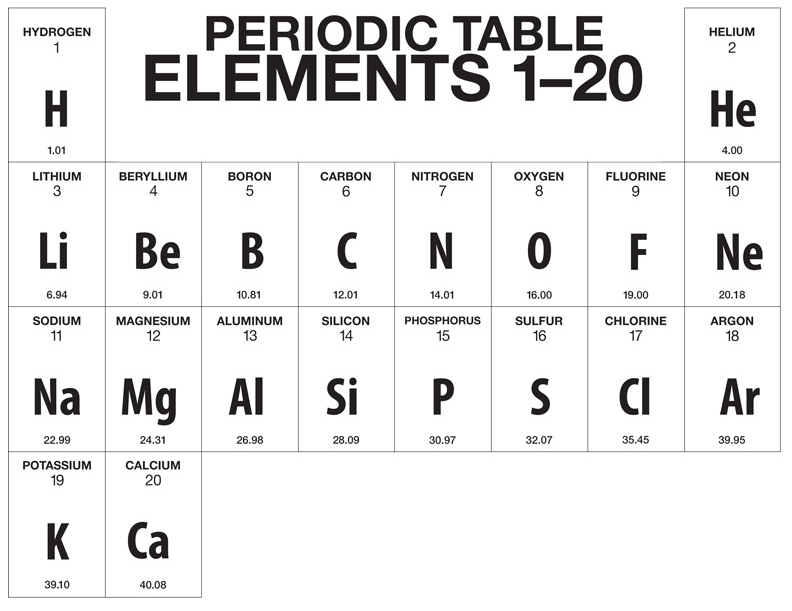
C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\PADZ5RWG\MC900278998[1].wmfAtomic Mass.

Numeracy Task

C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\KL5B28BZ\MC900351955[1].wmf

The relative formula (Mr) mass of a compound is simply the relative atomic masses of all its elements added together.

**e.g.**

**Water = H2O**

**1 + 1 + 16**

**= 18**

9

20

24

27

19

1

39

40

31

40

35

28

23

4

16

12

10

14

32

7

Find the relative formula mass for the following compounds:

1. Salt = NaCl
2. Carbon Dioxide = CO2
3. Hydrochloric Acid = HCl
4. Sulphuric Acid = H2SO4

What percentage of Carbon Dioxide is Oxygen?

What is the ratio of Carbon to Oxygen in Carbon Dioxide?

How many grams of Hydrogen are needed to make 45g of water?

C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\PADZ5RWG\MC900334202[1].wmfC:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\PADZ5RWG\MC900412544[1].wmfAlloys

Numeracy Task

An **alloy** is a uniform mixture. It is made up of two or more chemical elements of which at least one is a metal. An alloy has properties different from the metals it is made of. Most alloys are made by melting the metals, mixing them while they are liquid to form a solution, then leaving them to cool and turn solid again.

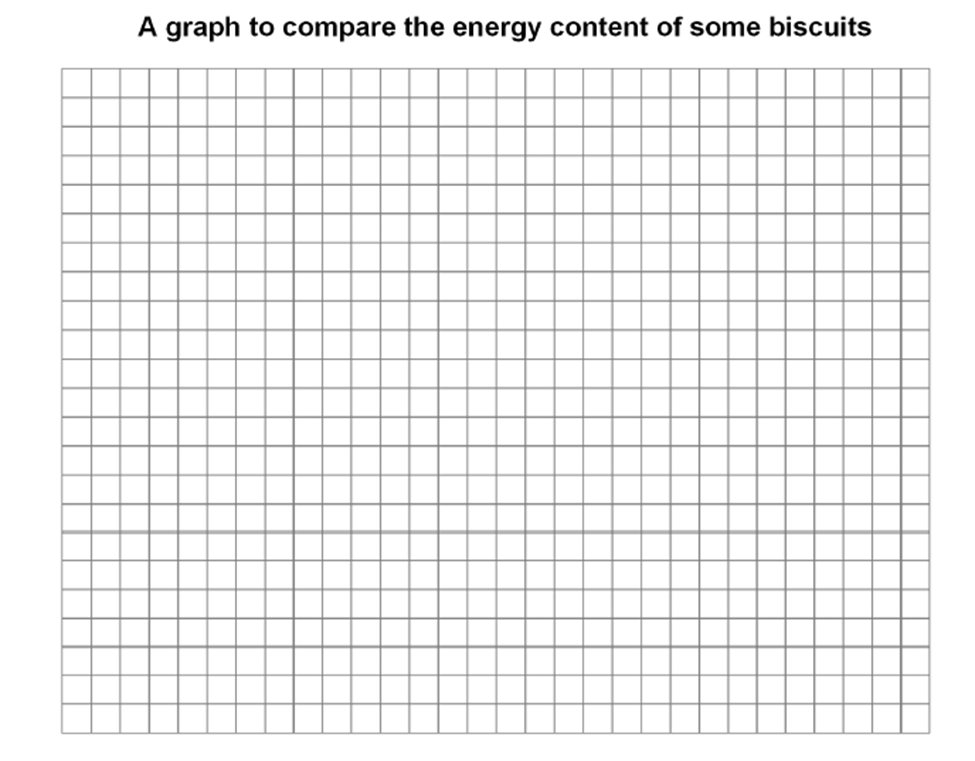
|  |  |  |
| --- | --- | --- |
| Name | Chemicals | Use |
| Brass | 35% Zinc and 65% Copper | Musical instruments, Jewellery, Taps and decorative hardware |
| Stainless Steel | 18% Chromium 80.6% Nickel and 0.4% Carbon | Used for tableware, cookware and surgical tools |
| Steel | 99% Iron and 1% Carbon | Tools, Car bodies, machinery, girders and rails |
| Bronze | 87.5% Copper and 12.5% Tin | Boat hardware, screws and grill work |
| Solder | Lead and Tin | Join metals together |

Write down the fraction of Zinc in the alloy Brass, remember to simplify.

How much chromium, nickel and carbon are needed to make 200g of stainless steel?

Write down the ratio of Tin to Copper in Bronze.

How much Brass could be made with 70g of Zinc? How much Copper would be needed?

Using the space below draw a graph to represent the elements used in Stainless Steel.

C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\9BHUFW3J\MC900002121[1].wmfC:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\P0VSFX19\MC900002122[1].wmfPlanets

Numeracy Task

The table describes the diameter of the planets in our solar system. The scale used is **1cm: 1000km**.

|  |  |  |  |
| --- | --- | --- | --- |
| Planet | Picture | Diameter of scale diagram cm | Actual Diameter km |
| Mercury |  | 5 |  |
| Venus | [Venus](http://annesastronomynews.com/wp-content/uploads/2012/02/Venus1.jpg) | 12 |  |
| Earth | [ANd9GcQxnaZbmMTFDZjCSE_VZf2TUB4yyExQ1vOdoq2lBM6wX0g93a5gCh6rspY0](http://www.google.co.uk/imgres?imgurl=http://alanbetts.com/image/1/1200/0/uploads/earth-1278686566.jpg&imgrefurl=http://alanbetts.com/understanding-climate-change/question/the-climate-energy-balance-of-the-earth/&usg=__mheBK8CprqgWMuP1t-jgapqcypo=&h=1201&w=1200&sz=186&hl=en&start=19&sig2=Zfb2LlP8BbXULSQX-6kKTg&zoom=1&tbnid=c5mCWjtwzRwGrM:&tbnh=150&tbnw=150&ei=4w8JUd7KCoOwhAfynIFo&prev=/search?q=earth&um=1&hl=en&safe=active&sa=N&tbm=isch&um=1&itbs=1) | 12.8 |  |
| Mars | [ANd9GcSXk_oxm3djDJ-na8xPntOlVsEhvsQytNw_77LXsawfDmqK-lzrlzjEdtnl](http://www.google.co.uk/imgres?imgurl=http://sos.noaa.gov/ftp_mirror/astronomy/mars/original/media/thumbnail_big.jpg&imgrefurl=http://sos.noaa.gov/Datasets/dataset.php?id=224&usg=__vgoOFJyqs8uGGhl_VHEIZ_McW90=&h=800&w=800&sz=86&hl=en&start=36&sig2=W6_iKz0y9373_g6dAdAUZA&zoom=1&tbnid=WnU_UqjIGI7UYM:&tbnh=143&tbnw=143&ei=XhMJUc3AMY24hAe0xoGgCg&prev=/search?q=mars&start=20&um=1&hl=en&safe=active&sa=N&tbm=isch&um=1&itbs=1) | 7 |  |
| Jupiter | [Jupiter by Cassini-Huygens.jpg](http://en.wikipedia.org/wiki/File:Jupiter_by_Cassini-Huygens.jpg) |  | 140 000 |
| Saturn | [ANd9GcTHLZQlavb-RarS2ddsi_vzZl07xZAj9wbmhfiz_N8hSI1QQYg8GxOqMIk](http://www.google.co.uk/imgres?imgurl=http://www.8planets.co.uk/wp-content/themes/8planets/images/saturn_1_lg.jpg&imgrefurl=http://www.8planets.co.uk/facts-about-saturn&usg=__GqxODSQ4XK0rG_79LmyPH7vpFdg=&h=1000&w=1000&sz=87&hl=en&start=12&sig2=QrGBdSmI7SOIJIG983Kd1A&zoom=1&tbnid=sqWV9q3234xUKM:&tbnh=149&tbnw=149&ei=ZRgJUZTxKs6BhQex3YHQBA&prev=/search?q=saturn&hl=en&safe=active&gbv=2&tbm=isch&itbs=1) |  | 120 000 |
| Uranus | [Uranus as seen by Voyager 2](http://en.wikipedia.org/wiki/File:Uranus2.jpg) |  | 52 000 |
| Neptune | [ANd9GcQS4Q3kauq8vn0IqIVrdnviFsFtkzx-NUOuPdRZMma7Il0dc1jJqspmrTj1nA](http://www.google.co.uk/imgres?imgurl=http://www.astronomy.ohio-state.edu/~pogge/TeachRes/Ast161/Neptune/nep2002_hst1pan.jpg&imgrefurl=http://www.astronomy.ohio-state.edu/~pogge/TeachRes/Ast161/Neptune/index.html&usg=__OnNYOx0Q5bEN0nyLlyrKC4sm0o0=&h=1000&w=1000&sz=64&hl=en&start=32&zoom=1&tbnid=ldoWqjQfKfSfmM:&tbnh=149&tbnw=149&ei=UpYLUfC9GcHPhAe5qYDwBg&prev=/search?q=neptune&start=20&hl=en&safe=active&sa=N&gbv=2&tbm=isch&itbs=1) |  | 50 000 |

Below is a diagram of a new planet that has recently been discovered. Using the same scale find the diameter of the planet in kilometres.

The Sun has a diameter of 1.4 million kilometres. Using the formula Circumference = πd where π = 3.14 find the circumference of the sun.

The distance from the Earth to the Sun is 150 million kilometres; how far is this after it has been scaled down?

Food Chains

Numeracy Task

The diagram below represents the food chain of **ONE** Buzzard. Given that the diagram is to scale find the number of Blackbirds and Caterpillars needed.

**Buzzard**

1

1

**Blackbirds**

**Caterpillars**

**Oak Tree**

The number of blackbirds needed to support a Buzzard is?

The number of Caterpillars needed to support a Buzzard is?

The number of Caterpillars needed to support a Blackbird is?

Here is another food chain:



**1 fox needs 70 rabbits. 1 Rabbit needs 20 000 blades of grass.**

How many blades of grass are needed to support 1 fox?

How many rabbits are needed to support 5 foxes and how much grass would be needed?

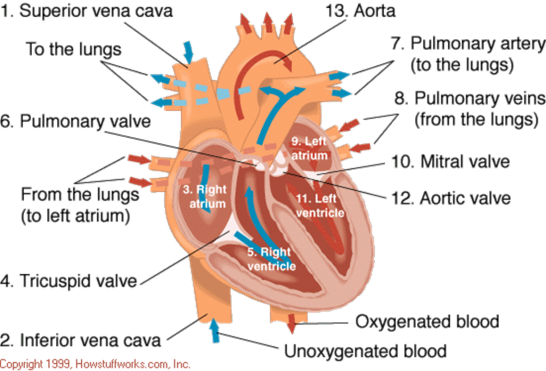
A field contains 11 million blades of grass how many foxes would that sustain?

C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\HOQVCWB2\dglxasset[1].aspxThe Heart

Numeracy Task

The heart is the body’s pump that forces blood around the body to all the vital organs. The average person has a heartbeat of 72 beats per minute. Given that each beat pumps approximately 70ml of blood answer the questions below.

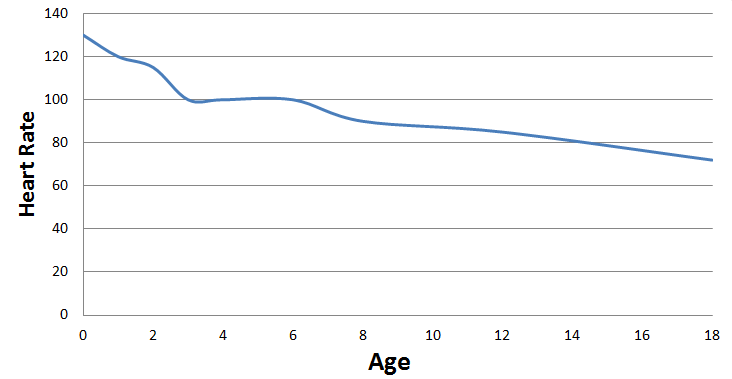
How much blood is pumped around the body in one minute?



How much is this in a day?

What about a year?

How much is that for 70 years? Surprised?

A person’s heart rate will change with age. The table below shows how your heart rate changes during childhood.

What is the heart rate of a 12 year old?

What is the difference in the heart rate between a new-born and a 3 year old? Why do you think this happens?

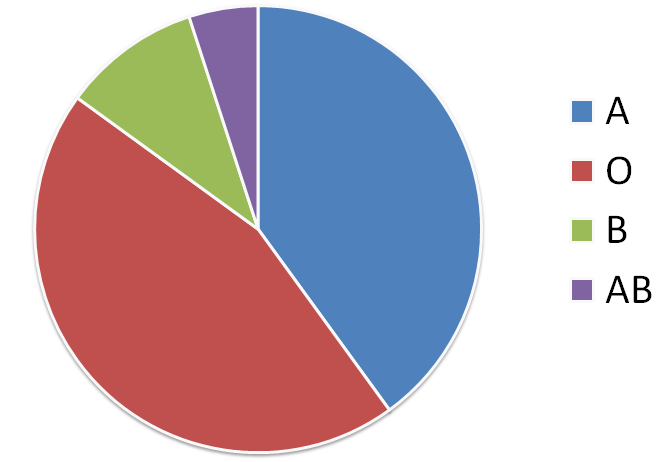
Apart from age what other factors do you think affect your heart rate?

Can you predict what happens to your heart rate as you get older (adulthood)?

C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\T04TK160\MC900229793[1].wmfBlood

Numeracy Task

Blood is vital for life. It carries oxygen and protects against disease. There are four main blood types, O, A, B and AB. The pie chart below displays the proportion of the blood types in the UK.



Measure the angle for each blood type and fill in the table below:

|  |  |  |
| --- | --- | --- |
| Blood Type | Angle | Fraction |
| C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\2PCLR90Z\MC910216386[1].pngA |  | C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\SXFFU5Z2\MC900286850[1].wmf |
| O |  |  |
| B |  |  |
| AB |  |  |

Use your answers in the above table to answer the following questions:

Which blood type is the most common?

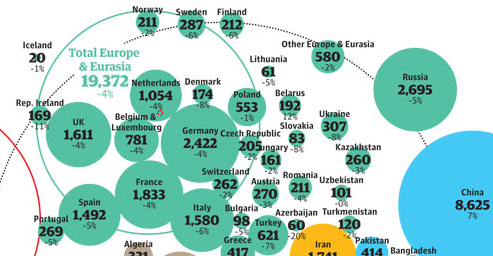
What percentage of people have blood type A?

In a population of 12 000 people how many would have blood type O?

C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\2PCLR90Z\MC900437719[1].wmfOil

Numeracy Task

Oil is a primary energy source which without careful management will one day run out. Oil is used to in plastics, heating and as fuel. It is fundamental to the way we live. The diagram below shows the amount of barrels (thousands) of oil used in Europe and surrounding countries per year. The percentage describes how much each country has increased or decreased their consumption from the previous year.



The diagram shows that China uses the most barrels of oil per year. Why would this be expected?

The United Kingdom uses 1 611 000 barrels of oil a year. Write this number down in words.

Which country has reduced their use of oil the most? How could they have done this?

Next year Italy reduces their use of oil by 5%. What is their oil consumption after the reduction?

America uses approximately ten times more barrels than France. How much do they use? Compare this to the Chinese usage, do you find it surprising? Why?

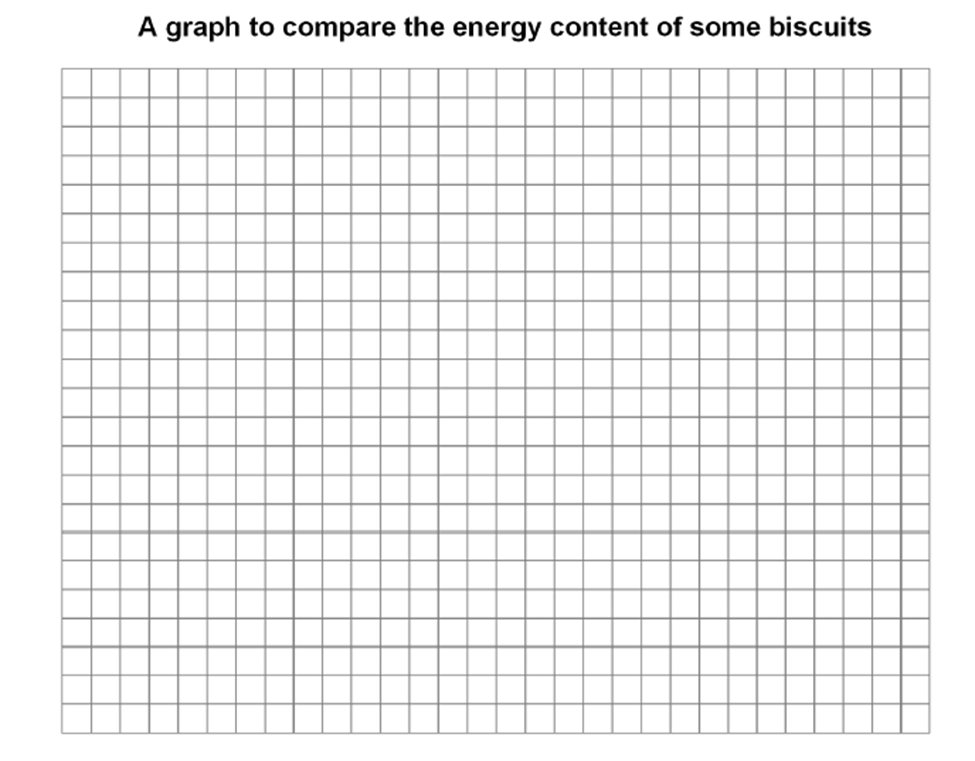
C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\P0VSFX19\MC900232730[1].wmfC:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\T04TK160\MC900432423[1].wmfThe Common Cold

Numeracy Task

Nobody likes having a cold. It can ruin your week sometimes even fortnight as they take forever to get rid of. Runny nose, a bad cough, difficulty swallowing plus the dreaded fever can all make having a cold unbearable.

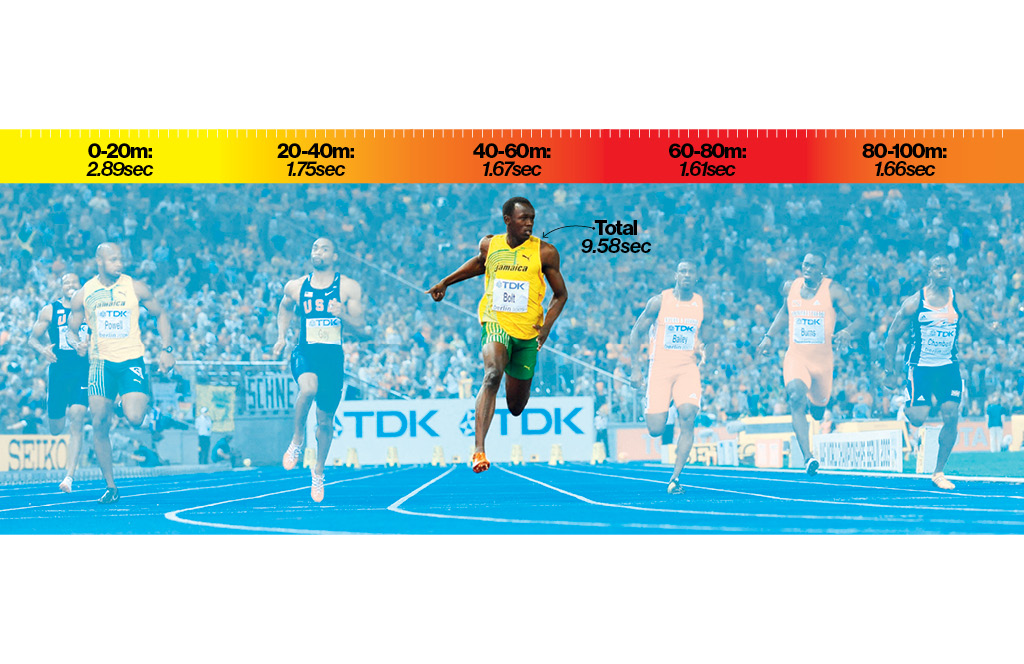
Below is a table showing the percentage of people who experience these symptoms over two weeks.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Symptom | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 | Day 8 | Day 9 | Day 10 | Day 11 | Day 12 | Day 13 | Day 14 |
| Runny Nose | 50% | 60% | 65% | 50% | 40% | 30% | 25% | 23% | 20% | 18% | 15% | 13% | 12% | 10% |
| Cough | 25% | 35% | 40% | 35% | 40% | 35% | 32% | 30% | 28% | 26% | 24% | 22% | 21% | 20% |
| Sore Throat | 45% | 50% | 35% | 20% | 10% | 5% | 2% | 0% | No More Symptoms | | | | | |
| Fever | 10% | 15% | 10% | 5% | 3% | 2% | 1% | 0% | No More Symptoms | | | | | |

Using the grid below draw a **line graph** to represent the table.

What percentage of people had a sore throat during day 4? How many people would that be if 200 people experienced colds?

If 250 people had colds how many more would have a cough during day 5 than a fever?

How fast is Usain Bolt?

Numeracy Task

Usain Bolt can run 100m in 9.58 seconds which is an average speed of 10.44 metres per second. But is this his fastest speed? Using the intervals above workout how fast he can run at each stage and hence find how fast Usain Bolt can really run.

Mr Owain Thomas is not so fast. His top speed is 5m/s. If he can sustain this pace for 15 seconds how far could he run?

Mr Anthony is built for endurance. He can run 10km in 40 minutes. What is his speed in m/s?

Dr Holmes is a keen walker. Once he walked briskly for 2 hours at 1.5m/s, how far in km did he walk? If he saw 2.5 squirrels every km how many did he see?

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Energy Efficiency

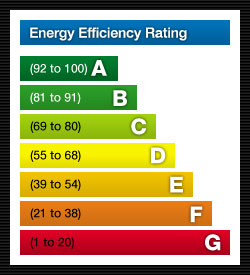
Numeracy Task

C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\AZ7BZDQC\MC900441834[1].wmfC:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\AZ7BZDQC\MC900441834[1].wmfAre all electrical items energy efficient? Light bulbs for example produce a great deal of additional heat which costs the bill payer and is not ecological. The formula below calculates the energy efficiency of an item

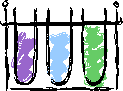
**Multiplying** this number by **100** will calculate the **Efficiency Percentage** which corresponds to a rating.

Using this formula and the diagram fill in the missing gaps in the table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Item | | Useful Energy  J | Total Energy  J | Efficiency Percentage to 2 d.p. | Energy Efficient Rating |
| Light Bulb | C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\AZ7BZDQC\MC900371024[1].wmf | 10 | 100 |  |  |
| Washing Machine | C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\AZ7BZDQC\MC900279706[1].wmf | 18 | 20 |  |  |
| Refrigerator | C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\AZ7BZDQC\MC900311292[1].wmf | 38 | 40 |  |  |
| Computer | C:\Program Files\Microsoft Office\MEDIA\CAGCAT10\j0205582.wmf | 12 | 18 |  |  |
| TV | C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\AZ7BZDQC\MM900336366[1].gif | 60 | 80 |  |  |
| Car | C:\Program Files\Microsoft Office\MEDIA\CAGCAT10\j0212957.wmf | 6 | 30 |  |  |
| Energy efficient light bulb | Shopping guide to energy saving light bulbs | 19 |  | 95.00% |  |
| Kettle | C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DUU87HII\MC900030279[1].wmf | 58 |  | 45.50% |  |
| Vacuum Cleaner | C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\AZ7BZDQC\MM900283895[1].gif |  | 120 | 70.00% |  |
| Microwave | C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DUU87HII\MC900352437[1].wmf |  | 72 | 64.00% |  |

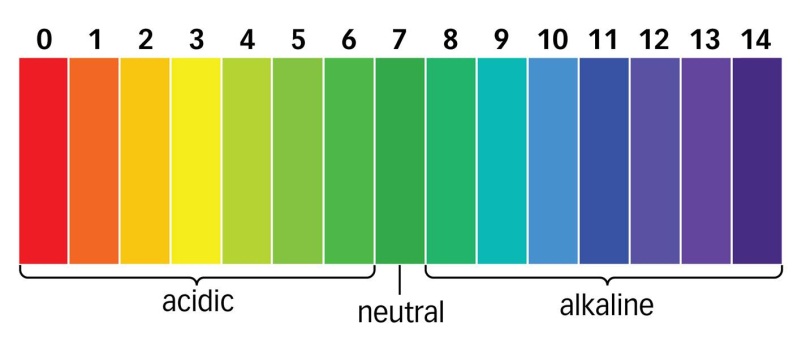


Workings:-

Acids and Alkali

Numeracy Task

|  |  |
| --- | --- |
| Item | pH |
| Pure Water | 7.00 |
| Tap water | 7.67 |
| Diet Cola | 3.289 |
| Cola | 2.525 |
| Lemonade | 3.202 |
| Milk | 6.8 |
| Yoghurt | 4.1 |
| Bleach | 12.6 |
| Lemons | 2.1 |
| Blood | 7.4 |



Is cola acidic or alkali? Why would this be bad for your teeth? How much would you have to raise your pH to make your mouth neutral?

What is the pH of diet cola to 1 decimal place?

Round the pH of bleach and tap water to the nearest whole number and find an approximate difference?

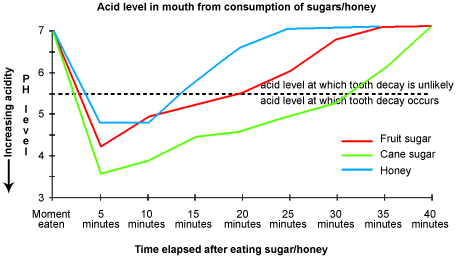
The pH of HCl used in school is 2.6 less than yoghurt, what is the pH of HCl?

A very strong alkali has a pH of 14, how much more is this than milk?

If the pH of pure water is raised by 15%, what would be the new pH?

Teeth and pH Level

Numeracy Task



The pH of your mouth is very important. Once you eat or drink the pH will change, generally becoming more acidic. This can cause tooth decay.

Using the graph above answer the following questions:-

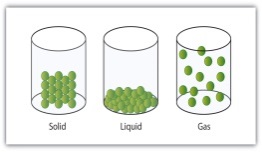
After consuming honey/fruit sugar/cane sugar approximately how long before your mouth is at a safe pH?

How many more minutes does it take for cane sugar than honey to become a safe pH?

What is the lowest the mouth becomes after consuming cane sugar? How much lower is this than the equivalent for honey?

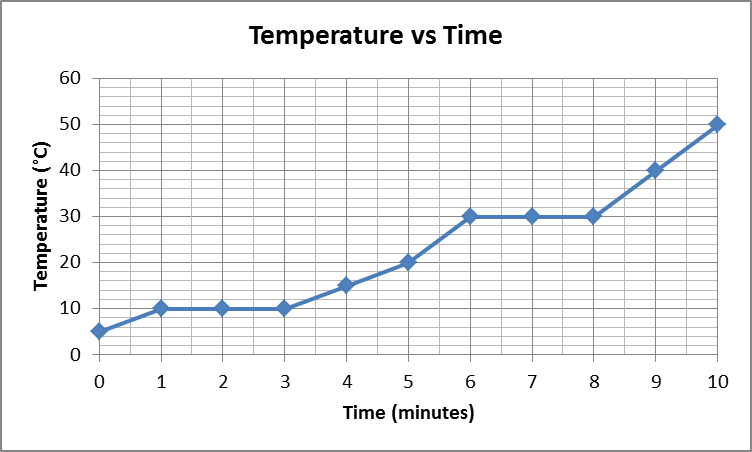
It is said that it takes twice the time for a mouth to become neutral after eating cane sugar than honey, is this true?

James eats a sweet (cane sugar) every twenty minutes what does this mean about the pH of his mouth?

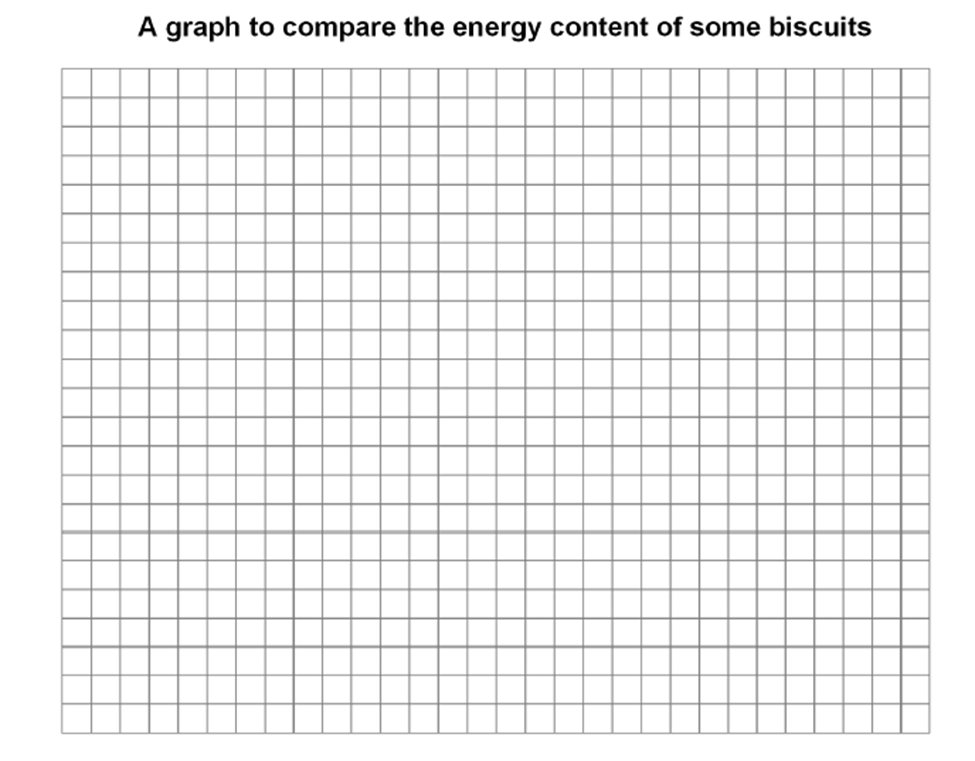
**[](http://blogs.learnquebec.ca/wordpress-mu/cassandrac/2013/02/19/reaction-rate-blog-post-nature-of-reactants/&ved=0CAUQjRw&url=https:/sites.google.com/site/anrosphysics/ib-physics/topic-3-thermal-physics/4-phase-change-and-lhc&ei=O5AjUZHLKc7w0QGKhoHYBg&bvm=bv.42553238,d.dmQ&psig=AFQjCNHgTXHjgaIBTOO8iEo8D3U8OE3tRg&ust=1361371524159220)Changes of State**

Numeracy Task

Look at the graph below and then answer the questions.



1. Was the substance being heated or cooled, why?
2. What was the **melting** temperature?
3. What was the temperature after 5 minutes?
4. What was happening at 9.5 minutes?
5. What was the temperature at 9.5 minutes?

A student records the temperature of a substance for a period of several minutes. Her results are recorded in the table below.

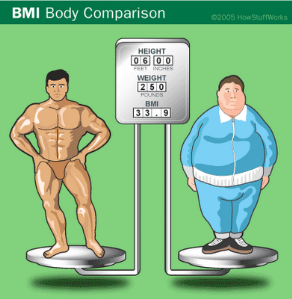
|  |  |
| --- | --- |
| Time (min) | Temperature (ºC) |
| 0 | 91 |
| 1 | 85 |
| 2 | 76 |
| 3 | 71 |
| 4 | 64 |
| 5 | 55 |
| 6 | 48 |
| 7 | 42 |
| 8 | 42 |
| 9 | 43 |
| 10 | 42 |
| 11 | 34 |
| 12 | 27 |
| 13 | 22 |
| 14 | 13 |
| 15 | 7 |

Draw a LINE graph of her results with temperature on the vertical (side) axis and time on the horizontal axis.

1. Was the substance being heated or cooled?
2. What was the **freezing** temperature?
3. What was the temperature after 5.5 minutes?

Body Mass Index

Numeracy Task

C:\Users\pb.AMAN.001\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\W7OQJVRE\MC900334158[1].wmfBody Mass Index (BMI)) is a simple index of ‘mass-for-height’ that is commonly used to classify underweight, overweight and obesity in adults. The formula below is used to calculate the BMI:

(Where the mass is measured is kg and height in metres)

Below is a table of ten pupils’ height and mass. Calculate the BMI of each person.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mass (kg) | Height (m) | Height Squared | Body Mass Index | Body Type |
| 45 | **1.53** |  |  |  |
| 69 | **1.68** |  |  |  |
| 76 | **1.68** |  |  |  |
| 38 | **1.53** |  |  |  |
| 45 | **1.63** |  |  |  |
| 45 | **1.65** |  |  |  |
| 83 | **1.83** |  |  |  |
| 53 | **1.53** |  |  |  |
| 40 | **1.73** |  |  |  |
| 51 | **1.58** |  |  |  |

Using the table below decide on the person’s body type.

|  |  |
| --- | --- |
| BMI | Body Type |
| 12-18 | Underweight |
| 19-24 | Healthy |
| 25-29 | Overweight |
| 30-39 | Obese |

Order the BMI, smallest first and find the median of the group.

Calculate the mean BMI of the group.

What would be the BMI of a person weighing 12 stone and measuring 6ft tall?