Humidity during egg storage is critical for maintaining optimal hatchability of the stored eggs. In a hatching cooler the wet bulb temperature is 68°F and the dry bulb temperature is 86°F. (Using this scenario answer questions 2 and 3)

1. What is the relative humidity in the egg storage room?
   (68°F – 32)*(5/9) = 20°C wet bulb
   (86°F – 32)*(5/9) = 30°C dry bulb
   Refer to Psychrometeric chart – 40% relative humidity in the hatching cooler
   a. 15%
   b. 20%
   c. 30%
   d. 40%
   e. 50%

2. Are the eggs in this storage room being maintained at the most optimum relative humidity?
   No – 75% - 85% is ideal (C-121)
   a. Yes
   b. No
   c. Relative humidity is not a consideration for egg storage

3. During a period of hatching egg surplus, eggs were commonly being stored for 8 days prior to being set. Typically hatchability from these breeder flocks is 85.5%, after 8 days storage what would the anticipated hatchability be for these flocks?
   C-122 top – 3 days storage beyond 5 days.
   3 days * 0.5% per day = 1.5% decrease in hatchability
   3 days * 1% per day = 3% decrease in hatchability
   a. No change in hatchability anticipated
   b. Up to 1% decrease in hatchability
   c. 1.5 – 3% decrease in hatchability
   d. 2.5 – 4% decrease in hatchability
   e. None of the above

4. If each egg in a 150,000 egg incubator is exothermic at a rate of approximately 0.001°F, does heat need to be added to or exhausted from the incubator, and approximately how many degrees? (Page C-125 ideal hatcher temperature 98.8)
   150,000 eggs * 0.001°F/chick = 150°F degrees of heat generated.
   150 °F – 98.8 °F ideal temperature = 51.2 °F needs exhausted
   a. Heat should be added, 51.2°F
   b. Heat should be exhausted, 51.2°F
   c. Heat should be added, 53 °F
   d. Heat should be exhausted, 53 °F
   e. Heat should be added 45°F

Use the following scenario to answer questions 6-11.

For a 100,000 eggs incubator the following data was collected:

Average egg weight before incubation	60 g
Average egg weight at transfer d 18	55 g
Day 10 Eggs Candled	
# of eggs candled	500
Visible dead embryos (from breakout procedures)	17
Visible bloods vessel development (from breakout procedures)	25
Clear eggs (eggs showing no sign fertility)	28
Total number of eggs hatched from incubator	80,000

Based on these data calculate the following:

5. Percent Fertility for this flock?
   (500-28)/500*100 = 94.4%
   a. 90.3%
   b. 91.6%
   c. 94.4%
   d. 96%
   e. 98.1%

6. Percent Early Dead?
   (17+25)/500 = 8.4%
   a. 3.4%
   b. 5%
   c. 6.4%
   d. 8.4%
   e. Not enough information provided

7. Hatchability of all eggs?
   80,000/100,000*100 = 80%
   a. 80%
   b. 82.2%
   c. 84.7%
   d. 85.5%
   e. None of the above

8. Hatchability of fertile eggs?

100000 eggs in incubator*94.4% estimated fertility = 94400 fertile eggs in incubator.
80,000 hatched/94400 fertile eggs = 84.7% hatch of fertile

a. 78.5%
b. 80%
c. 81.4%
d. 83.1%
e. 84.7%

9. What is the percent moisture loss at d 18 for the eggs in this incubator? Is this more than or less than ideal for best hatchability?

   (60-55)/60 = 8.3% moisture loss. Less than ideal

   a. 7.5%, more than ideal
   b. 8.3%, more than ideal
   c. 8.3%, less than ideal
   d. 20.5% less than ideal
   e. 20.5% more than ideal

10. Air supply is important for removing CO2 and excess heat from the incubator. For this incubator, calculate the ideal air supply. (C-123)

    100,000 eggs * 5 cfm/1,000 eggs = 500 cfm

    a. 150 cfm
    b. 200 cfm
    c. 250 cfm
    d. 400 cfm
    e. 500 cfm

11. Four day old eggs for 32-week-old chicken breeders normally require 21 days and six hours to incubate (510 hours). How much time (hours) must be added to incubation time for 8-day-old eggs from a 55 week old breeder flock, with an average egg weight of 2.5 ounces?

    C-122

    2.5 – 2.1 = 0.4*0.5 hour/0.1 ounce = 2 hours for egg size adjustment

    8 days – 6 days = 2 days additional storage * 1hour/day = 2 hours extended storage

    a. 4 hours
    b. 6 hours
    c. 8 hours
    d. No additional storage time needed
    e. None of the above

12. Positive and negative ventilation are used for controlling airflow in the hatchery and preventing contamination of clean rooms. In what rooms of the hatchery would positive airflow be utilized? (C-128, and powerpoint)
    a. Egg storage
    b. Incubators
    c. Hatchers
    d. Chick processing
    e. Both a and b

13. During vaccination, it seems there is an abnormally high number of sticky chicks. Which of the following **would not** cause this chick quality defect. (Page C-131)
    a. Temperature too high (day 20 and day 21)
    b. Excessive egg storage time
    c. Large eggs
    d. Broken eggs in the tray
    e. Inadequate turning

14. Hatchability can be suppressed at high altitudes, which of the following is the primary reason for this? (C-127)
    a. Increased barometric pressure
    b. Increased humidity
    c. Inaccurate wet bulb/dry bulb readings
    d. Reduced availability of O_2
    e. Decreased moisture loss from eggs

15. A commercial hatchery is producing approximately 400,000 chicks per day, 4 days a week. This hatchery has approximately 90% hatchability, and an average set egg weight of 2.3 oz per egg. The shell and residual membranes post hatch make up approximately 10% of pre-incubated egg weight. This hatchery is set up to dry these waste materials prior to disposal to reduce cost associated with disposal. Through drying this waste amount can be reduced by approximately 45%, how many lbs of hatchery waste need disposal each week?

C-127

400,000 chicks/90% hatchability = setting 444,445 eggs per day

444,445 – 400,000 = 44,445 eggs that did not hatch * 2.3 oz per egg = 102,223.5 oz/16 = 6,389 lbs unhatched egg waste

400,000 eggs that did hatch * 2.3 oz per egg * 10% shell and membrane post hatch = 92,000 oz/16 oz/lb = 5,750 lbs of shell waste per day.

6,389+5750 = 12,139 lbs of hatchery waste per day * 4 days/week = 48,556 lbs per week.

100% waste – 45% moisture loss through drying = 55% dried waste.

48,556 lbs per week * 55% = 25,249 lbs of hatchery waste per week to dispose of.

a. 23,567 lbs
b. 25,249 lbs
c. 46,589 lbs
d. 50,490 lbs
e. 55, 888 lbs