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## Theoretical Test Paper 2

### Answer Key

1. (3.2 points)

Sample	Types of organism			
	a	b	c	d
1	x	x	x	x
2	✓	x	x	✓
3	✓	✓	✓	✓
4	x	✓	✓	x

2. (1 point)

a	b	c	d
✓	✓	✓	x

3. (0.4 points)

Bacterium \_\_\_\_\_ is likely to be Gram negative.

Bacterium \_\_\_\_\_ is likely to be Gram positive.

4. (2.4 points)

4.1. (1.45 points)

	-35	-34	-33	-32	-31	-30	-29	
5'	T	A	T	A	A/T	A	A/T	3'

4.2. (1 point)

Sequence element				
Operator	Promoter	Origin of replication (ORI)	Telomere	Enhancer
x	✓	x	x	✓

5. (2.8 points, 0.4 point per cell)

I	II	III	IV	V	VI	VII
b, c	a	c, e	b, d, e, f	a	b	a, d, f

6. (0.8 point)

a	b	c	d
x	x	✓	x

7. (1.5 points)

I	II	III	IV	V
c	b	a	e	d

8. (1.8 points)

Cell cycle	Group		
	A	B	C
a. S phase	x	✓	x
b. Longest phase	✓	x	x

9. (1.6 points)

9.1. (0.8 points)

a	b	c	d
✓	x	x	x

9.2. (0.8 points)

a	b	c	d
✓	✓	x	✓

10. (1.2 points)

Gibberellin	DELLA mutant	GRAS mutant
Present	x	✓
Absent	x	✓

11. (6 x 0.4= 2.4 points) (0.4pts per column)

	I	II	III	IV	V	VI
Ligase	d	c	f	e	a	b
Reaction	B	E	A	F	D	C

12. (1.2 points)

1	2	3	4
↑	=	=	↑

13. (1.2 points)

I	II	III	IV
a	a	d	d

14. (2 points) (10 x 0.2, mark by row)

Organ / Cell	Type of cell division	Ploidy of cells
Endosperm of angiosperm	I	3n
Pollen grain	II	n
Central cells	I	n + n
Egg of angiosperm	II	n
Spore of moss	II	n
Protonema	I	n
Sperm of moss	I	n
Fern gametophyte	I	n
Spore of fern	II	n
Egg of fern	I	n

15. (1.8 points)

Bragg	<i>nts382</i>	<i>nts1116</i>
x	✓	✓

16. (8 x 0.3 = 2.4 points)

Nutrient	Required as trace element	Absorbed by passive transport
NO <sub>3</sub> <sup>-</sup>	x	x
K <sup>+</sup>	x	✓
Mg <sup>2+</sup>	x	x
Fe <sup>3+</sup>	✓	✓

17. (1.0 point)

a	b	c	d	e
✓	x	✓	x	x

18. (2 points)

Condition	Curve
In actively working muscles	3
In the lung	1
In human fetus	1
With increased temperature	3
With increased CO <sub>2</sub> content	3

19. (1 point- all or none)

a	b	c	d	e
x	✓	x	x	x

20. (2 points)

a	b	c	d	e
✓	✓	x	x	✓

21. (1.6 points)

a	b	c	d
✓	✓	✓	x

22. (1.5 points)

a	b	c
✓	x	✓

23. (0.6 point)

Grey matter	White matter
B	A

24. (1.2 points)

a	b	c	d	e	f
L	H	L	H	H	L

25. (1.5 points)

I	II	III
c	b	a

26. (1 point)

Answer:     C

27. (4.5 points)

27.1. (3.6 points)

Q <sub>10</sub> value	(i)	(ii)	(iii)
A	2.3	2.4	2.5
B	3.0	2.9	3.3
C	5.0	3.3	6.0

27.2. (0.9 points)

Ectotherm	Endotherm
C	A, B

28. (3.6 points)

28.1. (1 point)

Juvenile	Adult
C	B

28.2. (1 point – all or none)

Juvenile	Adult
A	B

28.3. (1.6 points)

a	b	c	d
x	✓	✓	x



29. (2.2 points)

29.1. (1.2 points)

Animal	Cleavage pattern and blastulas	Type of coelom formation
Mouse	2	E
Snail	4	S
Toad	3	E
Chicken	5	E
Seastar	1	E
Fruit fly	6	S

29.2. (1.0 point)

The main factor is C.

30. (0.8 points)

a	b	c	d
x	✓	x	✓

31. (2 points)

a	b	c	d	e
x	x	x	x	✓

32. (1 point)

a	b	c	d	e
✓	✓	x	✓	x

33. (2 points)( allow if given in decimal points or in lowest form or in percentage)

33.1. (1 point)

Answer: 3/16.

33.2. (1 point)

Answer: 4/16.

34. (1.8 points)

	Lethal	Hairless	Normal
Hairless (Hh) X Hairless (Hh)	2	4	2
Hairless (Hh) X normal (hh)	0	4	4

35. (1 + 2 + 1 points = 4 points)

Frequency of disease causing allele (%)	6.09
$\chi^2$ (3 decimal places)	0.338
Hardy-Weinberg Equilibrium	✓

36. (4 points)

36.1. (2 points)

A	B	C	D
✓	x	x	✓

36.2. (2 points)

The probability is 0.

37. (2.7 points)

37.1. (1.5 points)

Metabolites	Order in the pathway
Citrulline	4
Glutamic semialdehyde	2
Arginine	5
Ornithine	3
Glutamic acid	1

37.2. (1.2 points)

Step in metabolic pathway	1 → 2	2 → 3	3 → 4	4 → 5
Strain (carrying defect in this step)	B	C	A	D

38. (2 points) ( allow if given in decimal points or in lowest form or in percentage)

38.1. (1 point)

Answer: 1/6.

38.2. (1 point)

Answer: 2/9.

39. (1 point) (all or none)

a	b	c	d	e
x	✓	x	x	x

40. (1 point)

I	II	III	IV	V
✓	x	✓	✓	✓

41. (1.4 points)

41.1. (0.8 point)

a	b	c	d
✓	x	✓	x

41.2. (0.6 point)

a	b	c
✓	x	x

41.3. (1 point)

a	b	c	d	e
x	✓	x	x	x

42. (5.1 points)

42.1. (2.4 points)

I	II	III	IV
b	a	d	c

42.2. (1.2 points)

Island	Pico	Santa Maria	Terceira
Number of endemic species	48 - 52	100 - 104	63 - 68

42.3. (1.5 points)

a	b	c	d	e
✓	x	✓	✓	x

43. (1.2 points)

I	II	III	IV	V	VI
✓	✓	x	✓	✓	x

44. (1 point)

a	b	c	d	e
x	x	x	✓	x

45. (2.4 points)

a	b	c	d	e	f
✓	✓	x	✓	✓	x

46. (4.8 points)

46.1. (0.4 x 3 =1.2 points)

Taxonomic group	Y	X+Y	W+Z
Morphological character(s)	5	2	4

46.2. (1.2 points)

Chelicerata	Crustacea	Hexapoda	Myriapoda
Z	Y	W	X

46.3. (1.2 points)

1	2	3	4	5	6
III	IV	VII	V	VI	II

46.4. (1.2 points)

Monophyletic	Paraphyletic	Polyphyletic
I, IV	II, III	

**END OF PAPER**