

Reproduction

What is sexual reproduction, and what are the gametes in animals and flowering plants?

Reproduction

What is asexual reproduction?

Reproduction

Which type of cell division makes identical cells, and which makes non-identical cells?

Reproduction

Describe what happens when a cell divides by meiosis.

Reproduction

How do meiosis and fertilisation keep the chromosome number the same from one generation to the next?

Reproduction **Triple only**

Give two advantages of sexual reproduction.

Reproduction **Triple only**

Give three advantages of asexual reproduction.

Reproduction **Triple only**

How do malarial parasites reproduce?

Reproduction with only one parent, no fusion of gametes and no mixing of genetic information. Offspring are genetically identical clones. Only mitosis is involved.

The joining (fusion) of male and female gametes: sperm and egg in animals, pollen and egg in flowering plants. Genetic information is mixed, giving variety in the offspring.

Copies of the genetic information are made, then the cell divides twice to form four gametes, each with a single set of chromosomes and all genetically different.

Mitosis makes identical cells. Meiosis makes non-identical cells.

It produces variation in the offspring, which gives a survival advantage if the environment changes. Selective breeding can speed up natural selection to increase food production.

Meiosis halves the number of chromosomes in gametes. Fertilisation restores the full number. The new cell divides by mitosis and, as the embryo develops, cells differentiate.

Asexually in the human host, but sexually in the mosquito.

Only one parent needed; more time and energy efficient (no mate needed); faster; many identical offspring when conditions are favourable.

Reproduction **Triple only**

Give an example of a fungus and a plant that reproduce both sexually and asexually.

Reproduction

Describe the structure of DNA.

Reproduction

What is a gene?

Reproduction

What is the genome?

Reproduction

Give three reasons why understanding the human genome is important.

Reproduction **Triple only**

What is a nucleotide?

Reproduction **Triple only**

What are the four bases in DNA, and how many code for an amino acid?

Reproduction **Triple only** **Higher tier**

Which bases pair together on complementary DNA strands?

A polymer made of two strands forming a double helix, contained in chromosomes in the nucleus.

Many fungi: asexual by spores, sexual to give variation. Plants: seeds (sexual); runners in strawberry plants or bulb division in daffodils (asexual).

The entire genetic material of an organism.

A small section of DNA on a chromosome that codes for a particular sequence of amino acids, to make a specific protein.

The repeating unit of DNA: a common sugar and phosphate group with one of four bases attached to the sugar. The strands have alternating sugar and phosphate sections.

Searching for genes linked to disease; understanding and treating inherited disorders; tracing human migration patterns from the past.

C always links to G, and T always links to A.

A, C, G and T. A sequence of three bases codes for a particular amino acid. The order of bases controls the order of amino acids.

Reproduction **Triple only** **Higher tier**

Give a simple description of protein synthesis.

Reproduction **Triple only** **Higher tier**

What happens when a protein chain is complete?

Reproduction **Triple only** **Higher tier**

How can a mutation change a protein?

Reproduction **Triple only** **Higher tier**

What is the role of non-coding DNA?

Reproduction

Define allele.

Reproduction

What is the difference between a dominant and a recessive allele?

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What do homozygous and heterozygous mean?

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What is the difference between genotype and phenotype?

It folds up to form a unique shape, which lets it do its job, for example as an enzyme, a hormone or a structure such as collagen.

Proteins are made on ribosomes according to a template. Carrier molecules bring specific amino acids to add to the growing chain in the correct order.

Non-coding parts of DNA can switch genes on and off, so variants there may change how genes are expressed.

It changes the base order, so the amino acid order may change. A few mutations alter the protein's shape, so an enzyme may not fit its substrate or a structural protein loses strength.

A dominant allele is always expressed, even if only one copy is present. A recessive allele is only expressed if two copies are present.

A different form of the same gene.

Genotype is the alleles present. Phenotype is how the characteristic is expressed.

Homozygous: two alleles the same for a trait. Heterozygous: two different alleles.

Reproduction

Give two examples of characteristics controlled by a single gene. Are most characteristics like this?

Reproduction

What ratio of phenotypes do you expect from a cross between two heterozygous parents?

Reproduction **Higher tier**

Construct a Punnett square for $Bb \times bb$. What is the probability of a bb offspring?

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In a family tree, two parents without a trait have a child with the trait. What does this show?

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Which disorder is caused by a dominant allele: polydactyly or cystic fibrosis?

Reproduction

Give issues to consider about embryo screening.

Reproduction

What are the human sex chromosomes?

Reproduction

What is the chance that a baby is a girl or a boy, and why?

3 dominant : 1 recessive, so a probability of 1 in 4 (25%) for the recessive phenotype.

Fur colour in mice and red-green colour blindness in humans. No, most are the result of multiple genes interacting.

The trait is recessive and both parents are heterozygous carriers.

Gametes B, b and b, b. Offspring Bb, Bb, bb, bb. Probability of bb = 2 in 4 = $\frac{1}{2}$ (50%).

It may alleviate suffering, but embryos are destroyed and there are economic, social and ethical concerns. Gene therapy research also raises ethical issues.

Polydactyly (extra fingers or toes) is caused by a dominant allele. Cystic fibrosis, a disorder of cell membranes, is caused by a recessive allele.

50% each (1 : 1). All eggs carry X; half the sperm carry X and half carry Y.

Females XX, males XY. Humans have 23 pairs of chromosomes; 22 pairs control characteristics only.