2015 mock marking key

|  |  |
| --- | --- |
| 1 | B |
| 2 | A |
| 3 | B |
| 4 | A |
| 5 | B |
| 6 | A |
| 7 | B |
| 8 | D |
| 9 | B |
| 10 | B |
| 11 | A |
| 12 | D |
| 13 | A |
| 14 | D |
| 15 | C |
| 16 | A |
| 17 | B |
| 18 | B |
| 19 | B |
| 20 | B |
| 21 | A |
| 22 | D |
| 23 | B |
| 24 | D |
| 25 | B |
| 26 | A |
| 27 | C |
| 28 | C |
| 29 | C |
| 30 | A |

SECTION 2. See hard copy

Section 3

**Question 1**

1. Gene probe(1)

Each gene has its unique base sequence (1).

The base sequence on the probe matches the unique sequence in the gene that is being looked for.(1)

The DNA is first being studied is denatured(1)

The probe is then added(1)

The probe will attach itself only to the section of DNA that contains a base sequence that matches the probe’s sequence(1).

Probes are made with a radioactive or a fluorescent marker on them, so that they can be detected after attaching to the DNA.(1)

b

|  |  |
| --- | --- |
| **Description** | **Marks** |
| * The normal (HEXA) gene is removed | 1-11 |
| * by cutting it at a recognition site |
| * With a restriction enzyme |
| * Which makes a staggered cut made on either side of gene |
| * Creating sticky ends from (overhanging) unpaired nucleotides |
| * DNA / genetic material removed from virus |
| * Viral DNA cut with same restriction enzyme |
| * To create sticky ends that are complementary to gene |
| * DNA ligase is an enzyme |
| * That joins sticky ends of gene and viral DNA |
| * This amalgamation is called recombinant DNA |
| * Which is inserted back into virus |
| * Virus is now termed a vector |
| * Once inserted in the body, the virus would insert correct gene into body cells / replace faulty gene | 1-2 |
| * Gene could then function to produce the correct protein / enzyme |
|  | **Total 13** |

2.

**Question 2 (20 marks)**

1. Allele frequency can be changed by random genetic drift and genetic

bottle necks.

1. How often an allele occurs in particular population. Or something similar.

**(1 marks)**

1. Where chance occurrences cause a change in allele frequency.(1). Impacts greatest on small populations.(1)

**(2 marks)**

1. Fossils, comparative anatomy/homologous organs and geographical distribution. Also pay vestigial organs.

**(3 marks)**

1. Organism with characteristics that are advantageous/favourable/give survival advantage(1 mark) have more chance of surviving to reproduce and Pass on the genes/alleles (1) that give rise to these characteristics. Those organism with disadvantageous genes will die without reproducing (1) and their genes will be lost for the gene pool(1 mark). As a result allele that give rise to advantageous characteristics end up with a higher allele frequency(1)

**(Max 4marks)**

1. It is a disorder where red blood cells can collapse and become sickle/crescent shaped(1 mark).

It is a problem as the sickle cell blood cells cannot carry as much oxygen(1 mark) and can stick together causing blockages in the blood vessels(1mark).

It is caused by an allele inherited from parents(1 mark).

The homozygous genotype of the allele is normally fatal(1 mark).

The Heterozygous genotype of the allele show less sickling(1 mark) and usually only causes problems in low oxygen conditions(1mark).

The Heterozygous genotype is thought to give some resistance to Malaria(1 mark).

In areas of the world where Malaria is endemic the allele for sickle cell anaemia is more frequent(1 mark) as it gives increased survival chances(1 mark).

**(10 marks)**

3. a

Steps involved in the Sliding filament model.

Diagram of relaxed filaments (2) showing actin, myosin, sarcomere, Z lines and myosin cross bridges. 0ne mark correct diagram. One mark correct labels.

1. [Nervous impulse](http://www.teachpe.com/anatomy/nerves.php) arrives at the neuromuscular junction, which causes a release of Acetylcholine. (1)
2. The presence of Acetylcholine causes the depolarization of the motor end plate (1) which travels throughout the muscle causing Calcium (Ca+2) to be released from the sarcoplasmic reticulum (1) inside the muscle fiber.
3. The release of Calcium ions and the breakdown of ATP (1) (to release energy) (1) causes the heads of the myosin cross bridges to attach to the actin and bend back (1).
4. This causes the actin and myosin to slide over one another. (1) This is called the 'power stroke'. (1)

Diagram of fibres at contraction (2) one mark for drawing and one mark for labels.

1. This repeated pulling of the Actin over the myosin is often known as the ratchet mechanism.(1)
2. This pulls the Z lines closer and shortens the sarcomere.(1)

This occurs to sacromeres throughout the muscle cells causing the muscle to contract. (1)

b. The mitochondria produce the ATP needed (1)

c. Muscle origin(1)= end of muscle attached to bone that does not move during muscle contraction(1).

Muscle insertion (1)= the end of the muscle attached to the bone that does move during muscle contraction(1)

Tissue= Tendon(1)