THINKING AND REASONING SKILLS

SKILL 10: CREATIVE THINKING

This skill takes the Thinking and reasoning skills qualification beyond traditional critical thinking skills, such as working with the components of arguments and assessing credibility. Being able to think creatively, in a way that goes above and beyond the information provided, is an incredibly useful thinking skill with a variety of academic and practical applications.

By teaching and assessing this skill, the aims and objectives are as follows:

GENERATING QUESTIONS

Teachers should aim to:
Teach students how to ask open and relevant questions in order to gather information in response to stimulus.

STUDENTS SHOULD BE ABLE TO:

Produce questions that attract a full response that might be helpful in reaching a decision, conclusion, or hypothesis.

GENERATING IDEAS AND HYPOTHESES

Give students practice and guidance on how to come up with plausible, relevant, and sufficiently supported ideas and hypotheses.

STUDENTS SHOULD BE ABLE TO:

Use the information and evidence available to come up with a hypothesis, idea, or suggestion that realistically follows from the evidence.

GENERALISING AND EXTRAPOLATING FROM DATA

Expose students to a variety of ways in which data can be presented, how to extract information from it and to avoid making assumptions and unjustified generalisations in doing so.

STUDENTS SHOULD BE ABLE TO:

Analyse data in a variety of formats e.g. graphs, tables, and demonstrate an understanding of what can and cannot be reasonably drawn from the information it presents.

SUPPOSITIONAL AND COUNTERFACTUAL THINKING

Teachers should aim to:
Guide students in thinking suppositionally (if...then) and counterfactually (considering plausible, alternative outcomes based on alternative factors and different circumstances).

STUDENTS SHOULD BE ABLE TO:

Come up with realistic, alternative consequences in a historical situation based on a consideration of different factors and circumstances (if this had been the case, how might the outcome have been different?)`

HOW TO GENERATE QUESTIONS

Thinking creatively does not mean taking wild guesses and thinking so far 'outside the box' that the evidence and information inside 'the box' is ignored! In this context, it means working creatively with the information given, and involves having the imagination to ask questions that take you further. This is not an easy thing to do, but there are some techniques that can help.

Firstly, you should make sure that the questions you ask are worded so that they get lots of information back. Consider the following dialogues in a police investigation into a missing parrot:

PC Tipps: Were you in the petshop at the time Polly went missing?

Suspect: No

PC Tipps: Were you anywhere close by?

Suspect: Yes

PC Tipps: What were you doing last night?

Suspect: Lots of different things

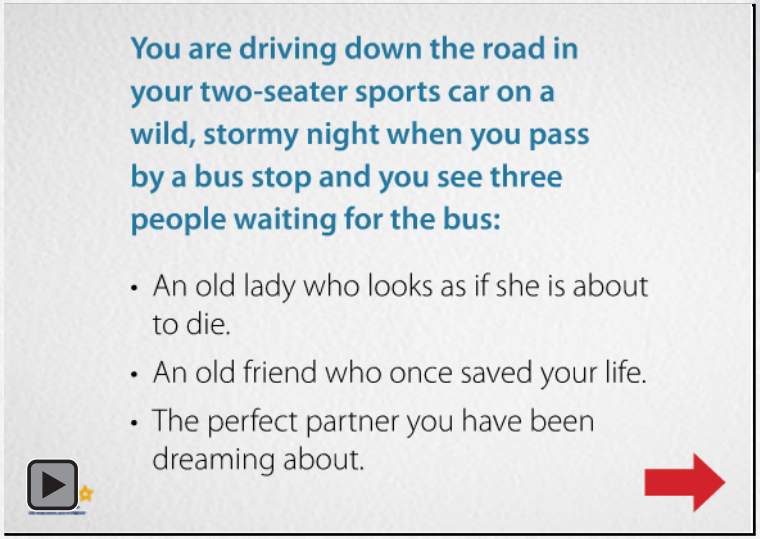
PC Tipps: Where exactly were you at 7pm yesterday?

Suspect: I was at home watching TV.

The following support materials can be found within the **Skill 10 pdf portfolio**.

10.01 Creative Thinking Starter activity.ppt

Click on the red arrow to preview



You may have noticed that PC Tipps' line of questioning did not get him anywhere until he asked a question that was clear enough to get exactly the information he needed. His first two questions were likely to attract only a one word answer, such as 'yes' or 'quite', which probably won't be very useful. A useful question, on the other hand, will get you more information – they often begin with one of these words:

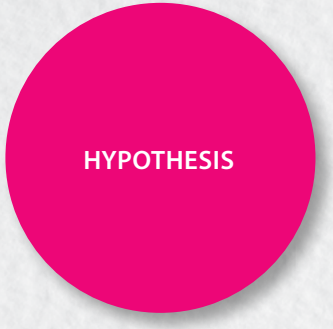
WHAT WHICH WHEN WHO WHERE WHY HOW

The following support materials can be found within the **Skill 10 pdf portfolio**.

10.02 Generating questions printable worksheet.doc

10.03 The Thing from Planet Zob printable worksheet.doc

HOW TO GENERATE IDEAS AND HYPOTHESES



The most important factor when generating new ideas and/or hypotheses is **justification**. Whilst creativity and imagination are also important, a wild and fanciful explanation for a given set of phenomena is no good if it does not fit with the information we already have, so you should always be able to justify a hypothesis by referring to the evidence supporting it.

A common saying in the medical profession is 'When you hear hoofbeats don't look for zebras'. The meaning here is that a medical professional should look for the hypothesis that is **likely**. In this case, a zebra could be a suitable explanation for the existence of hoofprints, but in most cases the there is a higher probability that the hoofprints belong to a horse. You might justify this with reference to a number of truths: we live in a country where there are only zebras in zoos; there are many horses in fields, used by the police, ridden around towns by their owners and so on.

The following activity, which is best done in groups, needs to be done in the order presented and will give you practice at generating questions as well as generating hypotheses:

The following support materials can be found within the **Skill 10 pdf portfolio**.

10.04 Puerperal Fever investigation.doc

10.05 Puerperal Fever hypothesis 1.doc

10.06 Puerperal fever hypothesis 2.doc

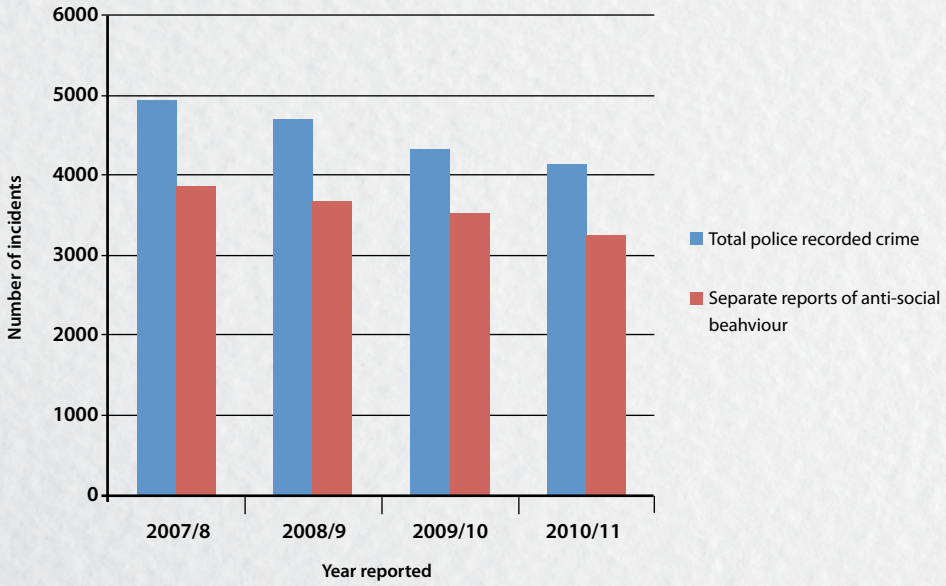
Once you have decided on your final hypothesis, you may want to see how it compares to what actually happened in this fascinating case:

10.07 Puerperal Fever - the final hypothesis.doc

HOW TO GENERALISE AND EXTRAPOLATE FROM DATA

It is common for data (facts or statistics collected together for analysis) to be presented as evidence, which can then be analysed and conclusions drawn from it. Data can be presented in a variety of ways, such as tables, graphs, pie charts – the purpose being to make the information clear or to give it more focus, but the way in which it is presented can sometimes make the information less clear, or ambiguous, or make it selective so that it supports a particular point of view. It is important, therefore, to look carefully at the labelling of axes and keys, as well as the data itself.

Consider the following data (taken from **www.homeoffice.gov.uk**) for anti-social behaviour related incidents:



It looks as though the incidents of anti-social behaviour make up a significant percentage of the total crime for that year, but it is important to note that these figures are separate to the total recorded crime – these are incidents that have been reported but not severe enough to be included as official 'crimes' – this includes things like littering or dog fouling, or making too much noise.

Consider which of the following can be reasonably drawn from this data:

A **There has been less anti-social behaviour in 2010/11 than in the year before**

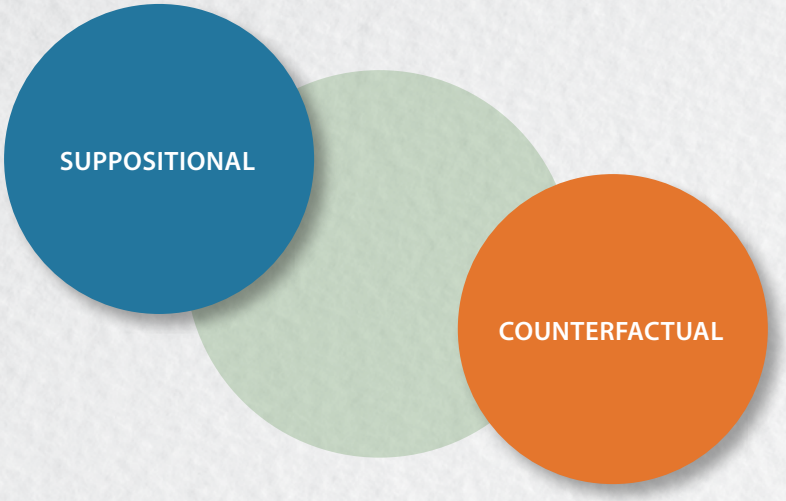
B **Crime in 2007/8 reached an all time high**

C **Less anti-social behaviour has been reported in 2010/11 than in 2009/10**

If we add anti-social behaviour to reported crime, there have been over 50'000 incidents over the last four years

We could reasonably draw a figure like this from this data, but the figure of 50'000 is a miscalculation and is too high.

HOW TO THINK SUPPOSITIONALLY AND COUNTERFACTUALLY



Returning to the example of Ant and Dec climbing Mount Everest we saw in skill 9, consider the following question:

If Ant discovered that two of his oxygen canisters were faulty as they were about to leave base camp, *then* what would be the closest they could now get to the summit, if they stay together?

Being flexible in the way we see factors and consequences is an important skill, as we often face unforeseen changes in the circumstances surrounding a problem, or make new discoveries about the factors leading up to a past event, which might change the way we see the outcome or how it might have turned out differently.

American TV series '*The Big Bang Theory*' has a funny scene in which Amy and Sheldon play a game that they call '*Counterfactuals*':

Whilst the changes that Amy and Sheldon propose are somewhat far-fetched, the important thing to note is the way in which they propose an alternative outcome and offer a reasoned justification for it.

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The following support materials can be found within the **Skill 10 pdf portfolio**.

10.08 Along The Way printable activity.doc

10.09 Alternative endings printable worksheet.doc

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