North Shore Helicopter Training Ltd

Selection Test Study Guide

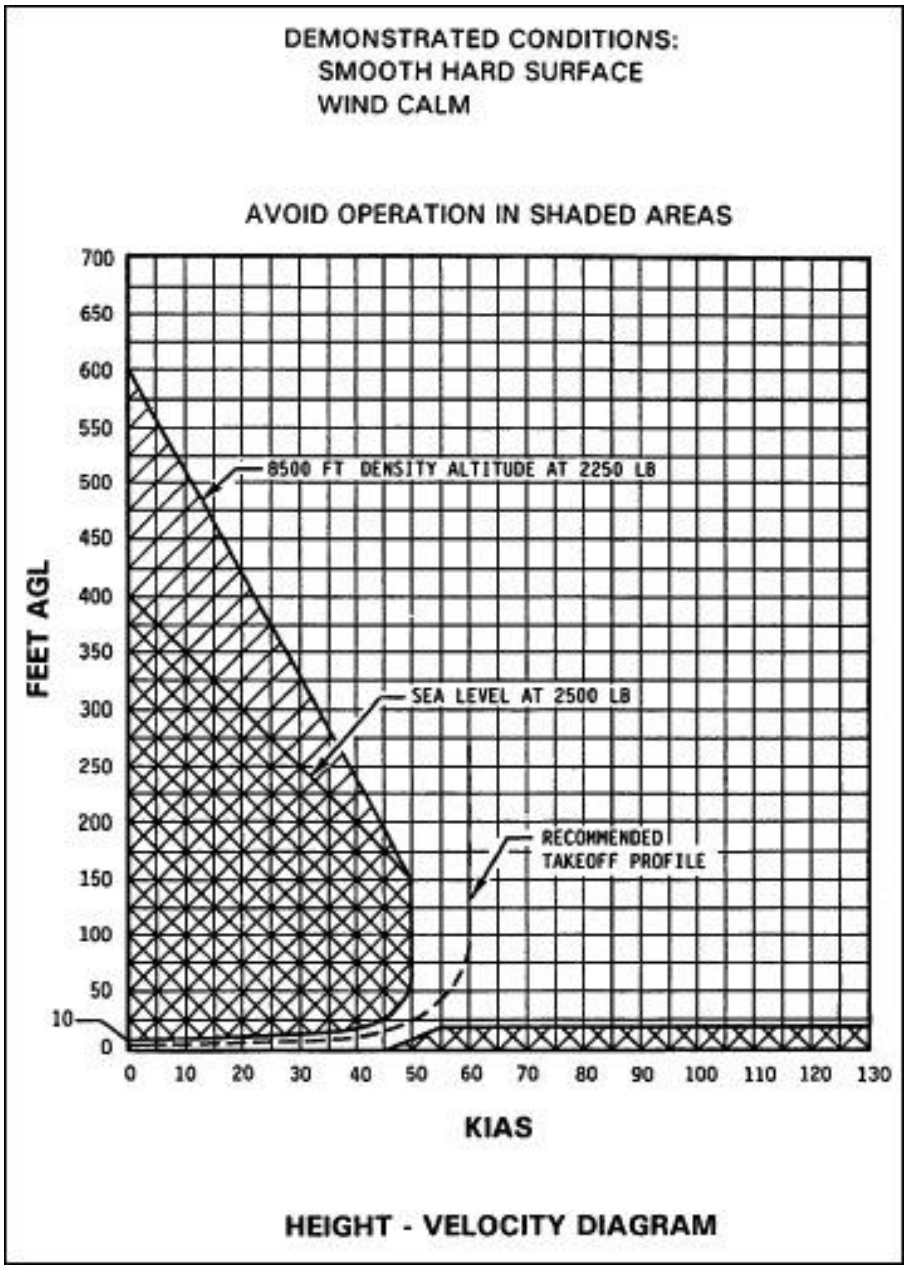
As part of our Student selection process we use an aviation general knowledge test. You will be required to answer questions on helicopter loading, solve navigational problems, interpret graphs, answer questions on familiar texts and show retention of some Civil Aviation Law.

All the information you need will be supplied in the test (except the law section) and you are not expected to have an in-depth understanding of aircraft or CAA law at this stage. We are using aviation related concepts to test your mathematical, general comprehension and knowledge retention abilities.

To assist you in preparing for the selection test we have prepared a short study guide. This guide contains some of the graphs required to answer some questions, the Human Factors Text for which you will be required to answer some questions about, and the Law definitions you are required to learn.

The test contains 20 mixed questions designed to test all the criteria above in an aviation format. There is no time limit on the test, and it is not a pass/fail exercise. It is simply one of the tools we use during the selection process.

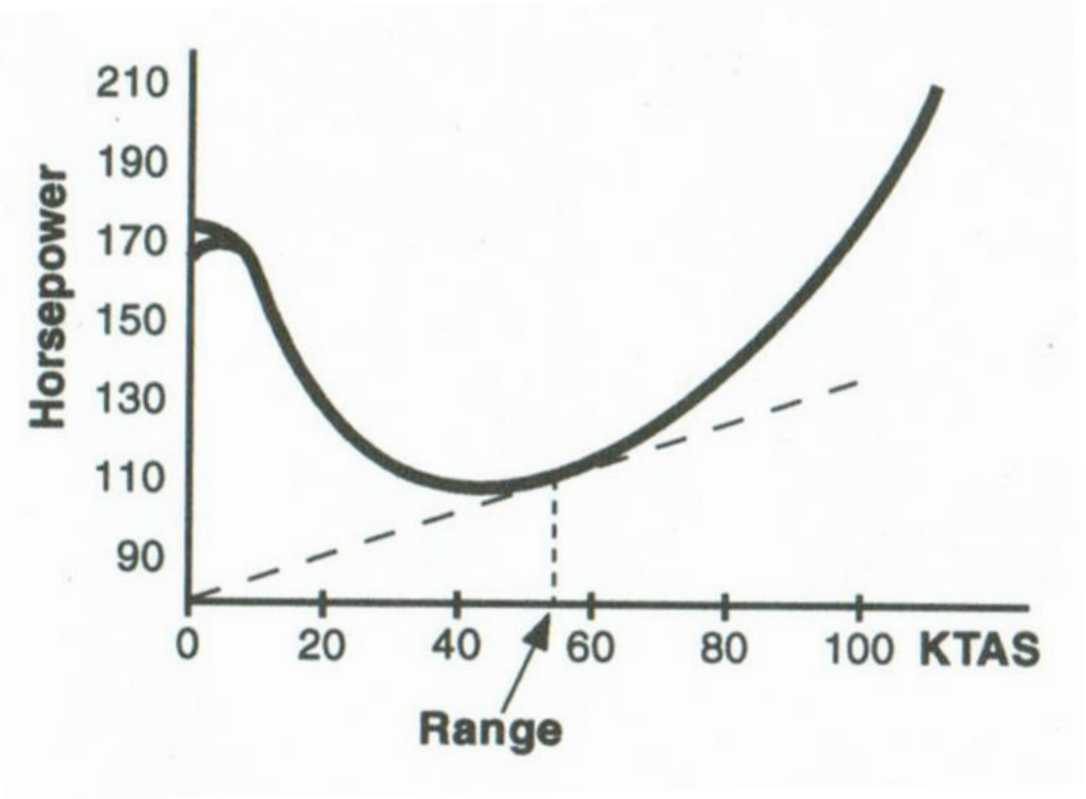
Height Velocity Diagram
(supplied in the test)



The Avoid Curve shows pilots which height / speed combinations are not likely to result in a favorable outcome in the event of an engine failure. Operations within the shaded area should be avoided. You will note that there are 3 shaded areas on this graph. One for Sea Level, one for 8500 ft and a high speed, low height area at the bottom. The different graphs areas are used depending on the configuration (weight) of the helicopter, the height flown, and in the case of the bottom avoid area the speed used.

Example:
Q: You are flying at 250 feet above the coast taking photos of the houses. What is the minimum speed required to remain outside of the avoid area?
A: 30 Knots

Horsepower Required Graph
(Supplied in the test)



The Horsepower required Graph shows pilots the engine horsepower required to maintain level flight at a given speed. Using this Graph allows us to establish airspeeds to fly at minimum power or the speed to achieve maximum range

Example:
Q: Your engine can only produce 150 Horsepower instead of its usual 190 Horsepower. What 2 speeds should the helicopter be flown at to achieve straight and level flight?
A: 20 Knots and 80 Knots

Human Factors Text
(Supplied in the test)

Using the text below you will be required to answer some reading comprehension questions

Human factors and ergonomics (**HF&E**), also known as comfort design, functional design, and user-friendly systems is the practice of designing products, systems or processes to take proper account of the interacting between them and the people that use them.

It is a multidisciplinary field incorporating contributions from psychology, engineering, biomechanics, industrial design, physiology and anthropometry. In essence it is the study of designing equipment and devices that fit the human body and its cognitive abilities. The two terms "human factors" and "ergonomics" are essentially synonymous.

The International Ergonomics Association defines ergonomics or human factors as follows.

Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.

HF&E is employed to fulfill the goals of occupational health and safety and productivity. It is relevant in the design of such things as safe furniture and easy-to-use interfaces to machines and equipment. Proper ergonomic design is necessary to prevent repetitive strain injuries and other musculoskeletal disorders, which can develop over time and can lead to long-term disability.

Human factors and ergonomics is concerned with the "fit" between the user, equipment and their environments. It takes account of the user's capabilities and limitations in seeking to ensure that tasks, functions, information and the environment suit each user.

To assess the fit between a person and the used technology, human factors specialists or ergonomists consider the job (activity) being done and the demands on the user; the equipment used (its size, shape, and how appropriate it is for the task), and the information used (how it is presented, accessed, and changed). Ergonomics draws on many disciplines in its study of humans and their environments, including anthropometry, biomechanics, mechanical engineering, industrial engineering, industrial design, information design, kinesiology, physiology,cognitive psychology and industrial and organizational psychology.

Prior to World War I the focus of aviation psychology was on the aviator himself, but the war shifted the focus onto the aircraft, in particular, the design of controls and displays, the effects of altitude and environmental factors on the pilot. The war saw the emergence of aeromedical research and the need for testing and measurement methods. Studies on driver behaviour started gaining momentum during this

period, as Henry Ford started providing millions of Americans with automobiles. Another major development during this period was the performance of aeromedical research. By the end of World War I, two aeronautical labs were established, one at Brooks Air Force Base, Texas and the other at Wright-Patterson Air Force Base outside of Dayton, Ohio. Many tests were conducted to determine which characteristic differentiated the successful pilots from the unsuccessful ones. During the early 1930s, Edwin Link developed the first flight simulator. The trend continued and more sophisticated simulators and test equipment were developed. Another significant development was in the civilian sector, where the effects of illumination on worker productivity were examined. This led to the identification of the Hawthorne Effect, which suggested that motivational factors could significantly influence human performance.

World War II marked the development of new and complex machines and weaponry, and these made new demands on operators' cognition. It was no longer possible to adopt the Tayloristic principle of matching individuals to preexisting jobs. Now the design of equipment had to take into account human limitations and take advantage of human capabilities. The decision-making, attention, situational awareness and hand-eye coordination of the machine's operator became key in the success or failure of a task. There was a lot of research conducted to determine the human capabilities and limitations that had to be accomplished. A lot of this research took off where the aeromedical research between the wars had left off. An example of this is the study done by Fitts and Jones (1947), who studied the most effective configuration of control knobs to be used in aircraft cockpits.

A lot of this research transcended into other equipment with the aim of making the controls and displays easier for the operators to use. The entry of the terms "human factors" and "ergonomics" into the modern lexicon date from this period. It was observed that fully functional aircraft flown by the best-trained pilots, still crashed. In 1943 Alphonse Chapanis, a lieutenant in the U.S. Army, showed that this so-called "pilot error" could be greatly reduced when more logical and differentiable controls replaced confusing designs in airplane cockpits. After the war, the Army Air Force published 19 volumes summarizing what had been established from research during the war.

In the decades since World War II, HF&E has continued to flourish and diversify. Work by Elias Porter and others within the RAND Corporation after WWII extended the conception of HF&E. "As the thinking progressed, a new concept developed—that it was possible to view an organization such as an air-defense, man-machine system as a single organism and that it was possible to study the behavior of such an organism.

Law Excerpts
(not supplied in the test – you will be required to remember these)

Abbreviations

AGL	Above Ground Level
AIP	Aeronautical Information Publication
AMSL	Above Mean Sea Level
ATC	Air Traffic Control
GPS	Global Positioning Systems
IFR	Instrument Flight Rules
VFR	visual Flight Rules
OGE	Out of Ground Effect

Aerodrome Traffic zone
An airspace of define dimensions established around an aerodrome for the protection of aerodrome traffic.

Baggage
Personal property of passengers or crew to be carried, or intended to be carried, on an aircraft, by agreement with the operator.

Cargo
Any property carried on an aircraft other than mail, stores and baggage.

Ceiling
The height above ground [or water] of the base of the lowest layer of cloud below 20,000ft covering more than half the sky.

Helicopter
A rotorcraft incorporating one or more power driven rotors.

Passenger
Any person to be carried by the aircraft other than a crew member.

Pilot in Command
Means the person responsible for the operation and safety of the aircraft.

CAA Excerpts

61.105 Solo flight requirements

(a) A person who does not hold a current pilot licence issued or validated in accordance with this Part must not fly an aircraft solo unless—

(1) The person is at least 16 years of age; and

(2) the person holds at least a current class 2 medical certificate issued under the Act and is complying with all the conditions, restrictions and endorsements on the medical certificate; and

(3) the person has sufficient ability in reading, speaking, understanding and communicating in the English language to enable them to adequately carry out the responsibilities of a pilot-in-command of an aircraft; and

(4) the flight is authorized by the holder of a current Category A, B, or C flight instructor rating, except for a first solo flight by day or by night which must be authorized by the holder of a Category A or B flight instructor rating; and

(5) Except as provided in paragraph (c), the holder of a current Category A or B flight instructor rating has certified in the person's logbook that they have received instruction and demonstrated competence.

61.203 Eligibility requirements

To be eligible for a commercial pilot licence, a person must—

(1) be at least 18 years of age; and

(2) in the case of an aeroplane and helicopter, hold a current private pilot licence for the appropriate category of aircraft; and

(3) hold a current class 1 medical certificate issued under the Act; and

(4) have minimum general flight time experience as a pilot comprising specific flight experience that is acceptable to the Director for the appropriate category of aircraft