Progress, Feedback and Differentiation in Science at TCS

Levels in science provide a generic description of how students are generally performing as well as giving us areas to focus our feedback on e.g. if a student is describing but not explaining concepts, we need to move them forward into explanatory language.

The basis of the levels we use in science is Blooms Taxonomy: a tool developed to analyse the type of questions asked in assessments; these don't entirely work hierarchically and have been updated beyond simply 'describe, 'explain, 'analyse', 'link' a number of times since the original work. Despite this, these core skills (DEAL) are useful in developing the complexity of both language and ideas in science; it is also student friendly.

Feedback

Whilst tests provide hard data of how much a student can do accurately, feedback has to be more than just 'do better'. We need to tell them how. Our general STAR marks should therefore demand something to secure them in a DEAL skill or move them on to the next; these should be the basis of our target comment e.g. you need to state what we mean by speciation (D); you need to explain why biodiversity is important (E); you need to explain how anaerobic respiration is important for marathon runners (A); you need to use the ideas of atomic radius and reactivity to explain the reactions of Group 1 metals (L). For exceptional performance we need to stretch beyond DEAL and into students creating their own ideas and evaluating assimilated ideas e.g you need to devise an experiment that we could use to compare the energy supplied from aerobic vs anaerobic respiration; you need to assess why aerobic and anaerobic respiration are necessary processes in living organisms.

Differentiation

Science is a content heavy subject and it is often not appropriate for us to differentiate the content or the language of delivery for students e.g. all students have to know about anaerobic respiration and be able to describe it. Our differentiation, however, should frequently distinguish between students in what we demand of them; they don't need to show us what they have learned in the same way e.g. within a sequence of lessons on the EM spectrum, students might be asked to either create a glossary for the electromagnetic spectrum, draw a mind map to show the key ideas or to design a set of questions to test someone's understanding of the EM spectrum. Of course, there are many other useful ways to differentiate which we might also use within science but this method is consistent with our bands, our feedback and the development of thinking over time. We should be differentiating in this way regularly (once every 5-6 lessons) so that students become versed in the DEAL acronym which is found on our classroom walls. This might be through homework, classwork or revision activity.

Guide to Progress in Science

The lesson activities and key questions can form the basis of activities/objectives of lessons and show how we can differentiate tasks in science. There should be reasoning behind why we believe students fall into one criterion or why we believe they should be working on a particular activity

TCS Band	Key 'Skill' in Science	Lesson Activities	Key Questions
3	Recalling and knowing	• Make a list of the main events • Describe all the facts you have learned as bullet points • List the main words need to know about this idea	• Can you name…? • What is...? • Can you list three...?
4	Describing and comprehending	• Make a timeline to show the order of events • Make a facts chart for someone to read • Make a set of cards to put in the right order • Write a mnemonic to help someone remember the key facts • Create a glossary of the key words needed to understand the ideas/facts you have learned • Draw a diagram that states the main ideas and make sure it is labelled	• How is...? • How did ...happen? • Describe what happened at...?
5	Explaining and applying ideas	• Write and perform a play/role play based on the idea • Explain in your own words the theories you have learned about • Draw a mind map to show the main ideas • Describe how most scientists think about the concepts you have learned • Draw a comic strip to explain the ideas you have learned	• Why does ….? • How would you compare...? • How would you rephrase the meaning...? • What facts or ideas show...? • Which is the best answer...? • How would you summarise...? • Which statements support…?
6	Analysing and making judgments	• Construct a model to demonstrate how the main idea works • Design a set of questions which would test if someone knew enough about this topic • Take a collection of photographs to demonstrate a particular point; label them and explain what they show • Write a textbook page about the main ideas • Make a puzzle that covers the main ideas of the topic e.g. crossword, pair them up game, matching up game • Write a paragraph to show how the method/idea you have used is similar to/useful to a different experience/scenario • Group all the main ideas/words into different categories and justify your decisions • From the information you have gained, develop a set of instructions that someone could use to repeat what you have done	• In what context would this knowledge be useful? • How would this information be useful if you had a...? • What factors would you change if...? • How could you use...? • What would happen if...? • How would you organise...? • How could we use what we have learnt today?
7	Linking ideas and coming up with new ones	• Design a questionnaire to gather information about people's views on the topic you have learned • Based on the data describe the relationship between….and…and explain if there is a causal relationship • Make a flow chart to show how the ideas about …. have changed over	• If...happened, what might we expect the result to be? • How is/was ...similar to...? • What do you see as other possible outcomes if….? • Can you explain what must have happened when...? • Can you distinguish between...?

		time • Collect data and draw a graph to illustrate the main relationship between …. and …. • Plan an experiment about ……..and video/photograph the steps needed	• What were some of the motives behind...? • What was the problem with...? • What assumptions can you make about ……. if……..?
8	Creating and Evaluating	• Write a report to assess how you have got to this point in your learning over the course of …. lessons • Write an editorial about the advantages and disadvantages of the ideas you have learned • Compose a song or poem to teach someone what you have learned • Create a poster/leaflet to sell the idea you have learned about • Create a new product to …….. Give it a name and plan a marketing campaign • Design a magazine cover for an article about what you have learned • Write a newspaper editorial about your feelings in relation to …… • Invent a machine to do the task of …….and explain how it works • Devise cue cards for both sides in a debate about ……	• Is there a better solution to...? • Can you defend...? • What changes to ...would you recommend? • How would you feel if...? • Do you think that ...is a good thing or a bad thing? How could you determine...? • What information would you use to support the view of...? • What data was used to make the conclusion that...? • How would you evaluate the difference between .. .and ….? • Would it be better if...?

Assigning Bands to Tests

Year 9

The bandings from 3-8 are allocated by the percentages in the 3rd column (the DfE document attached links these approximate percentages to the GCSE bands). e.g. bottom 5% were given band 3. These will be adjusted as necessary to fit the targets of a particular year group. Percentages are not exactly the same as that in the table due to students with the same mark, differences in performance in certain questions etc; however, they are as close as can be.

On your reports, please use this band; however, also apply a sub-level at your own discretion.

GCSE Band	TCS KS3 Band Version 1	% of Year Group (DfE documentation used for rough judgement)	Cumulative Total of Year Group
9	8	18%	18%
8			
7	7	23%	41%
6	6	22%	63%
5	5	20%	83%
4	4	12%	95%
3			
2	3	5%	100%
1			

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/377771/2014-09-12-board-paper-for-new-gcses-in.pdf

Year 8

Performance in tests will be based on students' attainment of marks gained in each key skill area according to the table below:

TCS KS3 Band Version 1	Key 'Skill' in Science	Types of Assessment Question that have been mastered	Equivalent GCSE Assessment Objective
7	Linking ideas and coming up with	Making judgements, linking concepts, analysing	AO3

	new ones	information	
6	Analysing and making judgments		
5	Explaining and applying ideas	Explanation and interpretation questions	AO2
4	Describing and comprehending	Recall and description based questions	AO1
3	Recalling and knowing		

Year 7

Performance in tests will be based on students' attainment of marks gained in each key skill area according to the table below:

TCS KS3 Band Version 1	**Key 'Skill' in Science**	**Types of Assessment Question that have been mastered**	**Equivalent GCSE Assessment Objective**
6	Analysing and making judgments	Making judgements, linking concepts, analysing information	AO3
5	Explaining and applying ideas	Explanation and interpretation questions	AO2
4	Describing and comprehending	Recall and description based questions	AO1
3			

Student Friendly Guide to Progress in Science

TCS Band	Key Skill in Science	Example of work at this level	Key Questions to Answer	Key Sentences
3	Recall	Ice is a solid and water is a liquid This sentence shows **recall** about solids, liquids and gases	• Can you name…? • What is...? • Can you list three...?	• Three key words for talking about ……. are….. • …….. is……
4	Describe	When ice melts, it turns from a solid to a liquid This sentence **describes** what happens when ice melts	• How is...? • How did ...happen? • Describe what happened at...?	• ……..means…….. • The main idea of ….. is…..
5	Explain	Ice melts when the particles in the solid gain energy, move and become separated This sentence **explains** what happens when ice melts	• Why does ….? • How would you compare...? • How would you rephrase the meaning...? • What facts or ideas show...? • Which is the best answer...? • How would you summarise...? • Which statements support…?	• …….. is important because…….. • …….happens because…….. • …… shows that …… because…….. • The best answer is ….. because…..
6	Analyse and Apply	When ice melts, we would expect the water to have a larger volume than the ice This sentence **applies** the explanation above to a new idea	• In what context would this knowledge be useful? • How would this information be useful if you had a...? • What factors would you change if...? • How could you use...? • What would happen if...? • How would you organise...? • How could we use what we have learnt today?	• If ….. happened, …….. • An understanding of ……. is useful in ……. because….. • ….. could be used to explain ….. by… • If someone was explaining ……., it would be useful for them to have an understanding of … because…….

7	Link Ideas	Since ice floats on water, it has a lower density than water. This suggests that ice actually has a larger volume than the water. This sentence **links** the explanation with a knowledge of density	• If...happened, what might we expect the result to be? • How is/was ...similar to...? • What do you see as other possible outcomes if....? • Can you distinguish between...? • What were some of the motives behind...? • What was the problem with...? • What assumptions can you make about …… if……..?	• If ….. happened, we would expect….. • …. is similar to … because…. • …is different to …because…. • The problem with the idea of…. Is…..
8	Create and Evaluate	Since ice floats on water, aquatic life can survive in ponds even in freezing temperatures; if ice sank to the bottom of water, plants and animals could not live in water in freezing conditions This sentence **evaluates** the importance of the explanation to make a general comment	• Is there a better solution to...? • Can you defend...? • What changes to ...would you recommend? • How would you feel if...? • Do you think that ...is a good thing or a bad thing? How could you determine...? • What information would you use to support the view of...? • What data was used to make the conclusion that...? • How would you evaluate the difference between .. .and ….? • Would it be better if...?	• A better solution to …… would be……. • If I were designing ….. I would….. • To support the view that ……., we have used data from…….. • The view that …… is important can be defended by….. • It cannot be true that…… since……