MODIFIED LESSON INSTRUCTIONS AND INSTRUCTIONAL GUIDES – TP 2 OF EO C232.03

A-CR-CCP-802/PG-001

EO C232.03 – IDENTIFY THE CHARACTERISTICS OF HELICOPTER ENGINES

1. **Performance.** Identify the Characteristics of Helicopter Engines.

2. **Conditions**

   a. Given:

      (1) Supervision; and

      (2) Assistance as required.

   b. Denied: N/A.

   c. Environmental: Suitable classroom facilities or training area large enough to accommodate the entire group.

3. **Standard.** The cadet shall identify the characteristics of helicopter engines, to include:

   a. technical development of early helicopter engines;

   b. challenges of rotary-wing flight; and

   c. categories of engines in CF helicopters.

4. **Teaching Points**

TP	Description	Method	Time	Ref
TP1	Have the cadets make and fly a paper helicopter.	In-Class Activity	10 min	C3-056

5. **Time**

   a. Introduction/Conclusion: 5 min

   b. In-class Activity: 10 min

   c. Total: 15 min

6. **Substantiation.** An in-class activity was chosen for TP1 as it is an interactive way to provoke thought and stimulate interest among cadets.

7. **References.** C3-056 US Centennial of Flight Commission. *Helicopters*. (2003). Retrieved 12 October 2006, from http://www.centennialofflight.gov/essay/Dictionary/helicopter/DI27.htm.

8. **Training Aids**

   a. Presentation aids (e.g. whiteboard/flipchart/OHP/multimedia projector) appropriate for the classroom/training area;

   b. Completed paper helicopter for demonstration purposes;

9. **Learning Aids**

   a. Directions to construct and fold a paper helicopter (A-CR-CCP-802/PF-001, Annex D); and

   b. Materials required to construct a paper helicopter.

10. **Test Details.** N/A.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL TWO

INSTRUCTIONAL GUIDE

SECTION 7

EO C232.03 – IDENTIFY THE CHARACTERISTICS OF HELICOPTER ENGINES

Total Time: 15 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-802/PG-001, Chapter 4. Specific uses for said resources are identified throughout the Instructional Guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Photocopy handouts of the paper helicopter construction templates and instructions shown in Figures 12T-2 and 12T-3 for each cadet.

Gather materials needed for the construction of the paper helicopter.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

An in-class activity was chosen for TP1 as it is an interactive way to provoke thought and stimulate an interest among cadets.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall identify the characteristics of helicopter engines.

IMPORTANCE

It is important for cadets to know about the characteristics of helicopter engines because helicopters form a significant part of the Canadian Forces' lift, tactical manoeuvring and Search and Rescue capabilities.

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Teaching Point 1 **Make and Fly a Paper Helicopter**

Time: 10 min Method: In-Class Activity

When a helicopter engine loses power under flight, the pilot can auto-rotate the aircraft to the ground.

Auto-rotation is the state of flight where the main rotor is being turned by the action of the wind passing up through the rotor disc instead of being turned by engine power.

ACTIVITY

Time: 15 min

OBJECTIVE

The objective of this activity is to have the cadets fold paper helicopters and then auto-rotate them to the ground to demonstrate that loss of engine power does not necessarily lead to a crash.

RESOURCES

Instructions and the template for folding a paper helicopter shown in Figures 12T-2 and 12T-3.

ACTIVITY LAYOUT

N/A.

ACTIVITY INSTRUCTIONS

1. Distribute the instructions and template for paper helicopter construction to each cadet.
2. Have the cadets cut out the paper helicopter and then fold it into shape.
3. Have the cadets stand and drop the helicopters.



Give the paper helicopter a spin before releasing it. This will help establish effective rotor action because, as stated by Newton's first law of motion, every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in the activity will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the activity will serve as the confirmation of this lesson.

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CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

Rotary wing aircraft present special challenges for aviation but they offer special capabilities as well, which enable them to make important contributions to the Canadian Forces' lift, tactical manoeuvring and Search and Rescue operations.

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

C3-056 US Centennial of Flight Commission. *Helicopters. (2003).* Retrieved 12 October 2006, from http://www.centennialofflight.gov/essay/Dictionary/helicopter/DI27.htm.

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A-CR-CCP-802/PF-001
Chapter 12, Annex T

INSTRUCTIONS AND TEMPLATE FOR FOLDING A PAPER HELICOPTER

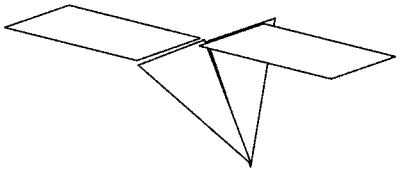
MAKE A HELICOPTER

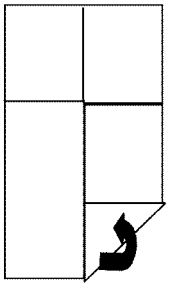
AIM: TO MAKE A TWIRLING HELICOPTER.

YOU WILL NEED: A HELICOPTER SHEET, SCISSORS, COLOURING PENCILS, PAPER CLIPS FOR WEIGHTS

WHAT TO DO:

1. COLOUR THE HELICOPTER SHEET.
2. CUT ALONG THE DOTTED LINES.
3. FOLD CORNERS A AND B TO MEET THE CENTRE LINE
4. FOLD E AND F IN THE OPPOSITE DIRECTIONS.





5. TEST YOUR HELICOPTER BY DROPPING IT FROM A HIGH PLACE (E.G. STANDING ON A RAISED PLATFORM).
6. DISCUSS WHAT HAPPENS.

THINGS TO TRY

DOES THE WAY THE FLAPS ARE BENT MAKE A DIFFERENCE TO THE HELICOPTER'S FALL?

ADD EXTRA WEIGHT TO YOUR HELICOPTER. DOES THIS MAKE A DIFFERENCE.

MAKE A NEW HELICOPTER WITH LONGER BLADES. HOW DOES IT WORK?

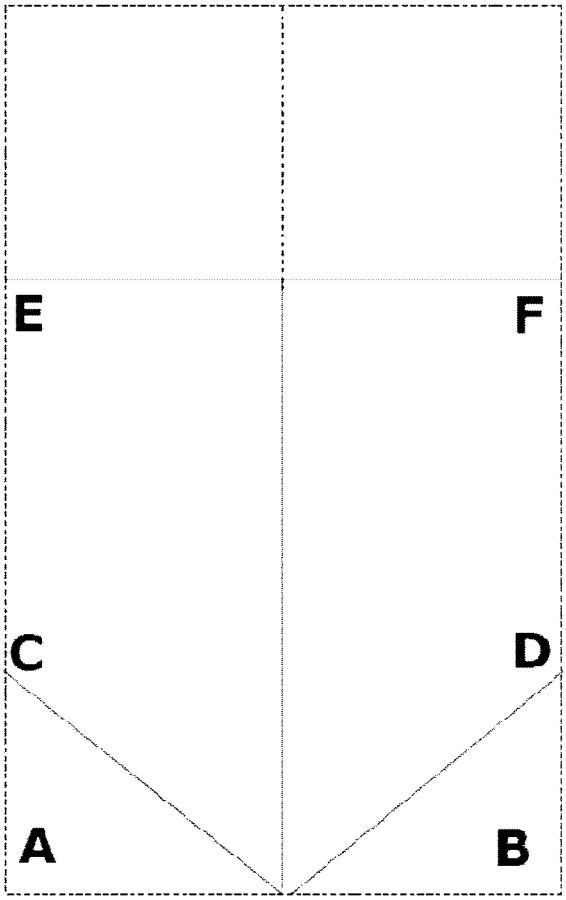
"Force and Movement" Making a Helicopter. Retrieved 11 October 2006, from http://www.teacherresourcesgalore.com/physics_files/helicopter.doc

Figure 12T-2 Instructions for Paper Helicopter Construction

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Chapter 12, Annex T

PAPER HELICOPTER TEMPLATE



"Force and Movement: Making a Helicopter". Retrieved 11 October 2006, from http://www.teacherresourcesgalore.com/physics_files/helicopter.doc

Figure 12T-3 Template for Paper Helicopter Construction

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