hand to raise and lower the collective-pitch lever (to climb or descend), your right hand to move the cyclic-pitch joystick (to go forwards, backwards and sideways) and both feet to work the anti-torque pedals (to point the nose). At first it all seems like an impossible dance, but with plenty of practice and careful co-ordination it can be mastered. Flying a drone, by comparison, is very easy. Some can be operated with little or no experience using only a smartphone application.

One passenger drone undergoing flight tests is the Volocopter VC200. It consists of 18 separate rotors, and its makers, e-volo, a company based in Karlsruhe, Germany, claim it is more stable than a conventional helicopter.

The attraction of drones is their ease of operation. Unlike most helicopters, hovering drones use multiple rotors. Many drones are based on a design called a quadcopter, which employs four rotors on arms adjusted 90 degrees to each other. Each rotor is directly driven by an electric motor. By turning two of the rotors clockwise and two anticlockwise it counters the twisting effects of torque produced by a single-rotor helicopter (without a tailrotor to push against the torque, a helicopter would spin hopelessly round and round). Moreover, whereas a helicopter needs to vary the pitch of its blades (the angle at which they attack the air) in order to manoeuvre, the multiple rotors on a drone have a fixed pitch. The drone instead manoeuvres by independently changing the speed of one or more of its rotors under computer control. As this set-up requires fewer and less complex moving parts than a helicopter, it makes drones simpler, cheaper to build and maintain, and potentially more reliable.

The VC200 has an all-in weight of 450kg and, in its present form, a flight duration of 30 minutes. After completing a series of flight tests the VC200 should be fully certified by 2017 in a category of aircraft known as an "ultralight".

The market for passenger drones in their various forms could be huge. Beside military and commercial operations, they would have a large number of leisure uses. They also open up new possibilities for a combination of manned and unmanned flight.

Adapted from the 'Science and Technology' print edition of The Economist Newspaper, 2016 (Adapted)

<http://www.economist.com/news/science-and-technology/21701080-personal-robotic-aircraft-are-cheaper-and-safer-helicopter-and-much-easier>

#### FOOTNOTES

1. **Torque:** force de torsion
2. **To spin round and round:** tourner
3. **Blade:** pale (chacun des éléments de forme vrillée, fixés au moyen d'un rotor)

D. Complete the table with appropriate information from the text.

(2 marks)

	DRONES	HELICOPTERS
How they are operated	13. ....	manually
Number of Rotors	Use multiple rotors	14. .... supplemented by a tailrotor
Way of eliminating twisting effect	15. by .....	Eliminate twisting effects of torque with a tail rotor
Pitch (angle attack of the air)	16. ....	Vary the pitch of its blades

II. LINGUISTIC COMPETENCE (8 marks)

E. The sentences in A have a modal auxiliary (should/could/needn't/must). Match each sentence with the modality expressed by the modal auxiliary. (2 marks)

**Modalities:** Absence of necessity / Strong probability/ Expectation/ Possibility

A- Sentences	B- Modalities
After being submitted to a series of tests, the VC200 should be certified.	17. ....
The market for passenger drones could offer large job opportunities.	18. ....
They needn't touch any button; it's an automatic system.	19. ....
That aircraft must be a jumbo jet.	20. ....

F. Put the verbs in brackets in the correct tense. (3 marks)

In the 20<sup>th</sup> century, designers (21) ..... (focus) mainly on increasing the speed of aircrafts. The start of the new millennium (22) ..... (mark) by a shift towards more automation and autonomy. Up to now, machines (23) ..... (create), which for a large part (24) ..... (operate) by trained crews. But the current trend (25) ..... (go) to the production of unmanned machines totally dependent on new sophisticated technologies. However, the decision of the Aeronautics Authorities (26) ..... (influence) their future application in sensitive domains like the military.

G. Reformulate the sentences using the prompts given. (1 mark)

27. Access to remote areas was so difficult; they used drones to collect the information they needed.

If access to remote areas had been easy, .....

28. Although flying a helicopter is very difficult, practice and organization can help master it. Despite .....

I- **READING COMPREHENSION** (8 marks)

A. Complete the table below using the words in the box.

(2.5 marks: 0.5 x 5)

Quadcopter	computer	smartphone application	cyclic-pitch joystick	tailrotor
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OPERATIONS	PARTS
It can allow an inexperienced operator to fly a drone.	1. ....
It provides the possibility to fly drones from a distance.	2. ....
It increases the maneuverability of the drone by changing the speed of its rotors.	3. ....
It prevents the helicopter from spinning round and round.	4. ....
It allows the helicopter to move in three different ways.	5. ....

B. Write down the letter corresponding to the correct meaning.

(2 marks)

6. 'It all seems like an impossible dance' means:
- Flying helicopters are compared to dancing machines.
  - Coordinating all the movements to fly a helicopter seems impossible.
  - Flying a helicopter means performing impossible manoeuvres.
7. 'Incredible flying machines' suggests that:
- Drones are piloted in a fascinating way.
  - Drones offer many possibilities of use.
  - People are amazed by drones.
8. 'Manned flight' means flying an aircraft:
- with men and women as the crew.
  - that men operate from a distance.
  - programmed by men for specific machines.
9. 'A hovering helicopter' means a helicopter whose position is:
- stationary.
  - moving sideways.
  - moving forwards and backwards.

C. Write down the letter corresponding to the right answer.

(1.5 marks)

10. Making a drone is more economical than making a helicopter because:
- A drone needs fewer components.
  - A helicopter has more functions.
  - Operating a drone is simpler.
11. The license for the VC200 to fly
- may be very difficult to get
  - may have already been approved
  - will not be issued.
12. Passenger drones may be ----- for the populations.
- Unattractive
  - Very attractive
  - Risky

H. Match each sentence with the corresponding function from the box below. (2 marks)

ABILITY/ CAUSE / CONTRAST / PURPOSE

Sentences	Functions
Unlike most helicopters, hovering drones use multiple rotors.	29. ....
As the set-up requires fewer and less complex moving parts, it makes drones more reliable.	30. ....
To manoeuvre, a helicopter needs to vary the pitch of its blades.	31. ....
After they had completed a series of flight tests on the VC200 they could issue a certificate in the category of 'ultralight'.	32. ....

III. **WRITING** (4 marks)

Choose one topic and write about 150 - 200 words on it.

33. **TOPIC 1:**

Do you think that it is a good option to develop automated systems in industrial and financial services (use of robots in car assembly lines and the use of credit cards in banks)? Support your arguments.

34. **TOPIC 2**

Drones are used in the military (to carry missiles and other weapons), and in the civilian (to survey areas which are difficult of access, take photographs, etc.). Which use of drones would you encourage? State your reasons.