

SUBJECTIVE SCORE INSTRUCTOR USE ONLY

100	90	80	70	60
50	40	30	20	10
9	8	7	6	5
4	3	2	1	0

PART 1

(T) (F) KEY

% 2 3

- 1 A B C D E
- 2 A B C D E
- 3 A B C D E
- 4 A B C D E
- 5 A B C D E
- 6 A B C D E
- 7 A B C D E
- 8 A B C D E
- 9 A B C D E
- 10 A B C D E
- 11 A B C D E
- 12 A B C D E
- 13 A B C D E
- 14 A B C D E
- 15 A B C D E
- 16 A B C D E
- 17 A B C D E
- 18 A B C D E
- 19 A B C D E
- 20 A B C D E
- 21 A B C D E
- 22 A B C D E
- 23 A B C D E
- 24 A B C D E
- 25 A B C D E
- 26 A B C D E
- 27 A B C D E
- 28 A B C D E
- 29 A B C D E
- 30 A B C D E
- 31 A B C D E
- 32 A B C D E
- 33 A B C D E
- 34 A B C D E
- 35 A B C D E
- 36 A B C D E
- 37 A B C D E
- 38 A B C D E
- 39 A B C D E
- 40 A B C D E
- 41 A B C D E
- 42 A B C D E
- 43 A B C D E
- 44 A B C D E
- 45 A B C D E
- 46 A B C D E
- 47 A B C D E
- 48 A B C D E
- 49 A B C D E
- 50 A B C D E

USE NO. 2 PENCIL ONLY

- MAKE DARK MARKS
- ERASE COMPLETELY TO CHANGE
- EXAMPLE: A B C D E

SCORE FEATURE:

- Mark total possible subjective points
- Only one mark per line on key
- 150 points maximum

EXAMPLE OF STUDENT SCORE:

100	90	80	70	60
50	40	30	20	10
9	8	7	6	5
4	3	2	1	0

NAME	KEY
SUBJECT	Biol 230
DATE	Sp 09
TEST NO.	
HOUR	gen

TEST RECORD

PART 1	47
PART 2	26
TOTAL	33
	90

Write your name on these pages and turn them in with your Scantron form.

33. Since the breast cancer gene has been cloned, what procedure would you use to determine the presence of this gene in an individual (two-word answer = 2 points)? Southern blotting

34. The *ras* gene produces mRNA containing an extra exon that includes a number of UAA codons. Cancer cells produce *ras* mRNA missing this exon. Why doesn't the long mRNA cause cancer? Where does the mistake most likely occur in expression of the abnormal *ras* product? (5 points)

- ① The exon has stop codons, therefore no product is expressed
- ② During RNA processing to remove introns.

35. Complete the sense strand of DNA and the peptide encoded by this strand. (14 points)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		
DNA	A	T	T	A	A	T	T	G	C	G	C	C	T	A	C	C	C	T	T	G	C		
mRNA																aug	G	G	A	acg			
tRNA																					U	G	C
amino acid																							

	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
DNA	A	T	G	T	A	C	A	T	T	C	C	C	C	C	C	G	G	G	G	G
mRNA	uac				aug			uaa												
tRNA	A	U	G					A	U	U										
amino acid							Met													

36. What would be the effect of the following mutations on the DNA in question 35? (5 points)

<p>a) Substitution of adenine at base 6. <u>no effect</u></p>	<p>b) Insertion of adenine between bases 22 and 23. $A^{\vee}TGTACATT$ $\rightarrow AATGTACATT$ <u>len two</u> <u>frameshift</u> <u>makes non-functional polypeptide</u></p>
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Extra credit (6 points).

Photobacterium bacteria have a *lux* operon that consists of a promoter, operator, and structural genes for the enzyme luciferase. Luciferase binds with FMNH₂ and emits a photon of light to oxidize the FMNH₂. *Pseudomonas* bacteria have a *mer* operon. When mercury binds to the repressor, the structural genes are transcribed to reduce Hg²⁺. Assume that you engineer *E. coli* bacteria to contain the *mer* repressor gene and the *lux* structural genes. What happens when the recombinant *E. coli* are exposed to

- (a) lux inducer nothing
- (b) arabinose nothing
- (c) mercury emit light