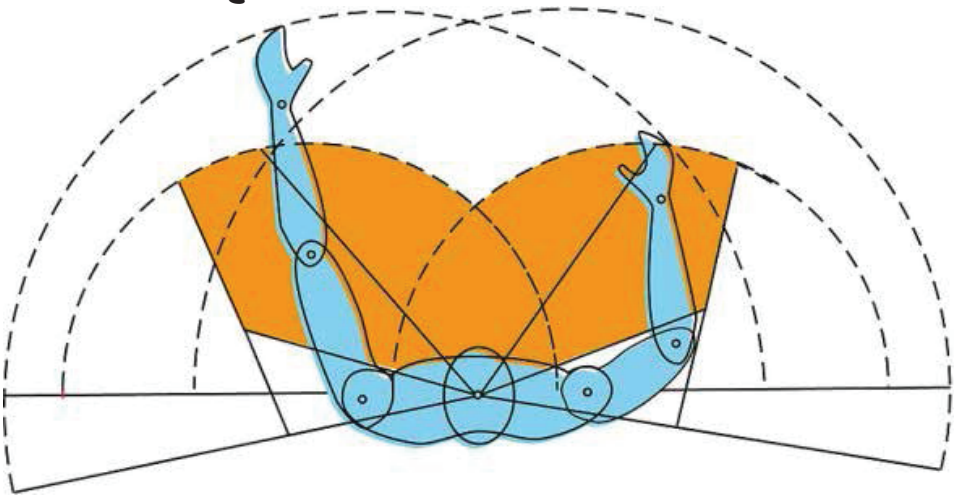
DESIGN & TECHNOLOGY

Year 8

Ergonomics & Anthropometrics



Collecting data, questions and some independent research.
All should be attempted.

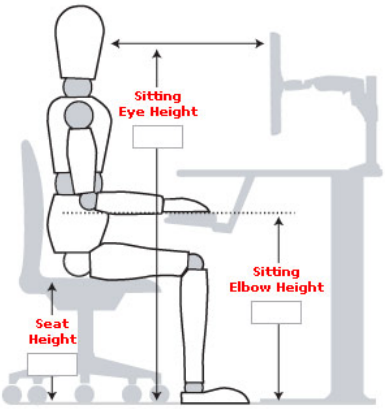
Designing, comparing and applying research.
Most should be attempted.

Advanced questions, analysing, using results and in depth research.
You may find these hard.

Name:	Level: See back cover	O A E B C
Due:		

What is Anthropometrics

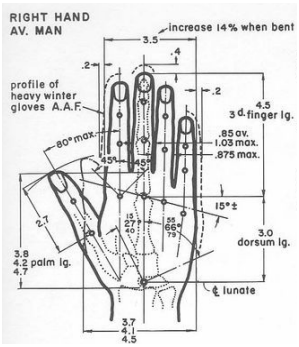
Anthropometrics is the study of the human body and its movement. It often involves research into measurements relating to people. It also involves collecting statistics or measurements relevant to the human body, called Anthropometric Data.



Task 1:
Find some other definitions of anthropometrics (or Anthropometric Data) and write a definition in your own words.

What is Ergonomics?

Ergonomics is the study of people and their relationship with the environment around them. It can be when anthropometric data (measurements / statistics) is applied to a product. For example measurements of the hand are used to design the shape and size of handles.



Task 2:
Write your own definition of ergonomics. Try including an example like the description above.

Task 3:
Ergonomic products are made primarily so that products fit the human body as well as possible. It is also to make products comfortable to use.

How is this pen more ergonomic than a standard pen?

Task 4:
Explain why ergonomic products are important for people who work as a writer, lorry driver, office computer worker or have other similar jobs?

Ergonomic Product Analysis

These two remotes have been ergonomically designed. The official remote was produced first. A different manufacturer has produced the unofficial version.

Task 5:
Give a reason for some users choosing the unofficial remote over the official version.

Look at the official and unofficial remotes. The unofficial one has a different material where there fingers rest. It is a material like rubber.

Task 6:
Explain why you think rubber is being used?

Task 7:
Look for some other ergonomic products and suggest three different materials that would be suitable for controller grips.

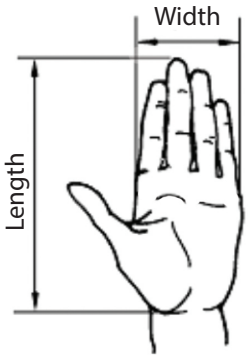
1
2
3

Task 8:
The controller below has been designed so your fingers will reach all of the buttons comfortably and easily. What hand measurements do you think were collected?

Ergonomic Design Challenge

TV's are getting smarter. They include the internet and apps and many now enable you to play downloaded games without a console. Your design challenge is to produce an ergonomic TV remote. The remote must:

be able to perform everyday TV operations.
be suitable for children aged 12+ and adults.
include basic game controls like a direction pad.



Collecting Anthropometric Data

The first part of designing an ergonomic product is collecting data. As you will be designing a remote, it would be good to collect hand sizes.

Task 9:

Collect the length and width of a person's right or left hand. As the remote is for an age of 12+, it would be useful to find 10 measurements from other Year 8 students and 10 measurements from adults. Try to get a mix of boys and girls.

Hand measurements from 12 & 13 year olds

***Thumb optional**

Name	Length (mm)	Width (mm)	Thumb (mm)*

Task 10 only:
Show your working out here:

Children age 12 / 13 Averages:

Length (round up) _____ mm
Width (round up) _____ mm
Thumb (round up) _____ mm

Making The Data Useful

Once you have collected all your data, you need to make it more useful. Most companies design their products based on the "average" person's measurements. This means they work out the mean average.

Task 10:

Work out the mean average hand measurements for each of the two tables.
Use this to work out average width and length measurements:

Step 1 : Add up all of the length (or width) measurements from the table.

Step 2 : Find the mean average by dividing the total number (from step 1) by the number of people (so 10). This will give you the mean average.

Task 11:

Use the mean average results from each table and merge the results so you have an overall mean average for adults and children aged 12+.

Show your working out here:

Combined Averages:

Length (round up) _____ mm

Width (round up) _____ mm

Thumb (round up) _____ mm

***Thumb optional**

Hand measurements from adults 18+

Name	Length (mm)	Width (mm)	Thumb (mm)

Task 10 only:
Show your working out here:

Adult Averages:

Length (round up) _____ mm

Width (round up) _____ mm

Thumb (round up) _____ mm

Ergonomic Design

Task 12 option 1:
Successful designers use lots of different hand measurements for remotes and controllers. You have the basic, most important data. It could be used to work out maximum and minimum size, layout of the buttons or direction pad.

Think about the shape of your hand and how it will hold the control.

Use the results from adults and children combined.

Use the results from children aged 12+ only.

Use the measurements from your own hand to design your remote.

Front View

Remember - The remote must:
be able to perform everyday TV operations.
be suitable for children and adults ages 12+.
include basic game controls like a direction pad.

Side / Back View

Task 13: 
Label your design with appropriate measurements. All in mm's.

Task 14: 
Research and label your design with some materials you think would be suitable.

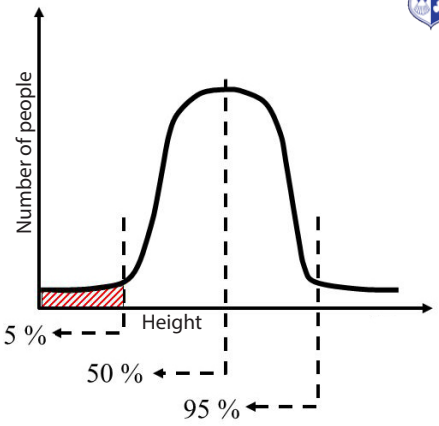
Extra: 
You could use playdough or a similar material to try modelling the shape of your controller before you draw it out.

Stick in some photos if you can.

Tip : Have a look online or look back at page 2 for some inspiration on shape.

Extra Questions

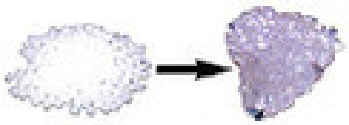
Large companies collect a lot of data. The graph to the right shows the relation between the number of people and their height. Let's imagine it was 100 people's height collected. The company would discard the bottom 5% and the top 5% of people's height, then work out the average (so the shortest 5 and the tallest 5 people). We call this the 5th and 95th percentile. The 50% line is the average height.



Extra Question 1:

Explain why you think companies do not include the top and bottom 5% of people when collecting data.

Polymorph is a smart material. It is a plastic that comes in small granules. When it is heated to about 60°C it melts and the granules can be squashed together. Research it online for more information.



Extra Question 2:

Explain why many companies use this material to prototype ergonomic products like handles and controllers.

Your level According To The School Reporting Policy

- O Outstanding - All questions attempted with strong answers. A good effort.
- A Above Expected - Most questions attempted. Working at or above target grade.
- E Expected - Appropriate questions answerd. Working towards target grade.
- B Below Expected - Not enough appropriate questions attempted or poor effort.
- C Concerns - Work is incomplete or very poor effort.