 Province of the

EASTERN CAPE

EDUCATION

**DIRECTORATE SENIOR CURRICULUM MANAGEMENT**

**(SEN-FET)**

**HOME SCHOOLING SELF-STUDY WORKSHEET ANSWER SHEET**

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| **SUBJECT** | LIFE SCIENCES | **GRADE** | 12 | **DATE** | 02 April 2020 |
| **TOPIC** | Monohybrid Crosses and Types of Dominance | **TERM 1**  **REVISION** |  | **TERM 2 CONTENT** | 🗸 |

WORKSHEET GENETICS TERMINOLOGY - Lesson 1

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| --- | --- | --- |
| 1.1.1 | An allele is an alternative form of a gene found at the same locus on homologous chromosomes🗸 | (1) |
| 1.1.2 | Phenotype is the external appearance of an organism🗸determined by the genotype  Genotype is the genetic make-up of an organism🗸 | (2) |
| 1.1.3 | Brown eye colour🗸, Curly hair🗸 | (2) |
| 1.1.4 | Dd🗸 | (1) |
| 1.1.5 | bb✓ | (1) |
| 1.1.6 | * Only the characteristic✓ * controlled by dominant allele✓ * can be seen in the external appearance✓ * for an individual with a heterozygous genotype✓ * The dominant allele for curly hair✓ * masks the appearance of the characteristic✓ controlled by the recessive allele which is straight hair✓, Any 4 | (4) |
| 1.1.7 | DD✓/ Dd | (1) |
| 1.1.8 | * The individual inherited a recessive allele for straight hair ✓ * from each parent✓.   **OR**   * In each somatic cell of the individual the homologous chromosomes✓ * both carry the recessive allele for straight hair✓ at the same locus, * there is no dominant allele for curly hair✓ Any 2 | (2) |

**LEARNER ACTIVITY: MONOHYBRID CROSSES**

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| 1. | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | P1 | Phenotype | | Brown | | x | Blue🗸 | |  | Genotype | | Bb | | x | bb🗸 | | *Meiosis* |  | |  | |  |  | |  | G/gametes | | B , b | | x | b, b🗸 | | *Fertilisation* |  | |  | |  |  | | F1 | Genotype | | Bb ; Bb ; bb ; bb🗸\* | | | | |  |  | |  | | | | |  | Phenotype | | 1 brown : 1 blue🗸\* | | | | | P1 and F1🗸 |  |  | |  | | | | Meiosis and fertilisation🗸 | | | | 2 Compulsory + Any 4 | | |   **OR**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | P1 | Phenotype | Brown | | x | Brown🗸 | |  | Genotype | Bb | | x | bb🗸 | |  |  |  | | | | | *Meiosis* |  | |  |  |  | | --- | --- | --- | | Gametes | B | b | | b | B b | b b | | b | B b | b b |   1 mark for correct gametes  1 mark for correct genotypes\* | | | | |  |  | | *Fertilisation* |  | |  |  | |  |  |  | | | | | F1 | Phenotype | 1brown : 1 blue🗸\* | | | | | P1 and F1🗸 |  |  |  | | | | Meiosis and fertilisation🗸 | | | 2 Compulsory + Any 4 | | | |  | | | | | | | (6)  (6) |

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| 2.1 | Rabbit 2 - Black🗸fur Rabbit 4 - white🗸fur |  | (2) |
| 2.2 | 1BB: 2BB: 1bb🗸 |  | (1) |
| 2.3 | 12🗸black |  | (1) |

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|  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | P1 | Phenotype | | Black | | x | Black🗸 | |  | Genotype | | Bb | | x | Bb🗸 | | *Meiosis* |  | |  | |  |  | |  | G/gametes | | B , b | | x | B, b🗸 | | *Fertilisation* |  | |  | |  |  | | F1 | Genotype | | BB ; Bb ; Bb ; bb🗸 | | | | |  |  | |  | | | | |  | Phenotype | | (3) black : (1)white🗸 | | | | | P1 and F1🗸 |  |  | |  | | | | Meiosis and fertilisation🗸 | | | | Any 6 | | |   **OR**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | P1 | Phenotype | Black | | x | Black🗸 | |  | Genotype | Bb | | x | Bb🗸 | |  |  |  | | | | | *Meiosis* |  | |  |  |  | | --- | --- | --- | | Gametes | B | b | | B | BB | Bb | | b | Bb | bb |   1 mark for correct gametes  1 mark for correct genotypes | | | | |  |  | | *Fertilisation* |  | |  |  | |  |  |  | | | | | F1 | Phenotype | (3) brown ; (1) white🗸 | | | | | P1 and F1🗸 |  |  |  | | | | Meiosis and fertilisation🗸 | | | Any 6 | | | |  | | | | | | | (6)  (6)  (16) |

**TEACHER COPY: MEMORANDUM TYPES OF DOMINANCE**

1. Study the diagrams below and answer the questions:

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| |  | | --- | |  | | KEY: Black fish (B) x Grey fish (G) | | |  |  | | --- | --- | | **Type of dominance** | Co-dominance🗸 (1) | | **Description** | Both grey and black appear in the phenotype of the offspring🗸, therefore both alleles/grey and black are equally dominant🗸 (2) | | **Crossing** | P1 phenotype Black fish x Grey fish🗸  Genotype BB x GG🗸  Meiosis  Gametes B, B x G, G🗸  Fertilization   |  |  |  | | --- | --- | --- | |  | B | B | | G | BG | BG | | G | BG | BG |   F1 genotype BG, BG, BG, BG🗸  phenotype All Black and Grey 🗸 fish  P1+ F1🗸  Meiosis + Fertilization🗸 (Any 6) | |  |  | |

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| |  | | --- | |  | | KEY: Red bird (A) x Blue bird (a) | | |  |  | | --- | --- | | **Type of dominance** | Complete Dominance🗸 (1) | | **Description** | Red is represented with (A) and blue is represented with (a) 🗸 indicating that red is the dominant allele and blue is the recessive allele🗸  **OR**  all offspring are Aa🗸 indicating that (A) representing red is the dominant allele and (a) representing blue is the recessive allele🗸 (2) | | **Crossing** | P1: Phenotype Red bird x Blue bird🗸  Genotype **AA** x **aa**🗸  Meiosis  Gametes **A, A**  x **a, a**  Fertilization   |  |  |  | | --- | --- | --- | |  | **A** | **A** | | **a** | **A a** | **A a** | | **a** | **A a** | **A a** |   F1 genotype Aa🗸  Phenotype all red🗸  P1 + F1🗸  Meiosis + Ferilization🗸 (6)  NO MARKS TO BE AWARDED FOR GAMETES AND GENOTYPE AS THEY ARE ALREADY GIVEN IN THE QUESTION  **NOTE:**  Homozygous dominant x homozygous recessive => all offspring are heterozygous dominant | |
| |  | | --- | | white  red    pink | | Key: Red flower (R)x White flower (W) | | |  |  | | --- | --- | | **Type of dominance** | Incomplete Dominance🗸 | | **Description** | White flower crossed with red flower gives pink flower🗸 (an intermediate phenotype) indicating that none of the 2 alleles i.e. red and white are dominant to each other🗸 | | **Crossing** | P1: Phenotype Red flower x Blue flower🗸  Genotype **RR** x **WW**🗸  Meiosis  Gametes **R, R**  x **W, W**🗸  Fertilization   |  |  |  | | --- | --- | --- | |  | **R** | **R** | | **W** | RW | RW | | **w** | RW | RW |   F1 genotype 100% RW🗸  Phenotype All Pink 🗸 (Any 6) | |

**EXAM TYPE QUESTIONS**

Q 2.4 P2 NOV 2018

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| --- | --- | --- | --- | --- |
| 2.5 | 2.5.1 | Purple🗸 |  | (1) |
|  | 2.5.2 | * When purple- flowering plants and white-flowering plants are crossed🗸 * All the offspring have purple flowers🗸/have no white flowers |  | (2) |
|  | 2.5.3 | * The two alleles for a characteristic🗸 * Separate during meiosis🗸so that * Each gamete contains one allele🗸 for that characteristic |  | (3) |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 2.5.4 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | P1 | Phenotype | | Purple | | x | Purple🗸 | |  | Genotype | | Dd | | x | Dd🗸 | | *Meiosis* |  | |  | |  |  | |  | G/gametes | | D , d | | x | D, d🗸 | | *Fertilisation* |  | |  | |  |  | | F1 | Genotype | | DD ; Dd ; Dd ; dd🗸 | | | | |  |  | |  | | | | |  | Phenotype | | 3 purple : 1 white🗸\* | | | | | P1 and F1🗸 |  |  | |  | | | | Meiosis and fertilisation🗸 | | | | Any 6 | | |   **OR**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | P1 | Phenotype | Purple | | x | Purple🗸 | |  | Genotype | Dd | | x | Dd🗸 | |  |  |  | | | | | *Meiosis* |  | |  |  |  | | --- | --- | --- | | Gametes | D | d | | D | DD | Dd | | d | Dd | dd |   1 mark for correct gametes  1 mark for correct genotypes | | | | |  |  | | *Fertilisation* |  | |  |  | |  |  |  | | | | | F1 | Phenotype | 3 purple ; 1 white🗸 | | | | | P1 and F1🗸 |  |  |  | | | | Meiosis and fertilisation🗸 | | | Any 6 | | | |  | | | | | | | (6)  (6)  (12) |

Q1.4 P2 NOV 2017

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|  | 1.4.1 | (a)  (b) | Genes🗸/alleles  Monohybrid🗸 |  | (1)  (1) |

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|  | 1.4.2 | Ovary🗸/gynaecium/pistil/ovule |  | (1) |

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|  | 1.4.3 | (a)  (b) | 2🗸/Two  4🗸/Four | |  | | (1)  (1) |
|  | 1.4.4 | (a)  (b) | Violet🗸  Short🗸 | |  | | (1)  (1) |
|  | 1.4.5 | 2🗸/Two | |  | | (1)  **(8)** | |

Q 2.3 P2 NOV 2019

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| --- | --- | --- | --- | --- |
| 2.3 | 2.3.1 | Spotted🗸back |  | (1) |
|  | 2.3.2 | * Spotted frogs produced offspring without spots🗸   **OR**   * The spotted offspring were three times more than offspring without spots/ ratio of spotted offspring to offspring without spots is 3:1 |  | (2) |

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| 2.3.3 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | P1 | Phenotype | | Purple | | x | Purple🗸 | |  | Genotype | | Dd | | x | dd🗸 | | *Meiosis* |  | |  | |  |  | |  | G/gametes | | D , d | | x | d, d🗸 | | *Fertilisation* |  | |  | |  |  | | F1 | Genotype | | DD ; Dd ; dd ; dd🗸\* | | | | |  |  | |  | | | | |  | Phenotype | | (2) spotted : (2) without spots\* | | | | | P1 and F1🗸 |  |  | |  | | | | Meiosis and fertilisation🗸 | | | | 2 compulsory + any 4 | | |   **OR**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | P1 | Phenotype | Spotted | | x | No spots🗸 | |  | Genotype | Dd | | x | dd🗸 | |  |  |  | | | | | *Meiosis* |  | |  |  |  | | --- | --- | --- | | Gametes | D | d | | d | Dd | dd | | d | Dd | dd |   1 mark for correct gametes  1 mark for correct genotypes\* | | | | |  |  | | *Fertilisation* |  | |  |  | |  |  |  | | | | | F1 | Phenotype | (2) spotted ; (2) without spots🗸\* | | | | | P1 and F1🗸 |  |  |  | | | | Meiosis and fertilisation🗸 | | | 2 compulsory + any 4 | | | |  | | | | | | | (6)  (9) |