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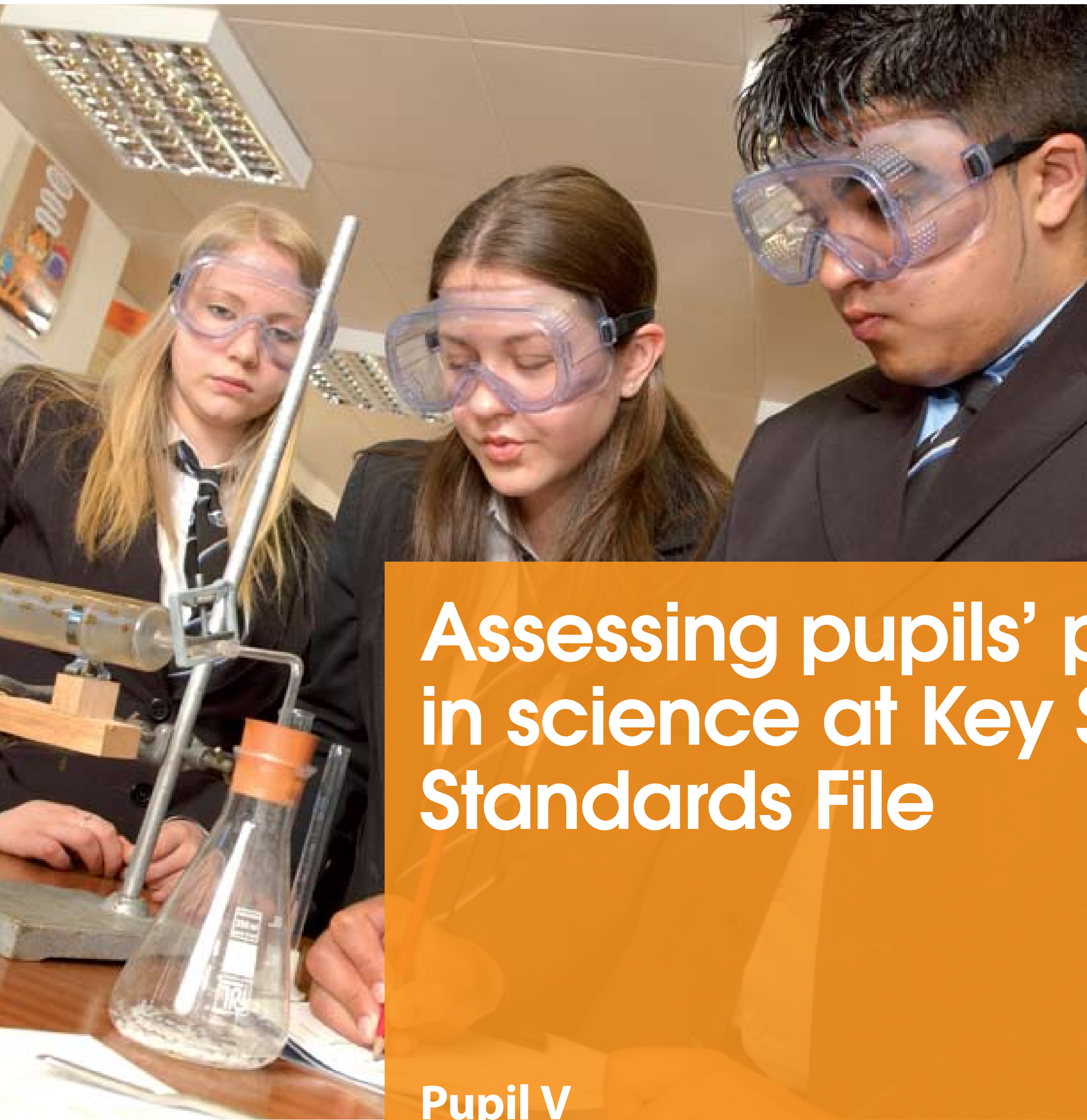
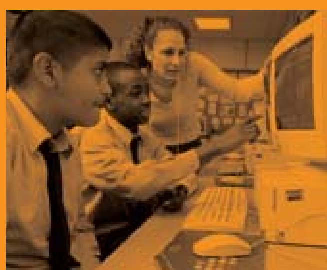


Assessing pupils' progress in science at Key Stage 3: Standards File

Pupil V



department for children, schools and families

QCA Qualifications and Curriculum Authority

Assessing pupils' progress in science at Key Stage 3: Standards File

Pupil V

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Pupil V Year 8 High level 5 Science Standards File

Pupil profile

Pupil V works in a set where pupils' attainment ranges from level 3 to level 5. Prior to this assessment her teacher expected her to be working at a secure to high level 5. The activities provide an opportunity to show achievement at level 5 and identify any areas in which progress is being made toward level 6.

The evidence

1. Presentation on vaccination
2. Analysing pulse rate data
3. Assessing risk when heating
4. Making cell models
5. Role playing particles
6. Investigating friction

00063-2009BKT-EN

1. Presentation on vaccination

Assessment focuses

AF1, AF2, AF3, AF5

Context

This activity followed a set of three lessons on microbes and disease. Pupils considered vaccination, referring to their own experiences of vaccination against common diseases and watching a video clip on the work of Edward Jenner.

The teacher asked pupils to research the work of Edward Jenner using an internet search and through a website chosen by the teacher (see the briefing sheet below). The teacher also asked them to research how vaccination worked, drawing on what they had studied previously. Their research was to be presented to the class using PowerPoint.

Pupil briefing sheet

History of Vaccination

You are going to produce some work on the history of vaccination and understand how science helped develop this technology. Use PowerPoint to present your answers

Your first task:

Using the internet, research the history of vaccines and produce a timeline showing the MAIN developments.

Search terms: Vaccination, Timeline, Jenner.

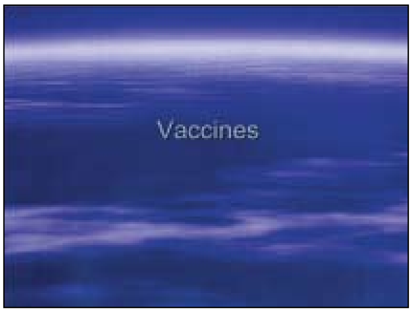
Second task:

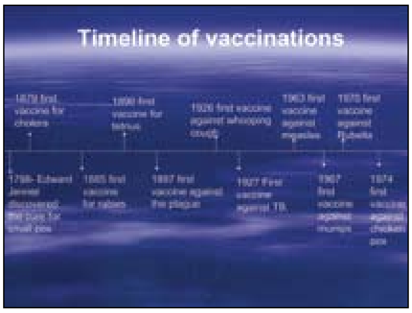
Go to the page: http://en.wikipedia.org/wiki/Edward_Jenner

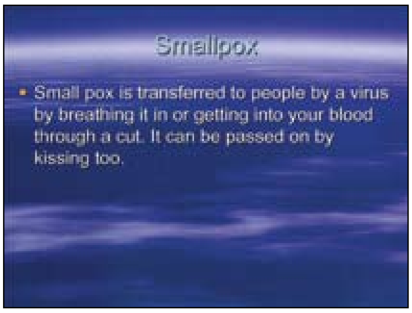
Read through the information carefully then answer these questions.

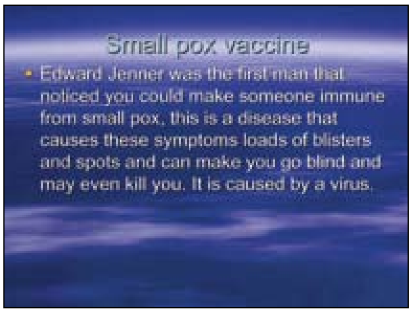
-What is small pox?
-How is small pox transferred to people?
-What was Jenner's theory?
-What was Jenner's prediction?
-How did Jenner test his prediction?
-What was the result of Jenner's experiment?
-How reliable do you think Jenner's results were?
-What made the results more reliable?

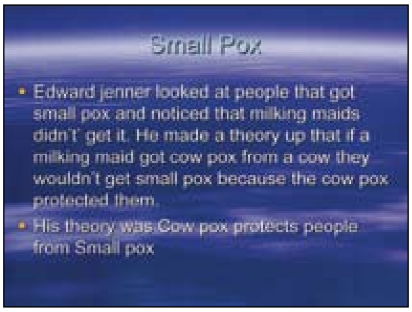
Pupil V's work

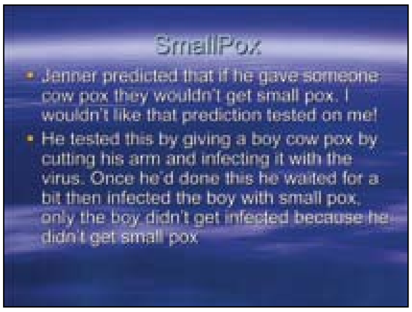


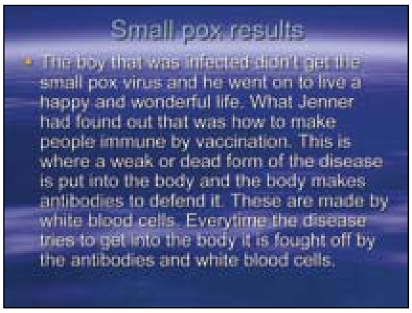


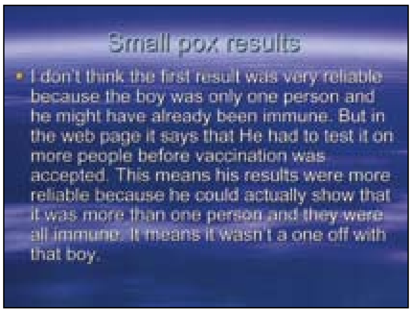


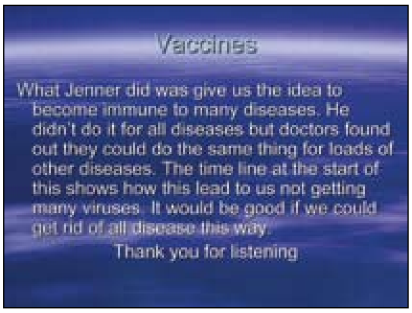












Teacher's notes

AF1

Pupil V described scientific evidence that supports the idea of cow pox infection providing immunity against small pox. She identified the use of evidence and creative thinking in the development of the vaccination process.

AF2

She linked vaccination to some of its underpinning scientific ideas, and also made an ethical statement, at a valid personal level, on the issues of Jenner's trial.

AF3

Pupil V presented information from secondary sources in an appropriate form, creating a means of communication that was well matched to its audience and purpose.

AF5

She questioned the reliability of Jenner's experiment, and suggested that further observations were needed for his initial experiment to be convincing evidence for the success of the vaccination process. She therefore suggested reasons, based on her scientific knowledge and understanding, for limitations in Jenner's initial evidence.

Next steps

- Consideration of opinion and scientific evidence in relation to the controversy surrounding the MMR vaccination.

Assessment commentary

Pupil V produces a clear presentation that gives a good overview of the development of the vaccination process, covering the required questions asked on the briefing sheet.

She takes a critical approach, recognising that many further tests were required to establish the credibility of the process. She highlights how beneficial Jenner's work was, with immunisation against many diseases now being available through vaccination.

Her understanding of the ethical issues of scientific studies is on a personal level and could be further developed to include other viewpoints.

2. Analysing pulse rate data

Assessment focuses

AF1, AF3, AF5

Context

Pupils were working on a 'healthy living' project. The starter activity for three lessons required pupils to come into the class, sit quietly and take their resting pulse rate for one minute and enter it into a class spreadsheet. They saved the data and then, using ICT facilities and the virtual learning environment, analysed the data they had saved.

The teacher then asked pupils to plot a graph of the results in an appropriate format, analyse the data and answer the following questions:

1. What is the pattern shown in the data?
2. Why does the data show variations between each day?
3. How could we increase the reliability of the test?
4. Why is pulse rate used as a measure of fitness or health?

Pupil V's work

Person	Day 1	Day 2	Day 3
A	58	70	70
B	70	68	80
C	53	55	57
D	68	67	74
E	56	61	63
F	53	55	58
G	54	56	53
H	51	62	59
I	82	75	–
J	48	47	44
K	80	74	74
L	49	55	85
M	80	81	85
N	49	41	51
O	72	77	63
P	56	68	78
Q	78	81	81
R	52	54	56
S	48	47	50
T	48	49	48
U	67	71	72
V	60	70	64
W	49	51	53
X	73	72	68
Y	42	55	32
Z	55	58	60
Average	59.6538	62.3076	63.12

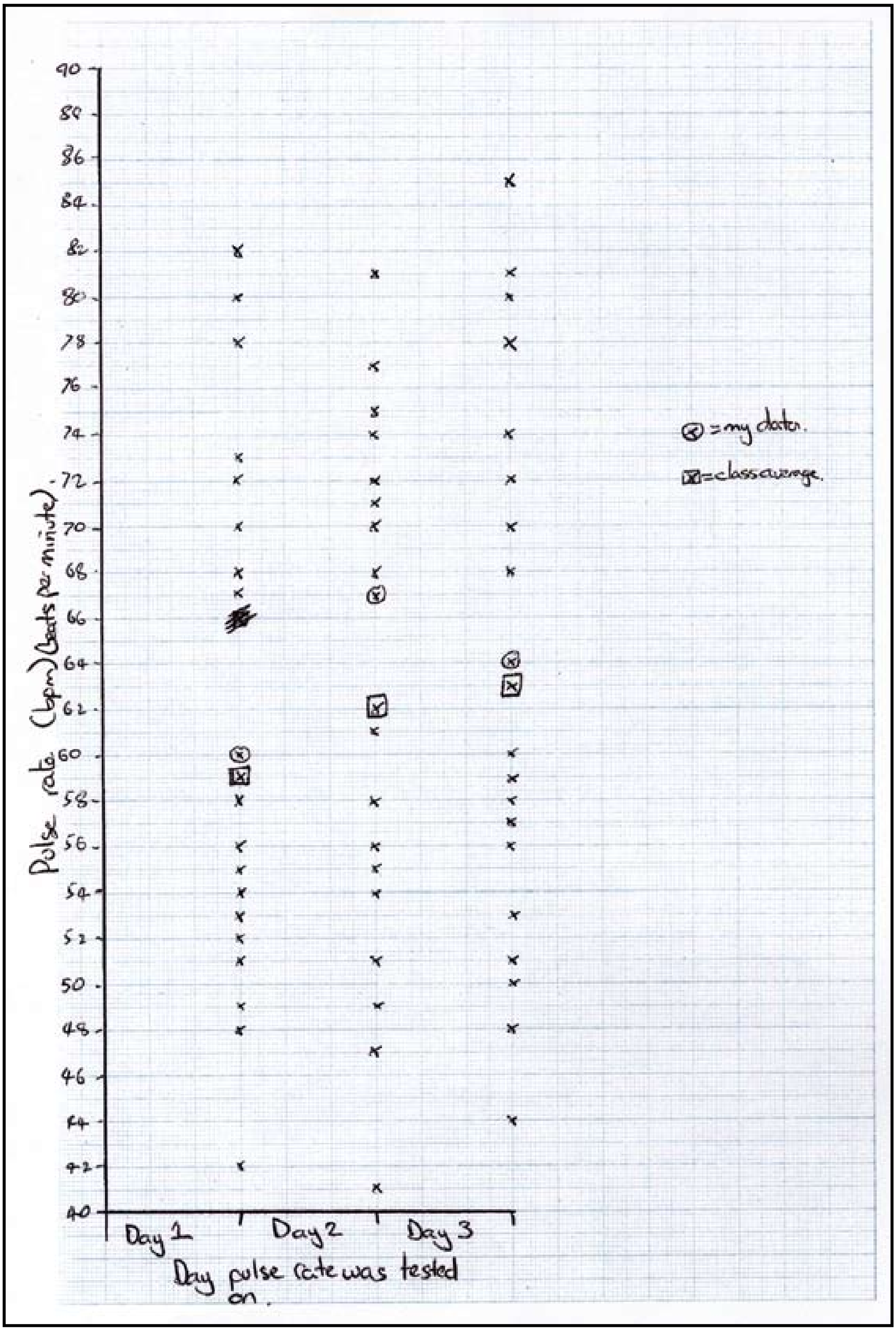
1. From the graph you can see that the pulse rates are all over the place. The numbers of bats per minute range from 41 all the wa up to 85 and this was without any exercise. The average pulse rate is sown in the table, my pulse rate is close to the class average although day 2's pulse rate was a bit higher.

2. The data could have been so varied because the way tested it was not a fair test. We took pulse rates at different lessons and some people might have been running around at break time and there pulse would be faster because of it. Also people could have counted there pulse wrong and cheated to make it better than t was or lost count and just made it up.

3. The way we could have made the test better and the data we got more reliable would be to use a better way of counting pulse. We could have used a pulse rate meter like the one Sir showed us so that it would be completely accurate and given us all the data for the whole lesson. We could have then worked out the average resting pulse rate for that lesson. we could have also made sure that the pulse rate was taken at the same time each day so that things like break time could have been not counted and also we could have rested for 15 minutes at the beggining of the lesson to let our pulse settle.

4. Pulse rate is used as a measure of fitness because it tells us how hard the heart is having to work when we are doing something. The harder the heart has to work when we are sat doing nothing means that when we do actually do something it has to work even harder. A person who has low resting pulse can make the heart work harder when they need to. E.g a fit footballer resting pulse of

40 means that when he has to run fast his heart can go faster up to his maximum heart beats. The heart has to work harder to deliver the oxygen and glucose for the muscles to get energy and work. the blood then gets rid of the waste such as carbon dioxide. Lower pulse means the body is getting all it needs without working hard.


Pulse rate (bpm) (beats per minute)
90
88
86
84
82
80
78
76
74
72
70
68
66
64
62
60
58
56
54
52
50
48
46
44
42
40
Day 1
Day 2
Day 3
Day pulse rate was tested on.
= my data.
= class average.

Teacher's notes

AF1

Pupil V used abstract ideas of more than one step in explaining the need for the heart to work harder during exercise. She also described why a lower pulse rate when resting can be used as an indicator of the level of fitness based upon the process of respiration.

AF3

This was a rather awkward set of data to represent graphically and Pupil V plotted a graph of the data in a scatter graph format that she devised herself. It shows the spread of data very effectively, together with average class pulse rate and her own results.

AF5

Pupil V identified and gave good explanations for the patterns in the extensive data, including the recognition of wide range and high variability, issues of fair testing (due to some measurement following physical activity during the break), and of the possibility of unreliable data. She offered good solutions to these problems.

Next steps

- Exercise on using graph drawing software to draw graphs from spreadsheet data.
- Investigating the effects of diet and exercise on pulse rates.

Assessment commentary

Pupil V uses initiative and creativity to produce an effective graphical representation of data. She shows confidence in identifying and describing the patterns in the data and linking these to scientific explanations. Her comments on the quality of data are valid and she describes her methods to improve the data. Variability of data has been accounted for and explained where possible. The data have been linked to the body processes effectively, although this could be developed further to include a complete description and explanation of the process of respiration and how this links to an increase in heart rate when exercising.

3. Assessing risk when heating

Assessment focus

AF4

Context

As a starter activity before a practical on observing changes when heating, the teacher asked pupils to list all the safety points that needed to be considered when carrying out the experiment.

Following a check by the teacher, Pupil V carried out the practical work putting her ideas into practice.

Pupil V's work

Safety when heating

Some students were going to carry out an experiment into heating a substance and looking for signs of a reaction similar to the experiment you will carry out today. They set up the equipment shown.

For this experiment list all the safety precautions that will need to be taken

* Safety Glasses (on eyes not top of head!)
* Don't Run near bunsen
* Don't leave bunsen alone
* light bunsen on Safety flame (air hole closed)
* Make sure gas pipe is fitted tight
* Don't look over the thing you are heating
* Tie hair back
* Don't add anything to the mixture you heat
* Make tripod safe

What are the signs of a reaction the students may look for?

Bubbling Fizzing change from solid to liquid change colour explode

Teacher's notes

AF4

Pupil V made suggestions to control obvious risks to herself and others and acted on these when doing the practical work in the remainder of the lesson. Further practical work confirmed that she was able to do this consistently.

Next steps

- Introduction to CLEAPSS[1] Student Safety Sheets as sources of information for assessment of risk.

Assessment commentary

Pupil V has shown she can identify a number of familiar risks when carrying out a simple heating experiment and has taken steps to minimise these risks.

1 © CLEAPSS. Used with permission.

4. Making cell models

Assessment focuses

AF1, AF3, AF4

Context

Pupils had learned about the differences between plant and animal cells and the functions of cell organelles. They had viewed microscope slides of cells and had explored images on the website of the Wellcome Trust[2] (http://medphoto.wellcome.ac.uk/).

They were given a range of materials to construct a model of each of the cell types. Materials included jelly, small clear plastic bags, modelling clay, polystyrene beads, glass beakers, pipe cleaners and paper.

They were not allowed access to any reference material when constructing the models. Upon completion, the teacher asked the pupils to describe their models and the features of them. The teacher noted key points of the student descriptions and used these to undertake an assessment.

Pupil V's work

Animal cell

Pupil V described the bag as being the cell membrane and described the function of this correctly. She used the jelly as the cytoplasm and the nucleus was the large modelling clay ball. She accurately described their functions.

2 © Wellcome Images. http://images.wellcome.ac.uk

Plant cell

Pupil V described the bag as being a cell membrane while the jelly was the cytoplasm, and she described the function of these correctly. The nucleus in this model was the large yellow modelling clay circle and the chloroplasts were the blue modelling clay circles. Although inaccurately placed outside the cell membrane, she described their functions correctly. She also accurately described the function of the cell wall, which was modelled by the glass beaker.

Pupil V went on to describe the advantages of these model cells including, "They were 3-D and not flat like on the paper ones we drew and things could move in the cytoplasm like in a real cell."

Teacher's notes

AF1

Pupil V constructed a model in order to represent her own understanding and used this as the basis for making multi-step descriptions of the functions of cell components. She also described some of the advantages of using a model.

AF3

Pupil V used appropriate scientific language to describe the functions of the cell organelles and to explain why the materials were selected for that part of the model

AF4

She explained why particular materials were appropriate for the ideas under consideration.

Next steps

- Follow-up confirmatory work on the positioning of organelles within the cell.
- Identifying the strengths and weaknesses of the cell models and other models.

Assessment commentary

Pupil V shows the ability to select suitable equipment to make a physical model. She uses appropriate scientific language to describe the roles of cell organelles and to justify her choice of material to represent them in the cell model. She is able to describe some advantages of the models, but does not yet consider the ways in which the model is an incomplete representation and how it could be improved.

5. Role playing particles

Assessment focus

AF1

Context

This role play came at the end of some work on particle ideas and the effects of heat on materials. Half of the class was involved in another activity, so only a small group took part in this role play. This made it easier to question some individual pupils about particle ideas. The pupils later edited the video file to make an informative video, to be used as a revision resource on the school's virtual learning environment.

Pupil V's work

Transcript

Teacher: Right. You lot are going to be particles. What I would like you to do is arrange yourself as particles would in a solid please.

[Pupils move together]

Pupil V's note – all particles touch

Teacher: Now I'm going to ask someone to explain what's going on. Are we arranged as we should be?

Pupil Z: Yes.

Teacher: Good. Right, can someone tell me... OK... you've got your hand up. Thank you. Would you like to tell me why you are arranged how you have done?

Pupil V's note - solids = tight bonds

Pupil T: 'Cause we're solids so we're all squished together so we can't move.

Teacher: You're all squished together. OK. So you can't move. Right! Do you want to add to that?

Pupil C: Because solids can't move so and the solid isn't all in little pieces so we're all one solid together.

Pupil V's note – regularly arranged

Teacher: So you're all one solid together. Right, anything else that anyone would like to tell me about the arrangement?

Pupil V's note – heat makes 'em wiggle

Pupil T: We're in rows.

Teacher: You're in rows. Right, now. Pupil L.

Pupil L: I thought solid can move like vibrate...

Teacher: Uh... interesting. So maybe particles could just wiggle about a little bit.

[Pupils wiggle]

Teacher: Good. Right, good point. What I'd now like you to do is show me the arrangement of particles in a liquid please.

Pupil V's note – solid 2 liquid = melting – more energy

[Pupils move around with some contact]

Teacher: Whoa! Thank you. Stop there. Right, let me see.

Pupil V: Particles can flow

Teacher: I'm going to ask Pupil V now. Pupil V - how are the particles arranged in a liquid?

Pupil V's note: Take shape of container

Pupil V: They're spread out a little bit more but they can move about - as long as they're touching.

Teacher: Right. Now how does this help us understand the behaviour of liquids? Pupil T?

Pupil V's note: Bonds are weaker

Pupil T: Like when the heat rises, it means, like, you get like, more energy.

Teacher: OK. So when the heat, maybe not rises, what might we think?

Pupil T: Increases?

Teacher: Good - increases. What gets more energy?

Pupil T: The particles get more energy and they start like bouncing around.

Teacher: Good. Right, and how... what might happen then?

Pupil T: Uh... it takes the shape of the container.

Pupil V's note: More heat = More NRG

Teacher: Right. So it can flow and take the shape of a container. Good. Right. What I'd like you to do is show me how the particles might be arranged in a gas.

[Pupils move around individually and randomly making 'boing' noises]

Teacher: Right. Stop. Thank you! Pupil F. Would you like to tell me how you have arranged yourselves.

Pupil V's note: Liquid 2 gas = evaporation

Pupil F: We arranged ourselves like flying around. 'Cause of the gas and the particles in the air.

Teacher: Right - particles in the air. Now, what does that mean about the particles?

Pupil V's note: Gas fills up room

Pupil U: There's lots of energy because of the heat.

Pupil V's note: lots of energy

Teacher: OK. What else goes on? Pupil V?

Pupil V: I was going to say, when the heat gets hotter, like, you can move around more.

Teacher: Right. So you're moving around more. Good. Pupil G?

Pupil G: You're moving around a lot faster.

Teacher: Right – a lot faster. Why?

Pupil G: More heat.

Pupil V's note: When gases bump, they react

Teacher: And more....?

Pupil G: More energy.

Teacher: Good. More energy. Good.

[Roll credits: Made by Pupil V]

Pupil V takes part in the role play and states, when questioned about particles in a liquid:

"They are spread out a little bit more. They can move about, as long as they are touching."

Teacher's notes

AF1

Pupil V understood that particles in a liquid are mobile, but still "touching". She also stated that they were "spread out a little bit more", which is true in most liquids. The titles added to the video clip, prepared by a group of three pupils including Pupil V, further illustrate the understanding of the arrangement of particles in different states of matter.

Next steps

- Using the particle model to provide interpretations of other phenomena including the expansion of solids, gas pressure and diffusion.

Assessment commentary

Pupil V has shown a good understanding and application of the particle model to changes of state. This can also be seen from the titles that Pupil V has produced (in collaboration with others) for the video. As a group they show a sound understanding of the arrangement of particles in solids, liquids and gases.

6. Investigating friction

Assessment focuses

AF3, AF4, AF5

Context

The teacher asked pupils to design and carry out an investigation into friction using a friction ramp, providing pupils with guidance in the form of a briefing sheet, which also outlined how to write up the investigation. Pupils had one lesson to design and carry out the investigation, and wrote this up as homework. Pupil V word-processed her work.

Pupil briefing sheet

How does surface affect friction?

You are going to plan, carry out and evaluate a scientific investigation into how the type of surface affects the friction.

You are going to use a ramp that can have different surfaces on it. You will pull a block up this ramp using a force meter, measuring the force it takes to get the block to move.

Aim: In this experiment I plan to find out how *(independent variable)* is affected by *(dependent variable).* This will be useful to find out so that...........

Fair test: I will make sure the test is fair by.....................
I will make sure I keep the following things the same..........
I will only change..................................
To make sure my results are reliable I will.......................

Prediction: I think that as .... the ....
Will...................... This is because (use as much science as possible here)

Method: I will carry out the test by................. (explain as clearly as possible, another person should be able to carry out your experiment by following your method)

Conclusion: In this experiment I have found out that............ This is because.....................(use as much science as you can)

Pupil V's work

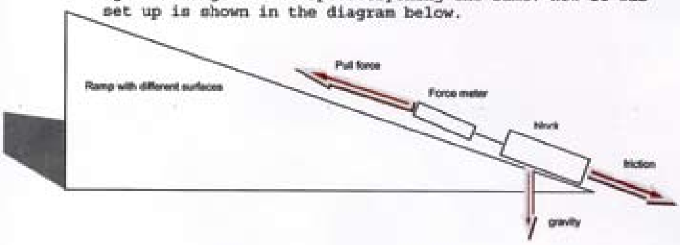
How does surface affect friction?

Aim- My aim is to find out how different surfaces affects the force it takes to pull a block of wood up a ramp with different surfaces on. My independent variable is the surface i'm pulling the block up, my dependent variable is the force it takes to get the block moving up the ramp. I think this will be useful to find out because it will help us to tell which is the best surface so we don't slip over or the best thing to stop things skidding.

Fair test- I made this a fair test by making sure the block is the same each time, that means the same weight and surface on it. I made sure i measured the force using the same force meter and kept the ramp at the same steepness (top step on the ladder). I also made sure i measured the force at the same time just as the block started to move up the ramp. I only changed the surface on the ramp. I made sure my results were reliable by doing each surface three times and comparing them to each other.

Prediction- I think the rougher the surface the more force it will take to move the block up the ramp. I think this because the rougher surface will have more little dents in for the block to stick to which will hold on to it this means i will have to pull harder to make it move, this is like how Velcro works.

Method- I took the block and set up the ramp with the first surface. I hooked the force meter to the block and put it at the very bottom of the ramp. I pulled on the force meter and just as the block moved i took the force from the force meter. I then put the block at the start of the ramp and tested it again twice more. I then changed the surface on the ramp and did the whole test again making sure i kept everything the same. How it was set up is shown in the diagram below.



Results- The results i got are shown in the table below. I worked out the average result for every surface i tested just to see hoe close each result was to the average.

Surface	Force taken to move on try 1 (newtons)	Force taken to move on try 2 (newtons)	Force taken to move on try 3 (newtons)	Average force taken to move (newtons)
Smooth wood	2	2.5	2	2.2
Rubber	2.5	4.5	3	3.3
Carpet	4.5	5	5.5	5
sandpaper	6	5.5	6.3	5.9

From the results you can see that the rougher the surface the more force it takes to pull the block up the ramp. This is because the rougher surface makes the block stick to it and you need more force to pull it off from where it sticks. The results are mostly close together on each test so it shows that they are reliable. It was difficult to take the force each time just as it started to move, i think this may be why some of the results are different between each trial. It is important to know about friction and surfaces because you don't want to be slipping in some places and you need to slip in others. For example tyres on a road need to not slip so the car doesn't skid that is why tyres are made of rubber and roads are rough and tyres have grooves in them.

Teacher's notes

AF3

Pupil V represented forces using force arrows, though it is unclear if the arrows are drawn to scale to represent the size of forces.

AF4

Pupil V described the variables in the experiment and selected, with guidance, an appropriate variable to investigate. She listed suitable methods to control other variables and correctly identified the dependent and independent variables. She repeated measurements during the test and linked this to the reliability of the results.

AF5

Pupil V recognised some of the inconsistencies in the data and tried to describe why they came about. The opportunity to evaluate the effectiveness of her work was given but was not developed very far. She made a comment about the difficulty in gaining reliable measurements but did not suggest improvements to her working methods. She manipulated data in order to increase the reliability of her conclusion.

Next steps

- Identifying suitable materials to use in given situations in which friction is significant.
- Evaluation of working methods in practical work.

Assessment commentary

Pupil V demonstrates her ability to design and carry out an investigation. She correctly identifies a range of variables and takes steps to control them appropriately. Pupil V also uses appropriate scientific conventions in communicating abstract ideas in her representation of the forces involved. She comments on the effectiveness of her methods and reaches a conclusion that is consistent with the data. Her explanation of roughness in terms of surface structure shows good understanding.

Assessment summary

AF1 Thinking scientifically

Pupil V can use abstract ideas and models and progresses through a number of steps when describing processes and phenomena. She has identified the evidence and creative thinking that has contributed to the development of scientific ideas. There has been some identification of the strengths and weaknesses of particular models. This indicates that she is working at a high level 5 for AF1.

AF2 Understanding the applications and implications of science

Pupil V makes links between an application of science and its underpinning scientific ideas. She makes a valid ethical statement, although this is limited to a personal viewpoint. The evidence suggests that she is working at secure level 5 for AF2.

AF3 Communicating and collaborating in science

Pupil V shows good communication skills, and uses secondary sources of information to create a presentation in an appropriate format. She presents sets of scientific data using graphs and tables, and shows a strong and promising initiative in devising a form in which to present a large and quite complex set of pulse rate data. There is good use of key terminology, although this is mainly limited to keywords from each task without much amplification of the science behind them. She achieves a high level 5 for AF3.

AF4 Using investigative approaches

Pupil V shows skills in recognising significant variables in investigations and selecting variables that are appropriate to investigate and control. She also describes ways in which to manage familiar risks and works effectively to reduce these. She repeats measurements when appropriate and selects appropriate equipment to study the ideas under investigation. For AF4, the evidence suggests that she is working at secure level 5.

AF5 Working critically with evidence

Pupil V uses a number of methods to interpret data and recognises and makes valid comments on the quality of the data, attempting to explain inconsistencies. Where there are differences in repeated measurements, a suitable explanation is offered. She manipulates data appropriately and largely follows suitable conventions in rounding values. She draws a conclusion that is consistent with the data and provides some basic explanation. Her work here for AF5 suggests a low level 6.

Overall assessment judgement

Pupil V is reaching level 5 comfortably across all the AFs, and is beginning to make an impact, albeit localised and especially for AF5, at level 6. She is working at a high level 5.

APP science assessment guidelines: levels 5 and 6

Name...V..

	AF1 – Thinking scientifically	AF2 – Understanding the applications and implications of science	AF3 – Communicating and collaborating in science	AF4 – Using investigative approaches	AF5 – Working critically with evidence
Level 6	**Across a range of contexts and practical situations pupils:** • Use abstract ideas or models or multiple factors when explaining processes or phenomena • Identify the strengths and weaknesses of particular models • Describe some scientific evidence that supports or refutes particular ideas or arguments, including those in development • Explain how new scientific evidence is discussed and interpreted by the scientific community and how this may lead to changes in scientific ideas ☐	**Across a range of contexts and practical situations pupils:** • Describe how different decisions on the uses of scientific and technological developments may be made in different economic, social or cultural contexts • Explain how societies are affected by particular scientific applications or ideas • Describe how particular scientific or technological developments have provided evidence to help scientists pose and answer further questions • Describe how aspects of science are applied in particular jobs or roles ☐	**Across a range of contexts and practical situations pupils:** • Identify lack of balance in the presentation of information or evidence • Choose forms to communicate qualitative or quantitative data appropriate to the data and the purpose of the communication • Distinguish between data and information from primary sources, secondary sources and simulations, and present them in the most appropriate form ☐	**Across a range of contexts and practical situations pupils:** • Apply scientific knowledge and understanding in the planning of investigations, identifying significant variables and recognising which are independent and which are dependent • Justify their choices of data collection method and proposed number of observations and measurements • Collect data choosing appropriate ranges, numbers and values for measurements and observations • Independently recognise a range of familiar risks and take action to control them ☐	**Across a range of contexts and practical situations pupils:** • Suggest reasons based on scientific knowledge and understanding for any limitations or inconsistencies in evidence collected • Select and manipulate data and information and use them to contribute to conclusions • Draw conclusions that are consistent with the evidence they have collected and explain them using scientific knowledge and understanding • Make valid comments on the quality of their data ☑
Level 5	**Across a range of contexts and practical situations pupils:** • Use abstract ideas or models or more than one step when describing processes or phenomena • Explain processes or phenomena, suggest solutions to problems or answer questions by drawing on abstract ideas or models • Recognise scientific questions that do not yet have definitive answers • Identify the use of evidence and creative thinking by scientists in the development of scientific ideas ☑	**Across a range of contexts and practical situations pupils:** • Describe different viewpoints a range of people may have about scientific or technological developments • Indicate how scientific or technological developments may affect different groups of people in different ways • Identify ethical or moral issues linked to scientific or technological developments • Link applications of science or technology to their underpinning scientific ideas ☑	**Across a range of contexts and practical situations pupils:** • Distinguish between opinion and scientific evidence in contexts related to science, and use evidence rather than opinion to support or challenge scientific arguments • Decide on the most appropriate formats to present sets of scientific data, such as using line graphs for continuous variables • Use appropriate scientific and mathematical conventions and terminology to communicate abstract ideas • Suggest how collaborative approaches to specific experiments or investigations may improve the evidence collected ☑	**Across a range of contexts and practical situations pupils:** • Recognise significant variables in investigations, selecting the most suitable to investigate • Explain why particular pieces of equipment or information sources are appropriate for the questions or ideas under investigation • Repeat sets of observations or measurements where appropriate, selecting suitable ranges and intervals • Make, and act on, suggestions to control obvious risks to themselves and others ☑	**Across a range of contexts and practical situations pupils:** • Interpret data in a variety of formats, recognising obvious inconsistencies • Provide straightforward explanations for differences in repeated observations or measurements • Draw valid conclusions that utilise more than one piece of supporting evidence, including numerical data and line graphs • Evaluate the effectiveness of their working methods, making practical suggestions for improving them ☐
BL	☐	☐	☐	☐	☐
IE	☐	☐	☐	☐	☐

Key: BL-Below Level IE-Insufficient Evidence

Overall assessment (tick one box only) Low 5 ☐ Secure 5 ☐ High 5 ☑ Low 6 ☐ Secure 6 ☐ High 6 ☐

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