

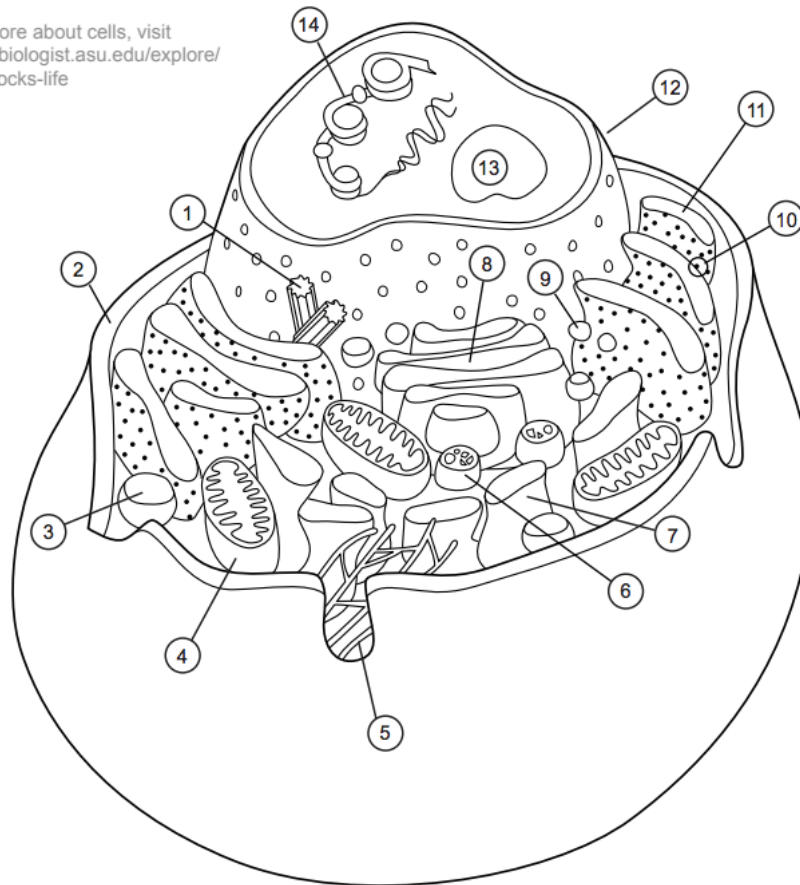
Biology



THE SIXTH FORM
AT WOODHOUSE GROVE

Cells : This is a diagram of an animal cell:

To learn more about cells, visit
<http://askabiologist.asu.edu/explore/building-blocks-life>



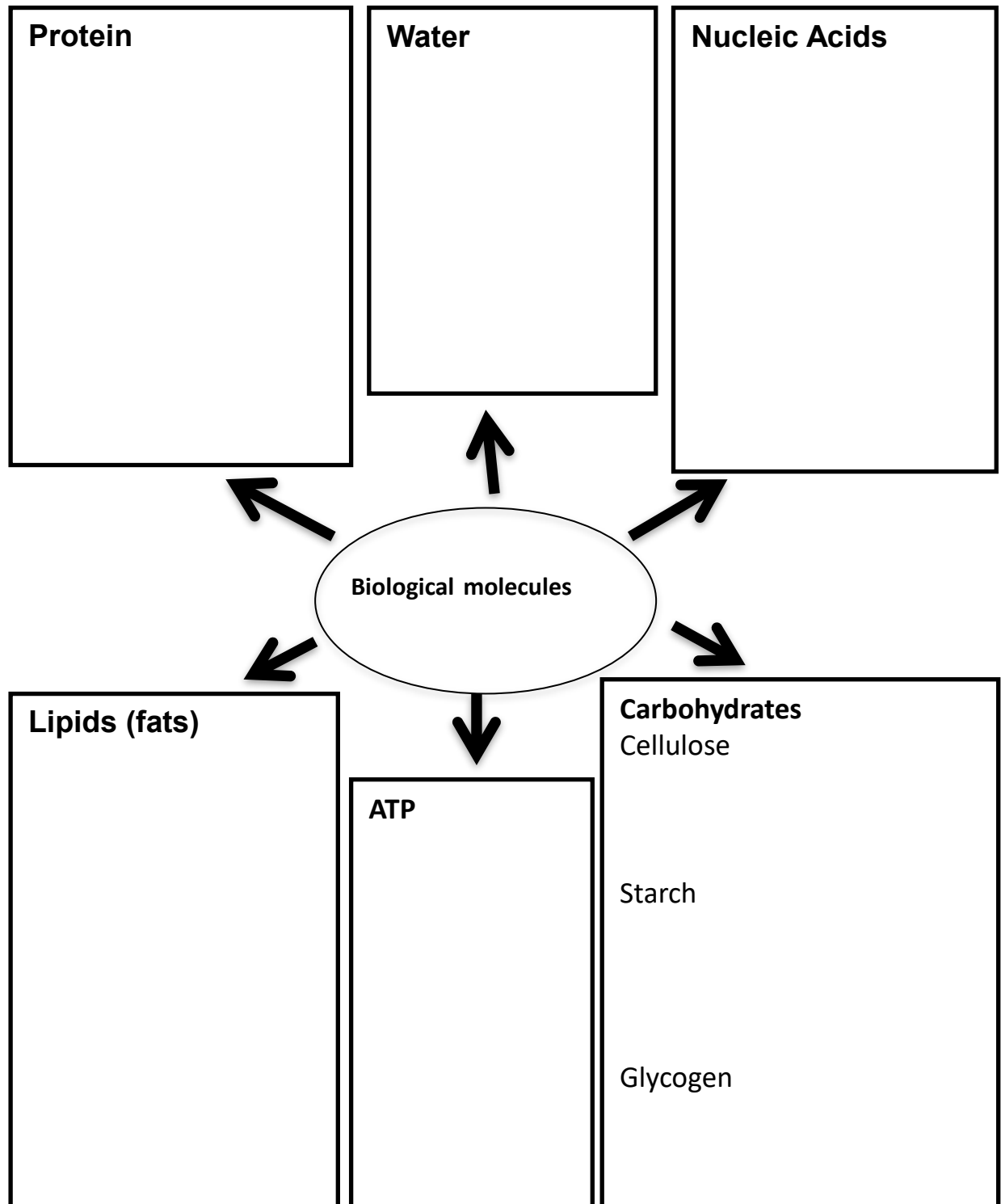
Organelle	Colour	Function	Organelle	Colour	Function
1. Centrioles			8. Golgi Apparatus		
2. Plasma membranes			9. Vesicles		
3. Peroxisomes			10. Ribosomes		
4. Mitochondria			11. Rough Endoplasmic reticulum		
5. Cytoskeleton			12. Nucleus		
6. Lysosomes			13. Nucleolus		
7. Smooth Endoplasmic reticulum			14. DNA		

Task 1: Colour the diagram of a eukaryotic animal cell above. Choose a colour and colour in the box next to the name of the organelle, then colour in the organelle in the diagram above the same colour. Research the function of each organelle and write this in the table.

Biochemistry: what do you know about biological molecules?

There are six biological molecules that you will learn about in the first term of your A-level biology course. Four are macromolecules and two are small molecules. You have encountered all but one of the molecules before.

Task 2: Research the different types of biological molecules. What different functions do they have in cells and tissues. What are they composed of? How does their structure relate to their properties and therefore function? How can we identify them?



1. Case study: Lactose intolerance

Some of you took part in a practical lesson earlier in the year which involved immobilising enzymes using alginate balls and processing milk to make it safe for cats to drink. Cats are lactose intolerant!

Watch the video below and answer the questions below in full sentences on a separate piece of paper. Use the figures below to help.



<https://www.youtube.com/watch?v=MA9bol1qTuk>

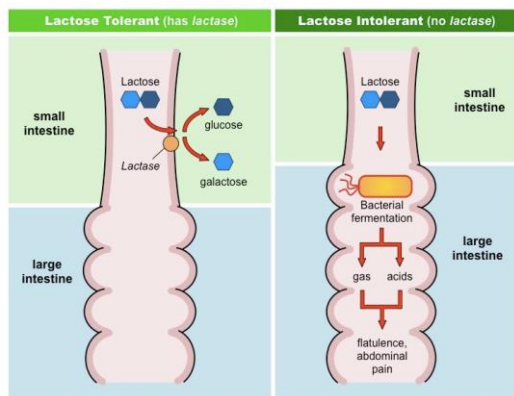


Figure 1

Lactose breakdown

Only one-third of adults can digest milk. The rest stop making the enzyme needed to process milk sugar

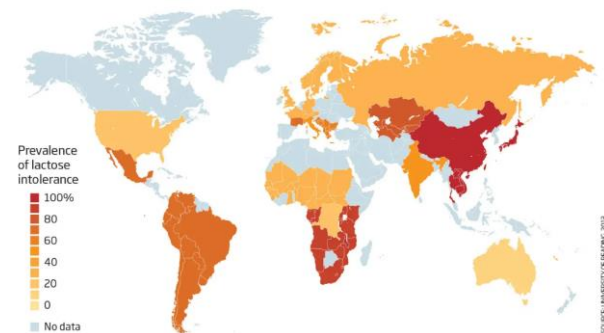


Figure 2

Table 2 Frequencies of the lactase persistence allele (*LCT*-13910C>T) reported in African countries

Country and/or population	Allele frequency (%)	Reference
Cameroon (Fulbe)	11.2, 21, 39	24,17,25
Mali (Fulbe)	37	26
South Africa (Xhosa mixed)	21.8	27
Morocco	17.3	7
Cameroon (Hausa)	13.9	24
Cameroon (agricultural)	4.3	24
São Tomé	4	17
Somalia	3.2	7
Senegal	2.6	24
Mozambique	1	17
Ethiopia	1.9	28
(Somali camel herders)		
Nigeria	0	24
Malawi	0	24
Sudan (north and south)	0	24
Ethiopia	0	24
Uganda	0	24

1. State what lactose is and identify the source of it in the diet? (2)
2. What is lactose intolerance? (1)
3. Describe and explain the symptoms of lactose intolerance. (6)
4. What causes lactose intolerance? (4)
5. Which ethnic groups are more at risk from lactose intolerance? (1)
6. What is the difference for the percentage of the population with the lactose persistence allele frequency between Sweden and Somalia? (1)
7. Explain the differences in the lactose persistence allele frequency in Sweden and Somalia using your knowledge of natural selection. (6)

2. Case Study: Rickets

Follow the links below to find out more about this significant and current health problem:

<http://news.bbc.co.uk/1/hi/health/8570542.stm>

<https://www.bbc.co.uk/news/av/uk-england-shropshire-41859863/my-baby-son-died-after-developing-rickets-telford-mother>

Rickets is a condition that affects bone development in children. It causes bone pain, poor growth and soft, weak bones that can lead to bone deformities.

Adults can experience a similar condition, which is known as osteomalacia or soft bones.

Read more about the [signs and symptoms of rickets and osteomalacia](#).

What causes rickets?

A lack of [vitamin D](#) or [calcium](#) is the most common cause of rickets. Vitamin D largely comes from exposing the skin to sunlight, but it's also found in some foods, such as oily fish and eggs. Vitamin D is essential for the formation of strong and healthy bones in children.

In rare cases, children can be born with a genetic form of rickets. It can also develop if another condition affects how vitamins and minerals are absorbed by the body.

Read more about the [causes of rickets](#).

Who's affected?

Rickets was common in the past, but it mostly disappeared in the western world during the early 20th century after foods like margarine and cereal were fortified with vitamin D.

However, in recent years, there's been an increase in cases of rickets in the UK. The number of rickets cases is still relatively small, but studies have shown a significant number of people in the UK have low levels of vitamin D in their blood.

Any child who doesn't get enough vitamin D or calcium either through their diet, or from sunlight, can develop rickets. But the condition is more common in children with dark skin, as this means they need more sunlight to get enough vitamin D, as well as children born prematurely or taking medication that interferes with vitamin D. The more melanin in the skin the more sunlight is needed to produce enough vitamin D this can be a problem as you move away from the equator in either direction as the intensity of light decreases.

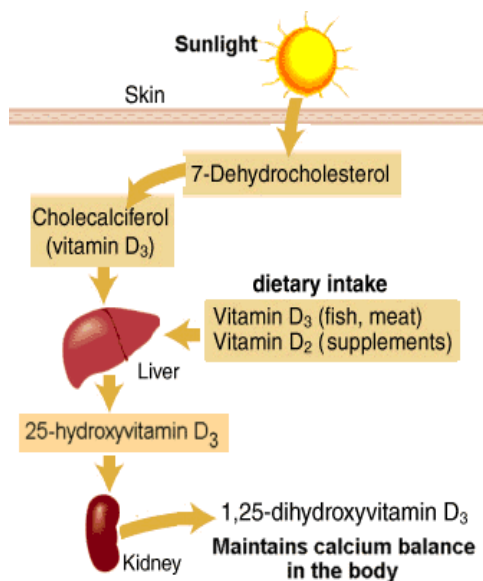


Figure 1 How sunlight is linked to calcium uptake



Figure 2 Dark skinned pregnant mothers in the UK at risk

Task:

Create a health promotion campaign video and poster to raise awareness of the risk of rickets in British black and Asian populations. Hopefully it will lead to less cases of rickets and money saved by NHS due to not having to treat rickets as much.

The poster can be displayed on buses and bus shelters in areas with large ethnic minority populations and the video can be played on TV.



England

It should:

1. Be three minutes long
2. Explain what Rickets is and provides some data as to the incidence of it.
3. Advise who is at risk and why.
4. Give advice on how to reduce the risk of developing rickets.

You could use stop motion or screen recording if you are shy or if feeling brave film yourself presenting. It needs to engage the viewer, meet the aims and have accurate science on it. The best will be shared on school social media and win a prize!