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Group 1 individual oral commentary
Revision summary for your IOC



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TOK



Jack Ma's Alibaba empire

Paul Hoang looks at the development
of a successful internet-based business



Exam links



- Unit 1.1 The role of entrepreneurship in overall business activity.
- Unit 1.6 Growth and evolution.
- Unit 3.1 Source of finance.
- Concept-based learning: change, globalisation and strategy.

Jack Ma is a self-made billionaire, with a net worth of \$21.9 billion. He is the founder and chairman of Alibaba Group, which owns Alibaba.com and Taobao.com, respectively the world's largest business-to-business (B2B) e-commerce business and the world's largest consumer-to-consumer (C2C) e-commerce business. Almost everything made in China can be traded globally on Alibaba and Taobao. In September 2014 the company floated its shares on the New York Stock Exchange, raising a world record \$25 billion

Cultural Revolution and China Pages

Ma started an internet company with initial capital of \$60,000 and went on to become China's richest man in under 15 years. He was born in 1964 in Hangzhou, eastern China and grew up during the Cultural Revolution, a period of total government control of the country.

Being a fan of kung fu books, Ma makes the analogy between a kung fu master and an entrepreneur:

“You have to suffer a lot, you have to practice, you have to learn, you have to have the spirit of never giving up, the fighting spirit...I learn from Kung Fu books. You can never learn from Harvard Business School!”

In the late 1970s, Ma worked as a voluntary tour guide to English-speaking tourists in Hangzhou, about 110 miles from Shanghai. He would start work at 5 a.m. at Hangzhou's only hotel, meeting foreign tourists and business travellers from the USA and

Jack Ma's accomplishments



- | | |
|---|---|
| <p>2000 Appears on the cover of <i>Forbes</i> magazine, the first mainland Chinese person to do so.
Voted by the World Economic Forum as a 'Young Global Leader'.</p> <p>2001 Alibaba becomes the world's first e-business to exceed 1 million members.</p> <p>2004 Voted by China Central Television (China's main television network) and its viewers as one of the 'Top 10 Business Leaders of the Year'.</p> <p>2005 Named as one of the '25 Most Powerful Businesspeople in Asia' by <i>Fortune</i>.</p> <p>2007 Named as a 'Businessperson of the Year' by <i>Businessweek</i>.</p> <p>2008 Honoured as one of the 30 'World's Best CEOs' by <i>Barron's</i> (US financial magazine).</p> | <p>2009 Selected by <i>Time</i> magazine as one of the world's 100 most influential people.
Named as one of the 'Top 10 Most Respected Entrepreneurs in China' by <i>Forbes China</i>.
Received the award for 'CCTV Economic Person of the Year: Business Leaders of the Decade Award'.</p> <p>2010 Named as one of 'Asia's Heroes of Philanthropy' by <i>Forbes Asia</i>.</p> <p>2013 Steps down as CEO, but remains as chairman and the face of the company.</p> <p>2014 Alibaba.com floats on New York Stock Exchange, cementing Ma's status as China's richest man.</p> |
|---|---|

Europe. For 9 years he offered free tours of the city's West Lake. This allowed him to practise his English and develop his entrepreneurial instincts.

Although Ma failed the university entrance exam on two occasions, his perseverance meant he graduated in 1988 with a bachelor's degree in English from Hangzhou Teachers College. He started his career as a lecturer of English and international trade at Hangzhou Dianzi University. This was also the year that he was introduced to Jerry Yang, co-founder of Yahoo, which later injected \$1 billion into the Alibaba Group. A born entrepreneur, Ma soon founded his own translation agency, working with some of the first US companies to do business in China.

In 1995 Ma made his first visit to the USA. He came across the internet, which was not available in China at that time. He was particularly keen to build websites that helped small businesses, and he founded China Pages (similar to Yellow Pages) in 1995 with \$2,000 he borrowed from his parents and brother-in-law. China Pages was arguably China's first web-based business, but it flopped.

An e-commerce revolution

In 1999 Ma went to Silicon Valley, USA, to find venture capitalists who would fund the Alibaba Group. However, he was rejected by every financier he saw. Not giving up, he managed to raise \$60,000 and founded Alibaba the same year.

Ma came up with the Alibaba name when he was in a coffee shop in San Francisco. Alibaba.com was aiming to provide huge opportunities for small-to-medium-sized businesses from around the world, which linked in with Ali Baba and his 'open sesame' catchphrase. In Ma's words:

“Ali Baba is not a thief. Ali Baba is a kind, smart business person, and he helped the village.”

The name is also known globally and easy to spell

Alibaba is now the world's largest B2B marketplace, serving more than 300 million small-to-medium-sized businesses from over 200 countries.

Many doubted Jack Ma's B2B business model. Some thought China was not ready for e-commerce, especially as Ma's emphasis was on helping small businesses rather than catering for multinational companies (the model used in Europe and the USA).

However, within 10 years Alibaba had 58 million small businesses using its B2B platform to sell products to overseas customers.

Ma says his thinking was simple — he believed that China needed an e-commerce platform, despite people saying that he had no chance of competing against eBay, especially with the poor logistics and credit system in China. His response to the pessimists was to point out an obvious fact: the USA had a population of 300 million compared to China's 1.3 billion, so it was just a matter of time before China had more internet users. In 2008 China became the country with the most internet users.

Speaking to the *Wall Street Journal* in October 2011, Ma said success relies on going back to basics:

“Think about how you can help people and create value for the others and then you'll get the money. This is how we succeed in China.”

From humble beginnings, Jack Ma focused on satisfying the needs of customers in order to 'influence the world and improve the country'. Few people would argue that he has failed to achieve this, even though China remains a difficult place for foreign firms to do business.

Theory of knowledge



- 1 In what ways does knowing a language give access to a culture? Is it possible to understand a language properly without understanding the culture?
- 2 Can the literature of a culture be meaningfully read in translation?
- 3 Are there certain ideas, concepts and beliefs that are best expressed using metaphors and idioms? Why might these unique uses of language provide access to ideas that otherwise cannot be scientifically or literally described?
- 4 In what ways do the grammatical structures of language influence the thinking within that language?

Paul Hoang is an IB workshop leader and an associate editor of IB REVIEW.



The rise of militarism in Japan

Paul Grace explores the major factors that led to the dominance of militarism in Japan during the 1930s



Exam links



Knowledge of the rise of militarism in Japan is useful for the following topics:

Standard level

Causes, practices and effects of war: causes of the Second Sino-Japanese War and/or the Pacific War.

Higher level

Aspects of the history of Asia and Oceania: Imperial Japan: empire and aftermath 1912–1952.

status in both the Second Sino-Japanese War and the Pacific War. Militarism can also be seen as a major factor behind the invasion of **Manchuria** in 1931 and the decision to attack Pearl Harbor in 1941.

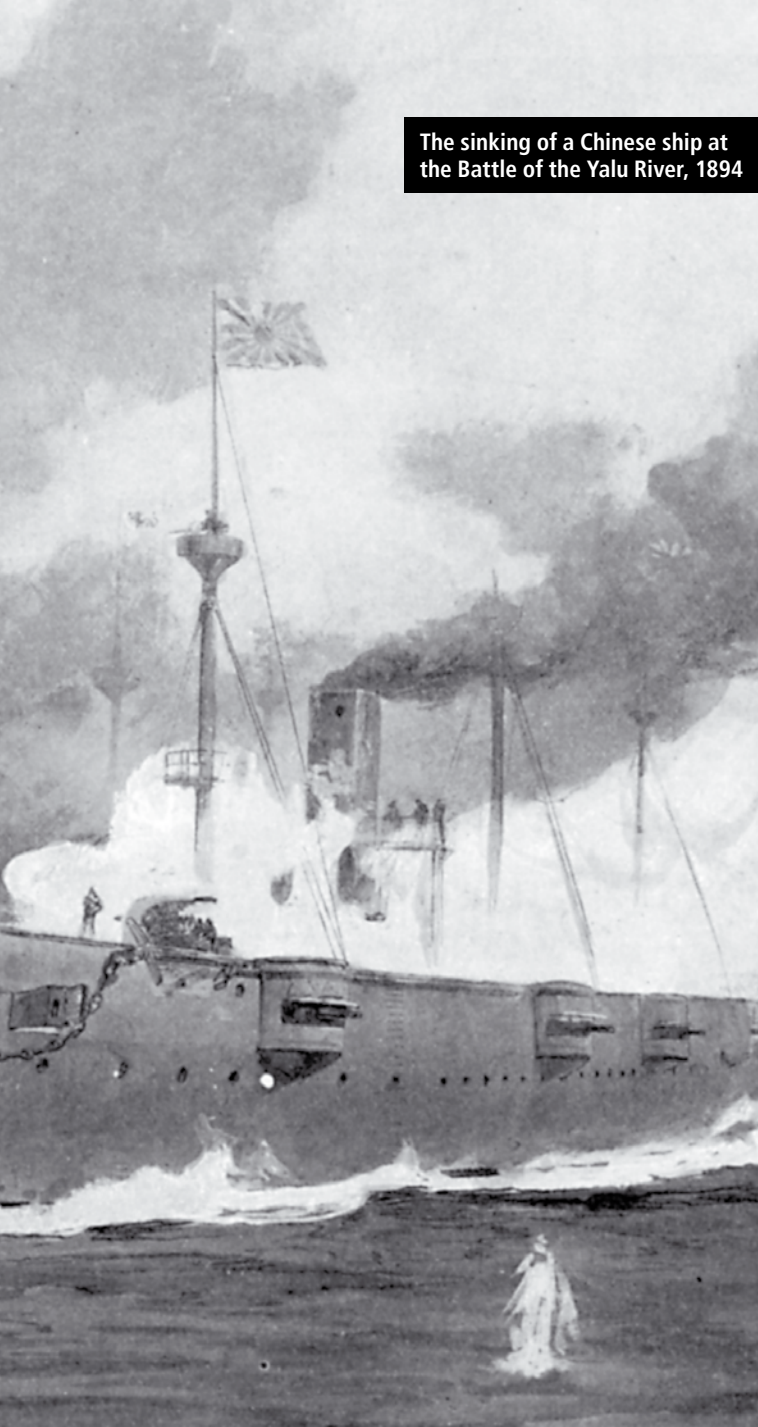
The legacy of the Meiji era

In July 1937, skirmishes between Japanese and Chinese troops on the Marco Polo Bridge just outside Beijing sparked all-out war between the two nations. So began the Second Sino-Japanese War, which lasted until 1945. Japan's aggression was largely due to a change in policy during the 1930s that saw the gradual dominance of militarist groups that wanted to engage with expansionist foreign policies into China.

Up until the middle of the nineteenth century, Japan had pursued an isolationist approach to world affairs under the rule of the **Tokugawa shogunate**. This changed in 1853 with the arrival

The rise of **militarism** in Japan significantly affected the course of the country's history in the twentieth century, and its militarism played an instrumental role in its aggressor

The sinking of a Chinese ship at the Battle of the Yalu River, 1894



of the Perry expedition from the USA, which sought to open Japan to the world. The Japanese reaction is commonly referred to as the **Meiji restoration**. The restoration and the era that followed led to Japan being built around the power and authority of the emperor. In addition, Japan quickly modernised and the institutions of military power were established.

The Meiji era also involved the disbanding of the **samurai**. The samurai had held a dominant position in Japanese society for centuries but their relevance had come under fire due to the changing needs of Japan as the country went through the process of modernisation. However, in many ways their ideals lived on through **bushido**, a moral code that placed a strong emphasis on chivalry, loyalty and honour. These ideals were exported to the new Imperial Army and Navy and this commitment can be seen in the 'Imperial Rescript for Soldiers and Sailors' of 1882, which further reinforced these values.

Timeline



Major events

1868	Meiji restoration
1889	Establishment of Meiji constitution
1894–1895	First Sino-Japanese War
1904–05	Russo-Japanese War
1910	Annexation of Korea
1925	Electoral law
1931	Manchurian incident
1932	Assassination of Prime Minister Inukai Tsuyoshi (May 15 incident)
1936	February 26 incident
1937	Marco Polo Bridge incident
1941	Attack on Pearl Harbor

Eras of Japanese history

1612–1868	Tokugawa era
1868–1912	Meiji era
1912–26	Taishō era
1926–89	Shōwa era

The military was given a degree of political independence in the Meiji constitution of 1889, which meant that it was only the emperor who had full control over them, not the parliament.

Japan as an imperial power

Japan had been victorious in wars against China in 1895 and Russia in 1905. These victories had established Japan as an imperial power and in many ways reflected the successes of the Meiji era. By 1910 Japan had overtaken China as the dominant power in east Asia, holding colonial control over the island of Taiwan and the entire Korean peninsula. Japan had also forged alliances with Western powers, including the UK through the Anglo-Japanese Alliance.

Japan continued its expansion during the First World War by seizing German colonial possessions in China. **The 21 Demands** issued by Japan in 1915 also increased its economic influence over China. Subsequently, many in military circles saw expansionism as Japan's path for the future. The invasion of Manchuria and the later all-out war with China therefore could be seen as the linear path of Japanese expansionism.

The unpopularity of the Taishō era

The turmoil of the First World War changed the nature of international relations and there was a global move towards collective security rather than imperial expansion. This included the creation of the **League of Nations**, of which Japan was a founding member. Furthermore, the 1920s saw a number of conferences that led to a reduction in the military capacity of Japan. For instance the Washington Conference of 1922 led to the reduction of the Japanese navy in a ratio of 5:5:3 between the USA, UK and Japan respectively.

The militarists' political position weakened during the 1920s and the influence of political parties increased. The high point of this era was the 1925 general election law that saw the vote granted to all working men over the age of 25. More social freedoms were gained during the 1920s and youth culture flourished with the 'Modern Boy' and 'Modern Girl' symbolising a more individualistic society.

Many conservatives considered the Taishō era as a move in the wrong direction, seeing the multilateral foreign policies as weak and

the coalition governments as ineffective. The military increasingly became a centre of opposition against these developments and the invasion of Manchuria in 1931 perhaps best illustrates the extremes that some discontented military leaders were willing to go to.

The invasion of Manchuria

In 1931 Japanese soldiers of the Kwantung Army stationed in Manchuria, northeast China, faked a sabotage of the railway lines they were guarding and implicated the Chinese as the aggressors. This presented an excuse for all-out takeover and control of Manchuria.

Japan had held interests in Manchuria for some time and had expected to gain more influence in the region following success in the 1905 Russo-Japanese War. However, Japan's earlier imperial gains had been stalled by the mediation of the USA and the more cooperative nature of international relations following the ordeal of the First World War. By the late 1920s many in Japan sought to restart the expansionist program. Manchuria seemed the ideal starting place: it would provide 'living space' for the Japanese, similar to how Hitler promised *lebensraum* for the Germans in many of his speeches. Manchuria was also rich in natural resources and fertile land that would particularly benefit Japanese farmers.

From 1932 onwards, Manchuria under Japanese rule became known as 'Manchukuo' and Puyi (the last emperor of Imperial China) was brought in as the puppet leader. It effectively became part of the Japanese empire, joining the more established colonies of Korea and Taiwan.

The international reaction, though delayed, was one of condemnation of the Japanese aggression in Manchuria. This led to Japan leaving the League of Nations in 1933, a move that weakened the diplomatic power of the league. The condemnation also strengthened anti-Western sentiment within Japan.

The Manchurian incident of 1931 was a clear indication of the growing power of the Japanese military and the government's inability to control it. The global economic depression had also reached Japan, and it can be seen as instrumental to the move towards militarism.

The impact of depression

The Wall Street Crash of 1929 triggered a global economic depression. Japan was not spared the severe consequences of the downturn. Prices fell across most sectors of the Japanese economy. In their efforts to maintain their workforces, factory managers found themselves creating surplus goods, which pushed prices down even further. Unemployment was a by-product of these issues.

The drop in prices hit agricultural areas particularly hard, leading to a breadline existence for numerous rural communities and, in extreme cases, famine. The anger felt in these rural areas would add fuel to the militarists' cause as the 1930s progressed.

Japan's recovery from the depression was relatively quick in comparison to other countries. The recovery involved:

- the removal of Japan from the **gold standard**
- the lowering of export prices
- large-scale **budget deficits**

These policies were carried out by the finance minister, Takahashi Korekiyo, who is often compared to the famous economist John Maynard Keynes because of his focus on state intervention with economic policy. Keynes had advocated such an approach to reduce the extremities of the economic boom-bust cycle. As a side note, there has been a resurgence of interest in these types of economic policies following the global economic downturn since 2008.

The effects of the depression in Japan can be seen as a stimulant for two major changes:

- They increased the demand for more authoritarian and militarist policies both within Japan and overseas. The parliamentary cabinet



Japanese naval landing party guards a bridge on the approach to Shanghai, 1937

Glossary



Budget deficit Where a government's spending exceeds its revenues.

Bushido The moral code of the samurai, which stressed the importance of loyalty and honour, among other virtues.

Coup d'état A sudden, forceful and illegal seizure of government.

Gold standard A system where currency exchange rates are fixed against the price of gold.

League of Nations Peacemaking organisation set up after the First World War. Although initially successful, it failed to prevent the aggressive actions of Japan, Italy and Germany during the 1930s.

Manchuria Region of northeast China, where the old ruling class of the Qing dynasty came from. Japan took over this area in 1931 and formed the state of Manchukuo.

Militarism The idea that the power and capability of the military should be increased, often to include direct political power.

Samurai Japanese warriors who held high prestige in Japanese society, famed for carrying the samurai sword.

The 21 Demands Economic and political demands made by Japan to China in 1915 that led to increased Japanese dominance within China.

Tokugawa shogunate The shoguns (military leaders) who ruled over Japan during the Tokugawa era from 1612 to 1868.



A vanguard of Japanese troops led by a sword-brandishing officer during the Second Sino-Japanese War

governments of the Taishō era were blamed for the depression, as they were unable to deal with the economic problems at the time. The growing popularity of communism also pushed many towards strong, nationalist, militarist governments.

■ Japan recovered from the depression a lot quicker than other countries and went on to experience an economic boom by the mid-to-late 1930s. This economic prosperity explains the continued support for militarist governments throughout the 1930s, as they became associated with national strength.

Assassinations and factions

Japan became an increasingly dangerous place for politicians during the 1930s, as there were numerous assassinations and attempted **coups d'état** from various groups offering differing solutions to Japan's perceived problems. Such actions are often referred to as 'government by assassination'.

Historians generally agree that the end of parliamentary rule in Japan coincided with the May 1932 assassination of Prime Minister Inukai Tsuyoshi by a group of naval officers. This was an attempted coup d'état that also included attacks on other institutions of power. It failed in its objective of fomenting revolution and was quickly suppressed. However, the new cabinet under the leadership of Admiral Saitō Makoto began the move away from parliamentary rule, with the withdrawal from the League of Nations and the recognition of Manchukuo despite international condemnation.

Assassinations and attempted coup d'états continued as the numerous militarist factions vied for power. One of the most famous militarists, Kita Ikki, proposed a 'Shōwa restoration' much like the Meiji restoration of 1868. This led to the **February 26 incident**, where Takahashi Korekiyo and several other leading officials were assassinated, though the prime minister escaped due to a case of mistaken identity.

This Shōwa restoration failed, as Emperor Hirohito did not support the actions. The leaders were brought to trial and

executed. However, this was in many ways the final step towards the establishment of militarism in Japanese society, with the authority of the emperor re-established and consolidated. The militarists would push for both all-out war in China from 1937 and the attack on Pearl Harbor in 1941.

Theory of knowledge



- 1 During the 1930s, many militarists called for a return to the policies implemented during the Meiji era of the nineteenth century. What role does nostalgia for the past play in the shaping of future events? Do nations ever use nostalgia to engineer patriotism?
- 2 Marxist historians believe that economics is the driving force of historical change. How might this interpretation be used to explain the rise of militarism in Japan?
- 3 Kita Ikki is probably the most well known of the militarists vying for change in the early 1930s. What are the values and limitations of isolating significant individuals when studying a period of history?

References and resources



- BBC Radio 4's *In Our Time* podcasts feature the samurai and other aspects of Japanese culture: www.tinyurl.com/qg3f2sw
- Brendon, P. (2001) *The Dark Valley: A Panorama of the 1930s*, Pimlico.
- Gordon, A. (2013) *A Modern History of Japan: From Tokugawa Times to the Present* (3rd edn), OUP.

Paul Grace teaches history and theory of knowledge at Renaissance College in Hong Kong. He is an examiner for paper 2 of the history course.



Behind the

Reading comprehension in Chinese B paper 1

Success in reading comprehension in Chinese requires above all else a solid foundation of vocabulary that enables you to digest printed information with speed and write your responses accurately.

To build up your vocabulary reserve effectively and develop your understanding, you need to go beyond the surface of the words, phrases and idioms to discover the systems or characteristics that govern them. For example, knowing how affixes work in English helps you understand how the word 'relate' extends to 'relation', 'relating', 'relationship', 'relative' and 'relatively'.

Growing from stems

Like English, Chinese vocabulary has a system in which characters/words serve as a 'stem' to give birth to new phrases and idioms, which may or may not relate to the original meaning of the stem characters/words. In Chinese these forms are quite varied and more flexible than in English.

Table 1 shows how a collection of phrases and idioms found in Chinese B past papers (paper 1, higher level and standard level) can be traced back to the stem character/word and how these meanings evolved and changed.

Precision, imagery and rhythm

Numbers, as well as direction words and many other words of a specific nature, are often liberally deployed in Chinese rhetoric. These words are frequently used instead of generic alternatives to create precision, develop more vivid imagery and highlight rhythmic elements. These should always be treated as rhetoric devices and not in real terms.

Table 1 Stems and meanings

词干 Stem character	词语 Idiom	中文意思 Chinese meaning	英文意思 English meaning
颜色 Colour	大红大紫	很受欢迎	Popular
	青涩的你	腼腆, 没经验	Inexperienced
方位词 Position or direction	三个小时左右	差不多三个小时	Around 3 hours
	紧跟左右	总在旁边	Follow closely
数词 Numbers	七拉八扯	各种方式援助	Resort to all kinds of help
	成千上万	有上千万的数量	In the tens of thousands
	老百姓	普通人	The masses
味觉 Taste or flavour	五花八门	各种各样	All kinds of
	苦尽甜来	困难过去, 幸福到来	Hardship is gone, happiness is here
	吃苦	受难	Suffer
	甜密密	心情美好	Feeling happy
	辛酸	可怜, 悲伤	Sad

旦(dàn) 辞(cí) 黄(huáng) 河(hé) 去(qù), 暮(mù)
至(zhì) 黑(hēi) 山(shān) 头(tóu)。

words

Yan Burch explains how to build up your vocabulary to help you access your chosen language and write effective answers

身体部位 Parts of the body	扬眉吐气	成功的骄傲感	Fill with pride
	心满意足	很满意	Satisfied
	遭人白眼	受人鄙视	To be despised
	改头换面	跟以前不一样	Complete change
动物 Animals	生龙活虎	精力旺盛	Full of energy
	虎头蛇尾	结束不如开始强	Start well but not the finish
自然现象 Natural phenomena	日新月异	时代在快速变好	Changing fast for the better
	顶天立地	自强做人	Stand on one's own feet
	土生土长	本地人	Locally born and bred
	风云人物	受人瞩目的人	High profile personality
	未雨绸缪	为困难时期准备	Prepare for the rainy days
	风调雨顺	一切顺利和谐	All is well

Below is an abstract from a classical poem 'The Ballad of Mulan'.

'The Ballad of Mulan'

东(dōng) 市(shì) 买(mǎi) 骏(jùn) 马(mǎ), 西(xī) 市(shì)
买(mǎi) 鞍(ān) 鞞(jiān)。

南(nán) 市(shì) 买(mǎi) 辔(pèi) 头(tóu), 北(běi) 市(shì)
买(mǎi) 长(cháng) 鞭(biān)。

旦(dàn) 辞(cí) 爷(yé) 娘(niáng) 去(qù), 暮(mù) 宿(xiǔ)
黄(huáng) 河(hé) 边(biān)。

不(bù) 闻(wén) 爷(yé) 娘(niáng) 唤(huàn) 女(nǚ) 声(shēng),
但(dàn) 闻(wén) 黄(huáng) 河(hé) 流(liú) 水(shuǐ) 鸣(míng)
溅(jiàn) 溅(jiàn)。

旦(dàn) 辞(cí) 黄(huáng) 河(hé) 去(qù), 暮(mù) 至(zhì) 黑(hēi)
山(shān) 头(tóu)。

不(bù) 闻(wén) 爷(yé) 娘(niáng) 唤(huàn) 女(nǚ) 声(shēng),
但(dàn) 闻(wén) 燕(yàn) 山(shān) 胡(hú) 骑(qí) 鸣(míng)
啾(jiū) 啾(jiū)。

万(wàn) 里(lǐ) 赴(fù) 戎(róng) 机(jī), 关(guān) 山(shān)
度(dù) 若(ruò) 飞(fēi)。

朔(shuò) 气(qì) 传(chuán) 金(jīn) 柝(tuò), 寒(hán) 光(guāng)
照(zhào) 铁(tiě) 衣(yī)。

将(jiāng) 军(jūn) 百(bǎi) 战(zhàn) 死(sǐ), 壮(zhuàng) 士(shì)
十(shí) 年(nián) 归(guī)。

English translation (literal meaning)

(Mulan) buys the horse in the eastern market and saddle in the western market.

(She) buys the bridle head in the south market and whip in the north market.

(She) bids mother and father goodbye in the morning and by the evening she settles for the night by the side of the Yellow River.

(She) no longer hears the calling of her parents but hears the running water of the river

(She) leaves the Yellow River in the morning and arrives at the Black mountain at dusk.

(She) no longer hears the calling of her parents but hears the neighing of the horses of the barbarians.

Ten thousand Li [two Li is equal to one kilometre] it takes (the soldiers) to reach the battleground and they cross the fortresses and mountains in flight.

The winter's biting wind carries the sound of the hourly time beat, into the night and the cold moonlight shines on their metal uniforms.

After a hundred battles, commanders die', ten years pass before the soldiers return.

The following figures of speech help to give the poem a sense of rhythm that makes it easy to recite and chant:

- The direction words of east, west, south and north.
- The morning followed by evening.
- The mileage.
- The passing of time.

They also serve in the purpose of *parallel neatness*, a pronounced characteristic of Chinese classical poems. Most generic phrases and words would fail to achieve this. Try it yourself: recite the poem using the generic words instead of the direction words in Table 2 and see how it effects the poem.

Don't be an idiom idiot

The choice and proper usage of idioms is crucial to understanding another language. Every language is littered with idioms that if taken literally lead to absurd phrases. English examples include:

- something being a 'piece of cake'
- someone 'chomping at the bit'
- suggesting that a couple are like 'chalk and cheese'

When learning a new phrase or idiom, it is important that the origin or the stem character is traced to see how far the new meaning has deviated or stayed more or less the same. Taking new words at face value can have unexpected and sometimes hilarious consequences, as demonstrated by an essay written by a student that has been circulating on the internet: 'The essay that has upset hundreds of Chinese teachers.'



南(nán) 市(shì) 买(mǎi) 辔(pèi) 头(tóu), 北(běi) 市(shì) 买(mǎi) 长(cháng) 鞭(biān)。

Theory of knowledge

Hoang suggests that Jack Ma developed his entrepreneurial instincts during his early career. How can instincts be developed? Do some people have better or worse instincts? What role does experience and education play in allowing people to make better instinctual judgements? Consider Question 5 of the May 2015 TOK titles.

Table 2 Direction words vs generic words

Words used in the poem		Equivalent generic words	
东 East	西 West	市场这边 This side of the market	市场另一边 The other side of the market
南 South	北 North	一个商店 One shop	另一个商店 Another shop
旦 Morning	幕 Dusk	很早 Very early	很久以后 A long time later
万里 Five thousand kilometres	关山 Fortress and mountains	很多路程 A long journey	关口和山脉 Fortresses and mountains
朔气 Northern wind	寒光 Cold light	冬天的北风 Winter's cold wind	冰冷的月光 Cold moonlight
百战 A hundred battles	十年 Ten years	很多战争 Many battles	多年以后 Many years later

The essay is about a family outing for the National Day celebration, depicting a visit to the zoo followed by a meal in a restaurant. The young writer was too keen to display a mastery of idioms. Unfortunately, the idioms chosen were taken literally and hence applied inappropriately. Below are four sentences taken from the restaurant scene, with the idioms in question indicated. Look in the dictionary and find out what the writer has done wrong, assuming that mocking family members was not the intention:

- 1 全家都“贪得无厌”地“自食其果”。
- 2 头顶“羽毛未丰”的爸爸…
- 3 我们一家子早就“添油加醋”完毕。
- 4 我和妹妹更是“小人得志”，“沾沾自喜”。

Put your findings in Table 3.

One of the learning objectives of IB group 2 is to develop a genuine understanding of another culture. Knowing how a language works is an excellent way of determining this. The reading comprehension paper of any group 2 exam is therefore far more

than simply being able to identify the words on the page: it is also about learning how to use words in a way that native inhabitants of the culture would recognise.

References and resources



If you want to read 'The essay that upset hundreds of Chinese teachers', or similar essays written by Chinese students, go to <http://home.sanwen8.cn/>

Yan Burch has been teaching Chinese as a foreign language in the UK for over 20 years, with more than 5 years teaching IB.

IBReviewExtras



Go online (see back cover) for the answers to Table 3

Table 3

词语/成语 Idiom	中文意思 Chinese meaning	英文意思 English meaning
贪得无厌		
自食其果		
添油加醋		
小人得志		
沾沾自喜		



The individual oral

Nic Amy provides clear guidelines on the expectations of the IOC and advises you on how best to prepare and practise for it

IBReviewExtras



Go online (see back cover) for a revision summary to help you tackle the IOC.

The individual oral commentary (IOC) is a unique challenge for IB students. Counting for 15% of your final mark in English A: literature, it tests your:

- knowledge of the part 2 texts
- skill at analysing literature in detail
- ability to talk at length and in a structured manner

The IOC is unlike any other examination. It demands a combination of careful revision, detailed knowledge and the ability to apply your skills to talk convincingly about a passage and to conduct an interesting and engaging discussion.

At standard level (SL) you will be given a passage of approximately 30 lines from one of your two part 2 texts. You will have 15 minutes to study the passage and prepare your commentary. You will not know in advance which passage it will be.

After this, you will be invited to talk about the passage for about 8 minutes, followed by a 2-minute discussion about the passage with your teacher. Your teacher will be in the room with you — however, the commentary is also recorded and will be externally moderated by an IB examiner.

At higher level (HL), the same process is followed, with two differences:

- The passage for commentary will definitely be a poetry text.

- Immediately after the commentary, your teacher will spend a further 10 minutes asking you questions about one of your other part 2 texts. This will take the form of a discussion with, typically, your teacher asking a number of questions and you providing developed, and ideally wide-ranging, answers.

Preparing and revising

HL students will study three texts for part 2 and SL students will study two. You need to know the texts really well: there is no substitute for careful reading and re-reading to make sure you know what happens and when, who the key characters are, and what you think of the writer's presentation of the narrative and the manipulation of language, form and structure. You should start preparing for your IOC at least 4 weeks before you are due to take it, and you should revise for it with the focus you would for any examination.

Start by re-reading the texts. This is best done actively: sit at a desk or table when you are reading a text, and annotate it, making sure that you highlight interesting features of the writer's craft. Ask yourself questions such as:

- Why does the writer use these particular words here?
- Why does this happen at this point?

At higher level, the passage for commentary will definitely be a poetry text



commentary

- How do various literary techniques help to shape meaning in the text?

Because the IOC takes place at different times in different schools and doesn't happen at the same time as all the other examinations, some students might be tempted not to prepare as carefully as they might for other tests. It is important that you realise early on that the IOC demands the same levels of revision and preparation as for the final written examinations. You should design a detailed revision programme and practise as often as you can in order to ensure that you are ready for the all-important IOC day.

Structuring your IOC

You need to structure your commentary carefully in order to make the best use of the 8 minutes available and help the person listening to you to follow what you are saying. A good way to organise your ideas is to give the commentary a reasonably formal structure:

- Start by setting out how you will structure your commentary.
- Explain each point carefully.
- Finish with a brief conclusion.

Use the guiding questions at the bottom of the passage to structure your response. These will often pick out key areas for analysis, so make sure that you definitely answer them in the course of your commentary.

Many students find it useful to pick out two or three key themes in the passage for commentary, perhaps focusing on the guiding questions. For example, you might look at the writer's presentation of character or use of metaphor. In order to make sure you talk for 8 minutes, an effective structure for the commentary might be:

- 1-minute introduction.
- 2 minutes on each of the three themes or ideas (or 3 minutes on each of the two).
- 1-minute conclusion.

Make sure you signpost each section clearly so that your teacher — and the IB examiner who will be listening to the recording — can clearly follow your train of thought at each stage. In preparation for this, make sure that you listen to as many commentaries as you can. Listen to your own and to those by others. You will notice that those with the clearest structures are the easiest to follow. You may even



find that using clear numerical markers such as firstly, secondly, thirdly etc. will help you to structure your commentary.

Quotations

Because the commentary should involve close textual analysis, it is important that you keep referring to quotations. Therefore, make sure that you know which examples from the passage you are going to use to support each of your points before you start the commentary. In the 15 minutes of preparation time you should highlight the key quotations you are going to refer to. An effective way to do this is to use different colours for each of the three sections of your commentary so that your annotations help you to structure what you will say. You will talk about the groups of quotations in turn and offer a clear analysis of each one. When referring to the quotations you can help the examiner (and the IB moderator) by guiding them towards each quotation, using phrases such as: 'If we look at line 9 we can see that...'. This process of leading the listener through your treatment of the passage can prove extremely effective.

Practising

Once you are confident that you know the texts well and that you know how to structure a commentary successfully, you should start practising for the IOC itself. One way to do this is to choose a range of passages of about 30 lines each and spend 15 minutes reading, annotating and considering what elements of each passage you would talk about.

An oral examination is different from a written one. Aim to speak relatively slowly and as clearly as you possibly can. Make sure that you think about who will be listening: your IOC will be assessed by an examiner who will hear your voice on a recording, which means he or she won't be able to see any gestures or make eye contact. These non-verbal signals are often key elements of how we communicate but are not available to you in the IOC. The best way to prepare, therefore, is to practise while recording your voice, listen back to the recordings and seek feedback wherever possible. It won't necessarily be easy at first but you will find that you improve quickly.

A good tip is to practise in sections rather than always tackling a whole 8-minute commentary. The more times you are able to do this, the more confident you will be for the real thing. You could do this on your own, or with a friend: listen to each other's recordings and give honest but supportive feedback.

Whenever you listen to yourself, try to be as objective as possible. Make sure that you have the marking criteria with you, think carefully about what level you think you are performing at and, crucially, always try to work out what it is you need to do differently next time in order to improve. Indeed, whenever you seek feedback on any commentary this should be your guiding principle: how can I do even better next time?

Higher level

HL students also have to complete a 10-minute interview on one of their other texts. Answers during the discussion should be developed beyond a cursory response but should avoid becoming overly long. They should, wherever possible, refer to the text in detail and to the writer's methods and concerns. The best way to prepare for this is to practise with a fellow student, with a teacher or even by recording yourself answering a set of questions you have previously written

down. The aim is to conduct a 10-minute discussion that is varied, engaged and, wherever possible, enjoyable.

You will need to know the text very well indeed, and there is no shortcut to reading it: you should aim to have read it all the way through at least twice before the examination. It can also help if you have learnt some key quotations from the text so that you can quote these in the response. However, do be careful here because it is tempting to quote something you know just because you know it and not because it helps to answer a particular question. As in any examination, one of the key pieces of advice you should always take on board is to make sure you answer the question. It is amazing how often students go off on a tangent rather than directly address the question being put to them.

Assessment criteria

Make sure that you know the criteria against which you will be assessed (Table 1). Always have them in front of you when you are listening to a commentary and practise assessing commentaries yourself. This process will help you to work out what makes a good commentary and how you can improve. The more you think about the demands of the assessment criteria and use them in your preparations, the more likely you are to address them in your final commentary.

The more you prepare and practise, the better equipped you will be for your IOC. You should aim to:

- plan and prepare carefully
- structure your response
- talk passionately about the texts

If you follow this advice, you will hopefully enjoy the unique challenge of the IOC and perform at your best on the day.

Table 1 IOC assessment criteria

Standard level		
Criterion A	Knowledge and understanding of the extract	10 marks
Criterion B	Appreciation of the writer's choices	10 marks
Criterion C	Organisation and presentation	5 marks
Criterion D	Language	5 marks
Total		30 marks
Higher level		
Criterion A	Knowledge and understanding of the poem	5 marks
Criterion B	Appreciation of the writer's choices	5 marks
Criterion C	Organisation and presentation of the commentary	5 marks
Criterion D	Knowledge and understanding of the work used in the discussion	5 marks
Criterion E	Response to the discussion questions	5 marks
Criterion F	Language	5 marks
Total		30 marks

Nic Amy is assistant head, learning at Wellington College, UK. He is an experienced English teacher and is the author, with David James, of *English Literature for the IB Diploma*.

The task of the modern historian

Chris Taylor looks at how you can use the lessons of past historians to help you deliver an outstanding history extended essay

Events like the 1812 Battle of Moscow are an important part of the story of history but are of little worth to an extended essay as narrative details

Exam links



All IB Diploma students are required to complete an extended essay of 4000 words. A history extended essay requires you to choose a focused question and a number of sources to construct an analysis and a conclusion on a historical topic. The extended essay is marked out of 36. A mark below 9 is a failing condition.

The concerns of great historical essayists were sometimes remarkably similar to those of the modern IB student. Thomas Babington Macauley (1800–59) was an infuriatingly energetic Victorian, who if he had been an IB student would have completed his extended essay and filed his internal assessment early and have far too much to say in his theory of knowledge lessons. His portfolio of jobs seems antiquated to us now — paymaster general and secretary of war — and his views on the civilised world and ‘barbarians’ are far removed

from the international principles of the IB. But it is as an author and essayist that Macauley is best remembered today.

Karl Marx wrote that Macauley was ‘a systematic falsifier of History’ because there was almost nothing that he wrote that Marx agreed with. Macauley incurred the wrath of later essayist and historian **Winston Churchill** by criticising the latter’s ancestor, Marlborough. Yet history students would be well advised to note Macauley’s instructions to what he called the ‘Modern Historian’ in his article ‘On History’, published in the May 1828 edition of the *Edinburgh Review*. Relevant extracts from his instructions appear throughout this column.

Facts, facts, facts

When tackling a history extended essay it should be obvious that the choice of question is crucial, there should be a variety of worthwhile sources used, the sources should be evaluated, a conclusion should be

attempted and referencing must be clear and consistent. What is less obvious is the need to create an argument that is reasoned, logical and coherent while avoiding the perils of narrative. Macauley knew this nearly 200 years ago:

‘No past event has any intrinsic importance. The knowledge of it is valuable only as it leads us to form just conclusions with respect to the future. A history which does not serve this purpose, tho it be filled with battles, treaties and commotions, is useless.’

He was right. Knowledge of an event will earn points, but the extended essay requires you to understand events and use them to develop an opinion that is relevant to a well-thought-out research question. Thus an essay title of ‘the events of the **Napoleonic Wars**’ is no good and neither is a knowledge claim that the Battle of Moscow started in 1812. A consideration of whether the battle was an important contribution to Napoleon’s eventual defeat is more interesting by far.

It’s the journey that matters

As war secretary, Macauley compared essay writing to travel. Though his opinions are rooted in British **colonialism**, his awareness of the world around him and thirst for discovery is something that you should aspire to as an IB history student.

‘The effect of historical reading is analogous in many respects to that produced by travel. The student, like the tourist, is transported into a new state of society. He sees new fashions. He hears new modes of expression...but men may travel far and return with minds as contracted as if they had never stirred from their own market town. In the same way, men may know the details of battles and yet be no wiser.’

The acquisition of knowledge and the reciting of facts is never enough in itself. Some students approach the extended essay with the principle that the more books read and the more facts produced, the better their essays will be, but this is rarely the case. In fact an

Theory of knowledge



- 1 Macauley is much quoted, and such quotes transcend individual ways of knowing and areas of knowledge. Consider the following quotes from Macauley in terms of TOK and the nature of knowing:
 - ‘The highest proof of virtue is to possess boundless power without abusing it.’
 - ‘Men are never so likely to settle a question rightly as when they discuss it freely.’
 - ‘The object of oratory alone is not truth but persuasion.’
 - ‘Nothing is so galling...as a meddling government; a government that tells what to read, and say, and eat and drink and wear.’
 - ‘I would rather be poor in a cottage full of books than a King with no desire to read.’
- 2 What are the differences between belief, knowledge, faith and wisdom? How can such knowledge claims be justified or critically assessed?

Key points



- Don’t get bogged down in narrative content. Instead, think about the purpose of your extended essay — does it have an argument and analysis?
- Consider the question carefully. A narrow question is much better than a broad one.
- Study the assessment criteria closely so that you know what the examiner will be expecting from your essay.
- Consider your choice of sources carefully. Think about using sources that concern ordinary people or local history so that your essay is different and imaginative.
- Don’t waste time. Be organised and determined and try to enjoy the intellectual challenge of a task that will prepare you well for university.
- Think carefully about what is required in the abstract — read the marking criteria closely and don’t just write a summary of your essay.

The experiences of Second World War soldiers on the beaches of Normandy can produce more interesting written history than the machinations of their leaders



excessive number of sources can often confuse both the student and the examiner, and reduce the essay to an incoherent jumble of facts and a mountain of narrative that displays no critical thinking at all.

History in miniature

The best extended essays examine history in miniature: avoiding sweeping generalisations and not trying to cover a period or question that is too wide, vague or ambitious. One essay I recently assessed originally concerned the First World War, but that is far too broad a topic to cover in 4000 words. So the topic was narrowed down to the use of tanks in the war — but this was still too broad. Tanks in the second half of the war? Still too broad. Tanks in 1917? Too general. Eventually the candidate settled on the effectiveness of tanks at the Battle of Passchendaele in 1917, but it was only when this topic was narrowed down even further to the effective use of tanks at Passchendaele between 31 July and 10 August 1917 that a truly focused, analytical and top-grade essay was arrived at.

Macauley wrote that 'The perfect Historian is he in whose work the character and spirit of an age is exhibited in miniature'. He said that the best written history is concerned with ordinary people — the peasants of the Chinese countryside, the factory workers of pre-revolutionary Russia, the settlers of North America, the soldiers on the beaches of Normandy. Kings and queens are seductive and students are drawn to famous and heroic figures, but they do not always tell the best history.

The IB assesses the qualities of an essay that distinguish it from the average. This is called 'holistic judgment' in criterion K and can be a difficult thing for examiners to assess. One route to success in this part of the essay is to focus on the experience of everyday people from the past and on a narrow period, place or event. Criterion K mentions 'depth of understanding' and this is closely related to examining an issue in great detail.

Getting your abstract right

All of these ideas and the purpose of your extended essay should be made clear in your abstract, which should be the last thing that you write before putting down your pen and breathing a sigh of relief at a job well done. The abstract is troublesome for many, who mistake it for a simple summary of the essay. The IBO describes the purpose of the abstract as follows:

The abstract should encourage students to examine closely the development of an argument within the extended essay and the pertinence of any conclusions that are reached. It is also designed to allow readers to understand quickly the contents of the extended essay.

'IBO Extended Essay guide', pp. 15–16

This means that the abstract should provide an overview and be clear, concise and contained. There is no single format for writing a successful abstract but the marking criteria guidelines are quite explicit in what it should contain. Macauley didn't concern himself with abstracts in 1828 but his views still apply here:

Unhappily they have fallen into the error of distorting facts to suit general principles. The practice of distorting narrative into a theory is a vice.

His words are a warning to all historians who try to conclude and justify their views. If the general principles and overview expressed in

your abstract are derived entirely from narrative and facts, it will not be good.

Planning ahead

All this advice will be of no use to you if you do not approach the task with a clear focus and plan. There is no surer way of failing the extended essay than to delay starting it, since the collection of a number of good sources, the reading of the material and the creation of an argument that shows intellectual initiative takes a huge amount of time. Macauley knew this too:

A single breaker may recede but the tide is eventually coming in.

There may sometimes be a reprieve but deadlines are always approaching and you can be inundated and swamped all too easily. It is far better to tackle the extended essay with enthusiasm as an engaging intellectual task rather than a mere chore.

Questions and activities

- 1 Are the following research questions suitable for the extended essay? Think about what makes them good or bad.
 - 'A comparison of wars and the aspects of the Crimean War that led to medical advances.'
 - 'Why did Hitler come to power?'
 - 'To what extent was the Ukrainian famine of 1932 caused by Stalin?'
 - 'Why did communism fail across Europe in 1989?'
 - 'What were the causes of Custer's defeat at Little Big Horn?'
- 2 Below are the main concerns when choosing a suitable research question for a history extended essay. What other issues or concerns might be added to this list?
 - Does the question fall into the subject area of history?
 - Is the question sufficiently narrow?
 - Can you find the necessary resources to answer the question?
 - Is it interesting?
 - Is the question grammatically correct?
 - Does it need to be phrased in the form of a question?

Glossary



Colonialism Control of one nation, territory or population by another.

Karl Marx (1818–83). German political writer, philosopher, economist and socialist. Wrote *the Communist Manifesto* and *Das Kapital* with Friedrich Engels.

Napoleonic Wars European wars of the early nineteenth century between France and Britain, Russia, Austria and Prussia.

Winston Churchill (1874–1965) British statesman and politician. Prime minister in 1940–45 and 1951–55. Historian and author, recipient of the 1953 Nobel prize in literature.

Chris Taylor teaches IB history at Sha Tin College, Hong Kong, and is an examiner for the extended essay component.

DEAFiance

What would it be like to experience hearing loss or deafness? Six IB Diploma Programme students were captivated by this intriguing question as part of their CAS Project

We were all looking forward to the opportunity to do something meaningful and creative for our CAS Project. We didn't want it to be just another check box from our huge IB to-do list, but something that we could learn from and inspire others with. The issue of hearing loss and deafness in Hong Kong immediately grabbed our interest. This was something that none of us knew much about, but we believed it deserved attention and thus we formed our group, DEAFiance.

Sign language classes

To gain a better understanding of what it is like for people with hearing impediments, we decided to sign up for Hong Kong sign language lessons held by the Hong Kong Association of the Deaf. These lessons spanned a 5-week period, during which we would attend lessons for 3 hours every Saturday. We were taught different themes, ranging from personal pronouns to place names in Hong Kong.

Before the first lesson, we all tried to mentally prepare ourselves for the differences between communicating physically rather than verbally, but it was still difficult. In the first lesson, we tried to simultaneously learn the sign language actions while drawing small diagrams next to the words so we could remember them. This was extremely challenging because of the vast vocabulary we learned as well as the limited time given to record the actions. After 3 hours our brains felt completely exhausted, but it really put deaf people's daily lives into perspective for us, as it allowed us to gain some insight into the language obstacles that deaf people have to encounter within our communities.

Social media

We wanted to use an innovative method to raise awareness of hearing loss and deafness, and to encourage others to create change for deaf people in Hong Kong. The aim of our YouTube film was to help the hearing empathise with the struggles that deaf people face each day, focusing on a girl who wakes up unable to hear and experiences deafness for just a day. We followed her through several scenarios — including waking up, going to school and being asked for directions — in order to highlight the difficulties deaf people face. Watch the video here: www.tinyurl.com/pzpfmrm

Key points



- Often we take our hearing for granted, especially when it relates to commonplace, everyday situations. Spend 60 seconds imagining what it would be like if you couldn't understand anything that other people were saying.
- No one can really tell that you are deaf from your appearance. Try to imagine the assumptions people would make about you if you didn't respond to the sounds around you or to what they say.
- Being a minority group, how difficult do you think it is for deaf people to communicate with the rest of society?
- For those who don't suffer from hearing difficulties, how much do we really understand about being deaf?
- How effectively do you think you could communicate with a deaf person?



DEAFiance members teaching sign language to year 9 students



Year 9 students practising their sign language skills

Lunch and learn

Our school has an initiative called ‘lunch and learn’, where workshops are conducted during lunchtimes and staff can join in to expand their skill sets (a form of continuous professional development). We grabbed the opportunity to conduct a lunch-and-learn session for our teachers, showing them some of the sign language that we had learnt. This expanded the breadth of our target audience beyond the student population. Through this, we hoped not only to broaden the scope of our teachers’ skills, but also to give them a taste of how hard it is to communicate without spoken language. Furthermore, we hoped it would foster an appreciation within the teaching community for those with hearing loss and deafness.

GTS lessons and assemblies

Part of our aim for our CAS project was to educate the school community about hearing loss and deafness, so this meant involving as much of the student body as possible. This resonated well with the school’s global thinking skills (GTS) lessons. We planned 1-hour lessons, examining different ways to include all aspects of our CAS project in an informative and entertaining way. We also used facts and figures, both local and global, to emphasise the way of life of the hearing impaired and the scale of the issue.

To further promote our cause, DEAFiance conducted several assemblies aimed at both IB Diploma students and younger year groups, where we showcased our video and taught some rudimentary sign language. This helped to further raise awareness of our cause

among our peers so they could better understand the issue of hearing loss and deafness in Hong Kong and around the world.

We found that these presentations were relatively difficult to execute, as it proved a challenge to keep 160 students and teachers fully engaged for each 15–20-minute assembly. However, we received mainly positive feedback from our peers and many students e-mailed us to ask about deafness — a great encouragement for our group and our cause. Overall, it was an interesting and somewhat nerve-racking experience, but it was a meaningful one nevertheless.

Germaine Yuen, Hilary Lok, Heidi Chen, Lena Chan, Theodora Ng and Siu Yu Yeung are final-year students at Sha Tin College, Hong Kong.

Examiner



Dr Rutherford's top ten tips

Jill Rutherford is a former chief examiner for environmental systems and societies, and principal examiner for paper 1. She is now academic director of Ibicus.

- 1 Answer the question set and be familiar with the command terms and what they mean. You can know loads, but if you 'describe' when you are asked to 'explain', you don't get the marks. Underline the command terms in each question and make sure you do what the question asks you to do.
- 2 Notice how many marks (and lines) are allocated for each part of the question. Don't write less or more than you think is required. Be very wary of going over the box size on to extra paper. Usually it is because you are waffling and have not thought through the answer before you start writing. Though if you have large handwriting, you might need to practise making it smaller.
- 3 Structure your response to make it as straightforward as possible for the examiner to understand what you are saying.
- 4 If you are given reading time, use it well. Scan the paper to get an idea of what is required of you. Then read it more carefully and jot down thoughts, answers, relevant facts, essay ideas etc.
- 5 You don't have to start answering at question 1. If you have a response booklet to write in, do the easy questions first. That will give you more confidence and calm you down if you are worried.
- 6 If there are essays and a choice, spend some time at the start of the exam, deciding which to answer. Request some extra response paper and start your essay plans on these. If you mess up the timing, you can hand these in and hopefully gain a few marks. Answer what you think is your second-best essay first. This will get you into the swing of writing them and should mean your best essay scores even more.
- 7 Never leave a blank response. Have a go. Often your instinctive answer can be right, or a guess may get a mark.
- 8 Research good examples and case studies that you can use to illustrate your arguments. Make sure you have both local and global examples and that you know what you are talking about. Don't make things up — the examiner will know.
- 9 Write concisely and coherently. Know what you want to say before starting to write. Rehearse your arguments and evaluations on rough paper or in your head.
- 10 Know the grade descriptors for the subject and attempt to meet the grade 7 requirements when you answer a paper. You won't do everything in every answer, but you should try across the whole paper.

Experts' tips

As you begin the final stages of your exam preparation, three IB examiners draw on their experience to provide you with revision techniques and tips

IBReviewExtras



Go to www.hoddereducation.co.uk/ibreviewextras for a printable PDF of this poster.

Dr Dunn on revising for history

Alastair Dunn sets paper 1 for route 1 history and contributes to the IB history Curriculum Review Committee.

One of the main challenges for you as an IB history student is the quantity of factual content in the course, especially at higher level. However, it is worth remembering that for the timed essay answers in papers 2 and 3, you will not only lack the time to use all the knowledge that you have retained, but even to attempt to do so would run the risk of producing a narrative answer, rather than one that is argument-led and that responds directly to the question.

One solution is to look at high-mark papers produced by past students and carefully check the balance of fact and argument

needed to gain a strong mark. This can often be reassuring if you are worrying that you have to learn everything by rote. It is a good exercise to type out the paragraph from a strong answer and colour-code the relative balance of knowledge, argument, analysis and interpretation.

Another solution is to build your revision around essay plans, in which you not only plan the overall shape of your answer, but also put limits on how much time can be spent on a particular sub-topic. Being mindful of the clock in the planning stage can help you prioritise the factual knowledge that is essential to supporting the key points in a particular paragraph.

Aaron Deupree on English B assessments

Aaron is head of ESL at the Leysin American School, Switzerland, and an IB English B examiner.

For many IB Diploma students whose first language is not English, English B provides a chance to enhance their communication skills through the study of non-literary texts and various genres. However, there may be a misconception that because English B students in English-medium DP schools are exposed to English in most of their classes, they do not need to revise extensively for English B assessments. In fact, specific revision strategies should be undertaken for the various English B assessments in order to obtain success.

Interactive and individual oral

- Improve accuracy, fluency and intonation through repetition and reflection.
- Repeated mock oral assessments offer a chance to practise and receive feedback.
- Audio/video recordings give you a chance to listen to yourself or others and reflect on potential improvements.
- Practice talks allow you to note word and sentence stress as well as intonation, raising awareness of such language features.

Written assignment

- Stress intertextual reading skills to help with writing.
- At standard level, practise taking notes and comparing and contrasting source texts on a particular core topic.
- At higher level, consider the texts in a new light ('...what if?') in order to engage with them in a creative way

Paper 1

Improve reading comprehension by skimming the text to get the main idea, reviewing the questions carefully to identify exactly what information to scan for, and remembering that all answers should come from the text, not your opinions.

Paper 2

Improve your writing by making a plan; writing in well-organised paragraphs; having a clear beginning, middle and end; and checking for errors once you've finished. Make sure you identify the:

- audience
- language register (slang, informal, formal?)
- format based on text type
- communicative function (inform, persuade, argue?)



Theodore King and ManageBac

IB students all over the world are familiar with the ManageBac system used by schools to organise all aspects of their IB experience, from keeping track of deadlines and helping students fill out IB internal assessment forms to keeping drafts of essays safe and shareable with supervisors. It works well because the systems inventors Saurabh Jalan, Sang Ick Lee and Theodore King were themselves IB students. **John Sprague** asked Theo about his IB experience and how it has informed his development of ManageBac

In their second year at the University of Pennsylvania in 2006, Saurabh Jalan, Sang Ick Lee and Theodore King realised that they had fewer deadlines at university than when they were IB students at UWCSEA in Singapore (Saurabh Jalan and Sang Ick Lee) and the French American School in San Francisco (Theodore King). But even with fewer deadlines and a more focused workload, the virtual learning environment being offered by the university to manage it all simply wasn't up to the task. So they made their own.

The three housemates started developing a software package in between their studies. Theo was studying real estate and business, which might not seem relevant to software programming, but it requires similar skills:

“Once you start building software you can't stop until you finish. Like buildings. You have to think through system architecture, the user experience, how users will interact with the programme. You have to use many different disciplines to solve your problems.”

More users, more features

After developing the software tool to help them manage their own university studies, the trio started thinking further afield and soon released the program to IB schools. This first iteration wasn't as successful as they had hoped, so they went back to the drawing board and refocused the product on the IB's CAS programme, helping IB coordinators keep track of CAS hours and helping students develop

and share reflections. CAS Manager was released to schools soon after. In a couple of weeks over 20 had signed up, but with more users came requests for more features.

One thing led to another and soon a new feature was being released every week or so. In 2008 Theo attended an IB conference in San Francisco where the future electronic submission was discussed and this pushed his thinking towards sustainability and efficiency:

A new CAS Manager feature allowed schools to automatically fill out the masses of internal assessment paperwork. In 2009 the program's name changed to ManageBac, as TOK and extended essay functionality were added, along with MYP tools. As Theo says:

“We thought it made a huge amount of sense to fix the obvious waste. In the IB there shouldn't be any forms to fill out by hand anymore... It was a very exciting period for us, and we learned a lot about building a software company from scratch.”

ManageBac's functionality has developed to aid schools' admissions and information management. Eighty per cent of IB Diploma students in over 1300 schools now use ManageBac for some aspect of their learning.

With thanks to the IB

How did the IB Diploma prepare the ManageBac team for this meteoric rise? Theo graduated from the French American School in

2005, having taken Chinese B, English and history at higher level and chemistry, mathematics and economics at standard level, with an extended essay on outsourcing elective surgeries to hospitals in southeast Asia to reduce waiting times in developed countries.

Looking back on his IB experience, Theo identifies three key elements of the Diploma that prepared him for the future.

1 Second language

Theo's study of Chinese gave him a huge advantage and has opened the doors to new markets and locations. Theo spent a summer visiting mines in Guizhou in rural China. In 2013 ManageBac relocated its main office to Taipei, where they speak Chinese and English in the office.

2 Interdisciplinary skills

Another benefit of Theo's IB education is the interdisciplinary approach, which has prepared him for a professional life spent jumping between different skills and subjects every day:

“On a day-to-day basis, I might be drawing a wireframe design, then I'll shift to writing the copy, then move to working with our designer on the interface and thinking about the demographic of our users.”

3 Global perspectives

The global perspective encouraged in the IB has had a massive impact on the ManageBac business. The company still maintains offices in San Francisco and uses designers from around the world:

“We've always thought about our business in a global way, we don't distinguish between physical borders or where people are, we go where the talent is, wherever there are good people.”

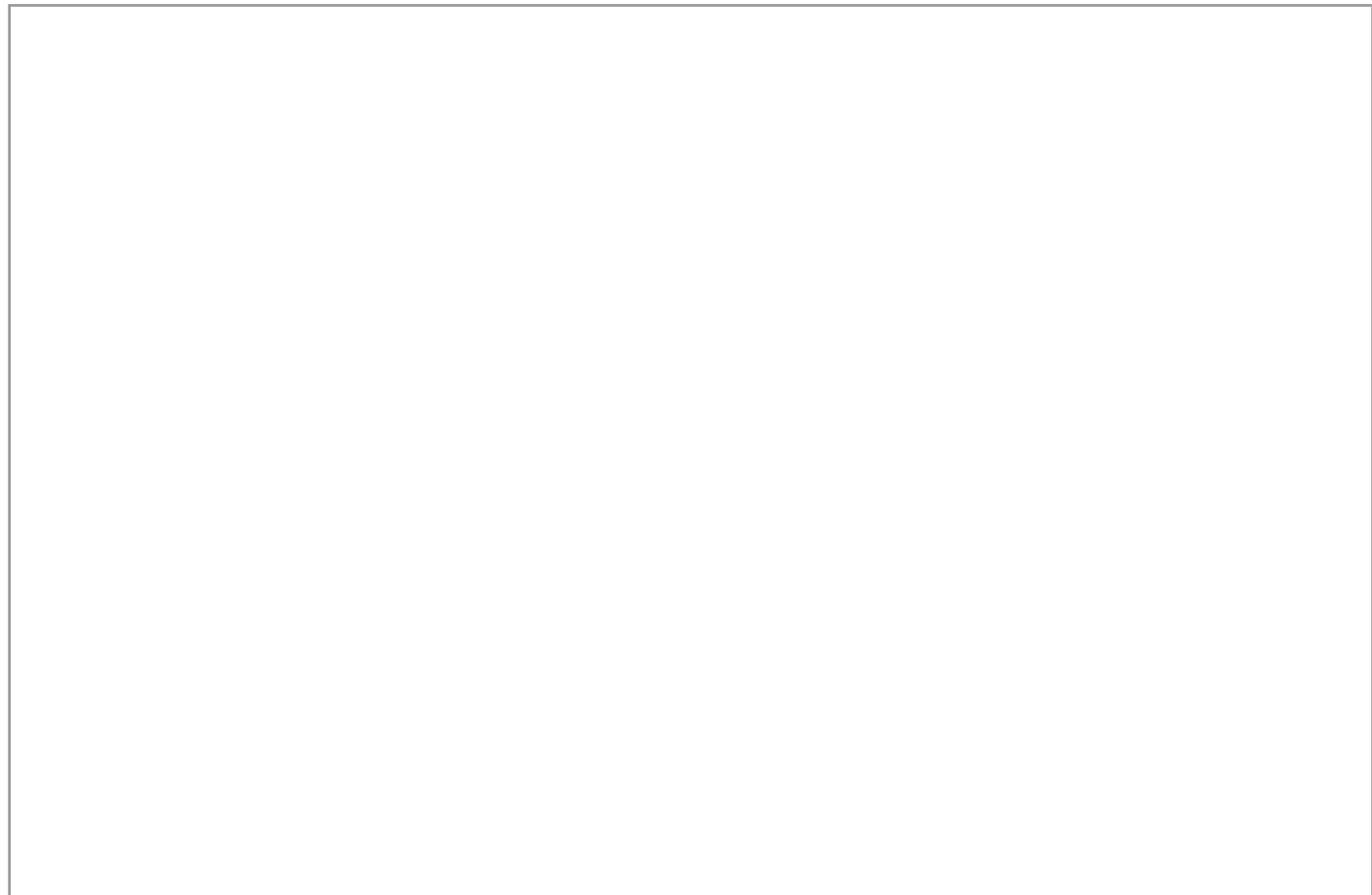
What next for ManageBac?

The next generation of ManageBac will be released in summer 2015:

“We're rebuilding the whole architecture of the system, which will involve a complete redesign of the interface. This will hopefully give everyone a refresh in terms of the way the system looks and feels. For students, we're hoping to build in a lot more resources and enhance the iOS. They'll have a much more modern looking system that will work well on their tablets. For Faria [the parent company of ManageBac], we aim to realize our goal of being global number one in education software-as-a-service within the next 5 years.”

In addition to making the work of IB students, coordinators and teachers more efficient, Theo also has wider hopes for the future of technology.

“I hope that more IB students will pursue technology entrepreneurship. I have a quote in our office from Masayoshi Son — 'We are born to make things happen' — and this is particularly true for IB students attending university in the UK or US, because they have a unique opportunity to act as a bridge in bringing ideas, innovations and systems to their home country.”





The digital classroom

Richard Davies highlights useful online resources that can help you through your mathematics studies

Exam links



The IB mathematics study guide recognises that 'problem-solving is central to learning mathematics and involves the acquisition of mathematical skills and concepts in a wide range of situations, including non-routine, open-ended and real-world problems'. This article relates to two of the objectives used to assess these skills:

- **Technology:** use technology accurately, appropriately and efficiently both to explore new ideas and to solve problems.
- **Communication and interpretation:** transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardised notation.

The information revolution facilitated by the internet has acted as a catalyst for the emergence of a 'global knowledge economy' (Cogburn, 1998). In this new epoch, international companies will only employ individuals with the requisite digital skills and they will have more flexibility to base teams in whichever region they deem most attractive. With an increasingly mobile workforce, graduates and school leavers find themselves in a global skills race to succeed in the knowledge wars of the future.

Amid this changing backdrop, in which firms such as BMW use technology to digitally tailor over 80% of their cars to precise customer requirements, is your school evolving sufficiently to ensure you are able to take advantage of such 'Digital Taylorism' (www.tinyurl.com/pv8d6hm) with a more personalised approach to learning? With students still finding themselves in lessons being



NASA's space mathematics site includes an activity on shipping cargo to the International Space Station

lectured at by a teacher and completing questions from a physical textbook, has there really been a commensurate digital revolution in education? Or do you still feel trapped in the Victorian era?

As you look ahead to forthcoming exams, what additional online resources are there that you can use to personalise your learning experience and transform the effectiveness of your independent study and revision in order to put you in the best position to take advantage of the tremendous opportunities in the global knowledge economy?

Flipped learning

In terms of making technology integral to student learning, one of the biggest developments could be **flipped learning**. In the flipped-classroom model students study pre-recorded instructional videos in advance of the lesson, rather than the traditional educational model where a teacher spends the first part of a lesson introducing a new topic that students practise for the rest of the lesson.

The benefits of this approach are twofold and resonate with the principles of Digital Taylorism seen in business:

- Pupils can follow explanations and work through examples at their own pace, replaying key sections as appropriate.
- The approach allows students to spend more time during lessons applying these new skills, addressing misconceptions, and developing their understanding further by working collaboratively with their peers to complete more complex questions or project work that require them to apply these skills in consort with other techniques.

While many teachers take advantage of existing resources such as those from the Khan Academy (www.khanacademy.org), some generate their own. Colin Hegarty (www.hegartymaths.com) provides some of the best examples of teacher-generated mathematics instruction videos. While these resources are geared towards the UK A-level curriculum, specific topics are readily identifiable and there are live sessions that are free to view and participate in. You can also find instructional videos grouped according to the IB mathematics curriculum at www.ibmathsresources.com/ib-sl-videos/

Box I Technology and the exploration

While the value of technology is manifest throughout the IB course and during revision, it is perhaps in the exploration that it is most valuable. This might mean using Twitter to make connections with health professionals in west Africa to elicit real time data on Ebola infection rates in order to develop a mathematical model, tracking hashtags to explore the mathematics of viral advertising campaigns, or simply finding partner schools through Skype Classroom to collect quantitative data for analysis from an internationally diverse sample.

According to the IB, the effective use of technology should address the following specific purposes as part of the exploration:

- enable students to experience the satisfaction of applying mathematical processes independently
- provide students with the opportunity to experience for themselves the beauty, power and usefulness of mathematics
- develop students' personal insight into the nature of mathematics and to develop their ability to ask their own questions about mathematics
- encourage students, where appropriate, to discover, use and appreciate the power of technology as a mathematical tool

Do it yourself

While the standard of professional instructional videos is high, it is fairly straightforward to produce your own tutorials. Education research by Professor John Hattie has shown that when students generate and share content themselves as a form of peer tutoring, there is a significant impact on learning. Even though it may take longer than watching someone else's video, creating your own will deepen your understanding.

At the most basic level, you could simply video yourself working through a problem on paper and upload this to YouTube. However, such an approach can be difficult for others to follow on screen, so consider using an application such as Explain Everything or Educreations, which enables you to create something like Jonathan and Ryan's tutorial on the quotient rule (<http://youtu.be/Fa7dT8Rn1Ec>). Online applications such as Screnr can be used to record from your screen.

Whatever mechanism you use to produce your tutorial, once you have taken the time to create it, consider promoting it through Twitter to help your peers benefit from your explanations. There is a huge mathematics community on Twitter, and besides sharing your tutorials, you can also find people to answer your questions or just follow interesting mathematical articles and discussions. The best hashtags to follow are:

#math
#mathchat
#IBmath
#AlevelMaths
#mathhelp
#STEM

Mathematics resources

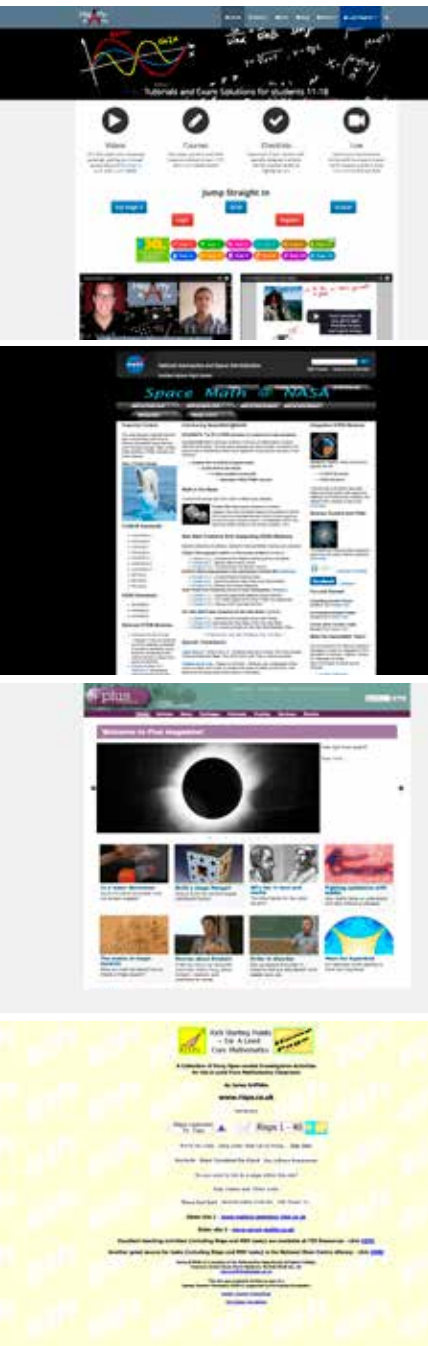
Mathematics is a subject that lends itself to the use of digital applications and programs. There are several platforms that effectively serve as online classrooms, providing instruction through lesson slides and activities, and helping you to develop your understanding further through applying principles to additional questions. The most relevant for IB mathematicians is IB Maths (www.ibmaths.com), run by Adrian Sparrow, which, if your school does not already have a subscription, will cost you \$50 for a year's access. Others such as My iMaths (www.myimaths.com) also have excellent resources. These resources may be aligned to courses other than the IB, so you may need to decipher the different terminology to locate your particular IB topic.

A comprehensive stock of IB-specific past papers and exam questions can be acquired through the online store (<http://store.ibo.org>). Other useful software to consider, alongside your graphic display calculator, is the powerful and free graphing website Desmos (www.desmos.com), which may well provide a more user-friendly complement to your school's subscription to Autograph.

The exploration

Another area of your mathematics studies that is ripe for digital tailoring is the uniquely challenging IB requirement of the exploration. An essential piece of advice to remember when embarking on this mathematical magnum opus is to choose a topic that genuinely interests you.

While you may already have visions of exploring number theory in a way similar to Professor Wiles' proof of Fermat's last



theorem, it can be hard to know where to look for inspiration. If you are interested in science, the University of Cambridge's NRICH site has a page dedicated to STEM (Science, technology, engineering and mathematics), with an array of topics and investigation that may appeal to and catalyse your imagination (www.nr rich.maths.org/9153). Similarly, if you are interested in the bigger picture, NASA has a site dedicated to space mathematics, with an array of resources, data and investigations such as a problem involving how to ship cargo to the International Space Station (<http://spacemath.gsfc.nasa.gov>). Other useful sites include Plus magazine from the University of Cambridge (www.plus.maths.org/content) and Johnny Griffith's 'Rich Starting Points for A Level Core Mathematics' (www.risps.co.uk).

Revision help

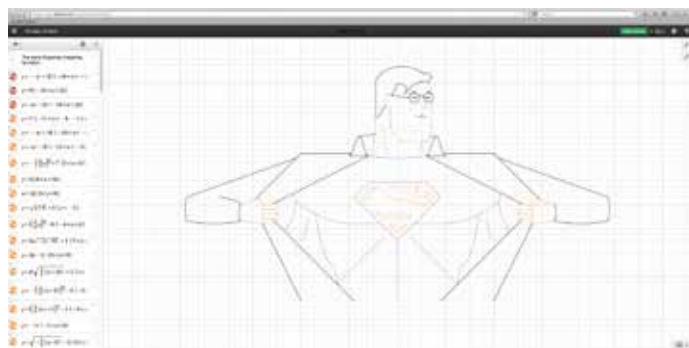
Perhaps the greatest gains to be had from a digitally tailored learning approach come in the revision period between the end of classes and the IB exams. Having practised all the questions in the textbook so much that you can remember the answers off by heart, and not being able to access your teacher as regularly as you might like, it can feel like an isolating existence in which new challenges and discussions could prove fruitful. What if your

teacher was able to hold a half-hour Google Hangout for a small group of your class who, say, needed some support on integration but did not want to lose 2 hours of revision time travelling to school and back? Similarly, if you are struggling to plot a regression line using your calculator, why not view an online tutorial? Then try to produce your own version and share it with your peers through social media.

Allied to the myriad sites that have already been highlighted with their plethora of question banks, past papers, tutorials and live question and answer sessions, the ability to personalise your learning and recognise the unknowns through online interaction should help you transform the effectiveness of this pre-exam hiatus.

Preparing you for the next step

Whether your teacher is an old-school advocate of 'chalk and talk' or you are completing interactive quizzes on your wi-fi enabled graphic display calculator, there have never been more opportunities for you to take charge of your own learning and embrace all that technology has to offer. The IB itself is designed to provide global citizens with the skills they need to succeed, and capitalising on digital educational infrastructure may just confer on you a competitive advantage in the global skills race and prepare you for the changing face of higher education. Although the education sector as a whole may be somewhat pedestrian in its response to the digital revolution, as multinational companies drive Digital Taylorism and the number of private-public initiatives in higher education increases, its effects can be expected to filter down, allowing you to demand a personalised and modularised university course more closely aligned with the needs of your prospective employers.



Desmos graphing website: are you a mathematics superhero?

Theory of knowledge



- 1 As knowledge becomes increasingly accessible via the internet, what is the role of schools and teachers? Why shouldn't students remain at home and learn by themselves? Is there something about a school that is necessary in the sharing of knowledge between generations?
- 2 Do you think that the internet is more or less influential than the invention of the printing press?
- 3 How critical of the 'teachers' on the internet should you be? Do you think the public nature of the internet (where anyone can develop a 'lesson', video it and post it for others) raises the level of rigour or do you think it raises real problems of 'dumbing down' the knowledge?
- 4 How critical are you of the expertise of your own 'real' teachers?

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- The Flipped Classroom: Traditional Education Turned Upside Down, www.kokuamai.com/test/flipped
- TI-NspireT handheld tutorials: www.atomiclearning.com/ti_nspire

Richard Davies teaches mathematics at the United World College of South East Asia.

Dialogue vs debate

Shawn Pernasilici examines the importance of dialogue, linking it to ethics and the idea of falsification in the natural sciences

'You just don't understand!' is a phrase you may have used at one time or another. A lack of common understanding can act as a barrier in our personal relationships. More generally, it can also hinder the development and progress of many types of knowledge. How do we come to a better understanding of differing points of view in order to move forward? It may be as simple as realising the difference between dialogue and debate.

Winning the debate

A debate typically involves two opposing sides or people, each with the intention of 'winning' through argument and persuasion. In his book *On Dialogue*, theoretical physicist David Bohm (1917–92) envisioned dialogue as a:

stream of meaning flowing among and through us and between us

The key idea being that it involves shared meaning.

How often do we try to convince each other that we are right, when we may not truly understand the other person's ideas? Striving for better understanding of other points of view is the key aspect of dialogue. However, this is not necessarily a natural instinct. We are all subject to our own individual experiences, prejudices, cultures, languages, religions and educations. These factors shape us and give us conviction, but can also make us resistant to ideas that are different to our own. The challenge of dialogue is to constructively embrace and understand the differences.

Dialogue and TOK

Many TOK teachers use Socratic seminars as a form of dialogue in their classes. These consist of a circle of students, with the teacher participating as an equal in the circle. Generally, there is a selected text (a news article, poem, book excerpt etc.) that all participants must read the night before. The dialogue begins with an opening question — usually a knowledge question based on situations in the text.



Dialogue helps us make decisions on key issues such as climate change

There are some basic principles that the participants must adhere to:

- *Listening* when others are speaking is the most important. The ability to listen carefully and intently is a skill that we should all aspire to develop.
- Participants should *refer to the text* when making their points or questioning those of others. This keeps the dialogue on track and focused.
- All participants should *build on the ideas of others, seeking clarification rather than tearing them down*.

These principles allow the exploration of knowledge questions through *investigating multiple perspectives* and making many different *links to ways of knowing and/or areas of knowledge*. Often, students will support their ideas with *real-life examples*, and throughout the dialogue the group will *explore counterclaims*. All students complete a general evaluation at the end and consider the *implications* of the dialogue.

Do the italicised words above stand out to you? These words can be found in the highest level of the TOK essay assessment criteria. In fact, the tool of dialogue is so useful that some students even choose to write their TOK essay as a fictional dialogue between several characters, much like Plato did in his writings. I once read an essay written as a dialogue between the comic-strip characters Calvin and Hobbes.

Writing an essay alone can make it difficult to analyse knowledge questions from many perspectives. Dialogue can help with this problem. As Bohm says:

“Even one person can have a sense of dialogue within himself, if the spirit of the dialogue is present.”

Dialogue and ethics

How does the concept of dialogue relate to your everyday life? The open-ended dialogues of the real world are a departure from the closed questions you might encounter in class or exam debates. Stop and reflect on the last time you found yourself entrenched in an argument. Were both parties truly listening to each other and trying to understand each other's ideas? Were you able to suspend your immediate judgement when you heard something you initially disagreed with? Did you search for areas of agreement or common ground? We need look no further than the news headlines to see many conflicts that cannot be resolved. Why? Often, there is a lack of true dialogue.

Writer and lecturer Dale Carnegie (1888–1955) was a master at helping people improve their communication and leadership skills. He wrote:

“Nine times out of ten, an argument ends with each of the contestants more firmly convinced than ever that he is absolutely right.”

It is not difficult to imagine the implications of Carnegie's words. One of the central knowledge questions in ethics is: 'How are conflicts between different ethical systems resolved?' The ability of humans to resolve ethical conflicts has far-reaching consequences, which are sometimes a matter of life and death. When we use our own personal



What are the pros and cons of genetically modified foods?

knowledge and experience to define our ethical standards, we may be guided by our emotions and intuition. It does seem though, that there is a greater community that we belong to and interact with. The process of dialogue — understanding the ideas, needs, emotions and experiences of others — seems key to resolving ethical conflicts and helping us move forward positively.

When considering dialogue, it is also easy to see an interplay between personal knowledge and shared knowledge. For instance, what moral obligations do scientists have when faced with new information or discoveries? How do they reconcile their personal ethical viewpoints with those of other scientists? Dialogue can serve as a lens through which we examine our own personal knowledge and compare it to the ideas of others. This process allows us to synthesise our personal ideas and collectively make decisions on key issues such as stem-cell research, genetically modified foods and climate change.

Conflict and falsification

In her talk 'Dare to Disagree', Margaret Heffernan explains that constructive conflict and disagreement can actually be a powerful tool in the natural sciences and in the workplace. When I saw this talk for the first time, I immediately linked it to one of the TOK essay titles from May 2013: 'In what ways may disagreement aid in the pursuit of knowledge in the natural and human sciences?'

Heffernan tells the story of Dr Alice Stewart, who in the 1950s began a study on X-rays as a cause of childhood cancer. She linked X-rays of pregnant women to elevated rates of childhood cancer, but her results were ignored for nearly 25 years. Stewart's colleague, statistician George Kneale, scrutinised her data and searched for sources of conflict within her work. You might wonder why Kneale did not search for more evidence to confirm her theories. However, by actively trying to disprove Stewart's work, Kneale was actually reinforcing it.

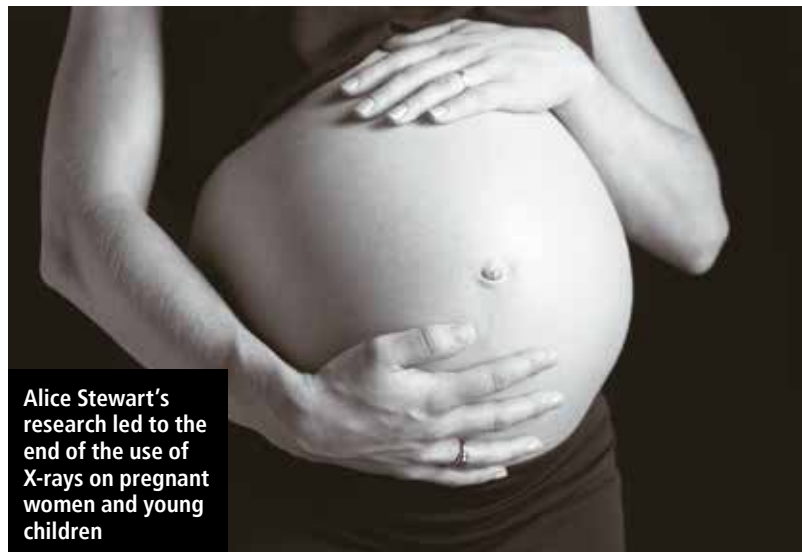
Philosopher Karl Popper (1902–94) argued that any worthwhile scientific theory cannot absolutely be proven true, but it can be falsified. Using this concept of falsification, he drew a figurative boundary between scientific and non-scientific theories. Physicist Wolfgang Pauli was famously quoted when commenting on the paper of a young physicist:

“It is not only not right, it is not even wrong.”

Popper's idea of falsification helps us realise that seeking evidence to confirm our hypotheses may not be the only way to further our scientific knowledge. The best scientific theories stand the test of time because new evidence supports and reinforces them. When new evidence disagrees with existing theory, we see the biggest leaps in scientific knowledge. To understand this concept, consider the words of scientist and science-fiction writer Isaac Asimov:

“the most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka!' (I found it!) but 'That's funny...'

In reality, the collaboration and openness between Stewart and Kneale only strengthened the former's evidence and conviction. Kneale's inability to find any statistical counterevidence for Stewart's ideas was just as important as the supporting evidence. Eventually, the scientific community accepted Stewart's findings after nearly a quarter



of a century, and the practice of X-raying pregnant women and young children was stopped. The dedication, mutual respect and scientific dialogue that Stewart and Kneale maintained allowed them to change the prevalent way of thinking, and this saved many lives.

Seeking out dialogue

Heffernan advises us to seek out people with different ways of thinking and experience, and find ways to engage with them. She comments that this requires a lot of patience and energy, but suggests that showing this type of dedication to another person is a kind of love.

Dialogue is a fantastic tool for your TOK essay or presentation. However, its true power is that you can carry it beyond the TOK classroom, into your personal life and career. It will help you connect with others and enrich your viewpoint of the world. Next time you're tempted to say 'You just don't understand!', remember that dialogue can help.

References and resources



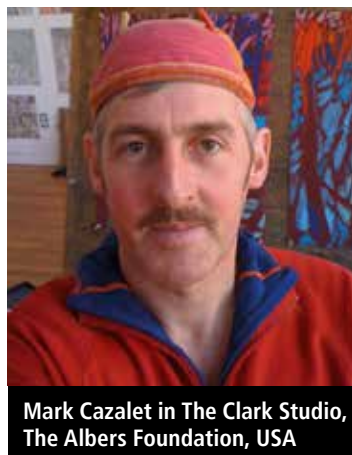
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Shawn Pernasilici is the DP coordinator at GEMS Modern Academy in Dubai, UAE and has taught IB physics, mathematics and TOK for 9 years. He is an IA moderator and team leader for SL mathematics, as well as a workshop leader.



Opening

Exploring the Albers credo



Mark Cazalet in The Clark Studio, The Albers Foundation, USA

Artist **Mark Cazalet** explains how he came to reassess what seeing and making means, and in researching Josef Albers' teaching methodology discovers the debt IB visual arts owes to radical modernism

As an IB visual arts student, you are expected to develop a contextual, visual and critical appreciation of your work. To do this you should explore the work of other artists and reflect on how what you have learned can influence your own practice.

I recently took up two residencies at the Josef and Anni Albers Foundation in rural Connecticut, USA. The Albers are regarded as titans of the modernist movement. Their influence is cited by generations of designers, makers and creative thinkers. Yet when I was awarded the first of two residencies to work in a studio at the foundation in the spring of 2012 and then 2013, I had only the remotest appreciation of their work. In fact I was more anxious about how I would handle the experience of living alone in the woods of rural Connecticut and being so far from home for over 2 months than the effect of the Albers on me.

This article is an account of the discoveries I made about my own creative practice in the light of the disparate methods and multiple media employed by Josef and Anni. Most of what I learned came as a surprise, stemming from being immersed for long, uninterrupted periods of time, which induced intense creative concentration. Every arts student needs to find a balance between historical research and giving time to reflect on their own personal themes. Too often

perhaps, given the understandable pressures of a timetable, we look for quick creative solutions rather than commit time to the quiet reflection that is the bedrock of innovative creative discovery. Equally I found that after periods of single-minded making I needed the counterpoint of research in the Albers archive and trips to the major collections of the east coast museums.

The Albers credo

Josef and Anni Albers were intimately involved in three of the most significant twentieth-century graduate art education institutions:

- Bauhaus
- Black Mountain College
- Yale University

Josef Albers

Over a period of 50 years Josef honed his pedagogy to a precise set of criteria and practical approaches. He began in the 1920s as master of the glass studio of the Bauhaus by teaching the common foundation course for all students. This experimental but design-focused curriculum was further expanded and refined at Black Mountain College, where interdisciplinary collaboration between performing and liberal arts was a central aspect of the educational



artists' eyes

Full Moon nightscape,
pastel on coloured paper

life of the community. As head of the Yale design department, Josef's dictum to open the eyes of his students had a profound effect on artists as varied as Eva Hesse and Neil Welliver. In fact, his impact on American postwar art stretches far beyond his students to artists such as Donald Judd, Robert Rauschenberg and Peter Halley. Anni taught in the textiles studio at Bauhaus and on immigrating to the USA produced an incredible body of innovative textiles, prints and drawings.

Josef's teaching model was based on two beliefs:

- the imperative for his students to make creative self-discoveries through the comparative evaluation of effects and material combinations
- that the hand needs to be trained to be dexterous

Josef believed that through direct observation of natural phenomena, students' eyes could be opened in order to see more acutely. As a teacher myself, I was particularly impressed by his determination not to allow his personality to influence the emergence of students' creative voices and stylistic interpretations. In a seminal quote, he said:

Learn to see and to feel life, cultivate imagination, because there are still marvels in the world, because life is a mystery and always will be. But be aware of it... Art means: you have to believe, to have faith, that is, to cultivate vision.

Anni Albers

Anni's intentions were expressed in her aphorism on the use of materials: 'Let them speak'. This simple-sounding instruction was the foundation of her sensibility and in getting to know Anni's weavings her relationship to her materials was probably the greatest spur for me to review how I use my materials. In fact it took several months in the foundation's archive before the wisdom of the Albers' combined vision began to permeate. During the subsequent 2 years

the implications of these ideas have continued to ripple out with seemingly ever-greater force.

Living and making alone

Life in the woods of Bethany, Connecticut is simple. Two studios stand in splendid isolation, each with a dominant central window. Working under this wall of light feels much like standing on a stage facing out onto a vast amphitheatre of woodland. It is a lonely landscape, hemmed in by indigenous trees and unsettling in the illusion of uninhabited distance. There is an almost monastic simplicity and the environment is enabling: it purges the clutter and history of one's normal workspace. This aesthetic is in keeping with Josef and Anni's own instinct for simple, well-considered and stripped-down design.

To what purpose does isolation and quiet serve a contemporary artist? The foundation's intention is that there should be no interruptions, obligations or distractions for the duration of the residency, but to what end? Josef stressed that the only way of knowing is doing, and although one might collaborate creatively, it is the personal pursuit of visual curiosity and practical investigation that represents the only viable route to knowledge in the visual arts. He demanded that students be empirically, analytically and emotionally absorbed.

When working alone, the days have no necessary beginning or end and weeks have no natural breaks. One pushes into exciting but strange places of intensity. I found that my energy levels were so high that even after working until the light faded I would grab a quick dinner and go out at night to draw in a canoe on the lake (in gold and silver markers on coloured grounds) then return late only to rise early and repeat the same 18-hour day in a kind of dreamlike state. Allowing artists time and space to become detached from mundane routine provides the opportunity to become lost in working and thereby find what might have eluded them in the rush of normal life.



Studio exterior



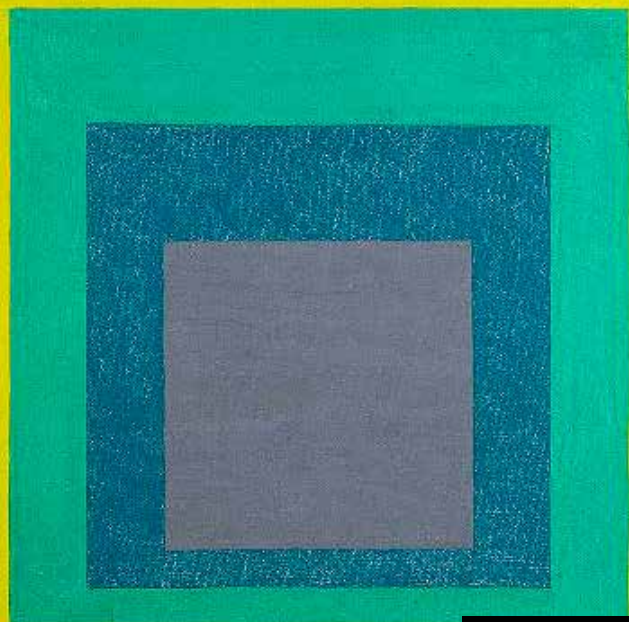
Studio interior

Producing personal art

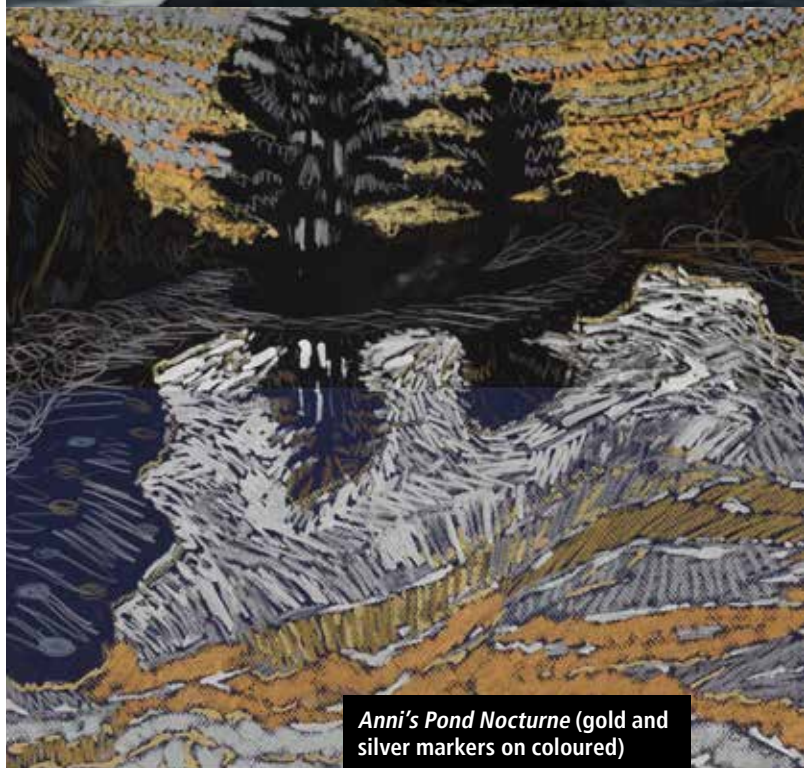
In 1963 Yale published Josef's seminal text, *Interaction of Colour*. His central premise was that no colour exists in isolation but only in relationship with its neighbours. The eye is therefore continually deceived as to the colour's actual identity. The text is illustrated with the numerous optical chromatic experiments that his students produced to test the ideas he propounded. He believed passionately in poetic and lyrical colour expression, as seen in his deep love of the work of his Bauhaus colleagues Paul Klee and Wassily Kandinsky.

However, for a long time I was suspicious that, in order to open others' minds, Josef's own work had become more technically accomplished than emotionally engaged. I particularly suspected this in his famous *Homage to the Square* series, comprising a format of three or four coloured squares placed within each other. In reproduction they can be mistaken for merely deft exercises in chromatic balance. It is only when encountered in reality and over time that the eye begins to appreciate the sublime interactive resonance of the hues, tonalities, saturations and temperatures of the colours. Although the effect in no way illustrates figurative references in the paintings, they seem to trigger an instant recognition of spatial familiarity and for me a musical poetic of relationships.

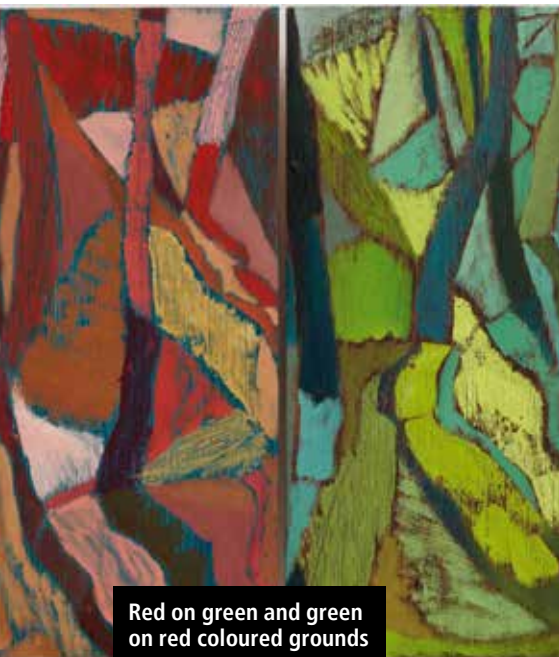
In spring 2012 the Metropolitan Museum in New York devoted a whole room to the *Homage to the Square* series, many of which had an unexpected coda following the series title. These qualifying secondary titles were apparently given after the painting was completed and staggered me by their associative readings: *Apparition, Soft Spoken, Eyes Open, Precinct, Sudden Spring*. It was a minor epiphany that the apparent formalism of his process and format could contain such an emotionally suggestive counterpoint. It was a timely reminder that, despite contemporary reprographics, the difference between a reproduction and the original is so



Homage to the Square



Anni's Pond Nocturne (gold and silver markers on coloured)



Red on green and green on red coloured grounds



Chalk pastels from my first week

profound as to be barely worth comparison. We take for granted unlimited access to instantly available internet images of art, but looking hard at such a quantity of original work raised challenging questions about the authenticity of our visual knowledge and real understanding of artefacts.

This encounter helped me formulate a plan to spend my time drawing and painting directly from nature, responding to the shifting light and colour effects. In February and March this meant working in the snow for as long as my hands could function. I employed coloured grounds to work on, at first pre-coloured papers for the pastels and then painted colour grounds for my oils, with the interaction of surface marks on the base hue generating both mood and optical shifts.

Sitting quietly in a foreign wood

The information you absorb when immersed in nature goes far beyond what is needed to resolve an image in purely pictorial terms. Drawing at dawn was always a stunning experience, especially the sudden illumination that transforms the pine foliage or water, and the revelation of birdsong and animation of creatures around me. This aural sensory revelation of the dawn chorus was reminiscent of Paul Klee's synaesthetic paintings of woodland birdsong. The Albers were the Klees' next-door neighbours in Weimar, Germany.

The Albers came to the USA in 1934 as refugees after the rise of the Nazi party. In general American life is decidedly non-European, but strong aesthetic roots persist, particularly in folk art and cooking. This encounter with apparently familiar-yet-alien values is another strong but not necessarily benign aspect of travelling to another culture to work. Rural Connecticut and indeed New York were both curiously different to my London life. As an artist one's instincts are to be continuously observant and comparative, and when living in another culture one's mind is restlessly responsive to difference. Taking the train, I passed the rust belt industrial decay of Detroit, with its redundant manufacturing heritage. A tragic series of monuments to a diminished factory history — yet the buildings had edifices redolent of a minimalist aesthetic.

Encountering such landscapes enabled me to understand a whole sector of previously obscure 1970s process art such as that by Donald Judd, Sol LeWitt and Chuck Close. The origin of art and its authors is crucial to understanding its soul or specific locale. Art history can effectively teach the theory and equip a student with contextual references, but the place itself, for me, provided the genuine spark of recognition.

After introductions to a number of New York art dealers, I showed my work and was intrigued by the range of responses. This felt like closing a circle: time to work in complete serenity in the woods, the opportunity to research two extraordinary artists in depth and at leisure, major museum collections to draw on, and lastly the commercial scene up close. The two Albers residencies enabled me to experience the complete spectrum of the art process and in doing so generated more questions than I ever anticipated, which cannot be answered except by carrying on making.

Theory of knowledge



- 1 In producing art, what is the role of reflection?
- 2 Cazelet emphasises the process of creation. What are the similarities with creating knowledge in other areas of knowledge? Do they also require certain levels of quiet reflection and careful study of the work of others?
- 3 Cazelet offers a quote from Josef Albers: that we should learn to see the world because 'there are still marvels in the world, because life is a mystery and will always be. Be aware of it...' Do you think that other disciplines also see a 'mystery' in life? Other than an artistic approach, what other ways of being aware of the world are there? Does it make sense to say that there is a scientific way of 'being aware'?

Mark Cazelet (www.markcazelet.co.uk) is a UK-based artist. He trained at Chelsea School of Art and Falmouth School of Art, and held two postgraduate scholarships at L'Ecole des Beaux Arts in Paris and at M.S. University Baroda in India.

How I got a 7

IB students share advice that can help you get a top grade

One of the remarkable things about the IB is the lack of grade inflation over the years. This means that achieving a 7 in any subject has always been an incredible achievement. Here, a number of IB students explain how they achieved that coveted mark. While not every student is on track to get a 7, every student can certainly learn from the experiences of those who did.

Engage with the subject

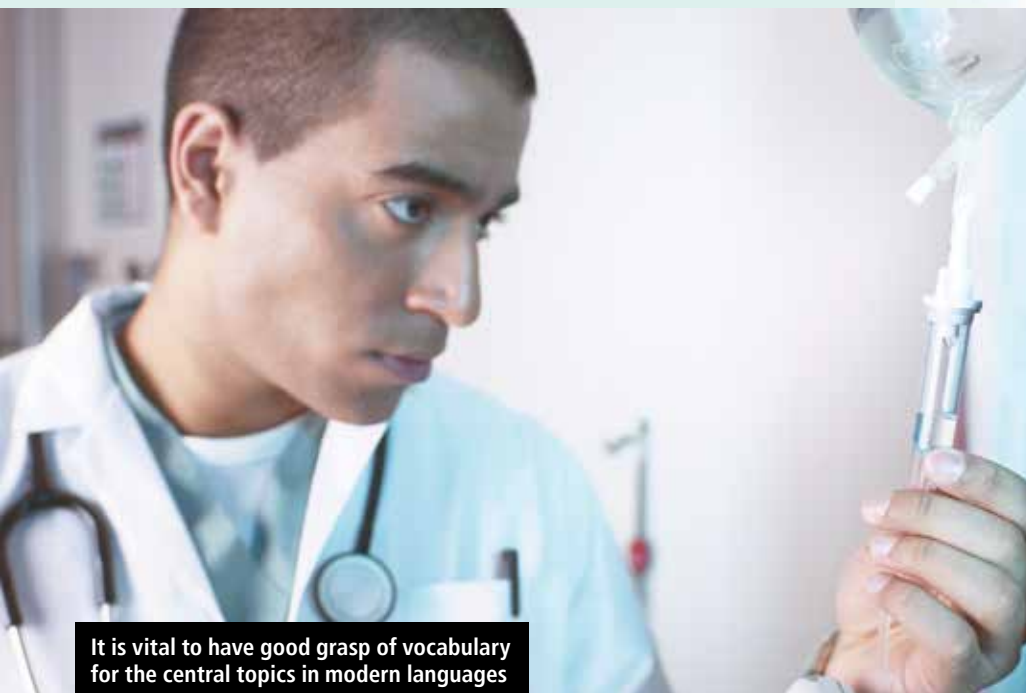
Issy Piper completed her IB Diploma in 2014 at Sevenoaks School, UK. She earned a 7 in both French B HL and Spanish B HL. She is currently taking a gap year and will apply to study Spanish and Russian at university.

In modern languages more than any other subject, you can't just sit down a week before the exam and cram revision to get a 7 — particularly because by the time you sit the exams in May, you've already done 50% of the course. Over the 2 years you will continuously improve, and to score a top grade, my advice would be to focus on each of the different components separately.

For me, being able to actually speak the language is the most important aspect. Take any opportunity you can to practise. Talking to teachers, engaging in debates and making foreign friends are fantastic ways to practise your language. Films are also a great way to absorb the language, and will beat learning grammar any day.

A good grasp of vocabulary is key for the written and reading papers, especially vocab relating to the central topics (science and technology, health etc.) Reading foreign language books over the 2-year course means that by the time you sit the reading paper, you will have a strong foundation of vocabulary and will be at ease with written texts. It is also a great way to pick up idiomatic phrases, which can make all the difference in the writing paper.

Finally, in your revision in the run-up to the final exams, make sure you know your grammar inside out. I'd recommend brushing up on it at regular intervals throughout the course — it will make your life much easier.



It is vital to have good grasp of vocabulary for the central topics in modern languages



Understand the concepts

Mayank Agrawal studied HL mathematics HL at The Village School in Houston, USA, earning his Diploma in 2014. He went on to study mathematics at Swarthmore College.

For my 7 in mathematics, the key was genuine understanding of the material. In middle school, I used to struggle on tests because I would memorise concepts and not really be able to apply them. I never truly understood what I was learning. But in order to get a 7 in HL mathematics, you can't simply focus on memorisation and repetition. Instead you need to be able to explain the concepts and why they work. Without building this intuition, achieving a 7 in mathematics is extremely difficult. You will be required to bring elements of mathematics from different sections of the course together. Understand the fundamentals of the material and you'll do great.

Don't be intimidated

Adam Herbers earned a 7 in Physics SL at Beaverton High School in Portland, USA. He is now studying at Clark Honors College, University of Oregon.

Probably the most important key to success in IB physics, particularly at standard level, is to not be intimidated by the mathematics involved. The most difficult skill within the course is the ability to take the concepts of physics and apply them to the situations presented in the exam. Once that's taken care of, the mathematics can be accomplished fairly easily.

I found that the best way to bolster this skill was to take questions from the textbook, as well as online exam banks, and simply practise working through the types of problems that would be presented on exams. Not only did this process help familiarise me with the scenarios I would have to grapple with, it also helped me practise understanding exactly what the numbers I was using within these

problems represented. Overall, I felt that by taking the concepts covered both in class and in the book and seeing how they directly applied to practical applications, I was able to obtain a deeper understanding through seeing the concepts in action rather than simply as an idea or theorem.

Learn to argue

Chloe James completed the IB Diploma at Wellington College, UK. She is now studying English literature at Durham University.

To achieve success in a philosophy SL exam, you need to develop a strong argument. A good argument will incorporate a clear personal response, two or more positions, and strengths and implications.

In order to prepare for the first exam I made posters relating to each topic, with sections covering each philosopher, their key ideas, the strengths and implications of their arguments, philosophers who would disagree with or support those arguments, and a line or two of my own personal response. This meant that when I entered the exam and read the questions, I immediately knew which philosophers to include and how to structure the essay. The exam is quite tight time-wise, so I also went through past papers, handing in essays to my teacher to be marked. This turned out to be extremely helpful, as a couple of days before the exam I wrote a similar essay to the one that came up in the paper, meaning that I could utilise my teacher's feedback in the exam.

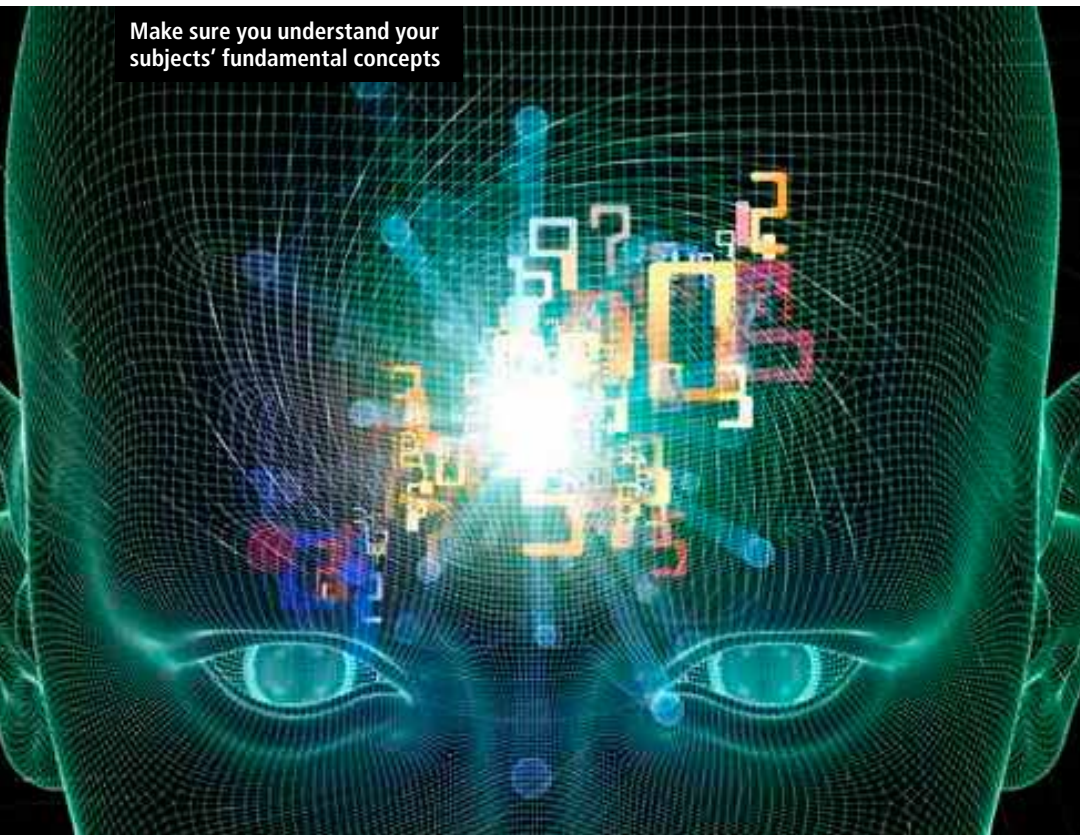
The set text paper is much more difficult to prepare for, as you only have two questions to choose from. I will never forget opening the paper and seeing two questions that I barely understood. However, the philosophy exam is kind inasmuch as you can score highly by applying whatever knowledge you do have in a convincing way through including the correct structural elements. This is particularly helpful if you panic when you open the paper, like I did. I would recommend reading a couple of high-scoring essays and creating some essay plans that mirror their structures. Having a clear idea of how your essay will be structured can really help in the first few minutes of the exam, and I found that clear planning meant that my arguments became more precise and my personal opinion took centre stage, both of which score high marks.

Learn from the past

Joselyn Salazar earned five IB course certificates at The Village School, USA. She earned 7s in French B and Chemistry SL and has gone on to study at the University of Pennsylvania.

As you embark on the hectic and exciting journey that is IB, you may believe that obtaining a 7 is going to be an impossible task. But nothing is further from the truth. Everyone has the potential to earn the highest marks possible.

Make sure you understand your subjects' fundamental concepts



It is not be enough to study all the material in the textbook and complete all the coursework that your teacher assigns. In order to obtain a 7, you need to study outside of class, specifically past papers. The IB store has an array of past papers, mark schemes and question banks. Don't be afraid to ask your teachers for practice questions — most have copies of old exams that you can use to revise.

You should focus on learning the objectives and making sure you are familiar with this knowledge. In IB, it is crucial to prioritise learning what will be on the final exam. For most of your classes, various components of coursework will factor into your final grade, so try to get as many points as you can on your internal assessments — these can constitute up to 20% of your final mark.

Apply and evaluate

Mohit Chainani earned his IB Diploma in 2014 at Sha Tin College, Hong Kong. He is now reading business at the Hong Kong University of Science and Technology.

Getting 7s in business management and economics is not easy. I focused on a few key elements. The first thing to do is to go through the textbook and make sure you understand everything. Learn how you can apply concepts and evaluate them according to the case study (especially advantages and disadvantages). Emphasise understanding the content rather than memorising and regurgitating it — this will help your analytical skills. Put extra emphasis on the finance section — it comes up quite a lot.

For paper 1, know the case study inside out. Don't slack on details. When you are allocated questions to do from the list of preparation questions, be an overachiever — don't do 20 questions, do 30. The exam questions are similar to these, so you are essentially answering potential exam questions months before you actually do them.

In the exams, keep asking yourself 'how?' and 'why?' when you make points to ensure you have explained them fully and haven't gone off track. Keep referring back to the case study. This is why it's about understanding, not regurgitating.

Bring IB business into your daily life. Keep an eye out for any advertising campaigns or marketing strategies, and consider them from an IB perspective. For example, notice pricing strategies when you go shopping and consider other pricing strategies that could be used.

Focus on themes

Micol Foa graduated from Southbank International School, UK, in 2013. She achieved a 7 in history and is now studying at Kings College London.

The IB programme prepared me well for university, especially the skills I learned in history and my extended essay. You should make notes efficiently throughout the year and keep them concise. Focus on themes rather than the chronological order of events, use mind maps and tables, and make one set of notes per topic. This will provide you with all the information you will need to revise, and you won't find yourself searching through multiple booklets and textbooks before an exam. It will also be helpful when writing essays.



Think about how you can bring your studies into your daily life



Approach essay topics thematically rather than chronologically, reread the question before starting each new paragraph to make sure your essay is focused on answering the question, always answer the demands of the question rather than trying to reproduce an essay you have done previously, and spend 5 minutes making a plan before starting the essay. Practise using the facts you have learned in an analytical way by writing lots of essay plans for past questions. Regarding source work, use the reading time to plan your own knowledge basis to question 4 in your head and note how to incorporate the sources as you go, keeping to the suggested time limit for each question (5, 5, 15, 15 and 20 minutes).



Performing the perfect titration

Titration is an important element of your understanding of chemistry at both higher level and standard level. More generally, good experimental and laboratory technique is important for both your knowledge and your abilities as a scientist. **Lee McManus** walks you through the titration process and gives pointers to make your lab technique more precise and effective

Exam links



- Titration is important in sections 1.3 (reacting masses and volumes), 8.2 (properties of acids and bases), 9.1 (oxidation and reduction) and 18.3 (pH curves — HL only).
- Understanding of the limitations, precision and uncertainties associated with the technique are implied in section 11.1 (uncertainties and errors in measurement and results).

Best practice in the laboratory is handed down through generations of chemists. In this outline of how to perform a titration there are lots of little snippets of wisdom passed on to me by my teachers, along with some of my own tips. See Figure 1 for the apparatus you need.

Titration is the process of determining the concentration of an unknown solution (the analyte or titrand) by adding a solution of known concentration (the titrant) with a suitable indicator that

Standard solution of titrant — a solution of known concentration that you use throughout your whole experiment

Conical/Erlenmeyer flask — the shape of the flask allows easy stirring/swirling and also keeps any splash-back contained

Three beakers — one for filling the burette with the standard solution of titrant, one for the water test (see the method section) and one from which to fill the pipette with analyte. Label the beakers to avoid confusion

Analyte/titrand of unknown concentration

Indicator — choose one that gives a distinct colour change at a pH appropriate for your reaction

Clamp/retort stand

Pipette filler (other designs are available) — take care when putting the pipette filler onto the pipette, or the pipette may break and you could injure yourself

White tile — it is easier to see the colour change on a white background

Filter funnel — always remove the funnel after you have filled the burette, as liquid can drip into the burette during the experiment and mess up your volume readings

Burette clamp

Pipette — choose the correct size of pipette so as to reduce error

Burette — fill using a funnel at below head height to avoid any unnecessary spillage. This is especially important when the chemical going into the burette is hazardous



Figure 1 Apparatus

Glossary



Stoichiometric Describes chemical reactions in which the reactants combine in simple whole-number ratios.

changes colour at the end point of a reaction. Using the results of the titration and our knowledge of the reaction occurring, we can calculate the concentration of the titrand

Safety and error avoidance

Before you begin the experiment you should check that all equipment is safe to use (e.g. the glassware is not cracked or chipped) and that everything is clean. Errors in titrations usually come from unclean burettes. Traces of chemicals can often be left inside the burette tap. The tap is detachable, so take it out and clean it properly. Even dust can mess up your results. Never trust those who have used equipment before you unless your teacher tells you that the equipment has been meticulously cleaned and rinsed with deionised/distilled water. It is also important that your glassware is dry, as you do not want to dilute the solutions you are using.

Another common problem in titrations is a leaky burette. Set up the burette as shown in Figure 2, ensuring that you have closed the tap and that it is pushed fully into its socket. Place an empty beaker below the tip of the burette to collect any leakage.

To test that the burette is working properly and not leaking, fill the burette with water using a filter funnel and open and close the tap to fill it up. Read and record the volume of water in the burette. If after a minute the volume has changed, tell your teacher and get another burette. Empty the water from the burette and rinse it through with some of the standard solution to avoid dilution of the titrant.

Method

1 Set up your clamp/retort stand, burette clamp, burette and white tile, as shown in Figure 2.

2 Place a clean beaker under the burette tip and a filter funnel in the top of the burette. Fill the burette



Figure 2 Burette clamp, burette, white tile and clamp/retort stand set up

(below head height) with your standard solution (titrant) until it is a little way above the zero mark. Run the titrant into the beaker to fill up the tap (air bubbles can mess up results) and allow the titrant to slowly run through until the meniscus reaches the zero mark, then close the tap.

3 Pour about 100–200 cm³ of the titrand (analyte) into a beaker. Never pipette directly from the main bottle or volumetric flask of solution, as you may contaminate it with material from the outside of the pipette.

4 Select a pipette with a suitable volume so that you will be able to perform several repeat titrations with your solution of unknown concentration. You do not want to use it all up after a couple of titrations, but if you have plenty of it you could use 25 cm³ for each titration.

5 Attach the pipette filler firmly and carefully to the pipette. You should always hold the pipette close to the end being fitted into the pipette filler. If you apply force to the pipette a long way from this end, the glass can snap and the broken end can be jammed into your hand (Figure 3). If you do not get a good seal between the pipette filler and the pipette, liquid will leak out as you transfer it to the conical flask, leading to inaccurate results, so test the apparatus before you use it in an experiment.

6 Make sure that you know how to operate the pipette filler. If you are unsure, practise filling it and emptying it until you are confident. It is important that you do not contaminate the inside of the pipette filler with any of your solution, so always keep the tip of the pipette under the surface of the liquid while you are filling it and do not



Figure 3 The right and wrong way to put a pipette filler onto a pipette

allow any air to be sucked in, as the bubbles can spray liquid into the pipette filler.

7 Before you measure out the first volume of titrand, you should rinse the pipette with this solution by filling it using the pipette filler to above the mark and then running it out to waste.

8 Using the pipette filler, draw up some of the titrand solution until it is above the mark. Hold the pipette vertically with the mark at eye level and gradually allow the solution to run out until the bottom of the meniscus is exactly on the line.

9 Wipe the outside of the pipette with a tissue so that you do not transfer any excess solution. Be careful not to touch the tip of the pipette with the tissue, as it will draw out some of the liquid by capillary action.

10 Transfer your precisely measured out volume of titrand into a conical/Erlenmeyer flask. Unless your pipette is labelled as 'blow out', it has been calibrated to have a small amount of liquid remaining in the pipette once the solution has been allowed to run through. Do not be tempted to blow out the last few drops of liquid, just touch the edge of the tip against the wall of the flask to remove the droplet from around the tip.

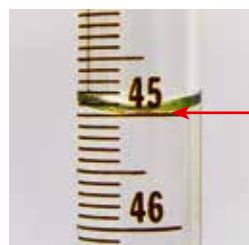
11 Add one or two drops of indicator to the titrand (in the conical/Erlenmeyer flask) and place the flask beneath the burette tip.

12 Record the volume of titrant in your burette (if you have just set it up for the first titration it is likely to be on zero). Hold a piece of



Figure 4 Arrange the tap so that it is on the opposite side of the burette to your palm. That way your hand supports the burette as you operate the tap

Box 1 The meniscus



Take reading from here

This particular type of meniscus is called a concave meniscus (there are also convex menisci but they won't be discussed here). A concave meniscus occurs because in the centre of the burette the analyte molecules are only interacting with each other (e.g. forming hydrogen bonds), but the analyte molecules at the edges can also interact with the walls of the burette. If the interactions between the analyte molecules and the glass surface are stronger than those between analyte molecules, the edges of the liquid are pulled upwards. We read from the bottom of the meniscus because it is a truer representation of the volume of the liquid.

white paper behind the burette to make the liquid easier to see. Be careful to take the reading at eye level and read the volume at the bottom of the meniscus (Box 1).

13 It is important that you stir or swirl the contents of the flask during the titration. Sometimes it is appropriate to use a magnetic stirrer, but in most cases a swirling action is used. The coordination required when performing a titration takes a bit of practice. Assuming that you are right handed, you should hold the flask in your right hand so that you can gently swirl the flask to continually mix the contents. Make sure that your hand does not obscure your view of the liquid inside the flask, as you need to observe the colour change the instant it occurs. Control the flow of liquid out of the burette with your left hand. You should position the tap so that it is on the opposite side of the burette to your palm (Figure 4). In this way your hand supports the burette as you operate the tap.

14 For the initial (rough) titration, add the titrant quite quickly to the solution in the flask while stirring/swirling the conical flask (Figure 5) to determine the approximate amount of analyte needed until a colour change occurs (the end point). The true end point of

Box 2 Determining the end point

As you add titrant to the titrand in the conical flask you will see a plume of the final indicator colour where the two solutions meet. As you swirl the flask to mix the contents the original colour will be restored. As you approach the end point of the titration it will take more time for the colour to be restored. As you observe this happening, reduce the volumes of titrant added until you are adding just one drop at a time.

When you see the new colour flash through the whole solution, you are likely to be a single drop away from the end point. Make a note of the volume added before continuing, then add one drop and swirl. Continue doing this until the colour change becomes permanent. Record the final volume used. In practice, the exact end point is difficult to get right and this can be a significant source of error in titration experiments.



This is why you need to stir. Just as sugar needs to be stirred in coffee, so do the acid and base in a titration

Figure 5 An unstirred mixture of sodium hydroxide, hydrochloric acid and methyl orange indicator

the reaction occurs when a blush of the new colour just remains in the solution (Box 2).

15 Set up the titration apparatus again (if you do not refill the burette, make sure that you have sufficient volume of titrant remaining and record the starting volume). Note that any distilled/deionised water remaining in the conical flask after washing and rinsing it out will not affect the test results. If possible, keep the flask of solution from the previous titration to hand, so that you can compare the colours of the end points. You will not need to wash the pipette or burette between titrations, as you are using the same solutions.

16 This time you will have a good idea of how much titrant you will need, so you can quickly add a volume to the conical flask that is a few cm^3 less than that of your approximate end point. From here onwards add very small amounts. When you see the final colour flash through the liquid in the flask, set the tap so that it delivers the titrant dropwise.

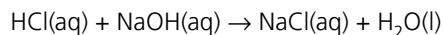
17 Stop when the colour change becomes permanent and carefully note the volume of titrant added.

18 Repeat your experiment until you get concordant results, i.e. volume readings that are within 0.1cm^3 of each other. You can take a mean average of your results, but do not average results with a large variation ($>0.2\text{cm}^3$). You should perform at least three titrations, one rough and two accurately to get concordant results.

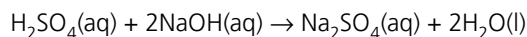
As with most practical activities, it takes practice to achieve a perfect titrating technique. So don't be discouraged if you find it tricky at first — keep working at it and soon you will be obtaining consistent and reliable results.

Calculating the concentration

To work out the concentration of the titrand, you need the results from your titrations and the stoichiometric equation for the reaction. From the equation you can work out how many moles of acid react with how many moles of base. For example:



tells us that one mole of hydrochloric acid reacts with one mole of sodium hydroxide. Whereas:



tells us that one mole of sulfuric acid reacts with two moles of sodium hydroxide.

You know the concentration of the standard solution (titrant) and how much of it you needed for the reaction (i.e. the volume used from the burette to reach the end point). From this you can work out how many moles reacted using $n = cV$, where n is the amount in moles (mol), c is the concentration in moles per cubic decimetre (mol dm^{-3}) and V is the volume in cubic decimetres (dm^3).

Note that the volumes are given in dm^3 , whereas you are likely to be measuring in cm^3 , so you will need to convert your volumes from cm^3 to dm^3 ($1000\text{cm}^3 = 1\text{dm}^3$).

Let's take an example. If 24.4cm^3 of a 0.100mol dm^{-3} solution of H_2SO_4 was required to reach the end point of the titration to determine the concentration of 25cm^3 NaOH , we can calculate that:

$$n = 0.100\text{mol dm}^{-3} \times \frac{24.4}{1000}\text{dm}^3$$

$$= 0.00244\text{mol of H}_2\text{SO}_4 \text{ reacted (or } 2.44 \times 10^{-3}\text{mol)}$$

We know from the **stoichiometric equation** that one mole of sulfuric acid reacts with two moles of sodium hydroxide. So if $2.44 \times 10^{-3}\text{mol}$ of H_2SO_4 reacted, we can work out that $4.88 \times 10^{-3}\text{mol}$ of NaOH reacted. If there were $4.88 \times 10^{-3}\text{mol}$ in 25cm^3 we can easily work out the concentration (c) of the unknown solution (using $c = n/V$):

$$c = \frac{4.88 \times 10^{-3}\text{mol}}{0.025\text{dm}^3} = 0.195\text{mol dm}^{-3}$$

Theory of knowledge



- 1 What is the role of *authority* in performing experiments at the level of high school science? In other words, in the event that your experiment doesn't give the expected result, at what stage do you, as an IB student, conclude that the general theory you are testing is mistaken? Or do you always assume that *you* have gotten it wrong? Why would you make this assumption?
- 2 How do scientists in general adjudicate between conflicting interpretations of evidence? Are there methods by which historians, or literary critics, or mathematicians can filter through competing claims? What are those methods and are they effective?
- 3 In what ways does the heavy use of mathematics in science guide the progress of science? Is it possible to do science without the use of mathematics?

Lee McManus is an undergraduate chemistry student at the University of York with a passion for scientific communication and experimental chemistry.



Bad examples in TOK exams

John Sprague highlights the importance of using examples effectively

Examples do a lot to help justify your point. A good example, properly analysed, will demonstrate your critical thinking skills and give an examiner every reason to give you marks. However, using examples that are ‘too easy’ or not analysing them properly demonstrates little analytical skill. Too often students drop in an example hoping that the reader will make all the connections themselves.

As an examiner, there are two examples in particular that I have in mind. Sometimes they are appropriate and well used, but too often it’s the opposite. You might do well to avoid them altogether, but I will attempt to give you a sense of how you might meaningfully use them.

Galileo and the church

It is certainly true that there was some tension between Galileo’s claim that the Sun stood at the centre of the solar system and the church’s official stance that it was the Earth at the centre of the universe. In reality, however, the issue is less straightforward. Hannah Arendt in *The Human Condition* points out that the theoretical belief of heliocentrism was not new to the church, which was happy to accept different interpretations of the cosmos (there were many of them at the time). Rather, it was the empirical methods that Galileo proposed to find out which theories were real (i.e. using the newly developed telescope) that was the larger threat. Whatever the case, the story is far more complicated than that of an authoritarian church versus a radical free thinker.

‘The Galileo Affair’ is an excellent vehicle through which to explore the flourishing use of empirical observation in science, and the role of tradition, culture and theory in the construction of knowledge. But if you are tempted to simply mention it in support of a claim like ‘Science and Faith are in conflict’ then you are both mistaken (it is simply too broad to be correct) and making far too naive an assumption — neither one of which will convince an examiner.

See the following sites for further discussion:

- Catholic Answers: www.tinyurl.com/7m6dajp
- Analysis of the dispute: www.tinyurl.com/kcskedf

‘People used to believe that the Earth is flat’

This is the go-to example for a number of TOK points, ranging from the ways our scientific understanding evolves, to the role of sense perception in our knowledge. The basic premise, however, that people actually did think the Earth was flat is again too broadly stated to have genuine critical bite. Most educated people have accepted a spherical Earth since Eratosthenes of Cyrene measured it in the third century BCE, and Plato taught this in his *Phaedo* a hundred or so years earlier.

The history of the calculation of the circumference of the Earth is itself a fascinating study of the development of geometry. Far from thinking the Earth was flat, Christopher Columbus sailed west because he wanted to get to India in the east — this only works on a sphere. Indeed, Magellan’s expedition in the sixteenth century actually sailed around the whole thing. So while it is true that some people during the last 2400 years might have thought the Earth was flat, they certainly do not represent the accepted scientific view of the world. This interplay between scientific and ‘colloquial’ understandings of the world might be an interesting avenue for discussion on its own.

See the following sites for more information:

- Eratosthenes’ work: www.tinyurl.com/ckorfnu and www.tinyurl.com/pxof4uo
- ‘The History of Geodesy’: www.tinyurl.com/n5ymvv

I do not offer these two examples as a general prohibition — both of them can be fantastic examples of TOK principles. I only suggest that using them without making them into good examples will, because they are so common, only highlight their inadequacy.

John Sprague is the lead editor of IB REVIEW, head of TOK at Sevenoaks School, UK, an examiner and an IB workshop leader.

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