Unit Assessment Plan
Grade 6
Topic A
Air and Aerodynamics

~

Carrie Harbidge

Cardston Elementary

March 16, 2011 to April 20, 2011

ED 3604

Unit Assessment Plan: Grade 6 Topic A - Air and Aerodynamics
Dates: March 16, 2011 to April 20, 2011

Content	**Evidence of Learning Taxonomic Level**		
	Knowledge and Comprehension	**Application, Analysis, Synthesis and Evaluation**	
K-1 Provide evidence that air takes up space and exerts pressure.		Assignment #1: Proof of Air (10%)	
K-2 Provide evidence that air is a fluid and is capable of being compressed.		Assignment #2: It's not Rocket Science...oh wait it is! (10%)	
K-3 Describe how air movement results in lift (Bernoulli's principle). K-4 Recognize that for things to fly, they must have lift to overcome gravity.		Webquest: Away we go! (15%)	
K-4 Recognize that for things to fly, they must have lift to overcome gravity. K-7 Describe how streamlining reduces drag & predict the effects of specific designs.		Assignment #3: Flight Mission (10%)	Performance Task: It's a bird, It's a plane! (25%)
K-5 Identify adaptations that enable birds & insects to fly. K-6 Describe the means of propulsion for flying animals & aircraft.			
K-8 Recognize that air is composed of different gases.	Unit Test (20%)	Assignment #4: Burn Baby Burn O2 Inferno! (10%)	
Total= 100%	**20%**	**55%**	**25%**

Background of Unit Test

Understandings (Knowledge)

General Learner Expectations

6-5 Describe Properties of air and the interactions of the air with objects in flight.

Specific Learner Expectations

Students will:

K-1 Provide evidence that air takes up space and exerts pressure, and identify examples of these properties in everyday applications.

K-2 Provide evidence that air is a fluid and is capable of being compressed, and identify examples of these properties in everyday applications.

K-3 Describe and demonstrate instances in which air movement across a surface results in lift (Bernoulli's principle).

K-4 Recognize that in order for devices or living things to fly, they must have sufficient lift to overcome the downward force of gravity.

K-5 Identify adaptations that enable birds and insects to fly.

K-6 Describe the means of propulsion for flying animals and for aircraft.

K-7 Recognize that streamlining reduces drag, and predict the effects of specific design changes on the drag of a model aircraft or aircraft components.

K-8 Recognize that air is composed of different gases, and identify evidence for different gases.

Unit Test Rationale

This test was designed to evaluate the student's ability to demonstrate their knowledge on the Unit Air and Aerodynamics. The test questions have been designed to address Bloom's Taxonomic levels of knowledge, comprehension, application, and analysis. Some of the test questions have been designed to evaluate the student's understanding of experiments conducted in class, and other questions have been designed in order to make the student think about what they learned in class and apply it to a different setting or situation. The test length and vocabulary was designed to address all of the knowledge specific learning outcomes while not overwhelming the grade 6 student. This test will be used as a summative assessment to show evidence that the students have an understanding of the concepts learned in this unit.

Please Note: At this time I am unaware of any modifications required by any of my students in my classroom.

Unit Test Blueprint: Grade 6 Science
Topic A: Air and Aerodynamics
Weighting: 20 % Lenght: 27 questions Time Limit: 50 minutes

Taxonomic Level			Content SLOs	Question Type				
K	C	A/A		T/F	MC	M	SA	Total
12(1), 14(1)	11(1), 23(1), 24(1), 25(1)	8(1), 21(1)	**K1 & K2** Properties of Air • Pressure • Weight • Space • Fluid • Compressible	21(1)	8(1),11(1), 12(1),14(1)	23(1), 24(1), 25(1)		8
5(1),7(1), 9(1), 18(1), 19(1)	1(1),2(1), 10(1), 22(1)	27(5)	**K3, K4, K6, & K7** Bernoulli's Principle, Lift, Gravity, Drag, Propulsion, & Streamlining	18(1), 19(1)	1(1),2(1), 5(1),7(1), 9(1),10(1)	22(1)	27(5)	14
4(1), 13(1), 17(1)	16(1)	26(5)	**K6 & K5** Bird Adaptions	17(1)	4(1),13(1), 16(1)		26(5)	5
15(1)	3(1), 20(1)	6(1)	**K8** Composition of Air	20(1)	3(1),6(1) 15(1)			4
11(11)	11(11)	5(13)	Total # of questions (marks)	5(5)	16(14)	4(4)	2(10)	35

Legend:

K= Knowledge	T/F= True, False	SA= Short Answer
C= Comprehension	M= Matching	
A/A= Application, Analysis	MC= Multiple Choice	

Topic A: Air and Aerodynamics
Unit Exam
April 20, 2011

Name:_____

Directions:

You will have 50 minutes to complete this exam.
Please do NOT write on the exam.
Answer all multiple choice questions on the scantron sheet provided.

Please use a pencil & fully erase any changes.
Each question is worth 1 mark unless otherwise stated.

The test is made of of 27 questions.
16 multiple choice questions worth 1 mark each,
5 true false questions worth 1 mark each,
4 matching questions worth 1 mark each &
2 short answer questions worth 5 marks each.

GOOD LUCK!

/35 marks

Part A: Multiple Choice - Please write your responses on the Scantron form provided with your test.

1. You and your friend are having a race to see who's paper will fall to the ground the fastest. You crumple up your paper into a ball and your friend leaves their paper as is. Your balled up piece of paper reaches the ground first because
   a. Your friend's paper weighed more than yours.
   b. Your friend's paper was smaller than yours.
   c. Your friend's paper had more drag than yours.
   d. Your friend's paper had less drag than yours.

2. You are explaining to a friend the reason why penguins can't fly. You tell your friend that the main reason a penguin can't fly is because
   a. they cannot tuck in their legs enough to decrease drag.
   b. their wings do not develop enough lift to overcome gravity.
   c. their bodies are not streamlined enough to overcome air resistance.
   d. they cannot generate enough speed to overcome gravity.

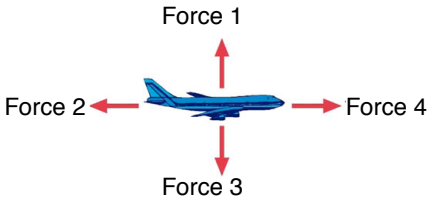
3. You ran out the door this morning without finishing your breakfast and left a half eaten banana on the counter. When you get home from school you notice that the banana has turned brown. You remember from science class the reason that this happened is because
   a. carbon dioxide in the air has causes the banana to oxidize.
   b. oxygen in the air causes the banana to oxidize.
   c. nitrogen in the air causes the banana to oxidize.
   d. argon in the air causes the banana to oxidize.

4. While on a walk, Judy notices a flock of geese flying overhead. She remembered that in order for a bird or a plane to fly,
   a. thrust must be greater than drag.
   b. lift must be less than gravity.
   c. drag must equal lift.
   d. gravity must equal thrust.

5. Both a bird and planes have streamlined designs in order to
   a. increase drag.
   b. reduce drag.
   c. decrease gravitational pull.
   d. decrease thrust.

6. Jimmy accidentally left his book on top of his ant farm blocking the all of the air holes when he went outside for recess. Which of the following statements describes what will happen to the air inside the ant farm as a result that the air holes have been covered?
   a. The oxygen concentration and carbon dioxide concentration will both increase.
   b. The oxygen concentration and the carbon dioxide concentration will both decrease.
   c. The oxygen concentration will decrease and the carbon dioxide concentration will increase.
   d. The oxygen concentration will increase and the carbon dioxide concentration will decrease.

7. According to the picture below, identify the forces that are acting on the plane. Which of the flowing answers are the correct forces acting on the plane?



a. Force 1- Thrust	Force 2- Gravity	Force 3- Lift	Force 4- Drag
b. Force 1- Lift	Force 2- Thrust	Force 3- Gravity	Force 4- Drag
c. Force 1- Drag	Force 2- Lift	Force 3- Thrust	Force 4- Gravity
d. Force 1- Lift	Force 2- Drag	Force 3- Gravity	Force 4- Thrust

8. As you drink from a juice box through a straw, the juice moves up the straw because the air pressure is
   a. lower inside the straw than inside the juice box.
   b. low inside both the straw and the juice box.
   c. high inside both the straw and the juice box.
   d. higher inside the straw than inside the juice box.

9. As seen in the image to the right, when Sam blows over the strip of paper, the paper lifts because the fast moving air creates an area of
   a. high pressure on the part of the paper that is furthest from Sam's mouth
   b. high pressure on the part of the paper that is closest to Sam's mouth.
   c. low pressure under the paper strip.
   d. low pressure on top of the paper strip.

10. You are riding in a hot air balloon over Cardston Elementary school. You recall that in school you learned that the reason why the hot air balloon is able to fly is because
    a. air inside the balloon is more dense than the air outside the balloon.
    b. air inside the balloon is less dense than the air outside the balloon.
    c. the air inside the balloon takes up space and can be compressed.
    d. the lift on the balloon is less than the force of gravity.

11. You are flying in a plane to Vancouver. As the plane takes off you remember Mr. O'neil (our guest speaker the pilot) explaining that lift occurs when the
    a. force of gravity is greater than the force thrust.
    b. force of drag is equal to the force of thrust.
    c. air above the wing is moving at the same speed as the air below the wing.
    d. air above the wing is moving faster than the air below the wing.

12. The experiment in the picture to the right shows a piece of paper wedged into the bottom of a glass, that is held upside down in a tub of water. When you pull the glass out of the water you notice that the paper is not wet. This is because
    a. air is lighter than water.
    b. water is heavier than air.
    c. air in the jar takes up space.
    d. gravity is pulling down on the water.

13. Two adaptions that allow birds to fly are
    a. big breast bones and hollow bones.
    b. hollow bones and pointed beaks.
    c. big breast bones and webbed feet.
    d. feathers and pointed beaks.

14. As hot air cools down it becomes heavier and more dense because
    a. air is composed of different gases.
    b. it becomes more buoyant.
    c. the molecules spread out.
    d. the molecules pack closer together.

15. 80% of air on earth is composed of_____.
    a. nitrogen.
    b. helium.
    c. oxygen.
    d. carbon dioxide.

16. Planes have been adapted from many of the features found in birds. Which of the following in NOT one of those adaptations?
    a. Made of strong, lightweight materials.
    b. Radar to help with navigation.
    c. Has long wings and tails.
    d. Has landing gear that folds up during flight.

Part B: True or False - Please write your responses on the Scantron form provided with your test. If the answer is true mark a, if the answer is false mark b.

17. Bird's wings are made of dense heavy material.
    a. True
    b. False

18. The larger the parachute the more the drag.
    a. True
    b. False

19. Blowing up a balloon demonstrates Bernoulli's Principle.
    a. True
    b. False

20. If a glass jar was placed over top of a burning candle the candle would burn out in a few seconds because the combustion (burning) of the flame has used up all of the oxygen in the bottle.
    a. True
    b. False

21. If there were no atmosphere, all objects that are dropped at the same height would hit the ground at the same time.
    a. True
    b. False

Part C: Matching Questions - Please write your responses for the following 4 matching questions on the Scantron form provided with your test. Below is a description of some of the experiments we did in class. Match up each experiment with the scientific idea that it proves.
***Please note that there are more scientific ideas then there are experiments, so choose wisely!**

Experiment	**Scientific Idea**
22. Place a piece of paper under your lip and blow (the piece of paper lifts).	a. Air has weight
	b. Bernoulli's Principle
23. Place 2 balloons on either end of a meter stick. Pop one balloon (the side of the stick with the inflated balloon rises).	c. Air takes up space
	d. Air can be compressed
24. Place a piece of cardboard on top of a full glass of water. Holding the glass and the cardboard quickly flip the glass upside-down and slowly let go of the cardboard (none of the water escapes).	e. Air exerts a tremendous amount of pressure
25. Place a medicine dropper that is half full of water in a 2 liter bottle of water. Apply pressure to the bottle (the medicine dropper sinks).	

Part D Short Answer Questions - Please answer questions on the answer sheet provided with your test. Each question is worth 5 marks.

26. You are hiking in Waterton Lakes National Park and you see birds soaring overhead. Give **2** examples of adaptations that birds have acquired **and** explain how these adaptations have enabled the bird to fly (5 Marks).

27. Your friend Judy asks you to explain how come planes can fly? Describe using Bernoulli's Principal how heavy objects, like a plane are able to fly. Make sure to include the following words: high pressure, low pressure, and lift (5 Marks).

Air and Aerodynamics Unit Test - Answer Key

1. c
2. b
3. b
4. a
5. b
6. c
7. d
8. a
9. d
10. b
11. d
12. c
13. a
14. d
15. a
16. b
17. b
18. a
19. b
20. a
21. a
22. b
23. a
24. e
25. d
26. Short Answer: Example answer:

- A bird's skeletal system is designed so that it can easily fly through the air. The shoulder joints are designed so that the inner wings are held at the proper angle to obtain the greatest lift.
- Birds wings are airfoils that create lift by altering the air current that passes over them. As the air hits the wing the air speeds up on the upper curved part of the wing creating lower air pressure above the wing and higher air pressure below the wing, and thus creates lift.

Question 26 Air and Aerodynamics Unit Test Rubric

Standard Criteria	5 Excellent	4 Good	3 Sufficient	2 Weak	1 Poor	0 Insufficient/ Blank *
K-5 Identifies Adaptations for birds that enable them to fly	Provides 2 excellent examples of bird adaptations with strong supporting evidence of how these adaptations will allow the bird to fly.	Provides 2 excellent examples of bird adaptation with some supporting evidence of how these adaptations will allow the bird to fly.	Provides 2 examples of bird adaptation with limited supporting evidence of how these adaptations will allow the bird to fly.	Provides a weak example of bird adaptation with limited supporting evidence of how this adaptation will allow the bird to fly.	Provides a weak example of bird adaptation with no supporting evidence of how this adaptation will allow the bird to fly.	*No score is awarded because these is insufficient evidence of student performance based on the requirements.

27. Short Answer: Example answer:

- For a plane to fly the wing needs to be shaped like an airfoil. Moving air across the airfoil pushes the air over the wing faster than under the wing. This creates low pressure over the wing and high pressure under the wing causing the wing to lift the plane. The weight of the plane determines how much lift is needed. Lift has to be greater than the weight of the plane (or gravity) in order to fly.

Question 27 Air and Aerodynamics Unit Test: Rubric

Standard Criteria	5 Excellent	4 Good	3 Sufficient	2 Weak	1 Poor	0 Insufficient/ Blank *
K-3,4,6,&7 Bernoulli's Principle, Lift, Gravity, Drag, & Propulsion.	Gives an excellent explanation of Bernoulli's Principle. Correctly uses all of the terms (high pressure, low pressure, & lift).	Gives a good explanation of Bernoulli's Principle. Correctly uses at least 2 of the terms (high pressure, low pressure, & lift).	Gives an adequate explanation of Bernoulli's Principle. Correctly and uses at least 1 of the terms (high pressure, low pressure, & lift).	Gives a week explanation of Bernoulli's Principle. Inaccurately uses the terms (high pressure, low pressure, & lift).	Gives a weak explanation of Bernoulli's Principle and does not address any of the terms (high pressure, low pressure, & lift).	*No score is awarded because these is insufficient evidence of student performance based on the requirements.

Resources:

Alberta Education. (2009). Released 2008 Achievement Test Grade 6 Science. Alberta Education.

Campbell, S., Gooley, D., Herridge, D., Kydd, G., Maitson, S., Moore, N., Williams, B., and Wortzman, R. (1993). Explorations in Science. Addison-Wesley Publishers Limited, Don Mills, Ontario, Canada.

Cardston Elementary School. (Unknown). Flight and Aerodynamics Unit Exam. Cardston Elementary School.

Cooke, D., Herrin, B., Purkis, B., Roitberg, C., Stief, V., Williams, P. (1996). Innovations in Science, Process and Inquiry. Harcourt Brace, Toronto, Ontario, Canada.

Cross, G., Fazio, X., Kelly, D., Lake, J., MacDonald, D., Martin, S., Rosborough, K., Stewart, W., Veitch, B., Wall, B., Wilson, J. (2000). The Sky's the Limit. Scholastic Canada Ltd. Markam, Ontario, Canada.

Edmonton Public Schools. (1996). Topic A: Air and Aerodynamics Grade 6. Edmonton Public Schools.

Holy Redeemer. (2010) Lift and Bernoulli's Principle. Retrieved from http://www.k12.nf.ca/holyredeemer/grassroots/block1/bern2.htm

Nilsson, C., Chiswell, L, Goodyear, J. (2000). Science & Technology Activities Resource: Matter and Materials, Air and Flight. GTK Press, Toronto, Ontario, Canada.

Rose, D. Up, up and away: an intergrate unit for flight, air and aerodynamics grade 6. Edmonton Regional Consortium, University of Alberta, Edmonton, Alberta.

The Ohio State University (2002). Wonders of our world. Retrieved from http://wow.osu.edu/experiments/gases/tissue.html

US Centennial of Flight Commission. (2011). Four Forces of Flight. Retrieved at http://www.centennialofflight.gov/essay/Dictionary/four_forces/DI24.htm