

## Lecture Exam 1: Fill-in-blank and Short Answer Grading Rubric

### Part I—Fill-in-blank:

Questions 1-9:

*Answers must match key. No alternatives accepted. Minor spelling errors OK. No partial credit.*

### Part II—Short Answer:

Question 1:

- A. *Carbohydrate or disaccharide (-1 pt if incorrect). No alternatives accepted. No partial credit.*
- B. *Must be circled around oxygen as in key (-1 pt if incorrect).*
- C. *Must include Alpha 1-1 (-1 pt if incorrect), glycosylic (-1 pt if incorrect).*

Question 2:

- A. *No aldehyde group (-1 pt), not 4 carbons (-1 pt), 3 hydroxyls and 5 hydrogens not correctly distributed on carbons (-1pt).*
- B. *Answer must be "4" (-1 pt if incorrect).*

Question 3:

*-1 pt if not C<sub>29</sub>, -1 pt if not H<sub>52</sub>, -1 pt if not O<sub>5</sub>, -4 pts if all wrong or blank.*

Question 4:

*# of pyruvates must be "6" (-1 pt if incorrect)*

<b>0.5 pts/box</b>	<b>per 1 G-3-P</b> (complete oxidat.)	<b>per 1 pyruvate</b> (complete oxidat.)	<b>Per 1 pyruvate</b> (partial—removed at Acetyl-CoA)
# NADH + H <sup>+</sup>	<b>5</b>	<b>4</b>	<b>1</b>
# FADH <sub>2</sub>	<b>1</b>	<b>1</b>	<b>0</b>
# ATP (by substrate level phosphorylation)	<b>3</b>	<b>1</b>	<b>0</b>
# ATP (by oxidative phosphorylation)	<b>16</b>	<b>14</b>	<b>3</b>

*-½ pt for each incorrect box in the table. No alternatives accepted. No partial credit.*

*Must show work for total number of ATP = 80 (-2 pts if incorrect). No alternatives accepted. No partial credit.*

Question 5:

- A. *phenotype = brown (-1 pt if incorrect)*
- B. *genotype of parent black mouse BbEe. (-1 pt if incorrect)*

One Punnett square must be drawn with eight boxes. Genotype and phenotype needed for each box. -½ pt for each incorrect box.

If it wasn't clear → no credit.

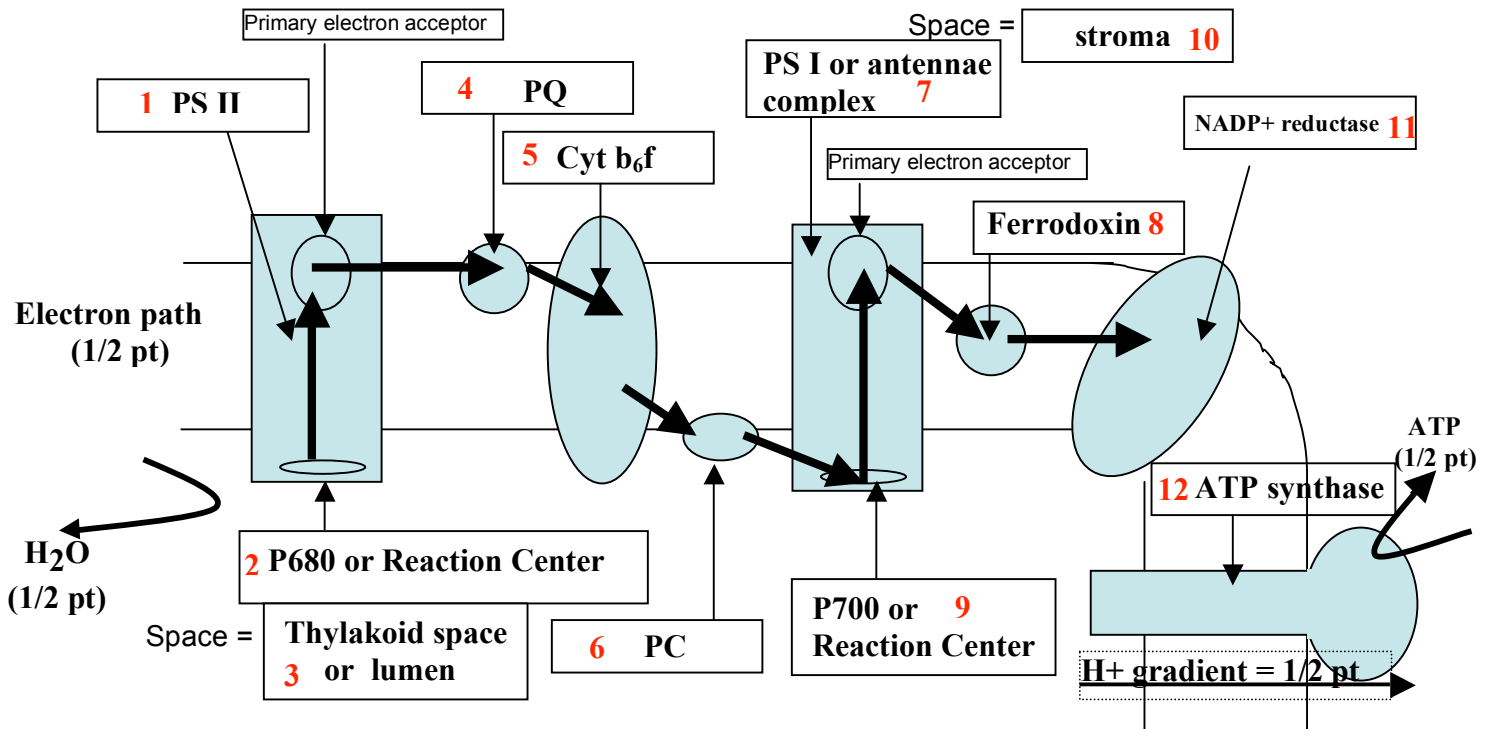
If 2 Punnett squares used → no credit.

Only phenotypes → ½ credit.

Only genotypes → ½ credit.

	<b>b ; E</b>	<b>b ; e</b>
<b>B ; E</b>	$\frac{B}{b} ; \frac{E}{E}$ <b>black</b>	$\frac{B}{b} ; \frac{E}{e}$ <b>black</b>
<b>B ; e</b>	$\frac{B}{b} ; \frac{e}{e}$ <b>black</b>	$\frac{B}{b} ; \frac{e}{e}$ <b>beige</b>
<b>b ; E</b>	$\frac{b}{b} ; \frac{E}{E}$ <b>brown</b>	$\frac{b}{b} ; \frac{E}{e}$ <b>brown</b>
<b>b ; e</b>	$\frac{b}{b} ; \frac{e}{e}$ <b>brown</b>	$\frac{b}{b} ; \frac{e}{e}$ <b>beige</b>

Question 6:



The following is a list of acceptable answers. The diagram used in the exam is from page 72, slide 11 of the lecture reader. If you wrote both a correct AND incorrect answer in any box, that box was marked as incorrect and points were deducted.

**Part 1:** (Each box = 0.25 pt.) Label the 12 components/spaces with their proper names. –¼ pt per box if not one of the following answers (red numbers maps to boxes in figure).

1	Photosystem II	PSII	
2	P680	Reaction Center	
3	Thylakoid space	Lumen	
4	PQ	Plastoquinone	
5	Cyt b6f	B6f-complex	Cytochrome complex
6	PC	Plastocyanin	
7	Photosystem I	PSI	Antennae complex
8	Ferredoxin	Fd	
9	P700	Reaction Center	
10	Stroma		
11	NADP+ reductase	NADP reductase	
12	ATP synthase		

**Part 2:** (0.5 pt) Use an arrow to show the flow of electrons through this system during non-cyclic electron flow. –½ pt if any part incorrect.

P680 → Primary Electron Acceptor → PQ → Cyt b6f → PC → P700 → Primary Electron Acceptor → Fd → NADP+ Reductase

**Part 3:** (0.5 pt) Use an arrow to indicate the direction of the H<sup>+</sup> gradient (label arrow H<sup>+</sup>). Proton movement also accepted since a significantly large portion of the class indicated movement instead of gradient. –½ pt if not one of the following answers.

Any ONE of these answers is correct:

1. Actual proton gradient: Lumen → Stroma (through membrane)
2. Proton movement: Stroma → Lumen (through Cyt b6f complex)
3. Proton movement: Lumen → Stroma (through ATP synthase)

**Part 4:** (0.5 pt) Indicate where ATP is produced. –½ pt if not one of the following answers.

Any one of these answers is correct:

1.  $ADP + P_i \rightarrow ATP$  (arrow drawn vertically through “bubble” end of ATP synthase)
2. ATP (near ATP synthase, in stroma; NOT in the lumen, NOT in the membrane)

**Part 5:** (0.5 pt) Indicate where water is oxidized. –½ pt if not:

H<sub>2</sub>O oxidation at PSII, on the lumen side  
(NOT in the membrane; NOT on the stroma side)