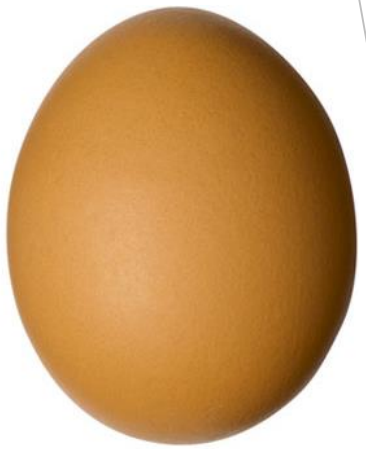
Agricultural Science
Forms 4 & 5



CSEC Agricultural Science Syllabus

Section C: Animal Production

4. Animal genetics, breeding and reproduction

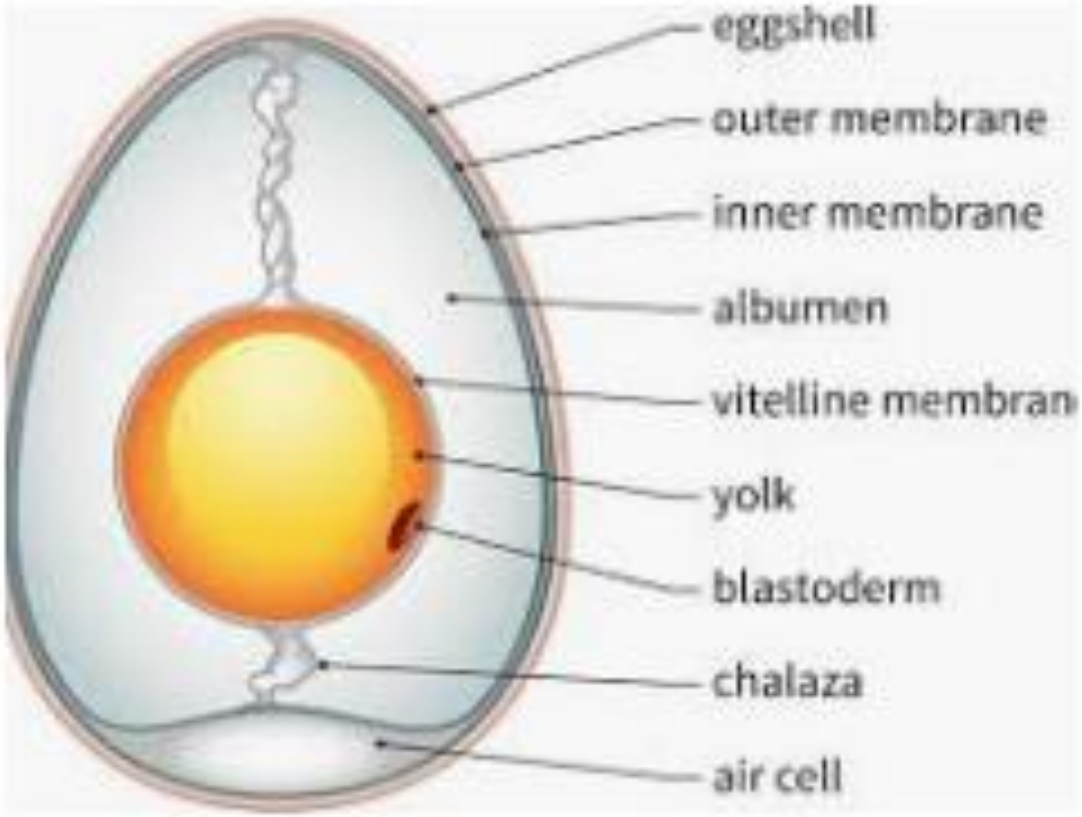
Specific Objectives

- **4.8 Relate the structure of the parts of an egg to its function**
- **4.9 Describe the process of incubation in poultry**

Compiled by Ms K Belgrove

Marabella North Secondary School

Parts of a hen's egg



- The air cell is also called the air space
- The blastoderm is also called the germinal disc and will develop into an embryo

Parts of the egg and their functions

Part of the egg	Function
Shell membranes	• Protect the inner parts of the egg
Albumin	• Contains proteins, minerals and some carbohydrates and provides the developing embryo with some food and water source • Protects yolk from mechanical injury • Protects embryo from bacterial infection
Yolk	• Contains fats and provides food for developing embryo
Chalazae	• Hold the yolk in place
Geminal disc / blastoderm	• If the egg is fertilized will develop into an embryo
Vitelline membrane	• Surrounds and supports the yolk
Air space	• For exchange of gases between the egg and the outside environment

Incubation

- Incubation is the process of providing the conditions needed for chicks hatch from fertile eggs
- Fertilization is the process where the sperm (male sex cell) fuses with the ovum (female sex cell) to form a zygote (fertilized egg)
- In hens, fertilization takes place in the INFUNDIBULUM
- Fertile eggs can be brooded naturally or artificially
- The incubation process is 21 days (*FOR chickens*)

Types of incubation

- Naturally using a broody hen

- Artificially using an incubator

Conditions necessary for Incubation

1. Temperature (normal body temperature of the hen 39.5^0C)
   - Encourages cell division and development of embryo
2. Humidity (moisture)
   - Prevents the egg from drying out
3. Fresh air
   - Allows exchange of oxygen into and carbon dioxide out of the eggs
4. Turning of eggs
   - Prevents yolk from sticking to shell

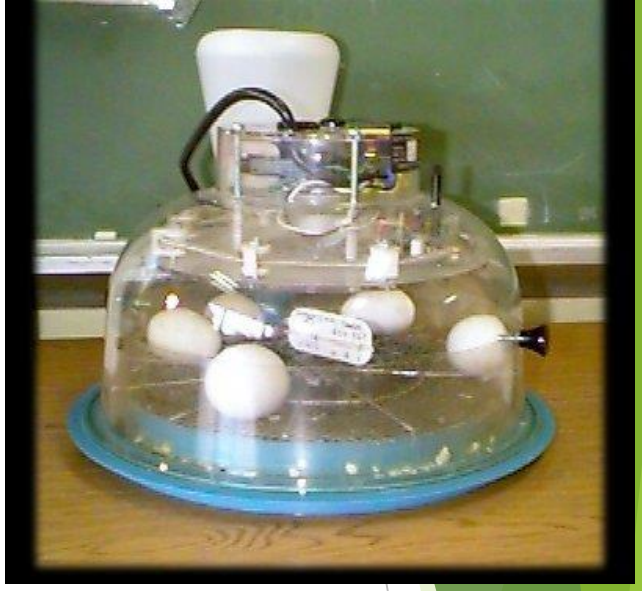
How does the broody hen incubate the egg naturally?

The hen is able to provide the correct:

- Temperature
  - Blood vessels in breast of hen gives heat
- Humidity
  - Builds the nest is in a cool dry area
- Fresh air
  - Obtained from the surroundings (environment around) of nest
- Turning
  - Done by hen using her beak and body

Artificial Incubators

Artificial Incubators
Simulate the broody hen to incubate the eggs.
They are capable of incubating large quantities of eggs on a commercial basis



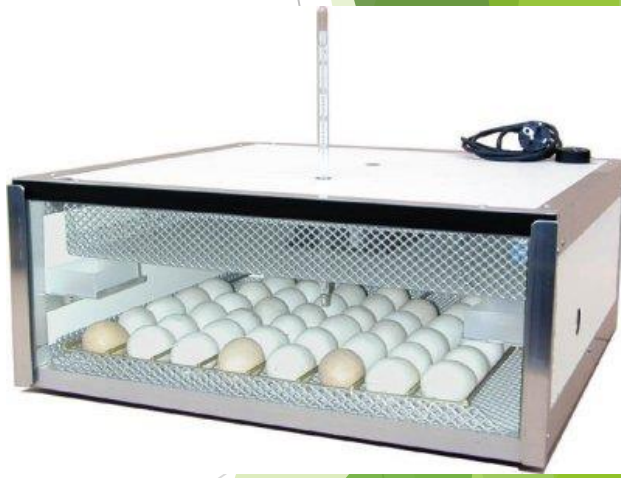
Incubator for home use

Incubator for commercial use

How does an artificial incubator (box structure) incubate the fertile egg?

The artificial incubator provides the correct:

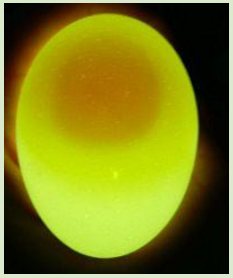
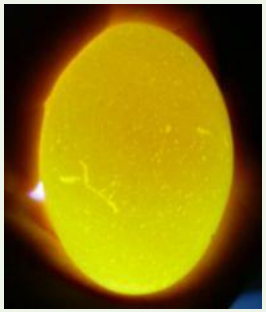
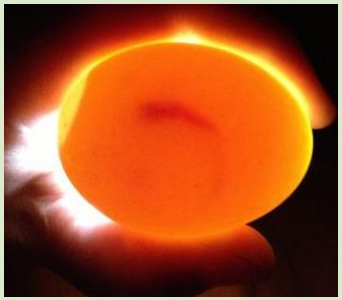
- Temperature
  - Controlled by a thermostat and powered by electricity or gas
  - Maintained at 38.5^{0}C in for the first 2 weeks (14 days); and then increased to 39.5^{0}C in week 3 for 7 days
- Humidity
  - 60% Relative Humidity
  - Water in box to control moisture
- Ventilation (good air circulation)
  - Openings to allow air to circulate
  - Fans within the incubator force the air through the system
- Turning
  - Done manually in box-type machine or done automatically in other machines



Candling of eggs

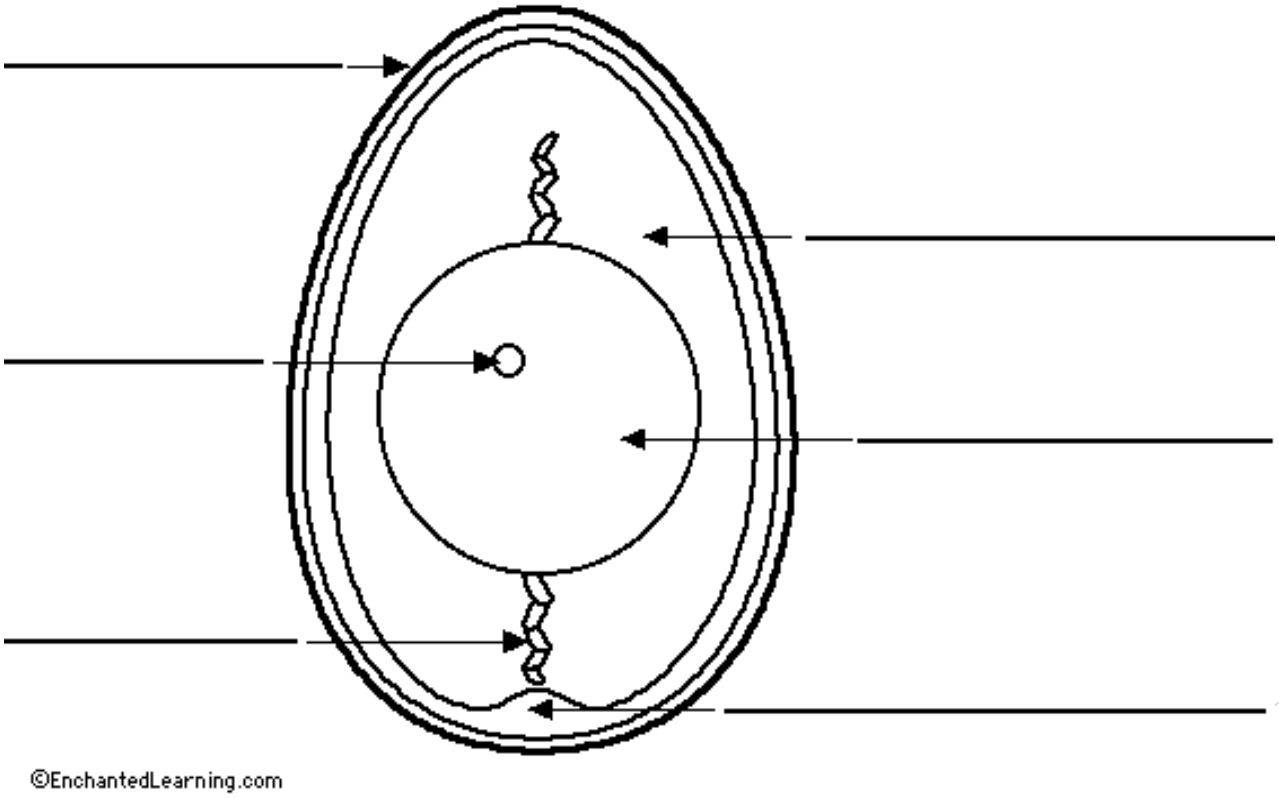
Candling is process by which eggs are tested for fertility. It is

- Determines if an egg is fertile or infertile
- Done by 10th day of incubation
- Steps in candling an egg
  - Hold egg against the light of the candler
  - Observe
    - Dark spot seen = fertile egg
    - Clear egg = infertile egg
    - Red blood ring in yolk = dead embryo

Observation with Candler	Inference
	FERTILE EGG
	INFERTILE EGG Called “clears”
	DEAD EMBRYO

Review: Parts of a hen's egg

- Use your textbook or the internet to label the diagram below



Review: Incubation of eggs

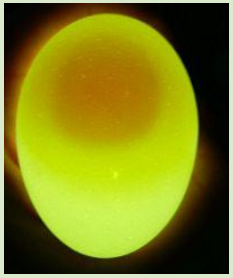
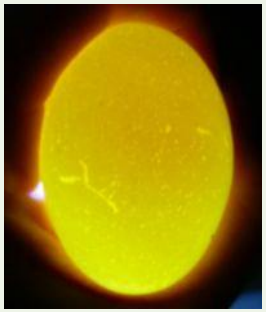
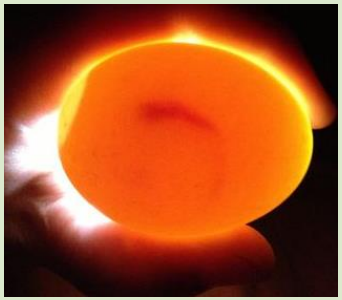
1. How is natural incubation different from artificial incubation?
2. Why are hatching eggs candled?
3. What would cause a candled egg to be rejected? Explain your answer
4. Complete the table below:

Word	Meaning
Incubation	
Candler	
Incubator	
Fertilization	
Zygote	

Review: Incubation of eggs

5. Complete the table below:

Part of the egg	Function
Shell membranes	•
	• Protects yolk from mechanical injury • Protects embryo from bacterial infection
	• Contains fats and provides food for developing embryo
Chalazae	•
……../ blastoderm	• If the egg is fertilized will develop into an embryo
Vitelline membrane	•
	• For exchange of gases between the egg and the outside environment

Observation with Candler	Inference
	
	
	

The Incubation Handout