Year 11

Biology booklet

Topic 1 – Variation, Inheritance and Evolution

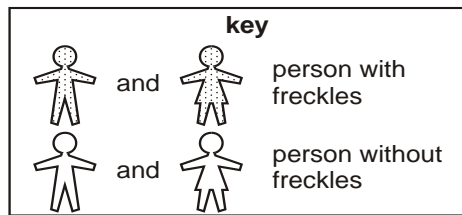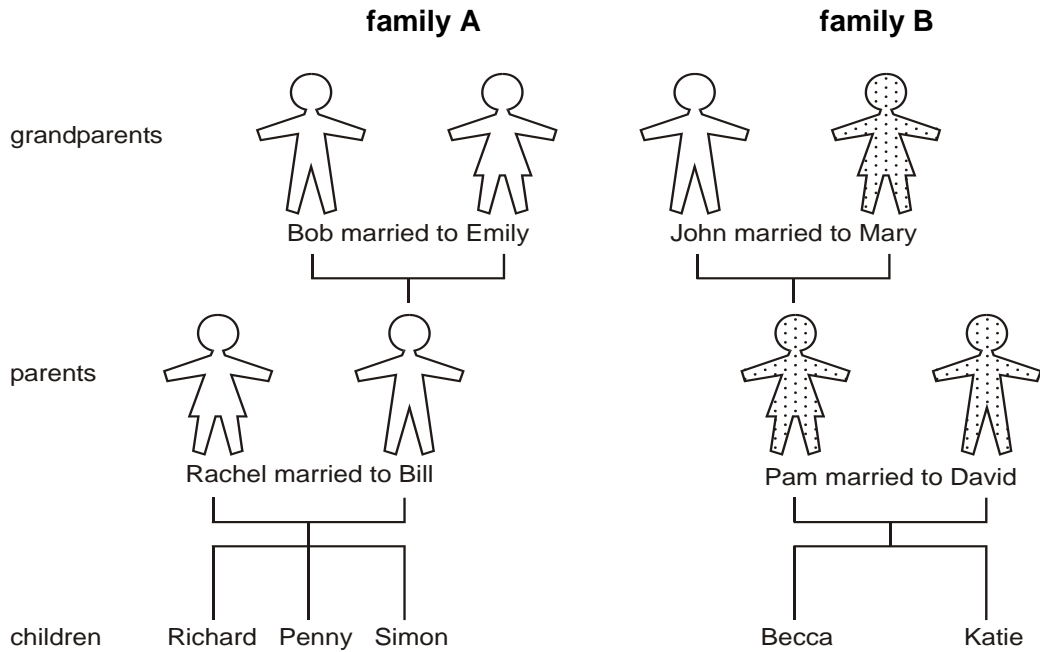Name: _____

Variation, Inheritance and Evolution

Give a definition for each of these key words:

Variation	
Sexual reproduction	
Asexual reproduction	
DNA	
Nucleotide	
Chromosome	
Gene	
Allele	
Mitosis	
Meiosis	
Clone	
Gamete	
Embryo	
Inheritance	
Genetic cross	
Mutation	
Genetic engineering	
Evolution	
Natural selection	
Extinction	

Chromosomes and inheritance

1. The diagram shows two families. Some of the people in the diagram have freckles.

family A   **family B**

grandparents

Bob married to Emily   John married to Mary

parents

Rachel married to Bill   Pam married to David

children   Richard Penny Simon   Becca   Katie

key

and   person with freckles

and   person without freckles

(a) (i) Which children are most likely to have freckles? Tick the correct boxes.

Richard   Simon   Katie   Penny   Becca

(ii) How did you decide?

....

....

(iii) Becca does not have freckles. What does this suggest?

....

....

Fill in the Punnett squares below for plants with red and white flowers given the following alleles.

Red - R

White – w
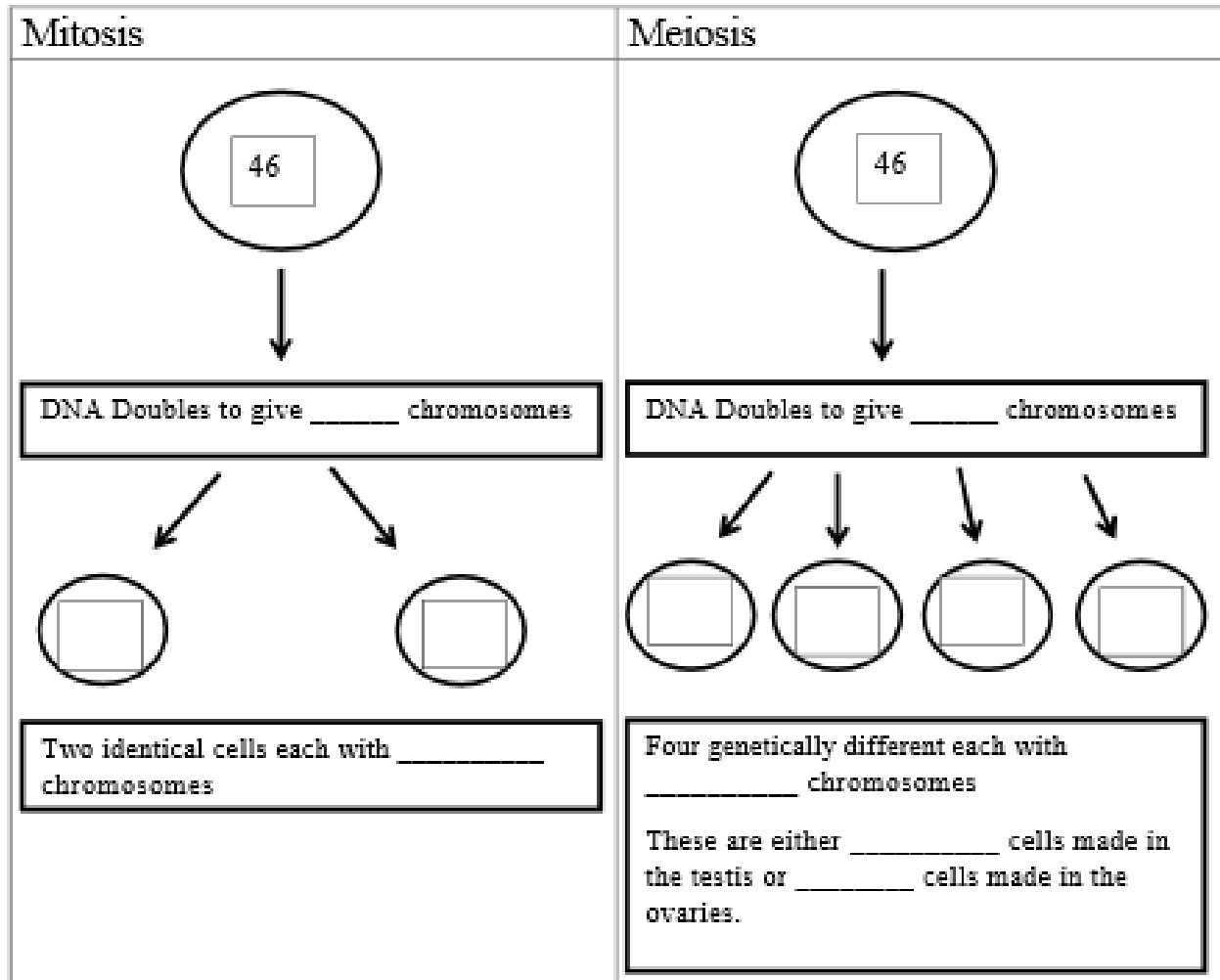
What does the capital letter tell us? _____

	R	R
R		
W		

	R	w
R		
W		

Add in the percentages for the phenotypes (red or white flowers) for each Punnett square

Explain the difference between genotype and phenotype giving an example of each.

Mitosis and Meiosis

Mitosis	Meiosis
 46 DNA Doubles to give _____ chromosomes Two identical cells each with _____ chromosomes	 46 DNA Doubles to give _____ chromosomes Four genetically different each with _____ chromosomes These are either _____ cells made in the testis or _____ cells made in the ovaries.

Comparison of Mitosis and Meiosis

	Mitosis	Meiosis
Role		
Number of cells produced from the parent cell.		
Chromosome Number in new cells		

Genetic engineering

Consequence of genetic engineering	Advantage	Disadvantage
Genetic engineering borderlines on many moral issues, particularly involving religion, which questions whether man has the right to manipulate the laws and course of nature.		
Disease could be prevented by detecting people/plants/animals that are genetically prone to certain hereditary diseases, and preparing for the inevitable.		
Animals and plants can be 'tailor made' to show desirable characteristics. Genes could also be manipulated in trees for example, to absorb more CO_2 and reduce the threat of global warming.		
Infectious diseases can be treated by implanting genes that code for antiviral proteins specific to each antigen.		
Nature is an extremely complex inter-related chain consisting of many species linked in the food chain. Some scientists believe that introducing genetically modified genes may have an irreversible effect with consequences yet **unknown**.		
Genetic Engineering could increase genetic diversity, and produce more variant alleles which could also be crossed over and implanted into other species. It is possible to alter the genetics of wheat plants to grow insulin for example.		

Evolution - Darwin vs Lamarck

Highlight which of the options below support Darwin and which support Lamarck (it may be the same for both!):

Inherit needed characteristics

Inherit surviving characteristics

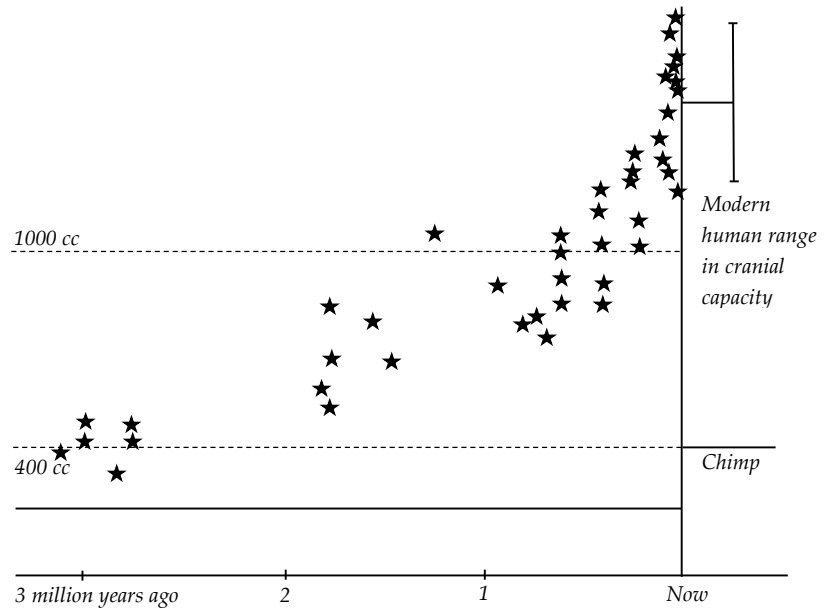Selective pressure / No selective pressure

Extinction / No Extinction

Variation / No Variation

Genes / No genes

Why is Darwin generally believed rather than Lamarck? _____

_____

_____

_____

Human Evolution

Each point on this graph shows the brain size of a fossil human ancestor.

The size of the brain is on the y-axis.
The age of the fossil is on the x-axis.

1000 cc

400 cc

Modern human range in cranial capacity

Chimp

3 million years ago   *2*   *1*   *Now*

---

1. Describe the trend shown in this data

2. Scientists have a theory that a larger brain gave early humans a better chance of survival. Explain whether or not you think the data supports this theory.

3. Give a reason why the data does not prove the theory.

4. Imagine that another very old fossil is found. This fossil has a very large brain size. Explain why this makes scientists less confident in the theory.

   Explain why the find does not disprove the theory.
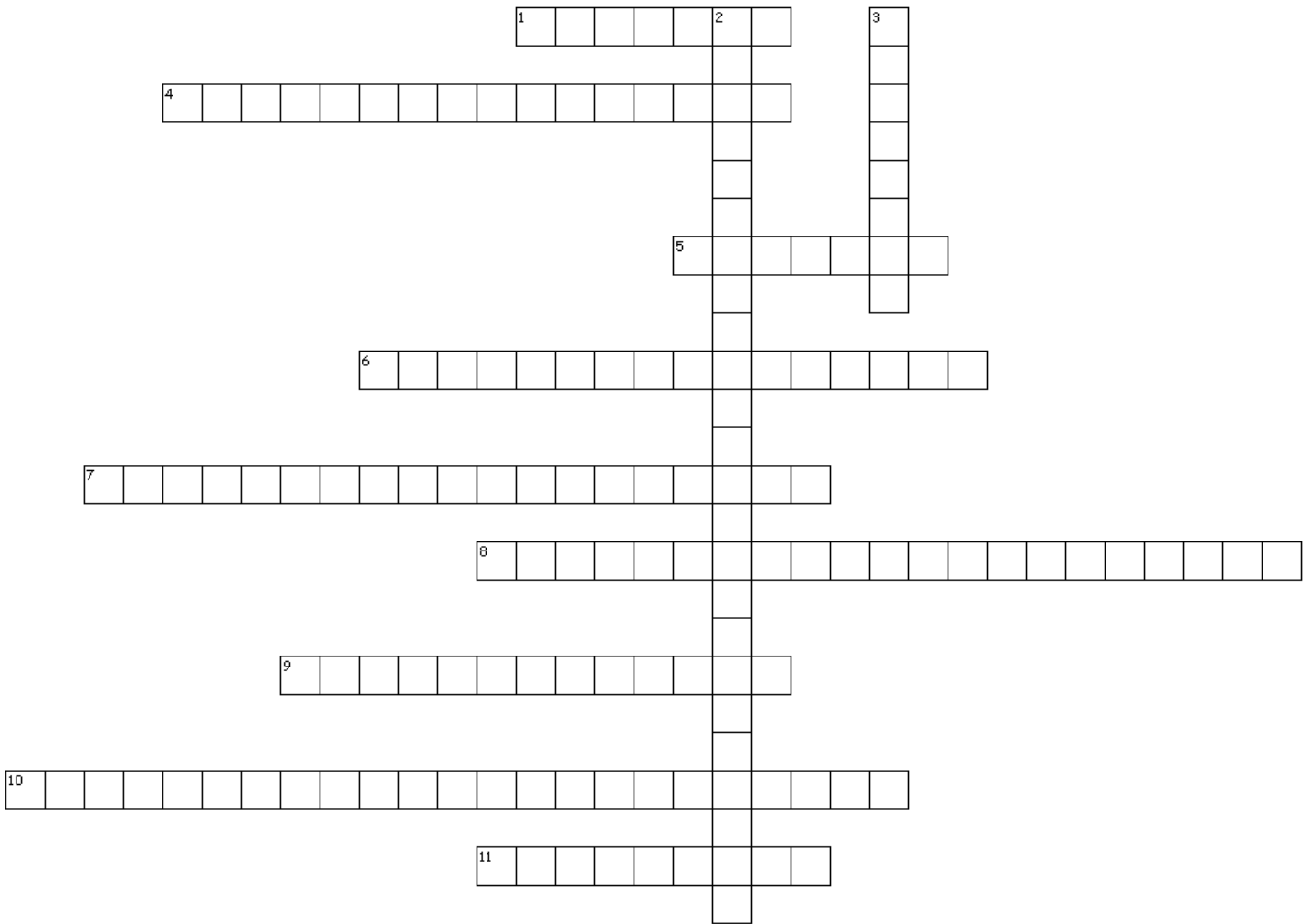
Across

1. A group of organisms with many features in common which can breed successfully producing fertile offspring. (7)

4. The process by which evolution takes place. Organisms produce more offspring than the environment can support so only those which are most suited to their environment – the 'fittest' – will survive to breed and pass on their useful characteristics. (7,9)

5. The highest group in the classification system, e.g. animals, plants. (7)

6. Model of the evolutionary relationships between different organisms based on their appearance, and increasingly, on DNA evidence. (12,4)

7. French biologist who developed a theory based on the inheritance of acquired characteristics. (4,8,7)

8. Classification system based on the similarities between different living organisms. (7,14)

9. The Victorian scientist who developed the theory of evolution by a process of natural selection. (7,6)

10. Jean-Baptiste Lamarck's theory of how evolution took place. (8,15)

11. The process of slow change in living organisms over long periods of time as those best adapted to survive and breed successfully. (9)

Down

2. Model of the relationships between organisms, often based on DNA evidence, which suggest how long ago they evolved away from each other and how closely related they are in evolutionary terms. (12,12)

3. A change in the genetic material of an organism. (8)