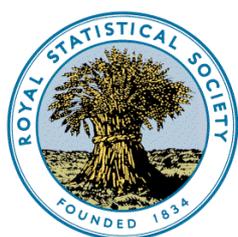
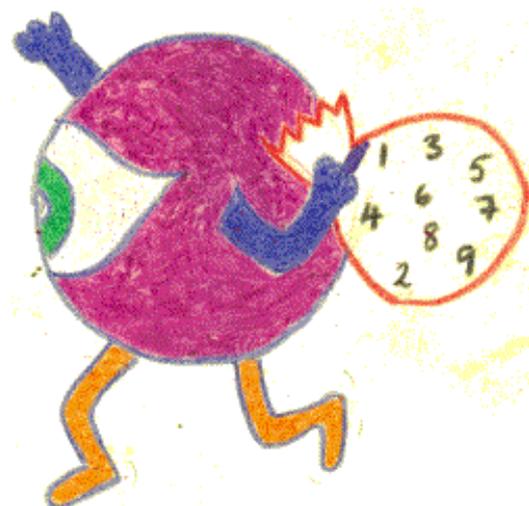


# Relevant & Engaging

# Statistics & Data Handling

**Using the Whole Problem  
Solving Approach**



Centre for  
Statistical Education

**Chapter 1**

Plan

Collect

Process

Discuss



## Chapter 1

# Using the Whole Problem Solving Approach

In this chapter we are going to illustrate with just one example how you can integrate the problem solving cycle within your statistics lessons. The lesson shown is one produced by the RSCSE during its recent review of the positioning of Statistics and Data Handling within the curriculum. The following lesson, along with 7 other similar resources, is available to freely download from the internet site [www.rsscse.org.uk/qca](http://www.rsscse.org.uk/qca). On the site you will find the PowerPoint, teacher's notes and all other resources that a teacher would need to conduct this lesson in their classroom. During this chapter we will show you the lesson and ask a few questions so you can consider how to make more use of the problem solving cycle in your lessons. One of the simplest ways to do this is illustrated by the four colours and symbols you can see at the top of this page. This helps to indicate to the pupil exactly where they are in the cycle at all times and so relates the various parts of the investigation/activity together. For example, the first slide below is in the planning stage of the investigation and the second in the collection phase.

By keeping the learners always aware of the part of the cycle they are in they will be actively thinking about how the parts fit together and understanding the processes they are going through.

Have a look at the following lesson which shows each relevant PowerPoint slide along with the objectives intended for that slide, suggestions of activities the learners could be doing alongside the slide and various other points to note. You should be aware that although we are being very prescriptive by using a PowerPoint we do try to simply offer this as a possible way through the lesson and hope that once teachers feel a little more comfortable teaching using the whole data handling cycle that they will deviate and change the lesson to suit their individual class.

Always using the signs and symbols is also a way to show your learners exactly where you are in the handling data cycle and even if you do feel the need to present a statistical technique in isolation to your learners you could use these signs to emphasise to them that they are only looking at a portion of the whole problem.

Plan

Collect

Process

Discuss



## How old is your height? – an example

The lessons are based on an extremely detailed PowerPoint that we will provide screen snaps of here. Remember the PowerPoint itself, along with the other resources for the lesson which were developed for the QCA-RSS Centre project can be freely downloaded from: <http://www.rsscse.org.uk/qca>

On the pages that follow you will find some brief teacher's notes followed by the PowerPoint and the pupil worksheet.

# How old is your height?

This task uses a **Problem-Solving Approach** and is designed to take approximately 3 hours of teaching time.

The resource explores the use of data within the historical context of the Industrial revolution. In 1833 the first factory act was introduced to control the employment of children in factories. Inspectors were employed to enforce the act and had to solve the problem of identifying a child's age.



Pupils are encouraged to look at what the inspectors did and consider their data, thinking about its reliability, as well as using their own data from CensusAtSchool to compare children's heights now and then. Optional material contained in the presentation leads pupils to consider spread in data and how a box and whisker plot can be a helpful graphical tool.

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## Downloadable materials:

- Teachers' overview
- PowerPoint presentation\*
- PDF of teachers' notes from PowerPoint slides
- Pupil worksheet\*
- Pupil feedback forms and teacher cover sheet

\* These materials can be edited for your own use

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## Classroom guidance:

Time: 3 hours

NC Level: 5-7

Cross curricular links: History

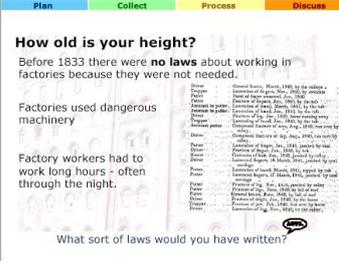
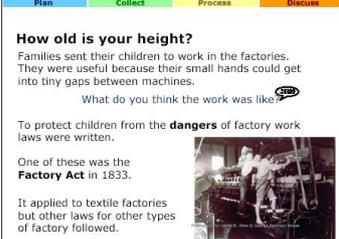
Citizenship

Source: The Penny Magazine (1837)

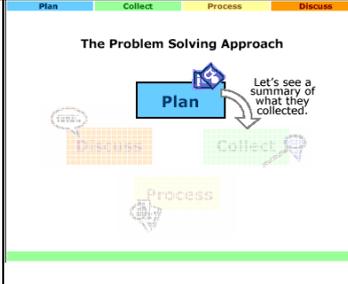
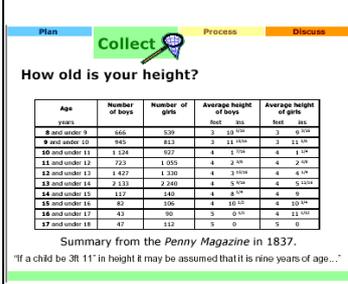
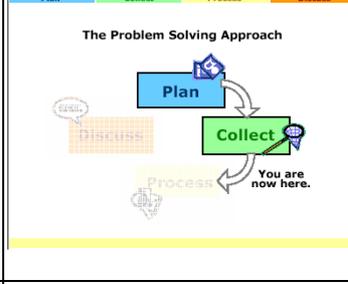
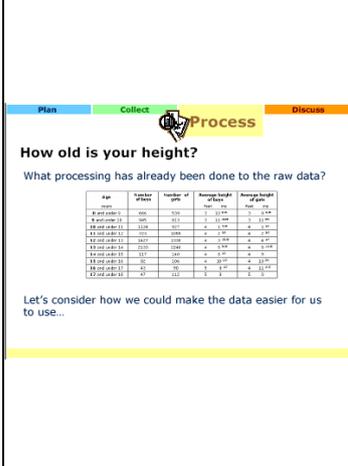
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## Keywords:

Industrial Revolution  
Agriculture  
Industry  
Line graph  
Mean  
Feet  
Inches  
Metric  
Average  
Mean  
Box and whisker plot  
Mid-point  
Median

No	Slide	Objectives Children should learn:	Activities
1	 <p>The presentation requires Microsoft PowerPoint version 2002 or above.</p> <p>You may download the free PowerPoint viewer from our website if you have an earlier version.</p> <p>This presentation contains 30 slides.</p>	<ul style="list-style-type: none"> <li>• to relate individual statistical techniques to a wider problem;</li> <li>• to think analytically about a statistical problem;</li> <li>• to apply a variety of techniques to solve a problem</li> </ul>	<p><b>Context (provided for the teacher's benefit – this is introduced through the slides)</b></p> <p>After the Industrial revolution child labour in Britain was rife. Children worked long hours being poorly paid for their efforts. The factory act of 1833 was one of several acts introduced to protect children from poor working conditions (even having to work at all). The act was difficult to enforce however so inspectors were employed to help protect the children. They collected the age and height of thousands of children and calculated the average height of children at different ages to provide a guide. These materials can be used to consider the use of an average as a guide for children's age or used to compare the heights of children in 1837 with children of today. Pupils can hypothesise and then use data from the CensusAtSchool database to examine the reality.</p>
2.		<ul style="list-style-type: none"> <li>• about the industrial revolution</li> <li>• the significance of the industrial revolution</li> </ul>	<p>The emphasis placed on this slide will depend on your cross curricular requirements for the activity. Activities could be soft discussion about the industrial revolution. The following questions could be used:</p> <p><i>Why did people move to the cities?</i>  <i>What impact did the shift have?</i>  <i>[introduction of canals, improved roads and then railways. Later came steam powered ships, the internal combustion engine and electricity]</i></p>
3.		<ul style="list-style-type: none"> <li>• why working law was introduced</li> </ul>	<p>Discussion points from the slide.</p> <p><b>Points to note:</b></p> <p>The factory act of 1833 was one of a series of acts written for factory workers.</p>
4.		<ul style="list-style-type: none"> <li>• to think about the historical experiences of others</li> <li>• why the factory act of 1833 was written</li> </ul>	<p>Discussion of the points on the slide</p>

5.	<p><b>Plan</b> <b>Collect</b> <b>Process</b> <b>Discuss</b></p> <p><b>How old is your height?</b></p> <p>The law put limits on the number of days and hours that children of different ages could work.</p> <p>What do you think was the youngest age children could work in a factory?</p> <p>How many hours-a-day and days-a-week do you think children could work?</p> <p>The act also talked about schooling. How many hours-a-day do you think children had to get?</p> 	<ul style="list-style-type: none"> <li>to think about the historical experiences of others</li> <li>to think about how working conditions <i>then</i> relate to now</li> </ul>	<p>PUPIL WORKSHEET has spaces for pupils to fill in ideas</p> <p>Discussion: predictions of what they think the rules were</p>
6.	<p><b>Plan</b> <b>Collect</b> <b>Process</b> <b>Discuss</b></p>  <p><b>The Factory Act 1833</b></p> <p>Children under 9 years of age are <b>not permitted to work</b>.</p> <p>Children aged 9-13 years are permitted to work: <b>no more than 9 hours</b> a day.</p> <p>Children aged 13-18 years are permitted to work: <b>no more than 12 hours</b> a day.</p> <p>Children are <b>not to work at night</b>.</p> <p><b>Two hours of schooling</b> each day for children.</p>	<ul style="list-style-type: none"> <li>what the factory act of 1833 said</li> <li>how current law compares</li> </ul>	<p>Discussion: <b>How does the factory act compare with what the students expected?</b></p> <p><b>How does it compare to today?</b></p> <p><b>Points to note: Today's law:</b></p> <p>These apply to any businesses where work is done for profit</p> <ul style="list-style-type: none"> <li>no work during school hours or lunch breaks</li> <li>no work before 7am or after 7pm</li> <li>only 2 hours work allowed on a school day (no more than 1 hour before school)</li> <li>no more than 8 hours work on a Saturday or during the holidays (5 hours for those under 15)</li> <li>no more than 35 hours a week during the holidays (25 hours for under 15's)</li> <li>no more than 12 hours a week when attending school</li> <li>young children should get at least a 2 week break during the school holidays at any point during the year</li> </ul>
7.	<p><b>Plan</b> <b>Collect</b> <b>Process</b> <b>Discuss</b></p> <p><b>Enforcing the Factory Act</b></p> <p>The passing of this Act didn't mean the everyone stopped employing under-age children.</p> <p><b>Four inspectors were hired to enforce the law across the whole country.</b></p> <p><b>Why might young children have continued being illegally employed?</b></p> <p><b>How might the employers or even the families try to get around the new laws?</b></p> 	<ul style="list-style-type: none"> <li>how the factory act was enforced</li> <li>why the act needed enforcing</li> </ul>	<p>Discussion of questions on the slide.</p> <p><b>Points to note:</b></p> <p>Many families depended on the income of the children in order to live.</p>
8.	<p><b>Plan</b> <b>Collect</b> <b>Process</b> <b>Discuss</b></p> <p><b>How old is your height?</b></p> <p>Imagine that you are one of those four factory inspectors. They weren't sure they could trust everyone to tell the truth.</p> <p>They needed a way to judge a child's age.</p> <p>What measurements do you think they could use to help judge how old a person is?</p>	<ul style="list-style-type: none"> <li>to think about questions which can be answered using statistics</li> <li>to think about what information data can provide</li> </ul>	<p>Brainstorm attributes which might be age related – some examples might be –</p> <p>height, weight, size of waist, length of ears, teeth</p>
9.	<p><b>Plan</b> <b>Collect</b> <b>Process</b> <b>Discuss</b></p> <p><b>How old is your height?</b></p> <p>They decided to survey children's heights and use the data to judge the age of employees.</p> <p>What information would they need to collect?</p>  <p>How big a sample do you think they took?</p>	<ul style="list-style-type: none"> <li>what data was collected</li> <li>what things need to be considered when planning to collect data</li> </ul>	<p>Discussion: <b>How could they collect the data?</b></p> <p><b>What problems might they encounter?</b></p> <p><b>How can you ensure the data is truthful?</b></p> <p><b>Points to note:</b></p> <p>The height data was recorded from 15000 children. Only a summary of the data is available today (including average heights). The next slide gives a choice of looking at the original table or a 'tidied up' metric version.</p>

<p>10.</p>	 <p>Plan Collect Process Discuss</p> <p><b>How old is your height?</b></p> <p>A summary of the data they collected from <b>15 000</b> children was printed in the <i>Penny Magazine</i> in 1837.</p> <p><b>THE PENNY MAGAZINE</b> Society for the Diffusion of Useful Knowledge, PUBLISHED WEEKLY BY CHARLES KNIGHT, PRINTER, FLEET STREET.</p> <p>Original table Metric version</p>	<ul style="list-style-type: none"> <li>• that data often needs reorganising to enable processing</li> </ul>	<p>Depending on students' ability and the amount of time available, either the original table or a reorganised metric version can be used.</p> <p><b>ORIGINAL TABLE:</b> Higher ability students could be given this and asked to adapt it to get it in a usable state. There are slides illustrating the process for review purposes.</p> <p><b>METRIC VERSION:</b> This version of the table is ready for students to use with the exception of finding the midpoint of the age groups.</p>																																																							
<p>11.</p>	 <p>Plan Collect Process Discuss</p> <p><b>The Problem Solving Approach</b></p> <p>Let's see a summary of what they collected.</p> <p>Plan Collect Process Discuss</p>	<ul style="list-style-type: none"> <li>• where the current task fits within the 'problem solving approach'</li> <li>• to review prior work.</li> </ul>	<p><b>Points to note:</b></p> <p>After they <b>planned</b> what to do, the inspectors <b>collected</b> information to help them answer the problem.</p>																																																							
<p>12.</p>	 <p>Plan Collect Process Discuss</p> <p><b>How old is your height?</b></p> <table border="1"> <thead> <tr> <th>Age years</th> <th>Number of boys</th> <th>Number of girls</th> <th>Average height of boys feet ins</th> <th>Average height of girls feet ins</th> </tr> </thead> <tbody> <tr> <td>8 and under 9</td> <td>665</td> <td>539</td> <td>3 10 1/2</td> <td>3 0 1/2</td> </tr> <tr> <td>9 and under 10</td> <td>965</td> <td>813</td> <td>3 14 1/2</td> <td>3 12 1/2</td> </tr> <tr> <td>10 and under 11</td> <td>1 124</td> <td>927</td> <td>4 1 1/2</td> <td>4 1 1/2</td> </tr> <tr> <td>11 and under 12</td> <td>723</td> <td>1 095</td> <td>4 2 1/2</td> <td>4 2 1/2</td> </tr> <tr> <td>12 and under 13</td> <td>4 927</td> <td>4 200</td> <td>4 3 1/2</td> <td>4 4 1/2</td> </tr> <tr> <td>13 and under 14</td> <td>2 131</td> <td>2 240</td> <td>4 5 1/2</td> <td>4 5 1/2</td> </tr> <tr> <td>14 and under 15</td> <td>117</td> <td>444</td> <td>4 8 1/2</td> <td>4 8 1/2</td> </tr> <tr> <td>15 and under 16</td> <td>82</td> <td>156</td> <td>4 10 1/2</td> <td>4 10 1/2</td> </tr> <tr> <td>16 and under 17</td> <td>43</td> <td>80</td> <td>5 0 1/2</td> <td>4 11 1/2</td> </tr> <tr> <td>17 and under 18</td> <td>42</td> <td>132</td> <td>5 0</td> <td>5 0</td> </tr> </tbody> </table> <p>Summary from the <i>Penny Magazine</i> in 1837. "If a child be 3ft 11" in height it may be assumed that it is nine years of age..."</p>	Age years	Number of boys	Number of girls	Average height of boys feet ins	Average height of girls feet ins	8 and under 9	665	539	3 10 1/2	3 0 1/2	9 and under 10	965	813	3 14 1/2	3 12 1/2	10 and under 11	1 124	927	4 1 1/2	4 1 1/2	11 and under 12	723	1 095	4 2 1/2	4 2 1/2	12 and under 13	4 927	4 200	4 3 1/2	4 4 1/2	13 and under 14	2 131	2 240	4 5 1/2	4 5 1/2	14 and under 15	117	444	4 8 1/2	4 8 1/2	15 and under 16	82	156	4 10 1/2	4 10 1/2	16 and under 17	43	80	5 0 1/2	4 11 1/2	17 and under 18	42	132	5 0	5 0	<ul style="list-style-type: none"> <li>• that data often needs to be put into a more user friendly form</li> </ul>	<p><b>Points to note:</b></p> <p>The chart needs some work – changing the measures into metric and so on. Some stronger students may enjoy the challenge of this. Areas to highlight – Age groups Imperial heights</p>
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<p>13.</p>	 <p>Plan Collect Process Discuss</p> <p><b>The Problem Solving Approach</b></p> <p>You are now here.</p> <p>Plan Collect Process Discuss</p>	<ul style="list-style-type: none"> <li>• where their current task fits within the whole 'problem solving approach'</li> <li>• to review their prior work.</li> </ul>	<p><b>Points to note:</b></p> <p>Now we have <b>collected</b> our data, we need to <b>process</b> it. We need to get it into a form that is easier to manage by drawing some graphs and charts and doing some calculations.</p>																																																							
<p>14.</p>	 <p>Plan Collect Process Discuss</p> <p><b>How old is your height?</b></p> <p>What processing has already been done to the raw data?</p> <table border="1"> <thead> <tr> <th>Age</th> <th>Number of boys</th> <th>Number of girls</th> <th>Average height of boys</th> <th>Average height of girls</th> </tr> </thead> <tbody> <tr> <td>8 and under 9</td> <td>665</td> <td>539</td> <td>3 10 1/2</td> <td>3 0 1/2</td> </tr> <tr> <td>9 and under 10</td> <td>965</td> <td>813</td> <td>3 14 1/2</td> <td>3 12 1/2</td> </tr> <tr> <td>10 and under 11</td> <td>1 124</td> <td>927</td> <td>4 1 1/2</td> <td>4 1 1/2</td> </tr> <tr> <td>11 and under 12</td> <td>723</td> <td>1 095</td> <td>4 2 1/2</td> <td>4 2 1/2</td> </tr> <tr> <td>12 and under 13</td> <td>4 927</td> <td>4 200</td> <td>4 3 1/2</td> <td>4 4 1/2</td> </tr> <tr> <td>13 and under 14</td> <td>2 131</td> <td>2 240</td> <td>4 5 1/2</td> <td>4 5 1/2</td> </tr> <tr> <td>14 and under 15</td> <td>117</td> <td>444</td> <td>4 8 1/2</td> <td>4 8 1/2</td> </tr> <tr> <td>15 and under 16</td> <td>82</td> <td>156</td> <td>4 10 1/2</td> <td>4 10 1/2</td> </tr> <tr> <td>16 and under 17</td> <td>43</td> <td>80</td> <td>5 0 1/2</td> <td>4 11 1/2</td> </tr> <tr> <td>17 and under 18</td> <td>42</td> <td>132</td> <td>5 0</td> <td>5 0</td> </tr> </tbody> </table> <p>Let's consider how we could make the data easier for us to use...</p>	Age	Number of boys	Number of girls	Average height of boys	Average height of girls	8 and under 9	665	539	3 10 1/2	3 0 1/2	9 and under 10	965	813	3 14 1/2	3 12 1/2	10 and under 11	1 124	927	4 1 1/2	4 1 1/2	11 and under 12	723	1 095	4 2 1/2	4 2 1/2	12 and under 13	4 927	4 200	4 3 1/2	4 4 1/2	13 and under 14	2 131	2 240	4 5 1/2	4 5 1/2	14 and under 15	117	444	4 8 1/2	4 8 1/2	15 and under 16	82	156	4 10 1/2	4 10 1/2	16 and under 17	43	80	5 0 1/2	4 11 1/2	17 and under 18	42	132	5 0	5 0	<ul style="list-style-type: none"> <li>• to consider what has already happened to data that is presented</li> <li>• to make figures more easy to use and understand</li> </ul>	<p>Discussion: What processing has already been done?</p> <ul style="list-style-type: none"> <li>- the data has been grouped and averages calculated</li> </ul> <p>Why are the heights recorded in feet and inches? What are feet and inches? What type of average is it likely to be? Why is the mean a good average to use here? - [because the data is not likely to be skewed] Which figure will be the most and least reliable? Why? - notice the different numbers of people being surveyed in each case</p>
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15.	<p>Plan Collect Process Discuss</p> <p><b>How old is your height?</b></p> <table border="1"> <thead> <tr> <th>Age range (years)</th> <th>Number of boys</th> <th>Number of girls</th> <th>Average height of boys (in)</th> <th>Average height of girls (in)</th> </tr> </thead> <tbody> <tr><td>8 and under 9</td><td>666</td><td>539</td><td>3 10 1/4</td><td>3 9 3/4</td></tr> <tr><td>9 and under 10</td><td>965</td><td>813</td><td>3 10 3/8</td><td>3 10 1/8</td></tr> <tr><td>10 and under 11</td><td>1124</td><td>927</td><td>4 1 1/8</td><td>4 1 1/4</td></tr> <tr><td>11 and under 12</td><td>723</td><td>1035</td><td>4 2 1/8</td><td>4 2 3/8</td></tr> <tr><td>12 and under 13</td><td>1427</td><td>1336</td><td>4 3 1/8</td><td>4 3 1/4</td></tr> <tr><td>13 and under 14</td><td>2131</td><td>2240</td><td>4 5 1/8</td><td>4 5 1/4</td></tr> <tr><td>14 and under 15</td><td>117</td><td>140</td><td>4 6 1/4</td><td>4 6</td></tr> <tr><td>15 and under 16</td><td>82</td><td>106</td><td>4 10 1/2</td><td>4 10 1/4</td></tr> <tr><td>16 and under 17</td><td>43</td><td>90</td><td>5 10 1/2</td><td>4 11 1/2</td></tr> <tr><td>17 and under 18</td><td>47</td><td>112</td><td>5 0</td><td>5 0</td></tr> </tbody> </table> <p>First let's convert feet and inches into metric units (cm).</p>	Age range (years)	Number of boys	Number of girls	Average height of boys (in)	Average height of girls (in)	8 and under 9	666	539	3 10 1/4	3 9 3/4	9 and under 10	965	813	3 10 3/8	3 10 1/8	10 and under 11	1124	927	4 1 1/8	4 1 1/4	11 and under 12	723	1035	4 2 1/8	4 2 3/8	12 and under 13	1427	1336	4 3 1/8	4 3 1/4	13 and under 14	2131	2240	4 5 1/8	4 5 1/4	14 and under 15	117	140	4 6 1/4	4 6	15 and under 16	82	106	4 10 1/2	4 10 1/4	16 and under 17	43	90	5 10 1/2	4 11 1/2	17 and under 18	47	112	5 0	5 0	<ul style="list-style-type: none"> <li>to make figures more easy to use and understand</li> </ul>	<p>Students to convert the figures to cm. Conversion used: 1 inch = 2.54 cm 1 foot = 12 inches</p>
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19.	<p>Plan Collect Process Discuss</p> <p><b>Height against age for children 8-18</b> Data from The Mirror Magazine, 1977</p> <p>Can you see a relationship between average height and age? What do you notice about the boys heights? Can you see any reason for the unexpected pattern? Hint: Look again at the table of data</p>	<ul style="list-style-type: none"> <li>to look at graphical information and interpret it</li> </ul>	<p>Discussion of the questions posed. <b>Points to note:</b> It should be noted the small numbers of people involved in the survey at the 16+ age group. This is likely to explain the drop in average for the boys.</p>																																																							
20.	<p>Plan Collect Process Discuss</p> <p><b>How old is your height?</b></p> <p>One inspector interviewed a girl that was 4'1" tall (125cm). She claimed to be 15. <del>How tall the inspector has the ability to check her age?</del></p>	<ul style="list-style-type: none"> <li>to read information from a graph</li> <li>to reason with data</li> </ul>	Discussion of the likely age of the girl																																																							

21.		<ul style="list-style-type: none"> <li>• to relate presented information to their own experiences</li> <li>• to question presented information</li> </ul>	<p>Discussion of questions on the slide</p> <p><b>Points to note:</b></p> <p>It is intended that students relate themselves to the data. Since the mean is plotted, it would be expected that roughly half of the children surveyed would be above and below the line. By plotting the groups heights on the graph you are likely to see that well over half of the group are above the line (thus unable to work) Pupils should be encouraged to think about why this might be and how it can be investigated further. In actual fact, children are taller (on average) now than they were in 1837.</p>
22.		<ul style="list-style-type: none"> <li>• where the current task fits within the whole 'problem solving approach'</li> <li>• to review prior work.</li> </ul>	<p><b>Points to note:</b></p> <p>Now we have <b>processed</b> the information by drawing charts and doing calculations, we need to <b>discuss</b> what our results show us and how they help us consider the problem.</p>
23.		<ul style="list-style-type: none"> <li>• to discuss their findings and relate them to the original problem and the data</li> <li>• to come up with new questions or hypotheses about the information</li> </ul>	<p>Discussion about questions on the slide</p> <p><b>Points to note:</b></p> <p>The remaining slides will lead students to taking samples of data from CensusAtSchool and comparing data for 'now' to 1837. Students may come up with hypotheses they wish to investigate. Data is also available to compare other countries with the UK data.</p>
24.		<ul style="list-style-type: none"> <li>• where their current task fits within the whole 'problem solving approach'</li> <li>• to review their prior work.</li> </ul>	<p><b>Points to note:</b></p> <p>At the end of the work, having <b>discussed</b> our findings we could now start the whole cycle again.</p>
25.		<ul style="list-style-type: none"> <li>• to pose a new question</li> </ul>	<p>Discussion of questions posed</p>
26.		<ul style="list-style-type: none"> <li>• to pose a new question</li> </ul>	<p>Discussion of points on the slide</p>

27.		<ul style="list-style-type: none"> <li>to plan what data they intend to collect</li> </ul>	<p>Discussion of questions posed</p> <p><b>Points to note:</b> The extra processing option on this slide explores the usefulness of drawing box and whisker plots to better illustrate the data.</p>
28.		<ul style="list-style-type: none"> <li>to think about what information is being presented</li> <li>to consider what affect the spread has on 'children being able to work'</li> <li>to think about maximums and minimums</li> </ul>	<p>Discussion of the questions posed</p>
29.		<ul style="list-style-type: none"> <li>what a box plot is</li> <li>how a box plot can be helpful in interpreting data like this</li> </ul>	<p>Pupils can draw box plots for their own age group.</p> <p><b>Points to note:</b> This slide is not intended to give all the information about how a box plot is drawn – instead it should give information about how they can be a useful tool in data analysis.</p>
30.			<p><b>End of slideshow</b></p>

The pupil worksheet available from the site:

Name : \_\_\_\_\_

### How old is your height?

170 years ago many children were employed in factories. This Act of Parliament put limits on the number of days and hours that children of different ages could work.

**Introduction**

I think that the youngest age allowed in a factory was \_\_\_\_ years. They would have been allowed to work for \_\_\_\_ hours per day and \_\_\_\_ days per week.

I also think they would have had \_\_\_\_ hours of school per day.

Factories were inspected to make sure that owners were not employing under-aged workers. To help them to quickly judge young people's ages they needed a quick and simple method.

Complete the table to show the survey that was carried out to help the inspectors.

Age Range	Mid point	Average (cm)	
		Boys	Girls

Height/ cm

**Discuss**

Were there any patterns linking age and height in the inspectors' data?  
As age increases does height increase in a regular way? Is the graph for boys similar to girls?

Are there any problems with these graphs created from the age and average height?

When you add your own heights, how many pupils fall below or above the lines the inspectors used? Does this suggest anything about modern pupils?

---

**Plan** **Collect**

What are you going to investigate?

What information are you going to collect?  
Is it primary or secondary data?

How large a sample are you going to collect?

What patterns do you think you are likely to find?  
This is your hypothesis