KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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JURUSAN BIOLOGI
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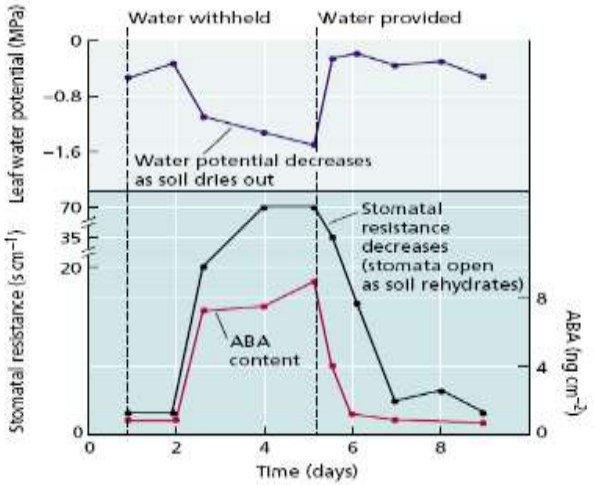
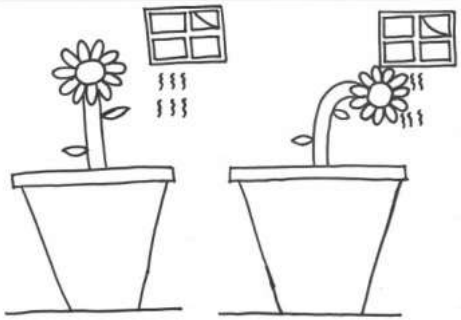
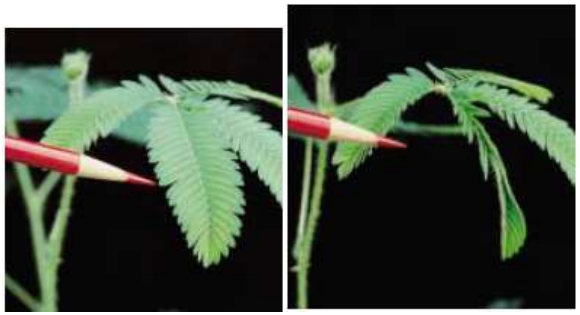
OUTLINE FINAL EXAMS

Course : Plant Physiology
Lecturers : Dr. Yuni Sri Rahayu,M.Si., Dr. Yuliani, M.Si.,
Class Sari Kusuma Dewi, S.Si., M.Si
Time : Undergraduate Programme in Biology Education
: 100 minutes

No	*INDICATORS*	*ITEMS*	*CRITERION*	*SCORE*
1	a. Understand the concepts of photosynthesis, respiration, and nitrogen (N) metabolism b. Relates the concepts of respiration and photosynthesis to nitrate assimilation	1. Explain the relationship between Photosynthesis, Respiration, and Nitrogen (N) Metabolism using the schematic	- If only the 2 concepts of physiological mechanisms are linked (5) - If only 3 concepts of physiological mechanisms are linked (10)	10
2	a. Describes fat formation and fat degradation	2. List the stages of fatty acid synthesis!	- If explaining incomplete stages (5) - If the stages are clear and complete (10)	10
3	a. Communicating the results of the experiment on seed germination and the factors of growth regulators that affect the seed germination process	3. The process of seed germination and seed dormancy is controlled by the composition of the Plant Growth Regulators. State what ZPT effects and explain how the mechanism is. The	- If only mentioning ZPT which affects the process of seed germination and seed dormancy (10) - If describing the aspects that affect the process of seed	15

	b. Associating the concept of dormancy with the response of plants to the environment	sequence starts from seed germination and seed dormancy!	germination and seed dormancy (15)	
4	Able to relate experimental results with hormone function in plant cells	 4. Look at the picture above. What physiological mechanisms occur in these plants when they are underwater stress and well supplied with water?	- If only describes 1 aspect involved in the physiological mechanism in the picture on the side (5) - - If describing the 2 aspects involved in physiological mechanisms in the picture on the side (10) - - If describing the 3 aspects involved in physiological mechanisms in the picture on the side (20) - Existing physiological mechanisms: 1. Change PA 2. ABA concentration 3. Stomata resistance to closing a. Water supplied: high PA, low ABA, low resistance of stomata to close, so stomata open. b. Water grip: low PA, high ABA, high resistance of stomata to close,	20

			so stomata close to reduce transpiration	
5	a. Explains the concepts of motion, photoperiodism, vernalization, phytochromes, and biological work hours b. Linking the above concepts to plant growth and development	5. Biology students plant sunflowers near windows that exposure to light. After several weeks, the direction of the sunflowers' plant growth turns to the windows. (Score 15)  Why did this event happen? Give your opinion and the underlying theory?	- If explained WITHOUT auxin mechanism with phototropism (7,5) - If explaining WITH the auxin mechanism is associated with phototropism and how auxin can affect tissue deflection (15)	15
6.	Linking the above concepts to plant growth and development Able to relate experimental results with hormone function in plant cells	6. In ancient times, the Chinese had the custom of placing citrus fruits near the incense for praying places. It is believed can accelerate fruit ripening. Explain your opinion scientifically!	If the reason does NOT explain the concept of Ethylene which is a gas and can affect the fruit ripening process (7.5) - If the reason explains the concept of ethylene in the form of a gas and can affect the fruit ripening process (15)	15
7	a. Explains the concepts of motion, photoperiodism,	c. From the picture below, it can see that plants are moving. (Score 15)	– If you only mention the name of the motion (5)	15

	vernalization, phytochromes, and biological work hours b. Linking the above concepts to plant growth and development	a. State what motion the plant does? b. Explain the mechanism that causes the plant motion to occur? 	Namely, the nyctinasty MOVEMENT - If you mention the name of the motion and its mechanism, that is, the motion of nyctinasty occurs following the stimulus given, namely the presence or absence of touch or vibration at a certain moment. (10) - If you mention the name of motion, its mechanism and the circadian rhythmic / biological clock that affects it, that is, the motion of nictinasti occurs following a given stimulus, namely the presence or absence of touch or vibration at a certain moment. Which is affected by changes in turgor pressure which changes in tech. Turgor as it is affected by turgor rhythmic changes (15)	

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OUTLINE FINAL EXAM of EVEN SEMESTER 2019/2020

Course : Innovative Learning I
Workload : 3 SKS
Lecturer : Prof. Dr. Muslimin Ibrahim., M.Pd, Prof. Dr. Endang Susantini, M.Pd, Dr. Sifak Indana, M.Pd, Pramita Yakub,
: M.Pd.
Class Undergraduate Programme in Biology Education/ 2018

No.	Indicator	Question Level	Question	The Answer Key	Score
1	Designing learning with its supporting devices, which refers to one of the learning models or learning strategies that come from the Innovative Learning I	C6	Compose a lesson plan with supporting devices, which refer to the one learning model or Learning Strategies derived from Innovative Learning 1: namely Direct Instruction, Learning Strategies, SET, Concept Attainment Model, Meaningful Learning, or discussion. (Assessment based on the design product)	Assessment Sheet of Learning Design Product	• Attached
2	Implement the learning process by implementing the design that has been made in the video form	C6	Record your performance in Learning process by implementing the design that you made it on number 1. Learning is not involving students. Focus a recording is on your performance implementing the lesson plan (An assessment based on your working on the video recording)	Observation Sheet Learning Performance (Based) VIDEO	• Attached

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OUTLINE FINAL EXAMS

Course : Genetics
Lecturer : Prof. Dr. Endang Susantini, M.Pd., and Team
Class : Undergraduate Programme in Biology Education
Time : 100 minutes

Learning objectives	***Items***	***Important aspects of answer***	***Scoring***
The students be able to solve the problem of genetics involving the polygenic inheritance	1. An inbred strain of plants has a mean height of 24 cm. A second strain ofthe same species from a different country also has a mean height of 24cm. The F1 plants from a cross between these two strains are also 24 cmhigh. However, the F2 generation shows a wide range of heights; themajority are like the P1 and F1 plants, but approximately 4 of 1000 areonly 12 cm high, and 4 of 1000 are 36 cm high. (a) What mode of inheritance is occurring h ere? (b) How many gene pairs are involved? (c) How much does each gene contribute to the plant height? (d) Indicate one possible set of genotypes of the P1 and F1 plants that could explain their heights.	(a) Quantitative inheritance (b) The frequency of either extreme phenotype gives us **n**, the number of gene pairs-- Frequency of one extreme phenotype $= (1/4)^n = 1/250$ of gene pairs = log (250) / log(4) = 4. (c) The maximum contribution of additive alleles = 36 - 12 = 24 cm.Since 8 additive alleles (4 genes) contribute 24 cm, each additiveallele contributes 3 cm. (d) Each parent has 4 additive alleles; since the F1 also have 4 additive alleles, the parents must be each be homozygous; the additive alleles of one parent are not present in the other. For example, the genotypes could be AABBccdd x aabbCCDD (or other genotypes following that pattern). (e) An 18 cm plant has 2 additive alleles; any genotype such as AAbbccdd or aaBBccdd would work. A 33 cm plant has 7 additive alleles; any genotype such as AABBCCDd or AaBBCCDD would work.	There are five important aspect, one aspect is true got 1/5 x 100 score

Learning objectives	*Items*	*Important aspects of answer*	*Scoring*
	(e) Indicate one possible set of genotypes to account for F2 plants that are 18 cm or 33 cm high		
The students be able to solve the problem of genetics involving the sex linkage	2. Marian's father is colorblind, as is her maternal grandfather (her mother's father). Marian herself has normal color vision. Marian and her husband, Martin, who is also colorblind, have just had their first child, a son they have named Mickey. Please answer the following questions about this small family. a.What is the probability that this child will be colorblind? b.Three sources of the colorblindness allele are mentioned in this family. If Mickey is colorblind, from which of these three men (Marian's grandfather, Marian's father, or Martin) did he inherit the allele?	• Marian is a heterozygot, because she herself is not colorblind, but her father was. For Marian, her maternal grandfather's colorblindness is immaterial. The X she inherited from her mother must carry the dominant normal color vision allele. Martin, Marian's husband, had the colorblindness allele on his only X chromosome. a. The probability that Mickey will be colorblind is 0.5 (50%). A son inherits his X chromosome from his mother, and Marian has one with the C allele and one with the c allele. He has an equivalent chance of receiving either one. b.Mickey's colorblindness allele came from Marian's father (via Marian herself, of course. Mickey's direct source of the allele was Marion. Mickey didn't get it from Martin, his father, because he had to get his Y chromosome from Martin, and the Y chromosome has no allele for this gene on it.	There are three important aspects. One aspect is true, got 1/3 x 100 score
The students be able to solve the problem of genetics involving the linkage genes	3. An individual is heterozygous for four genes, named a, b, c and d. The mutations are recessive. This individual is test-crossed with another individual who is homozygous recessive for all 4 traits. 1,000 progeny are found as	• The a and b loci should be 1:1:1:1 if they assort independently (1/2 X 1/2 for each of the 4 phenotypes) and If not then they must not assort independently • For phenotype a = 42 + 145 + 6 + 310 = 503 a+ = 43 + 140 + 9 + 305 = 497	There are ten important aspect. One aspect is true got 1/10 x 100 score

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<table>
<tr><th>Learning objectives</th><th>Items</th><th>Important aspects of answer</th><th>Scoring</th></tr>
<tr>
<td></td>
<td>follows:
<table>
<tr><td>phenotype</td><td># of progeny</td></tr>
<tr><td>$ab^+c^+d^+$</td><td>42</td></tr>
<tr><td>a^+bcd</td><td>43</td></tr>
<tr><td>$a^+b^+c^+d$</td><td>140</td></tr>
<tr><td>$abcd^+$</td><td>145</td></tr>
<tr><td>ab^+cd^+</td><td>6</td></tr>
<tr><td>a^+bc^+d</td><td>9</td></tr>
<tr><td>a^+b^+cd</td><td>305</td></tr>
<tr><td>abc^+d^+</td><td>310</td></tr>
</table>
Which genes, if any, are linked?</td>
<td>b = 43 + 145 + 9 + 310 = 507
b+ = 42 + 140 + 6 + 305 = 493
c = 43 + 145 + 6 + 305 = 499
c+ = 42 + 140 + 9 + 310 = 501
d = 43 + 140 + 9 + 305 = 497
d+ = 42 + 145 + 6 + 310 = 503
• In all cases the a 1:1 which implies a heterozygous individual crossed with homozygous recessive. If they assort independently we would expect to find a 1:1:1:1 for ab, ab+, a+b, a+b+.
• calculation : ab = 145 + 310 = 455, ab+ = 42 + 6 = 48, a+b = 43 + 9 = 52, a+b+ = 140 + 305 = 445. They don’t see a 1:1:1:1 and instead see ab as one parental chromosome and a+b+ as the other. Map distance = 100/1,000. 10 map units between a & b
• It would then look at bc. b+c+ = 42 + 140 = 182, bc = 43 + 145 = 188, b+c = 6 + 305 = 311, bc+ = 9 + 310 = 319. Map distance = 370/1,000 = 37 map units between b and c.
• Check c and d. c+d+ = 42 + 310 = 352, cd = 43 + 305 = 348, c+d = 140 + 9 = 149, cd+ = 145 + 6 = 151. Map distance = 300/1,000 = 30 map units between c and d.
• Check a and c. a c+ = 42 + 310 = 352, a+ c = 43 + 305 = 348, a+ c+ = 140 + 9 = 149, a c = 145 + 6 = 151. 300/1,000 = 30 map units between a and c.
• Gene order is c a d b. The a and d alleles are actually very close to one another.
• The parental chromosomes are c+a d+ b/c a+ d b+.
• In each case they do not show independent assortment –</td>
<td></td>
</tr>
</table>

Learning objectives	*Items*	*Important aspects of answer*	*Scoring*
		thus all 4 are genetically linked	
		•	

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OUTLINE MIDTERM EXAMS

Course : Genetics
Lecturer : Prof. Dr. Endang Susantini, M.Pd., and Team
Class : Undergraduate Programme in Biology Education
Time : 100 minutes

Learning objectives	*Items*	*Important aspects of answer*	*Scoring*
The students be able to solve the problems related to the problems involving one gene	1. Two wavy haired people (one male and one female) marry and have eight children. Of these eight, how many would you expect to be curly haired, how many wavy haired and how many straight haired, assuming that the family follows the expected statistically predicted pattern? Suppose you examine the actual children and discover that three of the eight have curly hair. What do you suppose went wrong?	• using the same symbols you chose there. This is a simple monohybrid cross. C^1 | C^1 | C^2 C^1 | C^1 C^1 | C^1C^2 C^2 | C^1C^2 | C^2 C^2 • Genotypic Ratio: 1 C1C 1 : 2 C1C 2 : 1 C2C 2 • Phenotypic Ratio: 1 Curly : 2 Wavy : 1 Straight • This phenotypic ratio predicts that ¼ of the offspring should be curly-haired, ½ should be wavy haired and ¼ should be straight-haired. • So of the eight children, our prediction would be 2 with curly hair, 4 with wavy hair and 2 with straight hair. • The answer to the question, "What went wrong?" is "Nothing." What solving the problem does for us is make a statistical prediction, but every new conception is a new toss of the	There are six important aspect, one aspect is true, got 1/6 x 100 score

Learning objectives	*Items*	*Important aspects of answer*	*Scoring*
		coins—statistical predictions are only really useful for large sample sizes. So it is very normal for a group as small as a family to show frequency distributions which don't match statistical expectations.	
The students be able to solve the problems related to the problems involving two genes	2. In cats, again, black color is dominant to a special, temperature-sensitive albino gene which produces cats with dark legs, faces and tails (Siamese cats, in case you don't recognize it). A short haired (dominant) Siamese colored female is bred to a long-haired black male. They have eight kittens: 2 black, short-haired; 2 black, long-haired; 2 Siamese, short-haired; and 2 Siamese, long-haired. What were the genotypes of the two parents?	• There are two genes. For the color gene, black is dominant to Siamese. For the hair length gene, short is dominant to long. • Our parents are a short-Siamese female and a long-black male. The only parts of their genotypes in question are her second hair length allele and his second color allele. A Siamese cat is always homozygous, as is a long-haired cat (second rule of pedigree analysis). • Their litter of kittens includes babies with all combinations of color and hair length. Note that the numbers (in this case 2 of each kind of kitten) are immaterial. What matters is what colors these parents can produce. • Since they have some kittens who are Siamese (and thus must be homozygous), the black parent must be carrying that recessive allele, so he's heterozygous. • Since they have some kittens who are long-haired (and must be homozygous), the short-haired parent must be carrying that recessive allele. • Since Mom is homozygous for Siamese and Dad is homozygous for long hair, all of the kittens must carry at least one allele for each of these traits. • So the black kittens are heterozygous, and the short-haired kittens are heterozygous as well.	There are seven important aspect, one aspect is true, got 1/7 x 100 score

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Learning objectives	*Items*	*Important aspects of answer*	*Scoring*
The students be able to solve the problems related to the problems involving the gene interaction/The modification of Mendel 's Law	3. In cats, there is a gene which produces ticked fur (bands of different colors on each hair) called Agouti (H). The recessive allele (h) for this gene produces hair which is a solid color from end to end. In addition, there is a coat color gene which has a recessive albino allele (a) which, in the homozygote, prevents the production of any coat color pigment, resulting in a white cat with pink eyes, the traditional albino. Note that this problem has described two completely different genes. These genes are unlinked. An albino female cat is mated to a solid brown male cat. All of their offspring are Agouti. The males and females among these offspring are allowed to freely intermate, producing a flock of F2 kittens. Predict the phenotypic ratio for fur color among these many grandkittens.	• In the original mating, the female is albino, the male solid brown. The kittens are all agouti. • This tells that the albino female cat carries the agouti allele. (It's possible she's homozygous, but you don't know for sure. The male is possibly homozygous for the normal allele of the albino gene, but again you don't really know for sure.) • The agouti offspring are all heterozygous for both genes. They are not albino, but inherited an albino allele from their mother; they are agouti, but inherited a solid allele from their father. • So this problem has set up a traditional dihybrid cross. Assign B/b to the alleles for the Agouti/brown gene and A/a to the alleles for the albino gene. • P: BbAa X BbAa G: BA BA Ba Ba bA bA ba ba • Genotypic Ratio: 1 BBAA 2 BbAA 1 BBaa 2 Bbaa 1 bbAA 2 BBAa 1 bbaa 2 bbAa 4 BbAa • Phenotypic Ratio:.9 Agouti : 3 Solid Brown : 4 White (Albino)	There are seven important aspect, one aspect is true, got 1/7 x 100 score
The students be able to solve the problems related to the problems	4. It was suspected that two babies had been exchanged in a hospital. Mr. and Mrs. Jones received baby #1 and Mr. and Mrs. Simon received baby #2. Blood typing tests on the parents and the babies showed the following:	• The key to determining whether these babies were switched or not is to look for impossible parent/child connections. • In this case, the problem is that Mr. Smith, who is Type AB, can't be the father of a Type O baby, because the I allele for Type O is recessive, and the child must receive it from both parents.	There are four important aspect, one aspect is true, got 1/4 x 100 score

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Learning objectives	*Items*	*Important aspects of answer*	*Scoring*
involving multiple allelic	<table><tr><td>Mr. Jones: Type A Mrs. Jones: Type O</td><td>Mr. Simon: Type AB Mrs. Simons: Type O</td></tr><tr><td>Baby 1: Type A</td><td>Baby 2 : Type O</td></tr></table> Were the babies switched? How do you know whether they were or they weren't?	• The IA and IB alleles are codominant, so a person with Type AB blood can't be carrying an O allele. • So, the baby switched.	