NAVRACHANA INTERNATIONAL SCHOOL, VADODARA

Theory of Knowledge – Handout

(Information in this document is resourced from IB subject guide and TSM)

The Diploma Programme

The Diploma Programme is a rigorous pre-university course of study designed for students in the 16 to 19 age range. It is a broad-based two-year course that aims to encourage students to be knowledgeable and inquiring, but also caring and compassionate. There is a strong emphasis on encouraging students to develop intercultural understanding, open-mindedness, and the attitudes necessary for them to respect and evaluate a range of points of view.

The core of the programme model

All Diploma Programme students participate in the three elements that make up the core of the programme model.

The first element – the theory of knowledge course, encourages students to think about the nature of knowledge, to reflect on the process of learning in all the subjects they study as part of their Diploma Programme course, and to make connections across them. Next element, the extended essay is a substantial piece of writing of up to 4,000 words and it enables students to investigate a topic of special interest that they have chosen themselves. It encourages students to develop the skills of independent research that will be expected at university. Finally, creativity, action, service (CAS) involves students in experiential learning through a range of artistic, sporting, physical and service activities.

The three elements of the programme model core are grounded in three coherent aims:

- to support, and be supported by, the academic disciplines
- to foster international-mindedness
- to develop self-awareness and a sense of identity.

The core, the heart of the Diploma Programme, remains closely linked to the academic disciplines. TOK, CAS and the extended essay feed into a deeper understanding of the subject matter in ways such as:

- transferring the critical thinking process developed in TOK to the study of academic disciplines
- developing service learning opportunities in CAS that will build on a student's existing subject knowledge and contribute to the construction of new and deeper knowledge in that subject area
- exploring a topic or issue of interest which has global significance in an extended essay through one or more disciplinary lenses.

The core has a responsibility to foster and nurture international-mindedness, with the ultimate goal of developing responsible global citizens. It is driven by the IB's mission "to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect" and "encourage students

across the world to become active, compassionate and lifelong learners who understand that other people, with their differences, can also be right" (IB mission statement).

To this end, the core encourages an exploration of issues of global significance and in so doing allows students to examine links between the local and the global. It encourages students to consider the contexts and views of others, and develop principles and values that are reflected upon throughout their lifetime.

This might include, for example:

- emphasizing different cultural perspectives in TOK and how different cultural traditions have contributed to our current constructions of knowledge
- considering a service project that reflects an issue of global significance, but is explored from a local perspective
- encouraging students to write a world studies extended essay—an interdisciplinary extended essay on a global theme.

Developing self-awareness and a sense of identity

The core strives to make a difference to the lives of students. It provides opportunities for students to think about their own values and actions, to understand their place in the world, and to shape their identity. This might include, for example:

- providing opportunities in TOK for students to have conversations with others from different backgrounds and with different viewpoints, thereby challenging their own values
- encouraging students in CAS to evaluate their commitment to helping those in need and exploring the notion of advocacy
- asking students to reflect on the process of writing the extended essay and in so doing identifying areas of strength and areas for development.

TOK at a glance

Knowing about knowing

TOK is a course about critical thinking and inquiring into the process of knowing, rather than about learning a specific body of knowledge. It is a core element which all Diploma Programme students undertake and to which all schools devote at least 100 hours of class time. TOK and the Diploma Programme subjects support and reference each other and share some common goals.

The TOK course examines how we know what we claim to know. It does this by encouraging students to analyse knowledge claims and explore knowledge questions. A knowledge claim is the assertion that "I/we know X" or "I/we know how to Y", or a statement about knowledge; a knowledge question is an open question about knowledge. A distinction between shared knowledge and personal knowledge is made during the course. This distinction is a device that helps teachers construct their TOK course and helps students explore the nature of knowledge.

The ways of knowing

While there are arguably many ways of knowing, the TOK course identifies eight specific ways of knowing (WOKs). They are language, sense perception, emotion, reason, imagination, faith, intuition, and memory. Students explore a range of ways of knowing, and it is suggested that studying four of these eight in depth would be appropriate.

Discussion of WOKs occurs naturally in a TOK course when exploring how areas of knowledge operate. TOK course explores how WOKs work together in the context of different areas of knowledge and in relation to the individual knower.

The areas of knowledge

Areas of knowledge are specific branches of knowledge, each of which have a distinct nature and entail different methods of gaining knowledge. TOK distinguishes between eight areas of knowledge - mathematics, the natural sciences, the human sciences, the arts, history, ethics, religious knowledge systems, and indigenous knowledge systems. Students must explore a range of areas of knowledge, and it is suggested that studying six of these eight would be appropriate.

The knowledge framework is a device for exploring the areas of knowledge. It identifies the key characteristics of each area of knowledge by depicting each area as a complex system of five interacting components. This enables students to effectively compare and contrast different areas of knowledge and allows the possibility of a deeper exploration of the relationship between areas of knowledge and ways of knowing.

Assessment

There are two assessment tasks in the TOK course: an essay and a presentation. The essay is externally assessed by the IB, and must be on any one of the six prescribed titles issued by the IB for each examination session. The maximum word limit for the essay is 1,600 words.

The presentation can be done individually or in a group, with a maximum group size of three. Approximately 10 minutes per presenter are allowed, up to a maximum of approximately 30 minutes per group. Before the presentation each student must complete and submit a presentation planning document TK/PPD which is internally assessed alongside the presentation itself, and the form is used for external moderation.

Recognizing the discursive aspect of the course, the TOK presentation assesses the ability of the student to apply TOK thinking to a real-life situation. The TOK essay gives the opportunity to assess more formal argumentation prompted by questions of a more general nature.

Nature of the subject

TOK plays a special role in the Diploma Programme by providing an opportunity for students to reflect on the nature of knowledge. The task of TOK is to emphasize connections between areas of knowledge and link them to the knower in such a way that the knower can become aware of his or her own perspectives and those of the various groups whose knowledge he or

she shares. TOK, therefore, explores both the personal and shared aspects of knowledge and investigates the relationships between them.

The raw material of TOK is knowledge itself. Students think about how knowledge is arrived at in the various disciplines, what the disciplines have in common and the differences between them. The fundamental question of TOK is "how do we know that?" The answer might depend on the discipline and the purpose to which the knowledge is put. TOK explores methods of inquiry and tries to establish what it is about these methods that makes them effective as knowledge tools. In this sense, TOK is concerned with knowing about knowing.

At the centre of the course is the idea of knowledge questions. These are questions such as:

- what counts as evidence for X?
- what makes a good explanation in subject Y?
- how do we judge which is the best model of Z?
- how can we be sure of W?
- what does theory T mean in the real world?
- how do we know whether it is right to do S?

While these questions could seem slightly intimidating in the abstract, they become much more accessible when dealt with in specific practical contexts within the TOK course. They arise naturally in the subject areas, the extended essay and CAS. The intention is that these contexts provide concrete examples of knowledge questions that may promote student discussion.

Discussion forms the backbone of the TOK course. Students are invited to consider knowledge questions against the backdrop of their experiences of knowledge in their other Diploma Programme subjects but also in relation to the practical experiences offered by CAS and the formal research that takes place for the extended essay. The experiences of the student outside school also have a role to play in these discussions, although TOK seeks to strike a balance between the shared and personal aspects of knowledge.

TOK is a course in critical thinking but it is one that is specifically geared to an approach to knowledge that is mindful of the interconnectedness of the modern world. "Critical" in this context implies an analytical approach prepared to test the support for knowledge claims, aware of its own weaknesses, conscious of its perspectives and open to alternative ways of answering knowledge questions.

It is a demanding course but one that is an essential component not only of the Diploma Programme but of lifelong learning.

TOK and international-mindedness

Knowledge can be seen as the shared legacy of mankind, a legacy which has been shaped and influenced by a wide range of cultures. This era of increased global interconnectedness promises unprecedented possibilities for interaction and enhancement of mutual understanding arising from the nurturing of international-mindedness. The TOK course provides an ideal vehicle for such global exchange and beneficial action through its examination of shared and personal knowledge in an atmosphere of critical and reflective inquiry.

The TOK classroom invites a unique partnership of learning, for global controversies often rest on significant knowledge questions that can provide useful starting points for TOK exploration and TOK, in turn, can contribute significantly to the understanding of these large questions.

The IB vision of internationally minded individuals implies a global engagement, embodying a commitment to address these 21st century challenges. TOK exists at the very core of the quest, as we strive toward an enlightened and fulfilled humanity.

Engaging with sensitive topics

Studying TOK provides the students with an opportunity to engage with exciting, stimulating and personally relevant topics and issues. Often, such topics and issues can also be sensitive and personally challenging. Teachers remain aware of this and provide guidance to students on how to approach and engage with such topics in a responsible manner.

Concurrency of learning

The TOK course requires at least 100 hours in the classroom spread over two years of the Diploma Programme. It is not possible to teach all the different topic suggestions in the TOK guide to the same depth in this time, therefore teachers select which topics to cover in more detail and which in less detail. The important point is that coverage remains broad enough to provide a balanced outlook.

Prior learning

The TOK course requires no specific prior learning. No particular background in terms of specific subjects studied for national or international qualifications is expected or required.

Links to the Middle Years Programme

The process of inquiring into subject content through the different perspectives provided by MYP global contexts enables students to develop a deeper understanding of both the subject and the dimensions of the global contexts. Through the inquiry cycle of understanding and awareness, reflection and action, students engage in reflection and metacognition, which can lead them from academic knowledge to thoughtful action, helping to develop positive attitudes and a sense of personal and social responsibility.

Alongside the development of thinking skills, MYP students are prepared for TOK in the Diploma Programme through the abilities to think critically, to reflect and to make connections.

MYP students are encouraged to question and challenge information and arguments. These critical thinking skills will help students in TOK to understand that there are different ways of thinking about knowledge claims.

Self-evaluation is important in the MYP. Students are encouraged to reflect at different stages in the learning process. Active reflection on one's own perspectives is an important attribute of a TOK student. The ability to make connections across subjects to create products or solutions

is important in the MYP. In TOK, this ability will allow students to make links between ways of knowing and areas of knowledge.

Aims

The overall aim of TOK is to encourage students to formulate answers to the question "how do you know?" in a variety of contexts, and to see the value of that question. This allows students to develop an enduring fascination with the richness of knowledge.

Specifically, the aims of the TOK course are for students to:

- ✓ make connections between a critical approach to the construction of knowledge, the academic disciplines and the wider world
- ✓ develop an awareness of how individuals and communities construct knowledge and how this is critically examined
- ✓ develop an interest in the diversity and richness of cultural perspectives and an awareness of personal and ideological assumptions
- ✓ critically reflect on their own beliefs and assumptions, leading to more thoughtful, responsible and purposeful lives
- ✓ understand that knowledge brings responsibility which leads to commitment and action.

Assessment objectives

It is expected that by the end of the TOK course, students will be able to:

1. identify and analyse the various kinds of justifications used to support knowledge claims
2. formulate, evaluate and attempt to answer knowledge questions
3. examine how academic disciplines/areas of knowledge generate and shape knowledge
4. understand the roles played by ways of knowing in the construction of shared and personal knowledge
5. explore links between knowledge claims, knowledge questions, ways of knowing and areas of knowledge
6. demonstrate an awareness and understanding of different perspectives and be able to relate these to one's own perspective
7. explore a real-life situation from a TOK perspective in the presentation.

Syllabus

Knowledge in TOK

Knowledge is the raw material of the TOK course. It is important that students and teachers have a clear idea of what might be meant by the term “knowledge”, however, this is not such a simple matter. Thinkers have wrestled with the problem of a simple definition of knowledge since before the time of Plato, without substantial consensus. How can we expect students to be able to tackle this question satisfactorily?

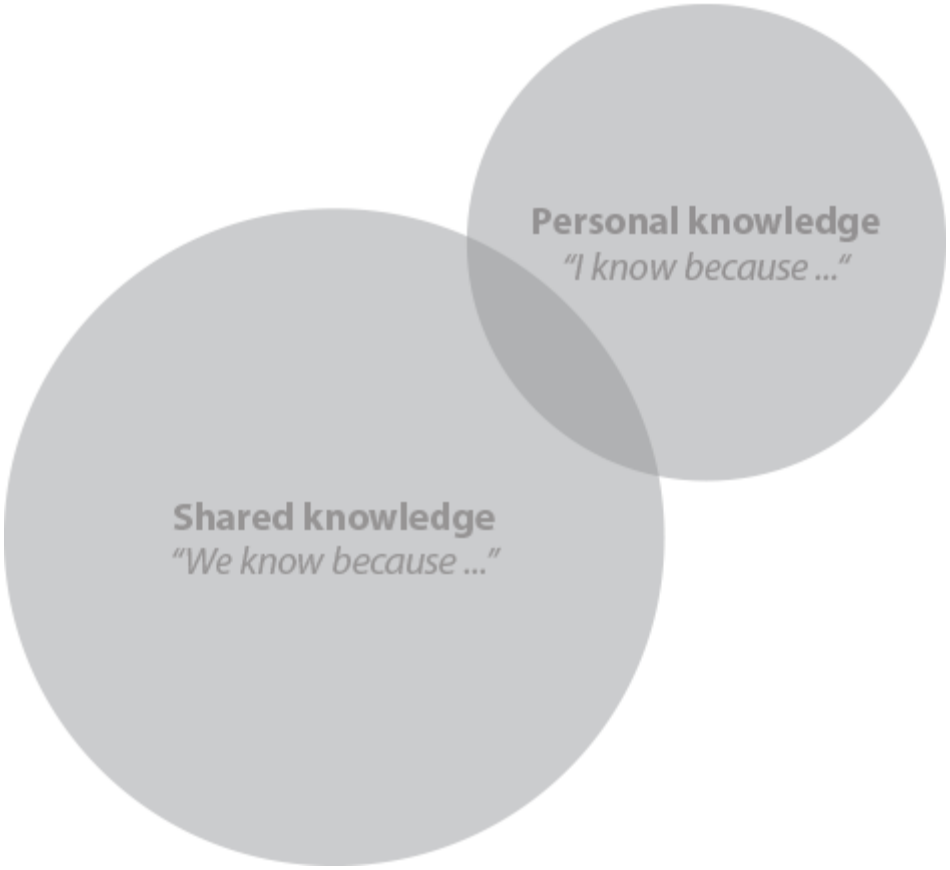
TOK is not intended to be a course in philosophy. While there might be a certain degree of overlap in the terms that are used, the questions that are asked, or the tools that are applied to answer these questions, the approach is really quite different. It is not a course of abstract analysis of concepts. TOK is designed to apply a set of conceptual tools to concrete situations encountered in the student’s Diploma Programme subjects and in the wider world outside school. The course is therefore not devoted to a technical philosophical investigation into the nature of knowledge.

Students are given a rough working idea of knowledge at the outset of the course. Towards the end of the course this picture will have become more rounded and refined. A useful metaphor for examining knowledge in TOK is a map. A map is a representation, or picture, of the world. It is necessarily simplified—indeed its power derives from this fact. Items not relevant to the particular purpose of the map are omitted. For example, one would not expect to see every tree and bush faithfully represented on a street map designed to aid navigation around a city—just the basic street plan will do. A city street map, however, is quite a different thing to a building plan of a house or the picture of a continent in an atlas. So, knowledge intended to explain one aspect of the world, say, its physical nature, might look really quite different to knowledge that is designed to explain, for example, the way human beings interact.

Knowledge can be viewed as the production of one or more human beings. It can be the work of a single individual arrived at as a result of a number of factors including the ways of knowing. Such individual knowledge is called **personal knowledge.** But knowledge can also be the work of a group of people working together either in concert or, more likely, separated by time or geography. Areas of knowledge such as the arts and ethics are of this form. These are examples of **shared knowledge**. There are socially established methods for producing knowledge of this sort, norms for what counts as a fact or a good explanation, concepts and language appropriate to each area and standards of rationality. These aspects of areas of knowledge can be organized into a **knowledge framework**.

Shared and personal knowledge

In many languages, the verb “to know” has two first person forms: “I know” and “we know”. “I know” refers to the possession of knowledge by an individual—personal knowledge. “We know” refers to knowledge that belongs to a group—shared knowledge. It can be useful in TOK to draw a distinction between these two forms of knowledge, as illustrated below.



Links between shared and personal knowledge

Clearly, there are links and interactions between shared knowledge and personal knowledge. These are discussed in more depth in the knowledge framework. The TOK course reflects the balance between shared knowledge and personal knowledge. The ideal balance might not be 50:50; it is likely that significantly less time will be spent on personal knowledge and more on shared knowledge. However, it seems difficult to examine areas of knowledge without considering the impact on individual knowers. Similarly, it seems difficult to examine personal knowledge in a vacuum without acknowledging that as individuals we are embedded in a web of social relationships.

Knowledge claims and knowledge questions

Knowledge claims

In TOK there are two types of knowledge claims.

- Claims that are made within particular areas of knowledge or by individual knowers **about the world**. It is the job of TOK to examine the basis for these first-order claims.
- Claims that are made **about knowledge**. These are the second-order claims made in TOK that are justified using the tools of TOK which usually involve an examination of the nature of knowledge.

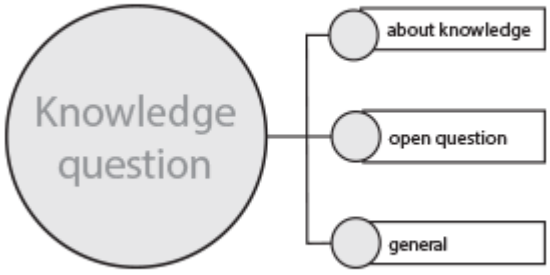
Both types of knowledge claims are found in TOK. The first type will feature in examples offered in the essay and presentation illustrating the manner in which areas of knowledge go about the business of producing knowledge. The second type will constitute the core of any piece of TOK analysis.

Knowledge questions

TOK is primarily concerned with knowledge questions. This phrase is used often in describing what is seen in a good TOK presentation or a good TOK essay; in fact, the whole point of the presentation and essay tasks is to deal with knowledge questions.

Knowledge questions are questions about knowledge, and contain the following features.

- Knowledge questions are questions **about** knowledge. Instead of focusing on specific content, they focus on how knowledge is constructed and evaluated.
- Knowledge questions are **open** in the sense that there are a number of plausible answers to them. The questions are contestable and open.
- Knowledge questions should be expressed in **general** terms, rather than using subject specific terms. For example, instead of a question focusing on a specific model in development economics, such as the Harrod-Domar model, a knowledge question might focus on the reliability of modelling as a method of gaining knowledge in economics.



The typical TOK question does not have one straightforward correct answer. This is because different and unique understandings of the involved key concepts give rise to different analyses and ultimately a different answer to the question.

It is inevitable that personal perspectives will play a part in the judgments made in any analysis. The intellectual resources that each of us has to draw upon might well be different and lead us to different or even diametrically opposed conclusions. The possibility of a lack of unanimity in answering TOK questions can be initially challenging for students.

Knowledge questions and assessment

Knowledge questions are at the heart of the assessment of TOK. The presentation and the essay both deal with knowledge questions.

The TOK presentation starts with a real-life situation described in "real-life" terms, the student then identifies the underlying knowledge question, which is then explored using the language of TOK. A conclusion is reached subsequently which is translated back into real-life terms.

The TOK essay follows a path that is in some sense a mirror image of this. The prescribed titles for the essay are expressed in rather general TOK language. The student is required to identify knowledge questions connected to the prescribed title. The student must then answer the knowledge questions through identifying and exploring examples which illustrate them.

More details and guidance on the assessment tasks can be found in the section "Assessment details".

Ways of knowing

The TOK course identifies eight specific ways of knowing (WOKs). The WOKs and their possible exploration prompts are:

- Language- *How does language shape knowledge? Does the importance of language in an area of knowledge ground it in a particular culture? How are metaphors used in the construction of knowledge?*
- Sense perception- *How can we know if our senses are reliable? What is the role of expectation or theory in sense perception? What is the role of language in sense perception?*
- Emotion- *Are emotions universal? Can/should we control our emotions? Are emotions the enemy of, or necessary for, good reasoning? Are emotions always linked to belief?*
- Reason - *What is the difference between reason and logic? How reliable is inductive reasoning? Are we predictably irrational?*
- Imagination- *What is the role of imagination in producing knowledge about a real world? Can imagination reveal truths that reality hides? What is the role of the imagination in understanding others?*
- Faith - *Should humanism or atheism be described as a faith? Can theistic beliefs be considered knowledge because they are produced by a special cognitive faculty or "divine sense"? Does faith meet a psychological need?*
- Intuition- *Why are some people considered more intuitive than others? Are there certain things that you have to know prior to being able to learn anything at all? Should you trust your intuition?*

- Memory- *Can we know things which are beyond our personal present experience? Is eyewitness testimony a reliable source of evidence? Can our beliefs contaminate our memory?*

Students must explore a range of WOKs. It is suggested that studying **four** of these eight in depth would be appropriate.

There are two central purposes to the WOKs in TOK. On the one hand they are the tools that answer the question "how do we know?" and on the other hand they help us answer the question "how do I know?"

Ways of knowing do not operate in isolation. They interact in various ways in the construction of knowledge and the formation of knowledge claims. For example, even a simple claim such as "this table is blue" involves a number of ways of knowing coming together. I need language to be able to understand the terms "table" and "blue". I need a conceptual system based on reason to realize that a table is something that has the possibility of being blue. I need sense perception to recognize that what I see is a table and that the colour of the table is blue. In this way, the individual ways of knowing are woven together into more elaborate structures in order to generate knowledge in the areas of knowledge.

Areas of knowledge

How do we know things? We know things because we use a range of methods of inquiry that incorporate ways of knowing to help construct knowledge in different areas of knowledge (AOKs).

The theory of knowledge course distinguishes between eight AOKs:

- mathematics
- natural sciences
- human sciences
- history
- the arts
- ethics
- religious knowledge systems
- indigenous knowledge systems.

Students must explore a range of AOKs. It is suggested that **six** of these eight would be appropriate.

While the Theory of Knowledge guide identifies eight broad AOKs, students are encouraged to also think about individual academic disciplines, that is, to think about

the nature of knowledge in their own specific IB subjects, such as chemistry, geography and dance.

Knowledge framework

One effective way to examine the AOKs is through a knowledge framework. A knowledge framework is a way of unpacking the AOKs and provides a vocabulary for comparing AOKs.

For each AOK the knowledge framework examines the following:

- scope, motivation and applications
- specific terminology and concepts
- methods used to produce knowledge
- key historical developments
- interaction with personal knowledge.

Assessment outline

The assessment model in theory of knowledge (TOK) has two components, both of which should be completed within the 100 hours designated for the course.

Both the essay and the presentation are assessed using global impression marking. The essay contributes 67% of the final mark and the presentation contributes 33% of the final mark.

Assessment component	Marks available
Part 1 Essay on a prescribed title **One** essay on a title chosen from a list of six titles prescribed by the IB for each examination session. The prescribed titles will be issued on the OCC in the September prior to submission for May session schools, and in the March prior to submission for November session schools. The maximum length for the essay is **1,600 words.** All essays are externally assessed by the IB.	10 marks
Part 2 The presentation **One** presentation to the class by an individual or a group (a maximum of three persons in a group). Approximately 10 minutes per student is allowed for the presentation. **One** written presentation planning document (TK/PPD) for each student. The teacher must use the assessment descriptors published in this guide to arrive at a mark for the presentation based on the student's presentation plan (on the TK/PPD) and his/her observation of the presentation itself. The teacher must record his/her observations of the presentation on the TK/PPD. A sample of TK/PPDs is selected and moderated by the IB.	10 marks

Assessment details

Nature of assessment tasks

The two assessment tasks, the essay and the presentation, both have at their centre reflection on knowledge questions, but this reflection is demonstrated differently in each. The emphasis in the TOK presentation is on demonstrating an understanding of knowledge at work in the world, and is in a sense an extensive TOK reflection on a single example (the real-life situation). It is thus distinguished from the TOK essay, where students are required to show their TOK thinking skills in the discussion of a prescribed title that may be primarily conceptual in nature.

Real-life examples play an important role in the essay by illustrating the main ideas or taking forward the argument. Real-life examples come from the student's academic experience or from life beyond the classroom. Anecdotal examples may be relevant but cannot on their own support the analysis in an essay. Neither the essay nor the presentation is primarily a research exercise. Although some factual information may need to be included, its reliability needs to be established through proper checks and referencing.

Part 1: Essay on a prescribed title

General instructions

Each student must submit for external assessment an essay on any one of the six titles prescribed by the IB for each examination session.

The titles ask generic questions about knowledge and are cross-disciplinary in nature. They may be answered with reference to any part or parts of the TOK course, to specific disciplines, or with reference to opinions gained about knowledge both inside and outside the classroom. The essays should express the conclusions reached by students through a sustained consideration of knowledge questions. Claims and counterclaims should be formulated and main ideas should be illustrated with varied and effective examples that show the approach consciously taken by the student. Essays should demonstrate the student's ability to link knowledge questions to AOKs and WOKs.

The chosen title must be used exactly as given; it must not be altered in any way. Any lack of relevance in the student's response to the prescribed title arising from modification will be reflected in the score awarded.

If it is clear that the title bears no literal resemblance to any title for the current session, the essay will be awarded a score of zero, in accordance with the TOK essay assessment instrument.

The essay must be written in standard 12 font and double spaced.

Essay length

The maximum length of the essay is **1,600 words**. Extended notes, extensive footnotes or appendices are not appropriate to a TOK essay and may not be read.

The word count includes:

- the main part of the essay

- any quotations.

The word count does not include:

- any acknowledgments
- the references (whether given in footnotes, endnotes or in-text)
- any maps, charts, diagrams, annotated illustrations or tables
- the bibliography.

Essays that exceed the word limit will be penalized in the following ways:

- examiners are instructed to stop reading after 1,600 words and to base their assessment on just the first 1,600 words.
- a 1 mark penalty will be applied to the essay.

Students are required to indicate the number of words when the essay is uploaded during the submission process.

Part 2: The presentation

General instructions

Students must make one or more individual and/or small group presentations to the class during the course. Presentations must be delivered in a language accessible to all members of the class (if the school has been notified to submit presentation recordings, those presentations must be given in the language for which the students have been, or will be, registered).

The maximum group size is **three**. If a student makes more than one presentation, the teacher should choose the best one (or the best group presentation in which the student participated) for the purposes of assessment. **Students are not permitted to offer presentations on the same specific subject matter more than once**. This refers to either the same knowledge question, or the same real-life situation. It is advised that the presentation should take place towards the end of the course, as otherwise students may not have had the chance to develop skills such as formulating knowledge questions which are key to this task.

The TOK presentation requires students to identify and explore a knowledge question raised by a substantive real-life situation that is of interest to them. The selected real-life situation may arise from a local domain of personal, school, or community relevance, or from a wider one of national, international or global scope. Whatever situation is chosen, it must lend itself naturally to a question about knowledge.

Presentations may take many forms, such as lectures, interviews or debates. Students may use multimedia, costumes, or props to support their presentations. However, under **no circumstances** should the presentation be simply an essay read aloud to the class. While pre-recorded inserts **within** a presentation are permissible, the presentation itself must be a live experience and not a recording **of** the presentation.

If students incorporate the thoughts and ideas of others into the presentation, this **must** be acknowledged.

Before the presentation, the individual or group must give the teacher a copy of the **presentation planning document**. This is part of the assessment procedure (see below). The document is not to be handed out to the audience.

Academic honesty

Authenticity

Teachers must ensure to the best of their ability that essays are the student's own work. In cases where there is concern, the authenticity of the essay can be checked through a discussion with the student and scrutiny of one or more of the following before uploading:

- the student's initial exploration of the title
- the full draft of the essay
- the student's references and/or bibliography for the essay, where appropriate
- the style of the writing, which may reveal obvious discrepancies
- a report from an online plagiarism detection service.

Acknowledgments and references

Students are expected to acknowledge fully and in detail the work, thoughts or ideas of another person if incorporated in work submitted for assessment, and to ensure that their own work is never given to another student, either in the form of hard copy or by electronic means, knowing that it might be submitted for assessment as the work of that other student.

The IB does not prescribe which style(s) of referencing or in-text citation should be used by students; this is left to the discretion of appropriate faculty/staff in the school. Regardless of the reference style adopted by the school for a given subject, it is expected that the minimum information given includes name of author(s), date of publication, title of source, and page numbers as applicable.

Students are expected to use a standard style and use it consistently so that credit is given to all sources used, including sources that have been paraphrased or summarized. When writing text a student must clearly distinguish between their words and those of others by the use of quotation marks (or other method such as indentation) followed by an appropriate reference that denotes an entry in the bibliography or works cited. The title "bibliography" or "works cited" depends on the referencing style that has been chosen. If an electronic source is cited, the date of access must be indicated.

Students are not expected to show faultless expertise in referencing, but are expected to demonstrate that all sources have been acknowledged. Students must be advised that visual material, text, graphs, images and/or data published in print or in electronic sources that is not their own must also be attributed to the source. Again, an appropriate style of referencing/citation must be used.

Factual claims that may be considered common knowledge (for example, "animals are not capable of performing photosynthesis") do not need to be referenced. However, it should be noted that what one person thinks of as common knowledge within a particular culture, may be unfamiliar to someone else, for example, an examiner in a different part of the world. This

would relate particularly to examples given from popular culture. If in doubt, give an authoritative source for the claim.

Classroom handouts, if they are the original work of a teacher, must be cited in the same way as a book. If their contents have been taken from a separate source, that source should be cited.

Bibliography or works cited

The TOK essay is not primarily a research paper but it is expected that specific sources will be used and these must be acknowledged in a bibliography or works cited list.

The bibliography or works cited list should include only those works (such as books, journals, magazines and online sources) used by the student. There needs to be a clear connection between the works listed and where they are used in the text. A list of books at the end of the essay is not useful unless reference has been made to all of them within the essay.

As appropriate, the bibliography or works cited list should specify:

- author(s), title, date and place of publication
- the name of the publisher or URL (http://…)
- the date when the web page was accessed, adhering to one standard method of listing sources

Failure to comply with this requirement will be viewed as plagiarism and will, therefore, be treated as a case of academic misconduct.

Assessment instruments

Using global impression marking

The method of assessing the essay on a prescribed title and the presentation in TOK judges each piece of work in relation to written descriptions of performance and not in relation to the work of other students.

The assessment of both tasks is envisaged as a process of holistic or global judgment rather than an analytical process of totalling the assessment of separate criteria. Although in the essay the assessment is presented as two aspects, they are integrated into five described levels of performance, allowing for variation in student performance across different parts of the overall assessment. Because of the requirement for a reasonable mark range along which to differentiate student performance, each mark-band level descriptor corresponds to a range of two different marks.

Assessment judgments in the first instance are made with reference to the level descriptors for **typical characteristics**. The **possible characteristics** underneath, are intended as starting prompts for discussion and development of a shared vocabulary among examiners, moderators, teachers and students as to how work at each level might be described.

The possible characteristics corresponding to a level of performance should not be thought of as a checklist of attributes; they are intended to function only as tentative descriptions, some of which may seem appropriate to apply to work at that level.

The achievement level descriptors concentrate on positive achievement, although for the lower levels (zero is the lowest level of achievement) failure to achieve is included in the description.

These level descriptors are designed to be used as a whole, and operate at a global level. It is to be understood that:

- the described levels are not a checklist or necessary minimum
- the different levels of performance are not discrete, and differences of degree are involved
- different levels suggest typical performance, and there are always exceptions requiring individual or case by case judgments
- the performance of students can be uneven across different aspects, but it is the overall impression that is most important.

Examiners and moderators will use the levels of performance as the terms on which they make a judgment that draws on their knowledge of what students at this level can do with tasks of this kind. How examiners and moderators will make a judgement about the level of performance attained in a particular student response will vary.

Essay examiners may make a decision in the course of reading the piece, and then review it and make a final judgment after completing a reading. Or they may register the comments and arguments of a student, read the essay as a whole and make a decision in retrospect. In either case the described levels are to be seen as global and holistic rather than a checklist of necessary characteristics. Examiners will make judgments about individual pieces of work by taking into account and evaluating the distinctive characteristics of a particular script.

Presentation moderators will similarly endeavour to reach a holistic judgment based on the responses of the student(s) and teacher on the TK/PPD form.

The mark-bands for each assessment task in effect represent a single holistic criterion applied to the piece of work, which is judged as a whole. The highest descriptor levels do not imply faultless performance and examiners and teachers should not hesitate to use the extremes if they are appropriate descriptions of the work being assessed.

TOK essay assessment instrument

Does the student present an appropriate and cogent analysis of knowledge questions in discussing the title?						
Aspect	Level 5 9–10	Level 4 7–8	Level 3 5–6	Level 2 3–4	Level 1 1–2	0
Understanding knowledge questions	There is a *sustained focus* on **knowledge questions** connected to the prescribed title—**developed** with *investigation* of **different perspectives** and **linked** *effectively* to **areas of knowledge**	There is a *focus* on **knowledge questions** *connected* to the prescribed title—**developed** with *acknowledgment* of **different perspectives** and **linked** to **areas of knowledge** and/or **ways of knowing**.	There is a *focus* on *some* **knowledge questions** *connected* to the prescribed title—with *some* **development** and **linking** to **areas of knowledge** and/or **ways of knowing**.	*Some* **knowledge questions** that are *connected* to the prescribed title are considered, but the essay is largely *descriptive*, with *superficial or limited* **links** to **areas of knowledge** and/or **ways of knowing**.	**Knowledge questions**, where present, are weakly connected to the prescribed title—the essay is *descriptive*.	The essay does not reach a standard described by levels 1–5 or is not a response to one of the prescribed titles on the list for the current session.
Quality of analysis of knowledge questions	**Arguments** are *clear*, supported by **real-life examples** and are *effectively evaluated*; **counterclaims** are extensively *explored*; **implications**	Arguments are *clear*, supported by **real- life examples** and are *evaluated*; some **counterclaims** are identified and *explored*.	*Some* **arguments** are *clear* and supported by **examples**; some **counterclaims** are *identified.*	Arguments are offered but are *unclear* and/or *not supported* by *effective* **examples**.	**Assertions** are offered but are *not supported*.	
Some possible characteristics						
	Cogent Accomplished Discerning Individual Lucid Insightful	Pertinent Relevant Thoughtful Analytical Organized Credible	Typical Acceptable Mainstream Adequate Competent	Underdeveloped Basic Superficial Derivative Rudimentary Limited	Ineffective Descriptive Incoherent Formless	

TOK presentation assessment instrument

Do(es) the presenter(s) succeed in showing how TOK concepts can have practical application?					
Level 5 9–10	Level 4 7–8	Level 3 5–6	Level 2 3–4	Level 1 1–2	0
The presentation is focused on a *well-formulated* **knowledge question** that is *clearly connected* to a *specified* **real-life situation**. The knowledge question is *effectively explored* in the context of the real-life situation, using *convincing* **arguments**, with *investigation* of *different* **perspectives**. The **outcomes of the analysis** are shown to be *significant to the chosen real-life situation and to others.*	The presentation is focused on a **knowledge question** that is *connected* to a *specified* **real- life situation**. The knowledge question is *explored* in the context of the real-life situation, using *clear* **arguments**, with *acknowledgment* of *different* **perspectives**. The **outcomes of the analysis** are shown to be *significant to the real- life situation.*	The presentation identifies a **knowledge question** that has *some connection* to a specified **real-life situation**. The knowledge question is *explored* in the context of the real-life situation, using *some adequate* **arguments**. There is *some awareness of the significance* of the **outcomes of the analysis**.	The presentation identifies a **knowledge question** and a **real-life situation**, although the *connection between them may not be convincing.* There is *some attempt* to explore the knowledge question. There is *limited awareness of the significance* of the **outcomes of the analysis**.	The presentation describes a **real-life situation without reference to any knowledge question**, or treats an abstract knowledge question **without connecting it to any specific real-life situation**.	The presentation does not reach the standard described by levels 1–5
Some possible characteristics					
Sophisticated Discerning Insightful Compelling Lucid	Credible Analytical Organized Pertinent Coherent	Relevant Adequate Acceptable Predictable	Underdeveloped Basic Unbalanced Superficial Derivative Rudimentary	Ineffective Unconnected Incoherent Formless	

Acknowledgment- *The above document is created with excerpts from the Theory of Knowledge guide, First assessment 2015 IB diploma Programme*

Following are two exemplars of TOK essays:

Essay -1

Without application in this world, the value of knowledge is greatly diminished. Explore this idea with reference to two areas of knowledge.

Knowledge is multi-faceted. Unlike a fruit it can either be used orexist untouched for years and yet nobody can predict if it will ever rot. If there exists a checklist for deciding which knowledge is valuable,will this notion apply to all knowledge equally? In that case does there exist anything such as the 'most valuable' knowledge? Plato's *meno* "What is it about knowledge that makes it more valuable than mere *true belief*?" poses a question for allknowledge that exists and the answer somewhere lies in the way humans apply the knowledge they possess.

Knowledge apparently, does possess the ability to diminish in importance to people and ultimately lose sight of, if not utilized to its potential. The objective nature of knowledge like the wave equation of physics is only valuable to a person if he can make use of it. The scientific community considers the discovery of dinosaur bones in the seventeenth century as a groundbreaking step towards the definition of time. Inferentially, this occurrence owes its success to the fact that the miniscule discovery of dinosaur bones was used for further research and then it was finally declared in the nineteenth century that dinosaurs did exist long

before humans started walking the earth. Scientists used their practice of reason and made plausible predictions about the age of the earth. Had the reason for the existence of such huge bones be left open-ended for human imagination, it would still have existed in some old paleontological lab as a mere source of calcium carbonate. When humans apply, they deduce conclusions and when they deduce, they primarily use reason.

Moreover, the value of certain knowledge which one community is oblivious to, can be fundamental for another, it goes for shared and personal knowledge as well. The very knowledge that holds great value to a group of people may not be of valuable to an individual. Here is where perception and emotion take their toll. Although the wave equation may not be valuable to my grandmother who is a homemaker, members of the physics community would be majorly helpless if there did not exist anything relating frequency and wavelength. Scientists today perceive the theorems proposed by yesteryear scientists as works of art. Those predetermined ideas are the yardsticks for the further research of these scientists. Hence those former theorems can in true sense be called 'valuable'.

Biology explains the reasons as to why the knowledge we don't use slowly fades out of our memories. The human brain is wired in a way that the least used neural pathways destroy themselves through apoptosis. If the entire human race collectively stopped applying a certain knowledge it possesses, the neural pathways linking that knowledge will ultimately get destroyed in all of our brains and fade away into oblivion.

However, the question that arises is who or what is it that determines whether certain knowledge holds greater value than the other? Why is it that even if the

wave equation is so valuable, my grandmother and "non-science" oriented human population fails to be aware of its use? Our personal knowledge and preferences of knowledge in our lives is what drives us to decide whether some knowledge is valuable, but then again this value is solely personal and one cannot conclude that it can be generalized into a concept of shared knowledge to majority, beyond the group of people with similar interests as ours.

Conversely, it is plausible claim that sometimes without application, knowledge can be of great importance. In a world where scientific developments are the order of the day,it is a natural tendency of scientists to overlook the implications of their discoveries to areas beyond Natural Sciences. Biology and life has scaled new heights with findings in stem cell research and rapid emergence of new concepts like saviour siblings. One of the major reasons why research such as this or the Einstein's theory of relativity needs a check of ethics is because its application leads to unprecedented implications, many of the destructive kind. Nevertheless, these theories and findings do not diminish in value but just become dormant. They still have the potential to be put into use in future.

Therefore when knowledge of natural sciences comes into question there is always interplay between the application and value and sometimes knowledge can be valuable even without application. However the fact remains that even after theories are proposed, they only hold value when their concepts are successfully used to carry forward research and help shape new theories and thus goes the cyclic process scientists' quest for knowledge.

Besides, the urge for aesthetics is so deeply rooted into the human psyche that it

has made us develop and sift knowledge even from mere shapes and colours, musical notes and also words. Hence there is always a distinctive nature of art that humans categorize as either plagiarism or revolution. However, one factor independent of any categorization is invariably the aesthetic value of art in general. Therefore one can claim that art induces knowledge which cannot be directly implemented and still retain the value it was intended for. Here in making the decision of being valuable, as applicability plays a very miniscule a role, emotion takes the center stage.

It is worthy of mention here that the meaning of the word 'value' generally tends to be *implied* at major fronts. When I say: I know that a US Dollar has the same value of 66 Indian Rupees." I mean monetary value, conversely when I say: "I know the value of money" or "I value friendship" I justify that perception through my emotion. Furthermore, 3000 rupees was more valuable to me when I earned it, over what I got as pocket money and the same money for someone else would not be any different from 3000 rupees in the bank. It is evident that when emotion comes into picture, the meaning of value for humans becomes warped and hence value by its definition itself can be deemed as a value judgment.

In the same way, when one finds the knowledge he pursues, it automatically becomes valuable to him. When humans see something, they tend to filter the information they acquired through the sieve of emotional value and not by its utility or application and so many times knowledge even without application can be valuable. This is probably the only reason why people keep memory keepsakes from the places they visit or celebrate their birthdays every year.

Subjective knowledge therefore weighs down logic and reason because it is emotion and sense perception that majorly affect our perception. When people walk into the Louvre museum in France and behold the Mona Lisa in front of their eyes, they are all appreciative of its worth. But is it only because of its monetary value? It is an example of the aesthetic value that human minds associate with works of art. Visual art cannot literally be applied in many places and yet it possesses an inherent aesthetic quality, which appeals to the human sight which is known for its ability to find value in a grain of sand and strokes of paint alike.

On the contrary, because there cannot exist absolute subjectivity, art can also be applied. Since ages literature invariably affected our lives. The human mind is tuned to using emotion and perception for finding familiarity in the lyrics of songs and characters of books. And why shouldn't we? As Leland Ryken aptly summed it up by stating that "The knowledge that literature gives of a subject is the kind of knowledge that is obtained by (vicariously) living through an experience. "Literature makes use of pseudo-situations to make us feel like a part of the story and a lot of knowledge gained through that process arouses an emotional response. Although it is indirect, we apply those emotional responses experienced when we 'connect' to a character with the reality around us.

Recently I read 'The Kite Runner' by Khaled Hosseini and the intensity of the theme of friendship portrayed in the book triggered a set of thoughts in my mind. After finishing the book, I could feel myself valuing friendship more seriously than I did before. Evidently, the experience associated with the book in

my memory when applied helped me make personal decisions. Similarly, my lawn tennis coach taught me a trick that players generally use for winning. During a match if the player recalls of an experience of winning and tries to recreate his emotional experiences, he could mentally be stable because his brain has created a winning ambiance for him. In the case mentioned, the players apply their memory to the present to feel similar emotions. It goes to say that the knowledge in our memories will only be valuable when applied to reality.

Nevertheless, perceptions are shaped by personal knowledge, this contributes to the subjectivity in arts or history or even human sciences for that matter and so there is not a lot of objective application that is evident in arts but sometimes a replay of memory or a re-presentation of knowledge does feature. Simultaneously, objective knowledge like math consists of the shared knowledge of the human race in general. It demands to be applied for conclusions to be reached.

However, nothing can put a hurdle in the pursuit of knowledge and when it comes to application, music compositions are used for therapy at the same time fractals convert into works of art. Since “Every word or concept, clear as it may seem to be, has only a limited range of applicability.” when studied for value, no knowledge can come first.

Word Count: 1602

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Essay 2

Given access to the same facts, how is it possible that there can be disagreements between experts in a discipline? Develop your answer with reference to two areas of knowledge.

Initially, the very existence of disagreements within a discipline made me question the methodologies employed to generate shared knowledge in the discipline. However, the underlying issue is really what the discipline defines as a fact and why. It is the nature of fact that often determines the scope of rational disagreement. The disciplines of cognitive psychology and mathematics differ vastly in this respect, opening themselves up to disagreement between experts to different degrees.

In my Psychology HL class, a friend and I once exchanged a mildly heated debate about whether intelligence was primarily the result of nature or nurture. I was disgruntled at her underplaying the role of the environment, while she thought I'd unfairly overruled the power of genetic programming. We turned to our textbooks to establish once and for all, which of us was 'right.' To my dismay, I found that two studies conducted by psychologists had come to opposing conclusions:

Bouchard and McGue (1990)[1] compared intelligence levels between identical twins raised together and identical twins raised apart across cultures. Since identical twins share the same genetic material, any significant differences in IQ, beyond what was expected by chance, could be attributed to the environment. The experts found no significant differences in participants' IQs and eventually concluded, after 20 years of longitudinal study, that intelligence was roughly 70% hereditary. In contrast, Horn et al

[1] Crane , John, and Jette Hannibal. IB Psychology: Course Book: Oxford IB Diploma. 2nd ed. London: Oxford U Press, 2012. Print.

(1979)[2] conducted adoption studies, and found no significant IQ differences between the biological children and adopted children (from lower socioeconomic backgrounds) of wealthy Caucasian families; suggesting that genetics had little impact. The intelligence debate does not as yet have a conclusion.

Although Bouchard and McGue increased their study's validity through consensus with a previous study, cross-cultural validity, and a wide age range, their findings are not considered facts about intelligence. Are there facts where cognitive psychology is concerned? It does not appear so. Methodologies vary – ranging from interviews to field experiments. Thus data is often *qualitative*; consisting of the development and exploration of ideas as opposed to the establishment of direct causal relationships, as observed above. This results in the need for *reflexivity*[3] on part of the experts – a reflection on the biases they may bring to the interpretation of the data because of their reliance upon individual sense perception. I find that the conclusions of my psychology essays are all along the lines of 'more research is always needed.' In the search for truth in cognitive psychology, methodologies are copious but facts rare. Cognitive psychology's greatest barrier to certain 'fact' seems to be its very scope. It seeks to explain thought processes and behavior in humans. Our inability to observe mechanisms of thought, or isolate variables – sheer human complexity – lead to uncertainty regardless of method employed. Absolutism is thus discouraged. This holds throughout the discipline, whether regarding intelligence, altruism, or other phenomena.

[2] Crane , John, and Jette Hannibal. IB Psychology: Course Book: Oxford IB Diploma. 2nd ed. London: Oxford U Press, 2012. Print.

[3] Crane , John, and Jette Hannibal. IB Psychology: Course Book: Oxford IB Diploma. 2nd ed. London: Oxford U Press, 2012. Print.

Facts are dubious in psychology, thus the volatility of shared knowledge in this discipline can actually be seen as an instigator of disagreement between experts.

Yet one can argue that the anticipated uncertainty with any psychological research is a 'fact' in its being universal to the discipline, but the certainty of uncertainty does not contribute to shared knowledge in cognitive psychology. It is rather a principle the discipline necessitates; but is the acquisition of knowledge in cognitive psychology always associated with uncertainty?

Surprisingly, psychologists seem quite unanimous in the linking of oxytocin to trusting behaviour. Baumgartner et al (2008)[4] have shown that the direct inhalation of oxytocin can be proportional to trust shown in a gambling game. It seems this conclusion is far more unequivocal. Firstly, the research conducted is more quantitative; reason is thus able to play a more crucial role. Since trust (money invested) and amount of hormone, were quantifiable variables, reductionist methods like the lab experiment, may help establish causal relationships and minimize scope for disagreement. However, I also note that cognitive psychology overlaps significantly with the natural sciences here in methodology: it seems the lack of disagreement ties in with the reduced complexity of the variable under study: trusting behaviour as observed in investment. Intelligence, however, is complex and difficult to quantify, opening itself up to greater degrees of disagreement. The majority of research in psychology is inconclusive and thus prone to disagreement, because human complexity will usually always necessitate qualitative research methods wherever behaviour is concerned; giving rise to multiple interpretations once more, even if more scientific methods are employed.

[4] Hannibal, Jette. Psychology for the IB diploma. Oxford: Oxford U Press, 2012. Print.

In contrast there is little disagreement between experts in applied mathematics. Deserving mention here is the distinction between disagreements – they can be rational or irrational. An expert could very well dispute 2 + 2 being 4 if they so wished, but this is not a rational disagreement, since there is no known deductive basis for it. There are no apparent contradictions in the math behind 2 + 2 within its system.

Mathematics' abstractive nature appears to free it from the bias of human perception, to a sphere where knowledge deals in proofs via reason. Since what quantifies fact within the discipline is clearly defined, and since these facts are usually unequivocally held true, the scope of disagreement between experts is slim. For example, I found that the concept of non-Euclidean (spherical) geometry[5] was unpalatable. My teacher explained that mathematics existed where the sum of the angles in a triangle was not 180 degrees. This seemed to topple whatever I had learned about mathematics up until that point. I asked him how it was so, and he simply said 'the math works.' Mathematical reasoning showed it was true. I learned eventually that he meant the concept had been deductively extrapolated from alternate axioms that assumed a *curved* surface rather than the plane surface Euclid assumed. It had created no contradictions within Euclid's system; it had rather formed a separate one. The absence of 'degrees of validity' in math narrows the window for disagreement: it is largely binary; either the math is correct or incorrect. Consequentially, methods can also be highly generalized; such as with formulae. Reason eventually abated any quarrel I had to spherical geometry. Rigorous, standardized truth checks for mathematical theories must be undergone for it to transition into mathematical fact – proof (usually verified by peer review). Once they

[5] "Euclidean and non-euclidean geometry, Section 4." Euclidean and non-euclidean geometry, Section 4. Cornell University , n.d. Web. 14 Mar. 2017. <http://www.math.cornell.edu/~mec/Winter2009/Mihai/section4.html>.

pass this test, they enter the communal pool of shared knowledge in math, now considered eternally valid *within the system.* Mathematics is done an abstract sphere; but to what extent can mathematics' abstractive quality free it from disagreement?

In math class I remembered being suddenly boggled by the idea of infinity. The idea of something never ending is highly counterintuitive to humans that exist in a material, finite world. My doubt led me to discover that there was actually a branch of mathematics that denied an infinite set of N natural numbers[6]. Somewhat tellingly named 'ultrafinitism,' or 'ultraintuitionism' they argue several large numbers cannot exist because they are not physically realizable. Here it seems mathematics' abstraction from reality serves to stimulate disagreement between experts, since the concept itself is so distended from human intuition. The significance of mathematical fact being true *within its system* is seen here:

Mathematics is built on axioms that are held as true. I realized it was possible to assume an alternative set of premises postulating the nonexistence of an infinite set of numbers, and derive mathematics that is both true and valid. It seems mathematical disagreement is usually directed at the *premises* rather than the conclusions; because what is extrapolated from a fixed, logical set of premises is almost always correct. Disagreement is greatly diminished therein. The mathematics extrapolated from either viewpoint of infinity is not invalid. However, since the concept is so essential to doing mathematics and has implications at deeper levels of abstraction, this rift is one that experts seek to reconcile. Disagreement here does not necessarily undermine prior knowledge as I expected, but rather opens up alternate, equally valid systems – just like

[6] Horsten, Leon. "Philosophy of Mathematics." Stanford Encyclopedia of Philosophy. Stanford University, 25 Sept. 2007. Web. 17 Jan. 2017. <https://plato.stanford.edu/entries/philosophy-mathematics/#Int>.

with spherical geometry. It would seem, then, that math's abstraction does allow for it to reach unequivocal truths within systems. The historical development of mathematics also shows that, though disagreements arise, proof is often established far later, as was observed in Fermat's Last Theorem that only found itself a 'fact' after 350 years of speculation[7]. Facts in mathematics remain thus largely undisputed.

Overall, it seems that experts can disagree because the areas of knowledge of their disciplines are conducive to disagreement to varying degrees. Both addressed areas of knowledge strive to arrive at valid facts, and that endeavor is complicated by the nature of what is under investigation in their disciplines. As illustrated by the example of qualitative research on intelligence, the scope of human complexity in cognitive psychology necessitates multiple methodologies, resulting in several interpretations and possible biases in the same due to the active role of sense perception. In consequence, knowledge itself is volatile and rarely completely generalizable, even where more scientific methods are employed, like with oxytocin. Thus room for disagreement between experts is widened. In contrast, the abstraction of mathematics and its subsequent reliance on reason frees it from disagreement that could arise from personal interpretation; even for perplexing concepts like spherical geometry. Disagreements that arise in math do not usually invalidate the opposing perspective, but rather create alternate, valid systems that derive their own 'facts.' The plausibility of disagreement is thus diminished. Experts can disagree upon facts within disciplines because each discipline is unique in its scope – the nature of fact is thus highly variable

[7] Kolata, Gina. "At Last, Shout of 'Eureka!' In Age-Old Math Mystery." The New York Times. The New York Times, 23 June 1993. Web. 9 Feb. 2017. <http://www.nytimes.com/1993/06/24/us/at-last-shout-of-eureka-in-age-old-math-mystery.html>.

as seen in both mathematics and cognitive psychology. While the former's scope frequently quells it, the latter's opens itself up to disagreement.

Word Count: 1597

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