



Glenlola Collegiate School
excellence through commitment, contribution and caring

Diet & Nutrition

LEARNING OUTCOMES

ALL MUST...

- Understand the idea of a balanced diet

Starter activity

- Use the white board to jot down all the things that your body uses food for.
- Share with your pair
- Share with the class



Functions of Food

ENERGY

GROWTH

PROTECTION

Tim & Moby Why we Eat

A balanced diet requires the correct food groups in the correct amounts as each has a specific function in the body

These include:

- **CARBOHYDRATES**
- **FATS**
- **PROTEINS**
- **VITAMINS**
- **MINERALS**
- **FIBRE**
- **WATER**

STARVATION

- Starvation occurs when **the body is using more energy than the diet is supplying.**



MALNUTRITION

The **correct quantity** of food is eaten, but it may consist of only one food type, or a **poor balance**.



Starter activity

- Read the ingredients for a common food listed on the next slide.
- Would you eat this food?
- Why?
- Can you guess what the food is?



INGREDIENTS: WATER (75%), **SUGARS** (12%) (GLUCOSE (48%), FRUCTOSE (40%), SUCROSE (2%), MALTOSE (<1%)), STARCH (5%), FIBRE E460 (3%), **AMINO ACIDS (<1%)** (GLUTAMIC ACID (19%), ASPARTIC ACID (16%), HISTIDINE (11%), LEUCINE (7%), LYSINE (5%), PHENYLALANINE (4%), ARGININE (4%), VALINE (4%), ALANINE (4%), SERINE (4%), GLYCINE (3%), THREONINE (3%), ISOLEUCINE (3%), PROLINE (3%), TRYPTOPHAN (1%), CYSTINE (1%), TYROSINE (1%), METHIONINE (1%)), **FATTY ACIDS (1%)** (PALMITIC ACID (30%), OMEGA-6 FATTY ACID: (LINOLEIC ACID (14%), OMEGA-3 FATTY ACID (LINOLENIC ACID (8%), OLEIC ACID (7%), PALMITOLEIC ACID (3%), STEARIC ACID (2%), LAURIC ACID (1%), MYRISTIC ACID (1%), CAPRIC ACID (<1%)), ASH (<1%), PHYTOSTEROLS, E515. OXALIC ACID, E300, E306 (TOCOPHEROL), PYLLOQUINONE, THIAMINE, **COLOURS** (YELLOW-ORANGE E101, (RIBOFLAVIN), YELLOW-BROWN E160a), **FLAVOURS** (3-METHYLBUT-1-YL, ETHANOATE, 2-METHYLBUTYL ETHONOATE, 2-METHYLPROPAN-1-OL, 3-METHYLBUTYL-1-OL, 2-HYDROXY-3-METHYLETHYL BUTANOATE, 3-METHYLBUTANAL, ETHYL HEXANOATE, ETHYL BUTANOATE, PENYL ACETATE), 1510, NATURAL RIPENING AGENT (ETHENE GAS).

AN ALL-NATURAL BANANA



INGREDIENTS: WATER (75%), **SUGARS (12%)** (GLUCOSE (48%), FRUCTOSE (40%), SUCROSE (2%), MALTOSE (<1%)), STARCH (5%), FIBRE E460 (3%), **AMINO ACIDS (<1%)** (GLUTAMIC ACID (19%), ASPARTIC ACID (16%), HISTIDINE (11%), LEUCINE (7%), LYSINE (5%), PHENYLALANINE (4%), ARGININE (4%), VALINE (4%), ALANINE (4%), SERINE (4%), GLYCINE (3%), THREONINE (3%), ISOLEUCINE (3%), PROLINE (3%), TRYPTOPHAN (1%), CYSTINE (1%), TYROSINE (1%), METHIONINE (1%)), **FATTY ACIDS (1%)** (PALMITIC ACID (30%), OMEGA-6 FATTY ACID: LINOLEIC ACID (14%), OMEGA-3 FATTY ACID: LINOLENIC ACID (8%), OLEIC ACID (7%), PALMITOLEIC ACID (3%), STEARIC ACID (2%), LAURIC ACID (1%), MYRISTIC ACID (1%), CAPRIC ACID (<1%)), ASH (<1%), PHYTOSTEROLS, E515, OXALIC ACID, E300, E306 (TOCOPHEROL), PHYLLOQUINONE, THIAMIN, **COLOURS** (YELLOW-ORANGE E101 (RIBOFLAVIN), YELLOW-BROWN E160a), **FLAVOURS** (3-METHYLBUT-1-YL ETHANOATE, 2-METHYLBUTYL ETHANOATE, 2-METHYLPROPAN-1-OL, 3-METHYLBUTYL-1-OL, 2-HYDROXY-3-METHYLETHYL BUTANOATE, 3-METHYLBUTANAL, ETHYL HEXANOATE, ETHYL BUTANOATE, PENTYL ACETATE), 1510, NATURAL RIPENING AGENT (ETHENE GAS).

RESEARCH ACTIVITY

- a simple carbohydrates
- b complex carbohydrates
- c fats
- d proteins
- e vitamins
- f minerals
- g fibre
- h water

SUCCESS CRITERIA:

a-d: elements, component parts, use in the body, food rich in this group

e-f: use in the body
food rich in this group;
deficiency disease

g-h: use in the body; where do we get it/food rich in this group, problems if it is missing from the diet.

LEARNING OUTCOMES

ALL MUST...

- Know the principal elements present in carbohydrates, fats and proteins.

LEARNING OUTCOMES

ALL MUST...

Know the sources and functions of:

- simple carbohydrates (sugars, glucose and lactose);
- complex carbohydrates (cellulose, glycogen and starch);
- fats (fatty acids and glycerol);
- proteins (amino acids);

LEARNING OUTCOMES

ALL MUST...

Know the sources and functions of:

- Fibre
- Water

FIBRE

- **WHERE WE GET IT**

cellulose cell walls of plants,
that we cannot digest

- **WHAT IT IS USED FOR**

helps food to keep moving through the
digestive system

- **WHAT HAPPENS IF IT IS DEFICIENT**

constipation, bowel cancer

WATER

- **WHERE WE GET IT**

Food and drink we ingest

- **WHAT IT IS USED FOR**

transport in the blood,

as a component of the cytoplasm and
body fluids,

as a solvent in our cells,

to regulate body temperature,

excretion (sweat / urine),

chemical reactions in cells

carbohydrates, C, H, O

made up of sugars

simple carbohydrates:

e.g.

Glucose in jam, biscuits, fizzy drinks

Lactose in milk & dairy products

Use: energy release

complex carbohydrates:

glycogen, we make it in liver & muscle cells
from glucose

Use: energy storage

starch, in bread, pasta, rice

Use: energy release

cellulose, in fruit and vegetables

Use: fibre

fats C, H, O

made from **fatty acids** and **glycerol**
animal fats are solid e.g. butter
plant fats are liquids e.g. olive oil

Use: **insulation**, **protection**,
energy storage

proteins C, H, O, N

made from amino acids

Animal protein e.g. eggs, meat, fish

Plant protein e.g. nuts, pulses

Use: growth and repair

LEARNING OUTCOMES

ALL MUST...

Know the sources and functions of:

- vitamins C and D (deficiency symptoms);
- minerals (iron and calcium and their deficiency symptoms)

vitamins

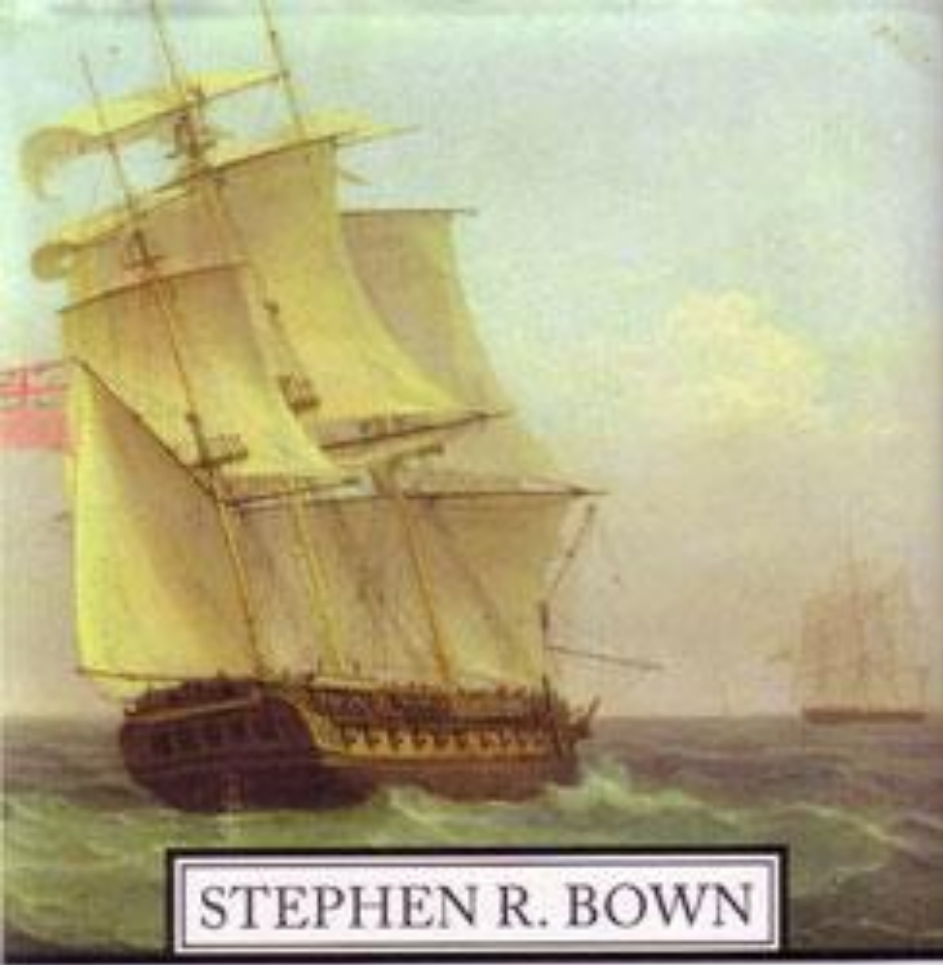
Needed in only very small amounts and are important in maintaining our general health

vitamin C



- Found in **fresh vegetables** and **citrus fruit**
- It is needed to **maintain blood vessels**,
and for **development of teeth and gums**
- A deficiency of vitamin C leads to **scurvy** (sore gums and bleeding around bones and from the intestine)





STEPHEN R. BOWN

SCURVY



How a Surgeon, a Mariner, and a Gentleman Solved the Greatest Medical Mystery of the Age of Sail

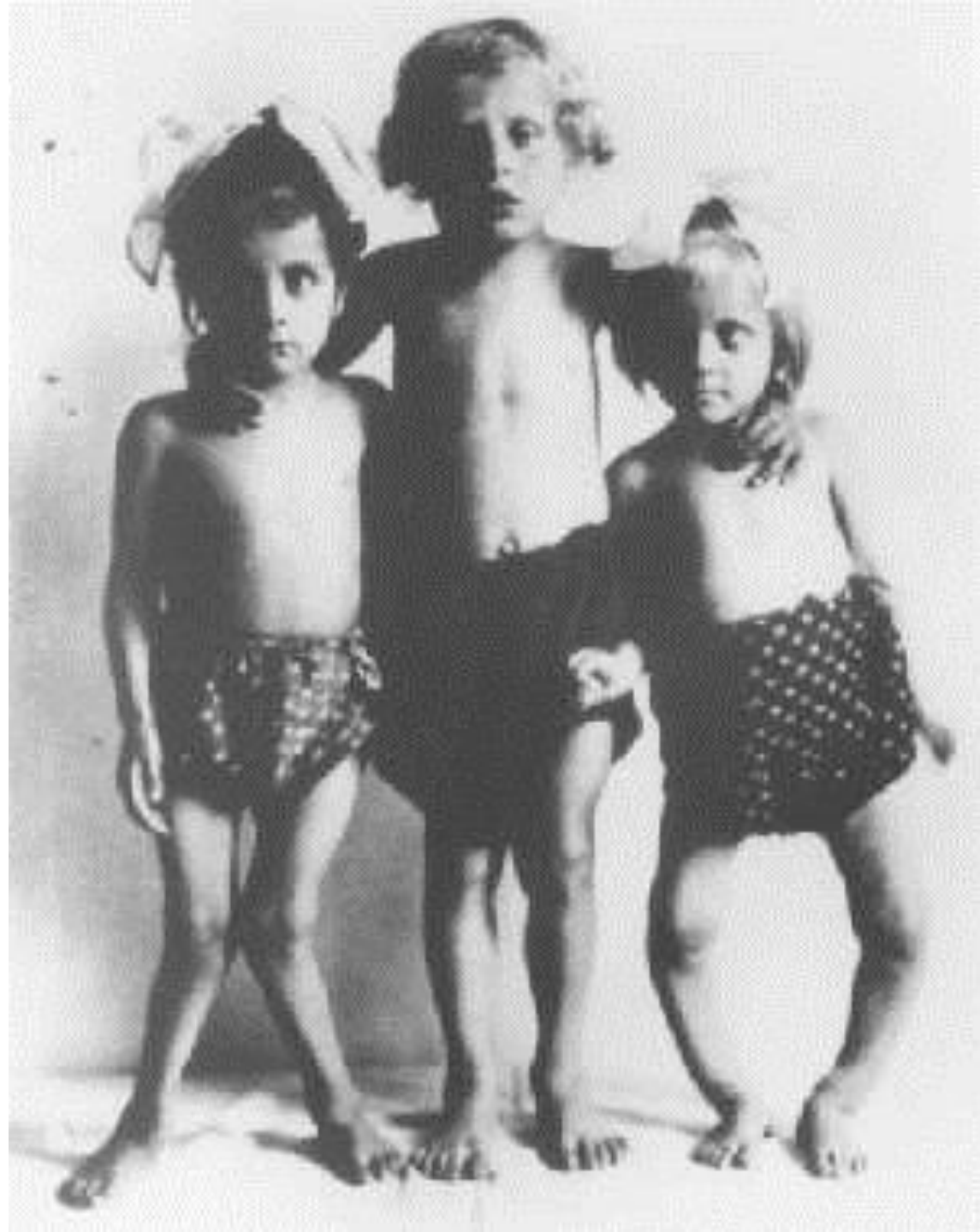


© Ivan Bilek www.naturfoto.cz



vitamin D

- Found in **fish liver oil, liver, milk, eggs**
- Made by the **skin** when exposed to sunlight
- Needed to regulate the use of calcium and phosphorus for **making bones and teeth**
- A deficiency of vitamin D leads to **RICKETS** (**soft bones that bend and dental decay**)



minerals

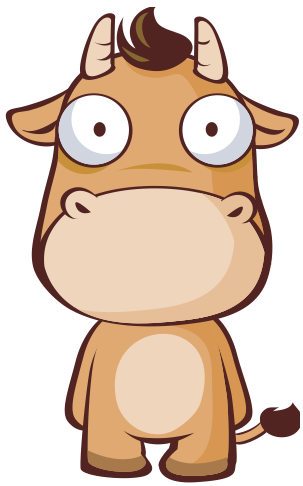
*Also needed in very
small amounts*



calcium

- Found in **milk & dairy products**
- Needed to **make bones and teeth**
- A deficiency leads to **poor development of bones and teeth**





i r o n



- Found in **red meat**
- Needed to make **haemoglobin** in **red blood cells**
- A deficiency of iron causes **anaemia**; **anaemic people have chronic fatigue**.
- because they have less haemoglobin to carry oxygen which is needed for respiration to release energy.

Tim & Moby Healthy Eating



A BALANCED DIET

[HTTP://LGFL.SK00OL.CO.UK/KEYSTAGE4.ASPX?ID=850](http://lgfl.skool.co.uk/keystage4.aspx?id=850)

CHOOSE BALANCED DIET

QUESTION 1, 2, 3 & 6

PAGE 9 & 10 BOOKLET



FOOD GROUPS

Fibre - prevents constipation
- from cellulose in plants.
- deficiency → constipation, bowel cancer ✓

Water - solvent in cells
uses → regulates body temp.
transport substances body
helps in excretion (poising)

Where from? food + drink
Deficiency → dehydration, where cells
shrink + stop working ✓

Simple Carbohydrates

Complex Carbohydrates

FATS

PROTEINS

Vitamin C + D

Mineral → calcium

Mineral → Iron

contains - animal hydrogen O₂
made up of - fatty acids + glycerol.

Examples - Animal fat - solid
+ - Plant oils - liquid
Functions - insulation, protection
energy storage.

Foods - Animal fats - butter,
lard. ✓
Plant oils - ~~lard~~.
olive oil. ✓

FATS

PROTEINS

Vitamin C + D

Mineral → calcium

Mineral → Iron

homework revision

LEARNING OUTCOMES

ALL MUST...

Describe how to carry out food tests and state the colour changes associated with each reagent:

- starch using Iodine solution: yellow/brown to blue/black
- reducing sugar using Benedict's reagent: blue to brick red precipitate
- amino acids & proteins using Biuret reagent: blue to purple
- fat using ethanol: clear to white emulsion

starch

Negative:
No change from
yellow/brown



Positive:
Blue/black





Positive:

Green, yellow/orange, brick red

**S
U
G
A
R**

**Negative:
No change from blue**



protein

copper
sulphate

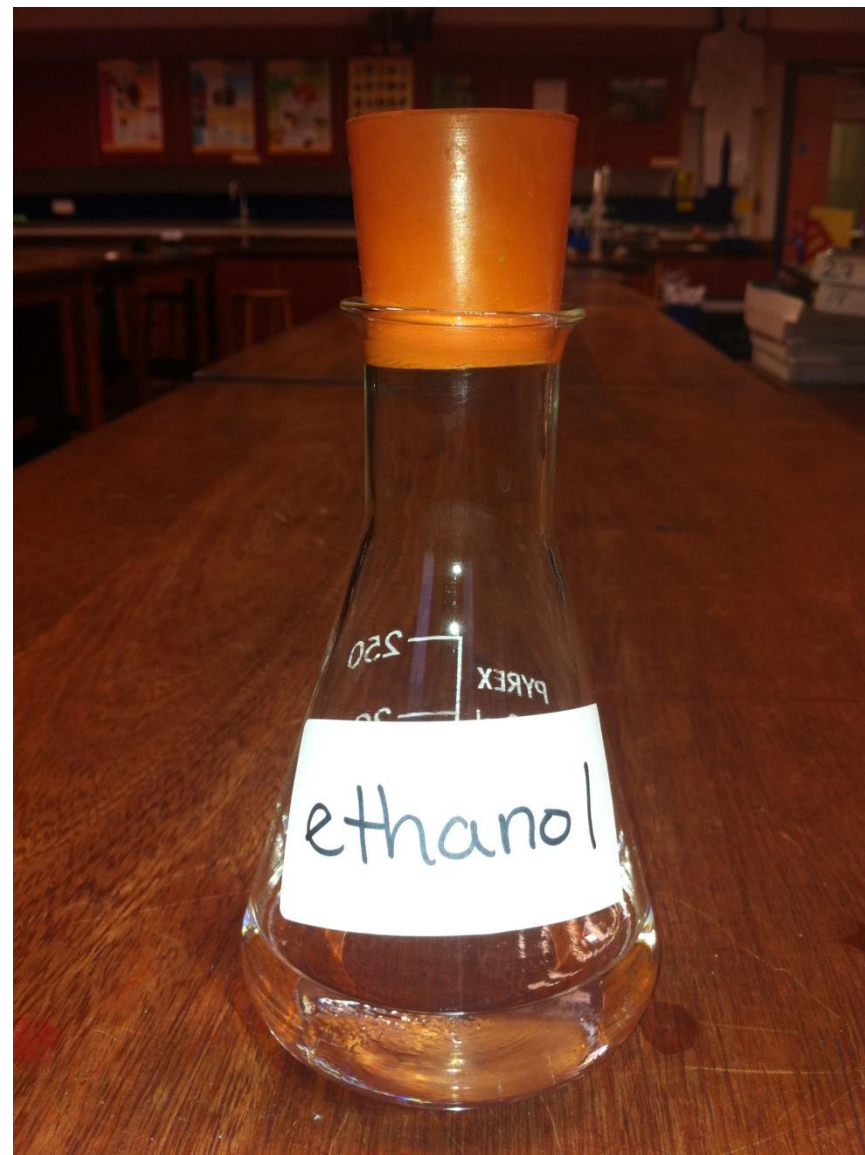
sodium
hydroxide



purple or mauve:
positive

negative:
no change from blue

Negative:
No change from clear





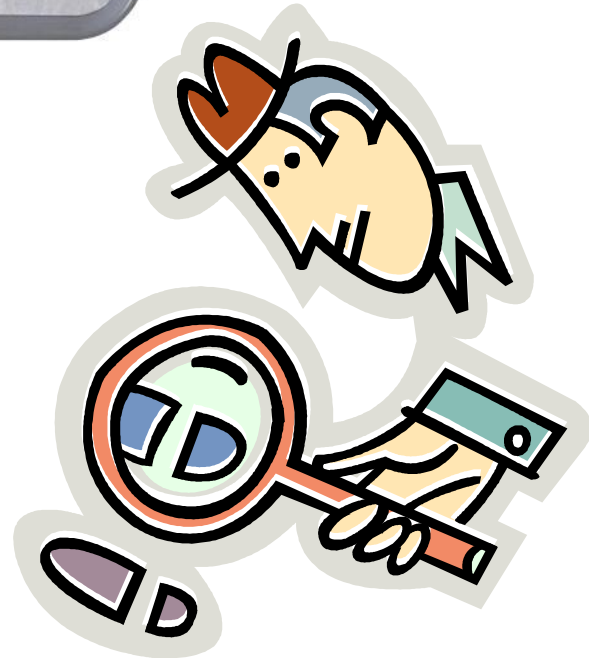
A BALANCED DIET

[HTTP://LGFL.SK00OL.CO.UK/KEYSTAGE4.ASPX?ID=850](http://lgfl.skool.co.uk/keystage4.aspx?id=850)

CHOOSE FOOD TESTS



CLUEDO ACTIVITY



QUESTION 4 & 5

PAGE 9 BOOKLET



LEARNING OUTCOMES

ALL MUST...

Describe how to test foods for Vitamin C using DCPIP

State the colour change from **blue** to **pink** then colourless for a positive test.



testing for vitamin C

vitamin C

turns

blue DCPIP

clear

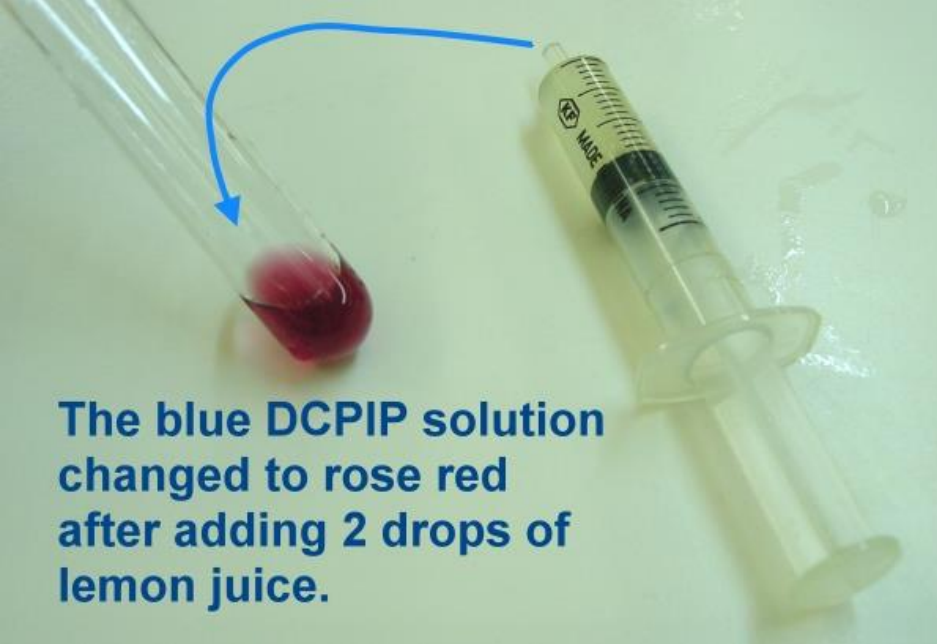
The **fewer drops** of **juice** added , the **more vitamin C** is present in the liquid.



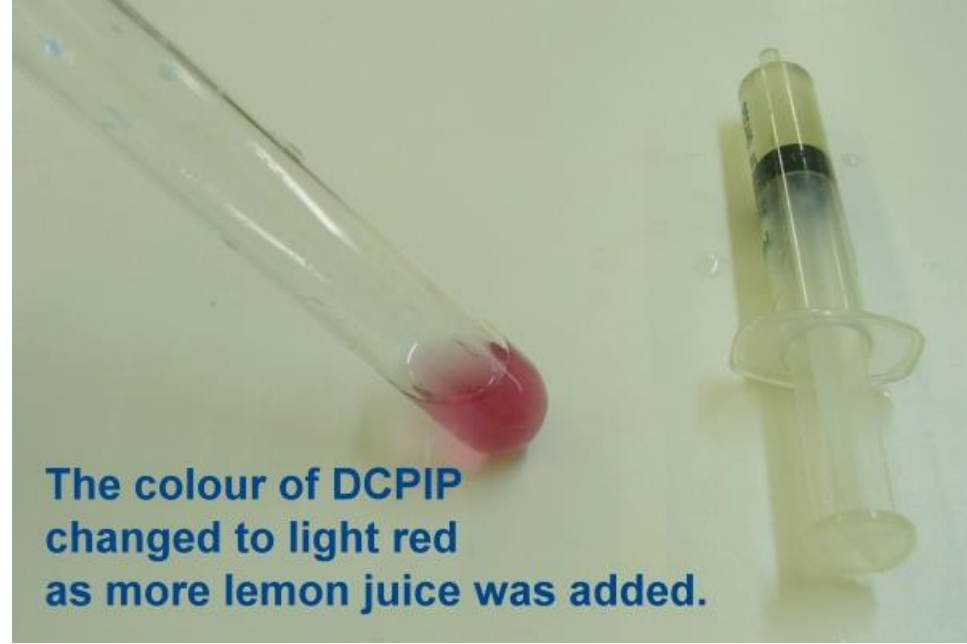
1 ml of DCPIP

**Lemon
juice in
a syringe**

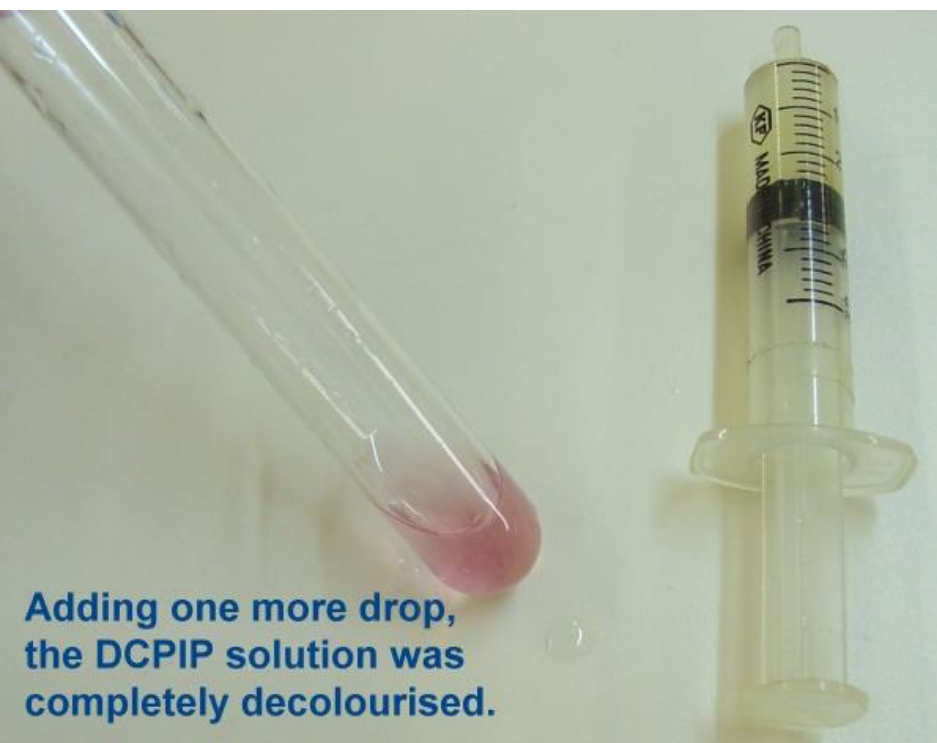




The blue DCPIP solution changed to rose red after adding 2 drops of lemon juice.



The colour of DCPIP changed to light red as more lemon juice was added.



Adding one more drop, the DCPIP solution was completely decolourised.



clear,
colourless
solution -
the end point !

The DCPIP solution was completely decolourised. The resultant solution was clear.

LEARNING OUTCOMES

SOME MAY...

- Calculate the vitamin C content of vegetable and fruit juices, (natural, processed and boiled) by comparing quantitatively to a standard solution of ascorbic acid (vitamin C)

practical



**investigating
vitamin C content
in orange juice**

See pupil booklet

Number of drops of juice needed to turn 1cm³ blue DCPIP Colourless

Test tube	1	2	3	4	5
Type of orange juice	Freshly Squeezed	Fresh carton	Unfresh carton	Heated carton	Ascorbic Acid
Volume of DCPIP / cm ³	1	1	1	1	1
Number of drops of juice					

- If the volume of fruit juice needed to decolorise DCPIP is greater than the volume of 0.1% ascorbic acid then the juice contains less than 0.1% Vitamin C.

- Which orange juice has the most vitamin C?
- Which orange juice has the least vitamin C?
Which orange juice/s contain more than 0.1% vitamin C?
- How does heating affect the amount of vitamin C?
- Why is it a good idea to drink carton juice within a few days of opening?
- Why do you think that there is often more vitamin C in carton juice than there is in freshly squeezed orange juice?

Other hypotheses to test

- Different types of fruit juice contain different concentrations of vitamin C
- Juice 'not made from concentrate' is best in terms of vitamin C content
- Fruit squashes have less vitamin C than fruit juices
- If heat destroys vitamin C, then heat-treated long-life juices will have lower concentrations

fair test

only one variable changed
all others remain the same

- The variable **changed** was the **treatment** of the Fruit Juice
- The number of drops of fruit juice needed to change the DCPIP from blue to clear **was measured**

- The **same volume** of DCPIP was used in each experiment
- The **same concentration** of DCPIP was used in each experiment
- The **same type** of juice was used

reliability

when repeated reliable data
will be of similar size

- Discuss the reliability of the class results
- Results that are far away from the others are called **anomalous results**
- Do you have any **anomalies**?

Validity

**results are not valid if
something cannot be controlled
and it affects the results**

- It was not possible to control the size of the drops of fruit juice using a dropper.

accuracy

**accurate results will be
measured precisely**

- Counting the number of drops of juice needed to decolourise the DCPIP is not accurate. A graduated syringe should be used for greater accuracy.

CCEA

model controlled assessment

examples

The investigations do not provide information about the concentration of vitamin C.

- Repeat, using a standard solution of ascorbic acid instead of juice. Compare the volumes. (The less the volume of juice needed, the more the vit C content).

YOUTUBE CLIP

I'M A CELEBRITY

Get Me Out Of Here!

STOP HERE

YEAR 10

LEARNING OUTCOMES

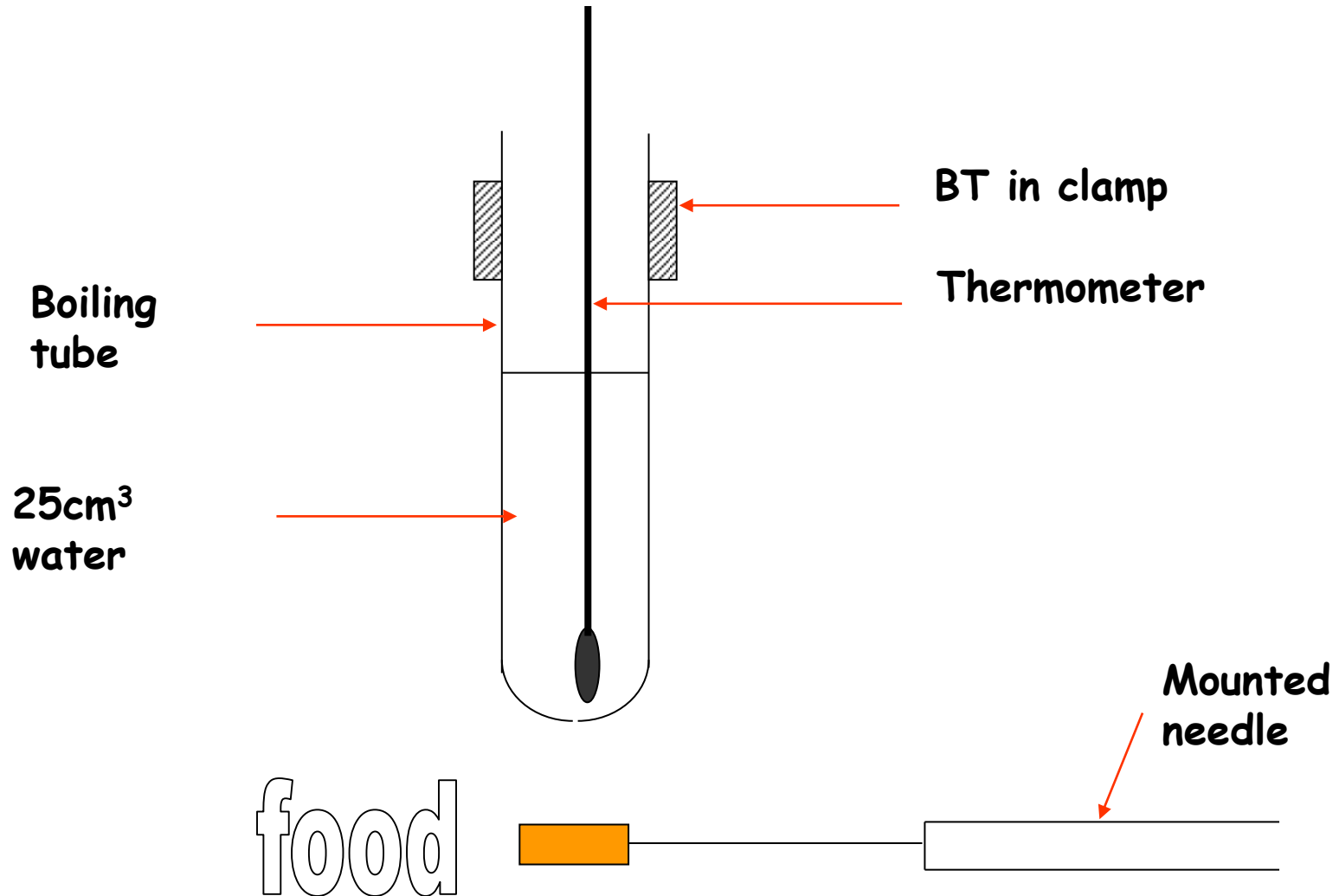
ALL MUST...

- Calculate the energy content of food by burning food samples,
- Compare their data with data from food labels,

SOME MAY...

- Evaluating the methods of data collection and their reliability and validity

Comparing the energy content of different foods (WS)



diamond
nine
cards

who needs most energy?

LEARNING OUTCOMES

ALL MUST...

- Explain why energy requirements vary with age, gender, activity levels and pregnancy

IN SCIENCE ENERGY IS MEASURED IN

joules

(j)

kilojoules

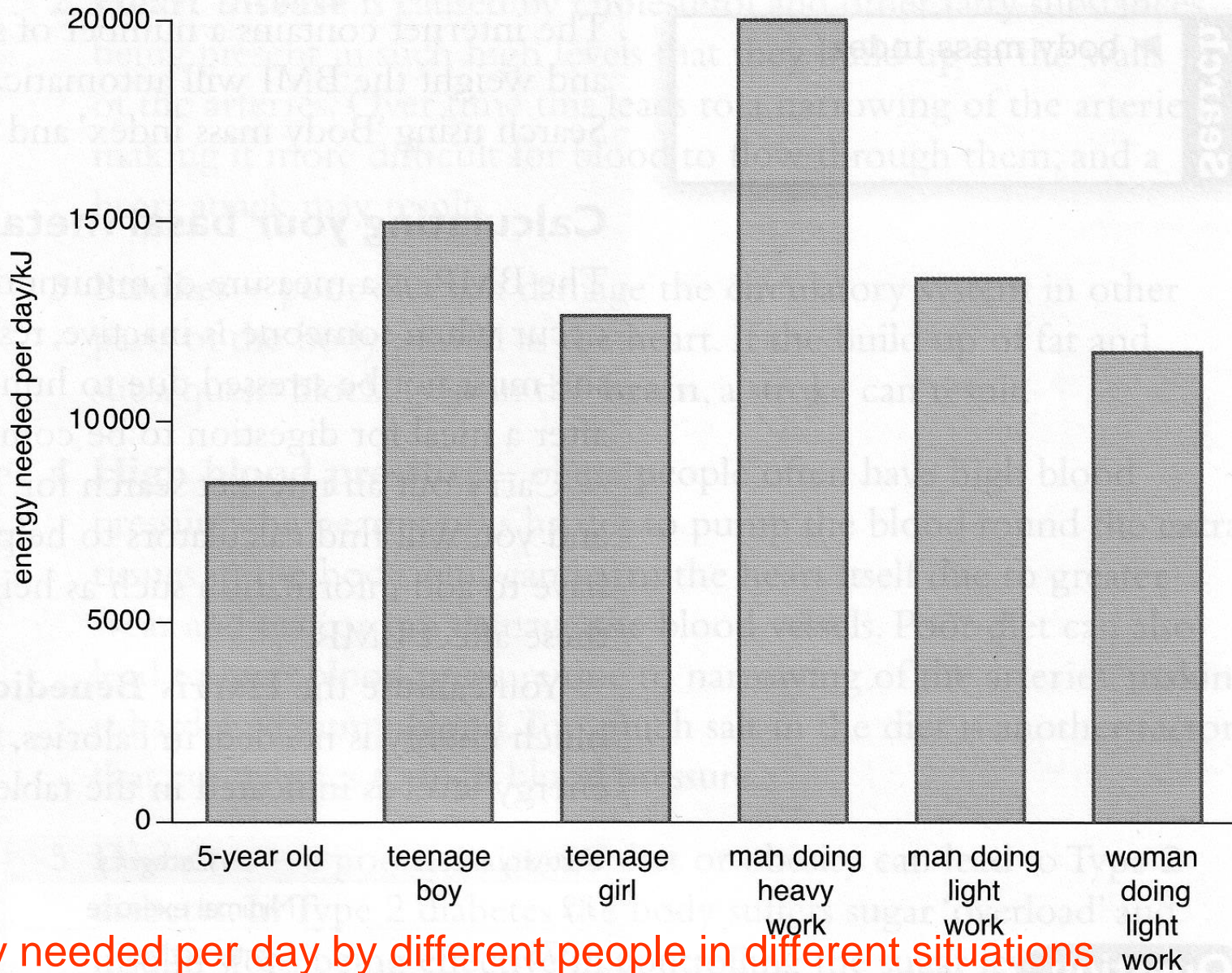
(kj)

megajoules

(mj)

most food packets also measure energy in calories

how much energy do we need?



Energy needed per day by different people in different situations

FACTORS AFFECTING ENERGY REQUIREMENTS

3 main factors affect our energy requirements, and therefore how much and what we need to eat



age

**older people need less energy
than younger people
as they are growing less**

Soul Prints
PHOTOGRAPHY

gender

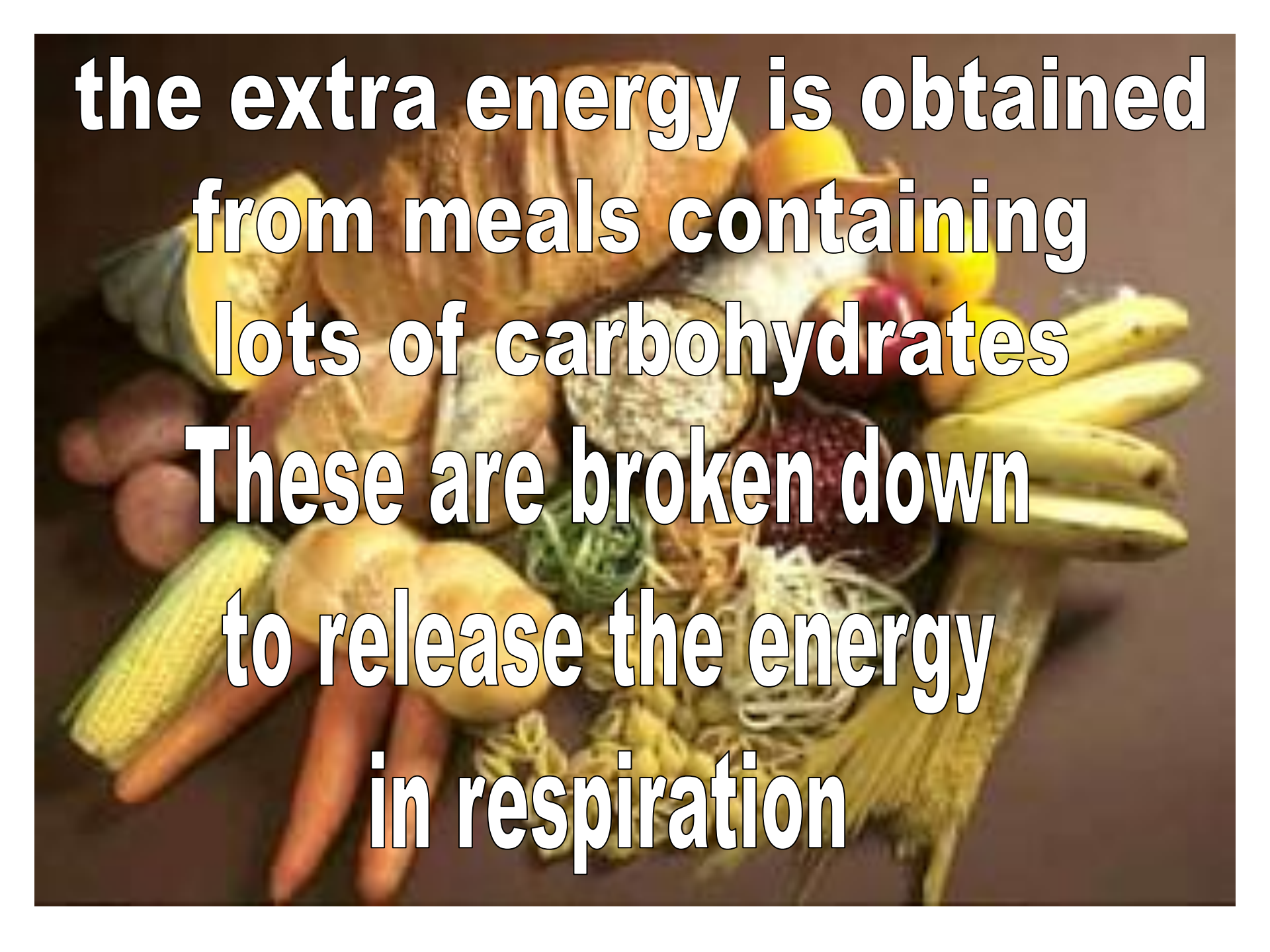
**generally men have more muscle than women
which uses more energy**



activity



**a physically demanding activity
requires more energy than a restful one**

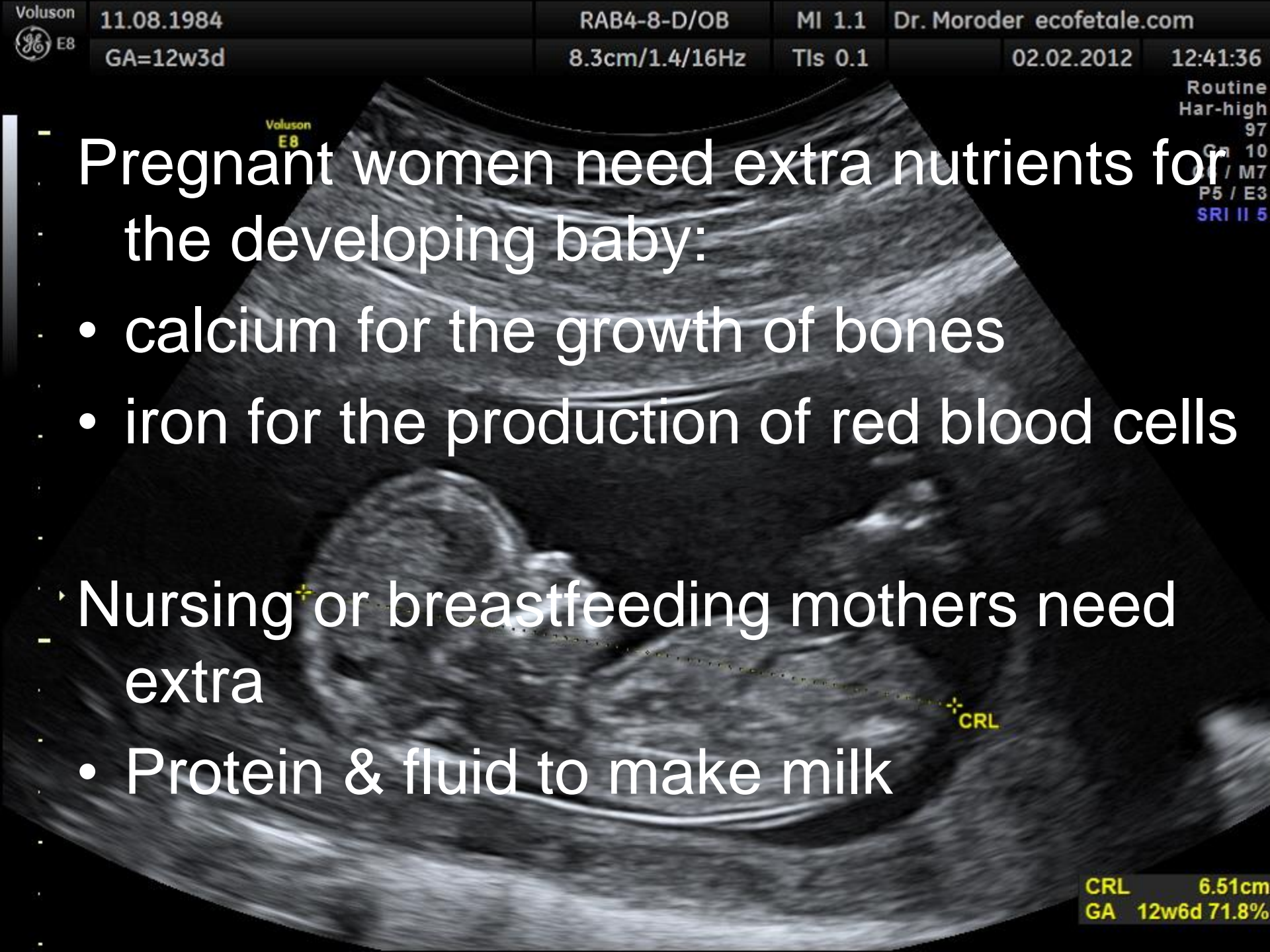
A collage of various carbohydrates including bread, pasta, corn, carrots, and fruits. The text is overlaid on this image.

**the extra energy is obtained
from meals containing
lots of carbohydrates
These are broken down
to release the energy
in respiration**

A pregnant woman is shown from the waist up, holding a tablet computer with both hands. The tablet displays a black and white ultrasound image of a fetus. The woman is wearing a white top and light-colored pants. The background is a plain, light-colored wall.

pregnant women

**have high energy & protein needs
due to the high rate of growth
of the developing foetus**



11.08.1984

RAB4-8-D/OB

MI 1.1

Dr. Moroder ecofetale.com

GA=12w3d

8.3cm/1.4/16Hz

TIs 0.1

02.02.2012

12:41:36

Routine

Har-high

97

Gn 10

P5 / M7

P5 / E3

SRI II 5

Pregnant women need extra nutrients for the developing baby:

- calcium for the growth of bones
- iron for the production of red blood cells

Nursing or breastfeeding mothers need extra

- Protein & fluid to make milk

CRL 6.51cm
GA 12w6d 71.8%

LEARNING OUTCOMES

**HIGHER
TIER**

SOME MAY...

- Use secondary data to calculate BMI and BMR rates,
- Work out recommended daily energy intake using the Harris–Benedict mathematical model

<http://youtu.be/2l7kpxMkbaM>

0-1.37

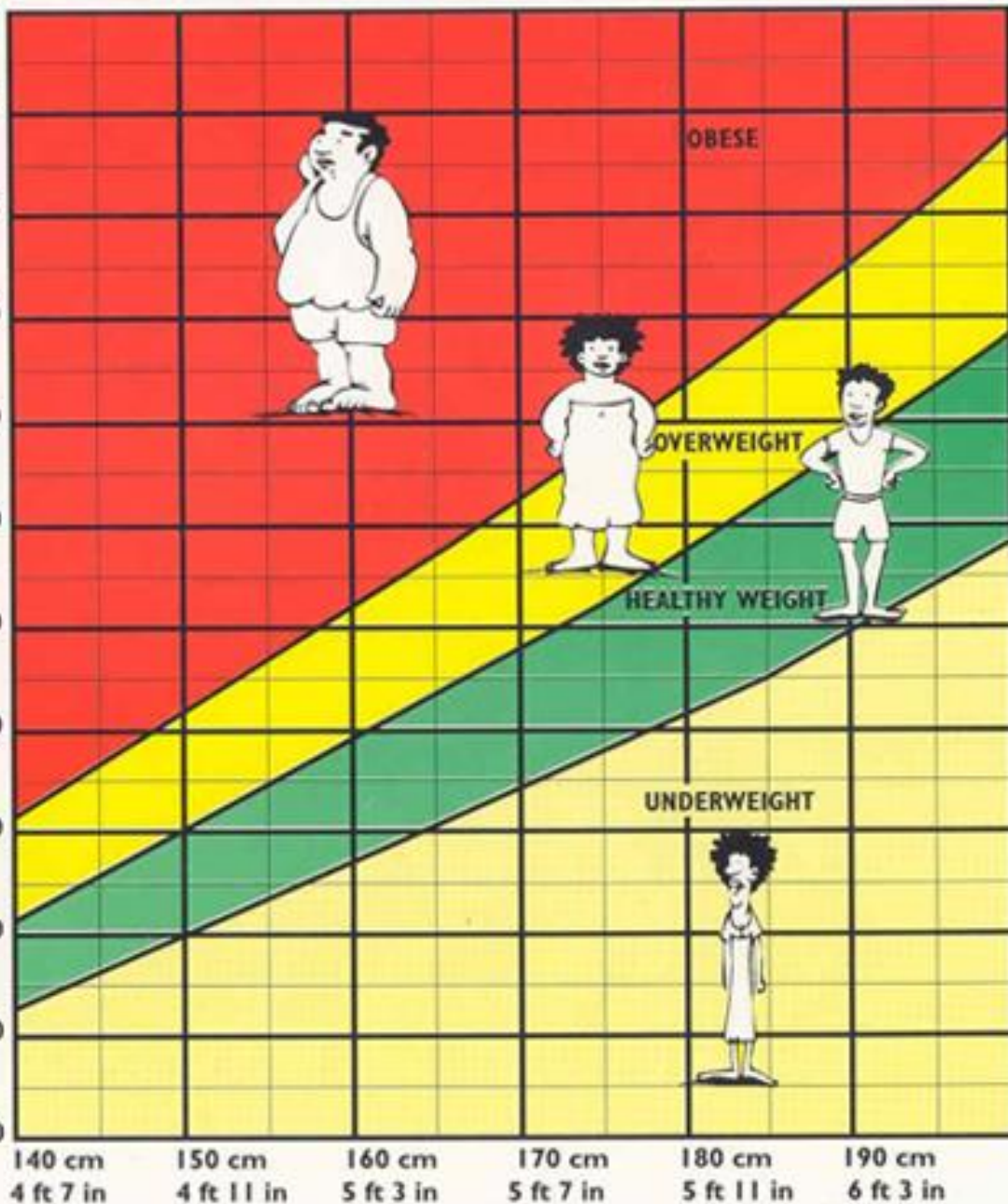
DO THIS ON THE IPAD TO REDUCE time!



WEIGHT FOR HEIGHT CHART FOR MEN AND WOMEN FROM 18 YEARS AND OVER

Weight in kilograms and in pounds – in light clothing and bare feet

lb kg
308 140
297 135
286 130
275 125
264 120
253 115
242 110
231 105
220 100
209 95
198 90
187 85
176 80
165 75
154 70
143 65
132 60
121 55
110 50
99 45
88 40
77 35
66 30



32
BMI

27
BMI

22
BMI

THE BODY MASS INDEX (BMI) IS AN INDEX BASED ON WEIGHT AND HEIGHT. A BMI OF BETWEEN 22 AND 27 INDICATES YOU ARE WITHIN THE HEALTHY WEIGHT RANGE.



Secretariat of the Pacific Community

Adapted from the 1993 SPC Community Health Programme Look Fit, Be Healthy Poster Based on figures from the Australian Nutrition Foundation and the Tonga Nutrition Committee Design by Jaki Le-Bars Produced by the SPC Community Health Programme Funded by the Government of New Zealand Printed at the Secretariat of the Pacific Community, 1998

140 cm 150 cm 160 cm 170 cm 180 cm 190 cm
4 ft 7 in 4 ft 11 in 5 ft 3 in 5 ft 7 in 5 ft 11 in 6 ft 3 in

Height in centimetres and feet & inches – bare feet



What advice would you give to a person who is 180cm tall and weighs 100kg?

BMI

The **body mass index** is a measure of whether someone is the correct weight for their height.

CALCULATING BMI

$$\text{BMI} = \frac{\text{weight}}{\text{height}^2}$$

Weight is measured in kg

Height is measured in cm

USING BMI VALUES

BMI value	Description
Under 18.5	Underweight
18.5 – 24.9	Normal
25 – 29.9	Overweight
30+	Obese

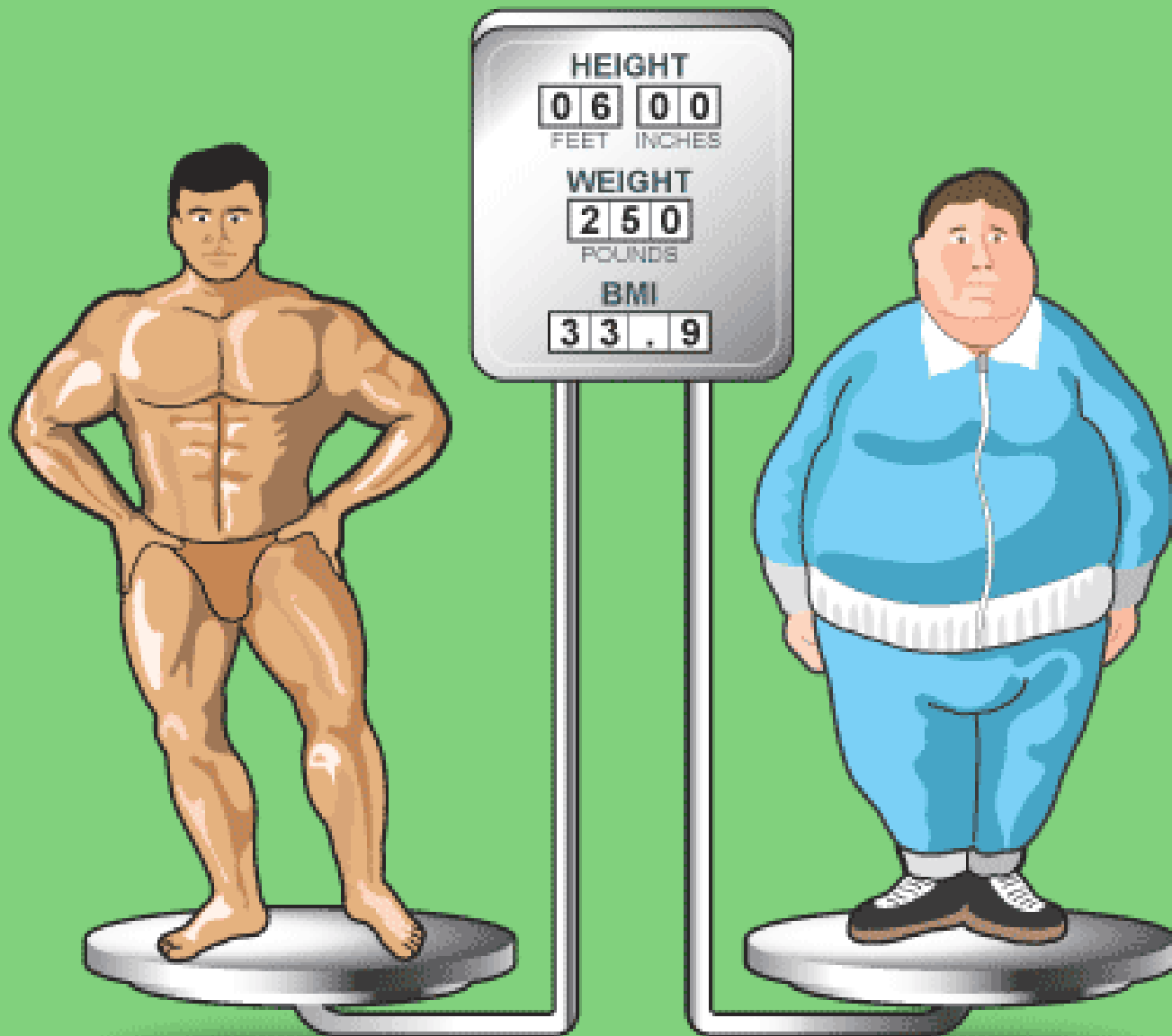
Calculate the BMI for a person who is 166cm tall and weighs 46kg.



Athletes have very high BMI values because they have a very high proportion of muscle, which is heavier than fat.

BMI Body Comparison

©2005 HowStuffWorks



BMR

The **basal metabolic rate** is a measure of the minimum energy use.

CALCULATING BMR

BMR calculator

To calculate your BMR you need to know:

Height / cm

Weight / kg

Age / years

gender

CALCULATING BMR

BMR for a woman =

655

+(9.6 X weight)

+(1.8 X height)

– (4.7 X age)

Calculate the BMR for a 14 year old girls with a mass of 40kg and height of 160cm.

HARRIS-BENEDICT EQUATION

Uses the BMR to calculate how much **energy** you need, to stay at your current weight.

$$\text{Energy in joules} = \text{BMR} \times \text{Activity factor}$$

The activity factor is found in a text book or online.

This gives the number of calories you need to eat to stay at your current weight.

Activity factor	Category
1.2	Minimal exercise
1.375	Lightly active
1.55	Moderately active
1.725	Very active
1.9	Extremely active

- The 14 year old girl in the question above has a BMR of **1261.2**
- She is quite active, playing netball and hockey for the school teams, so she practises every day.
- Chose the activity factor
- Calculate the energy she needs each day



LEARNING OUTCOMES

ALL MUST...

Understand how human health is affected by:

- inherited factors;
- environmental factors – obesity can be caused by energy intake being higher than energy used in exercise
- healthy food choices – limited intake of sugar, salt and fat and the benefit of fruit and vegetable

health
&
diet



health
&
diet



A number of factors affect our health and may lead to disease. The factors can be divided into 3 groups:

- **DIETARY** e.g eating too much saturated fat, sugar or salt and eating too little fruit and vegetables
- **ENVIRONMENTAL** e.g. stress
- **HEREDITARY** the genes you inherit from your parents can make you more susceptible to certain diseases such as heart disease

It is possible to **control diet** and **environmental factors**, and so reduce the chance of getting these diseases.

Whilst it is **not possible** to **control** the **genes** you inherit, by controlling the effects of diet and environmental factors you are reducing the chance of getting these diseases to a minimum.

LEARNING OUTCOMES

ALL MUST...

- Understand the contribution of an unhealthy diet to obesity, heart disease, strokes, high blood pressure, diabetes and arthritis

SOME MAY...

- Understand the costs to society of the current trend in obesity levels, including economic cost of treatment for NHS

A close-up photograph of a person's midsection. The person is wearing a bright yellow tank top and grey shorts. Their hands are resting on their hips. The word "Obesity" is written across the center of the image in a large, white, bold, sans-serif font with a thin black outline. The background is slightly blurred, suggesting an outdoor setting.

Obesity

caused by

having a higher energy intake

(sugar, starch, fat)

than the energy used

heart

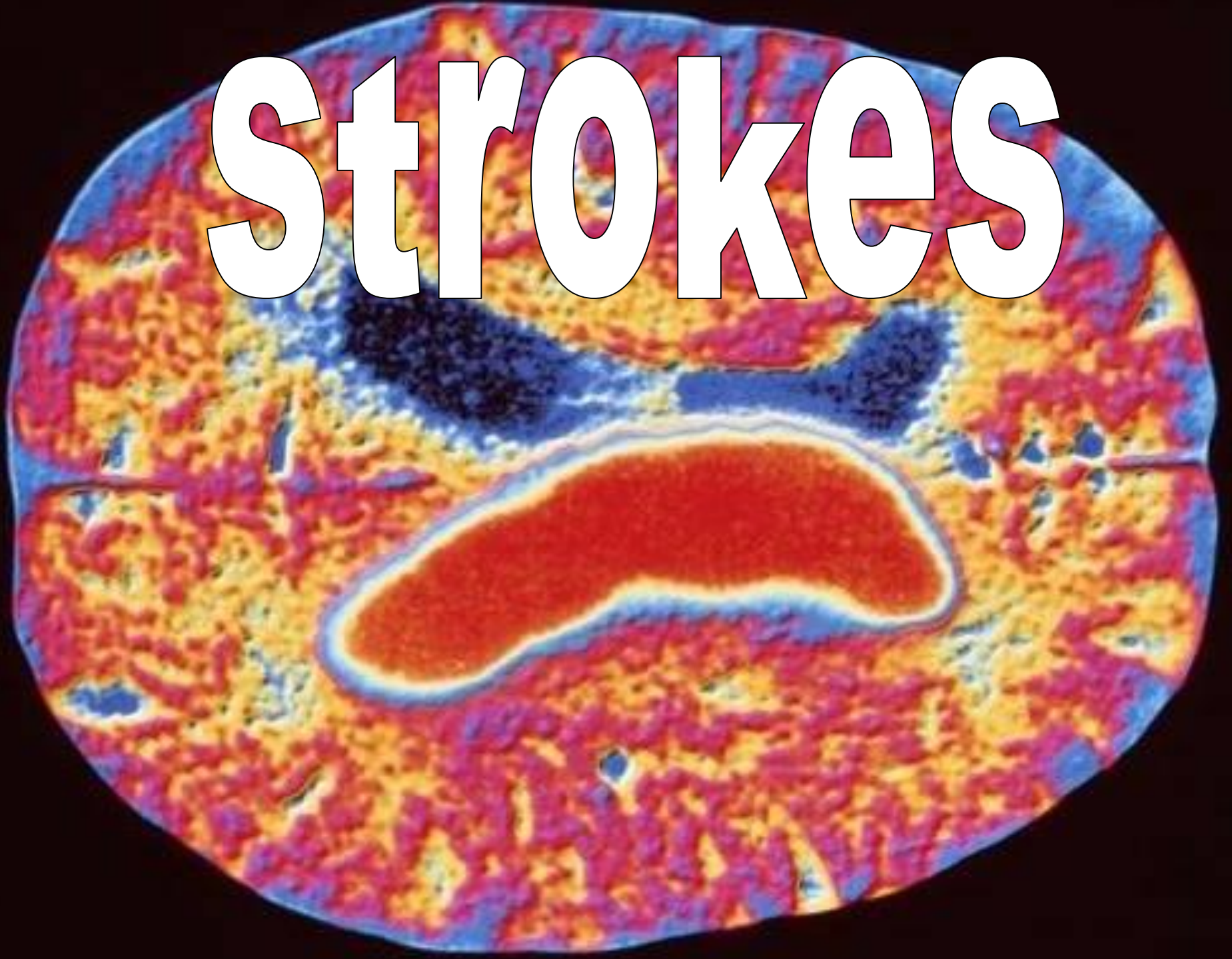


disease

high levels of cholesterol
& other fatty substances
build up in artery walls
over time arteries narrow &
less blood flows through them

cells are unable to respire
and release energy
because oxygen and glucose
can't get through
& this may cause
a heart attack

Strokes



build up of fat

in arteries in the brain

blocks the flow of blood

cells are unable to respire

and release energy

because oxygen and glucose

can't get through

Readings will appear
in less than a

h i s a n

**Systolic
Pressure**
mmHg

158

**Diastolic
Pressure**
mmHg

110

**Pulse
Rate**
BPM

87.2

General Reference Chart
for Adult

blood pressure

Normal

Diastolic

caused by
too much salt
in the diet

or because
the heart must pump harder
to get blood
round the extra tissue
in obese people
the extra wear and tear may
damage the heart or blood vessels

TYPE 2

DIABETES

too much sugar in the body
prevents insulin from
controlling
blood sugar levels

arthritis



extra weight causes

extra wear and tear on joints

e.g. knees, hips,

lower back

COSTS TO SOCIETY

The number of people with obesity has doubled over the past 20 years to 20% of the population.

The NHS is paying more to treat people for obesity and for the medical conditions associated with obesity such as type 2 diabetes and heart disease.

ACTIVITY

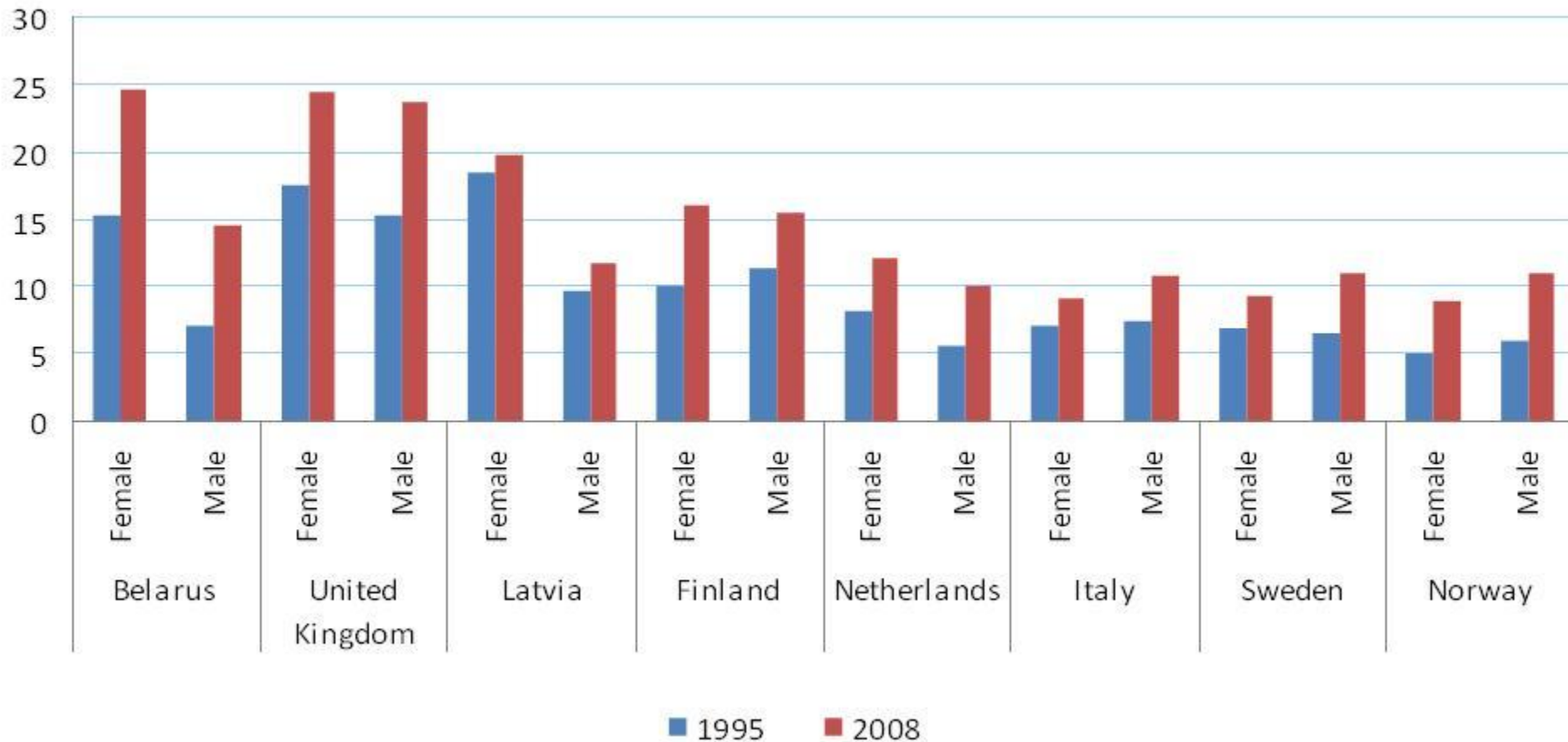
**YOU WILL BE ALLOCATED A
SOURCE OF INFORMATION TO
READ OR WATCH**

USE THE INFORMATION & YOUR NOTES TO

Produce a slogan, no longer than 10 words,
which could be used in the campaign to fight
against obesity.

WHAT IS THE TREND IN THE DATA BELOW?

Percentage of obese population (BMI \geq 30)
in 1995 and 2008



All countries have increased from 1995 –
2008

BELARUS/ UK/ LATVIA/ FINLAND/
NETHERLANDS

women > men

ITALY/ SWEDEN/ NORWAY

women < men

The number of patients diagnosed with dietary related diseases in Northern Ireland between 2006 and 2013

Disease	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13
OBESITY	144 945	161 871	165 956	174 180	170 840	167 150	168 976
CHD	76 126	75 984	75 278	75 123	75 027	74 788	74 648
STROKE	29 376	30 210	31 063	31 947	32 988	33 842	33 470
High BP	211 382	218 184	225 093	231 939	237 834	241 783	245 730
Type 2 DIABETES	56 924	60 822	65 066	68 980	72 693	75 837	79 072

discuss the trend in the results above

Obesity: increases from 2006 – 2009 and then falls

CHD: steady / falls slightly

Stroke: gradual increase

High BP: gradual increase

Diabetes: increase

Biggest problem is High Blood pressure

Diet may not be the only cause, as there are more people with high BP than with obesity