



Sometimes I think we're alone in the universe, and sometimes I think we're not. In either case the idea is quite staggering.

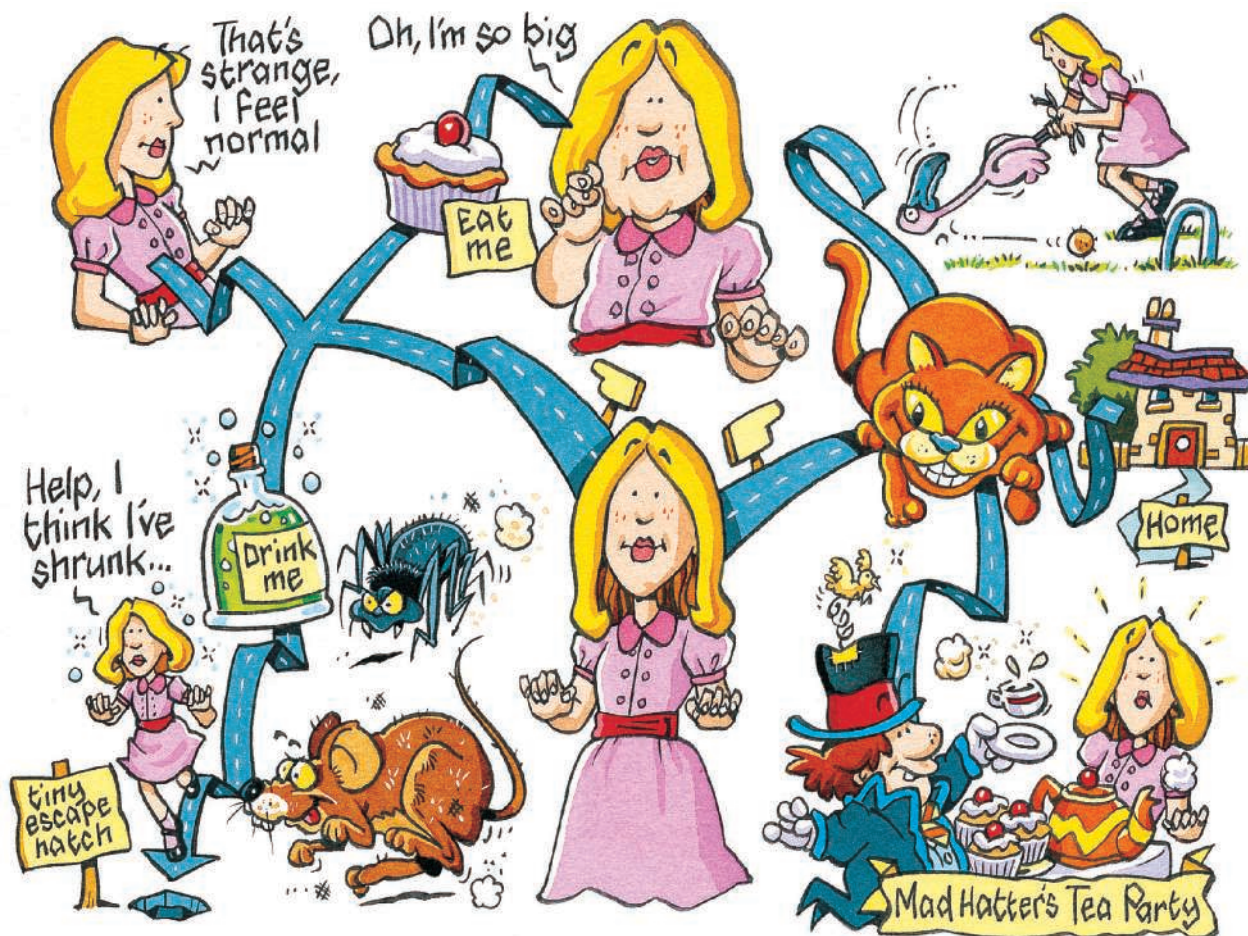
Arthur C. Clarke

Think quest

1

Who are you and who are you yet to become? How can your use of language and non-verbal communication give the 'right' impression about who you are? How do your attitudes affect when,

how and why you learn? Can you remember different types of learning in different ways? How can you make your learning and understanding more effective?



Alice's experiences and journey through Wonderland were influenced by her attitudes and the choices she made. How may your attitude and choices affect your journey?

Think about these

How can you initiate good rapport?

What is in the 'I' drawers of your learning cupboard?

What are six 'learning to learn' behavioural tools for lifelong learning?

Name the seven memory keys that can unlock your memory doors.

Which neurotransmitter can give you feelings associated with love?

Which hormone could be considered your trust hormone?

Key outcomes

Identify ways in which complex messages are effectively conveyed and apply this knowledge in communication.

Consider alternative views, recognise multiple possible interpretations and respond with insight when listening, viewing and responding.

Use verbal and non-verbal cues, subject-specific language and a wide range of communication forms.

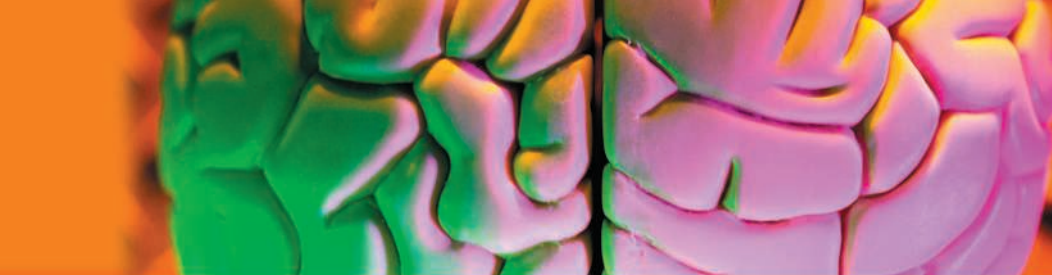
Generate questions that explore different perspectives.

Make informed decisions based on your analysis of various perspectives and sometimes contradictory information.

Use pertinent questions to explore and clarify complex meanings.

Review information to refine ideas and beliefs; explain conscious changes that may occur in your own and others' thinking and analyse alternative perspectives.

Use specific terms to discuss your thinking; select and use thinking processes and tools appropriate to particular tasks.



YourQuest

How can I get there?

Where are you now? Who are you now? Where do you want to be? What are your visions of who you will become? What goals can you set to help you reach your dreams?

THINK

1. Sketch your own 'How can I get there?' map and add side path comments that may be goals, strategies or tasks that can help you reach your dreams.

To learn . . . or not to learn?

Learning often involves taking a risk. Taking risks can make you feel uncomfortable and take you out of your comfort zone. There are times when it is necessary to sacrifice competence and control, and to tolerate frustration and confusion. Imagine how far a scientist would get if they took only the easy, well-trodden path. How many amazing discoveries would remain hidden and out of reach?

There are other times when the risks and potential learning are not to your advantage. At these times you need to protect yourself. Can you think of examples when this may be appropriate?

THINK AND DISCUSS

If you always retreat from uncertainty, then you may end up with a limited range of knowledge and know-how. If you always dive into the unknown, your life may be exciting, although possibly very short!

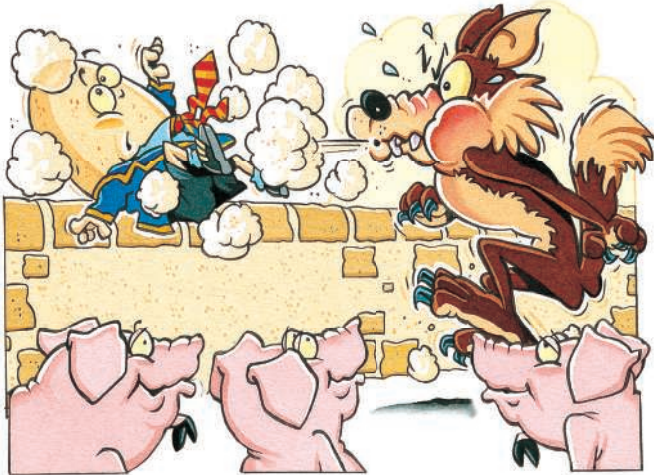
2. (a) Gather your thoughts on the above statements.
(b) Share your thoughts with your partner. Suggest real-life examples for each statement.
3. Visual thinking tools can be very useful in helping you decide which learning opportunities are worth taking on.
 - (a) In your team, brainstorm examples of potential learning situations that may require careful consideration.
 - (b) With your team, analyse two of these potential learning situations using either a SWOT (Strengths, Weaknesses, Opportunities and Threats) or PMI (Plus, Minus, Interesting) visual thinking tool (see pages 25–6).
 - (c) Reflect on the ideas or strategies that you might use when you are deciding whether or not to 'bungee jump' into a new learning situation.



What sort of questions do you ask yourself to decide whether you should take on new learning?

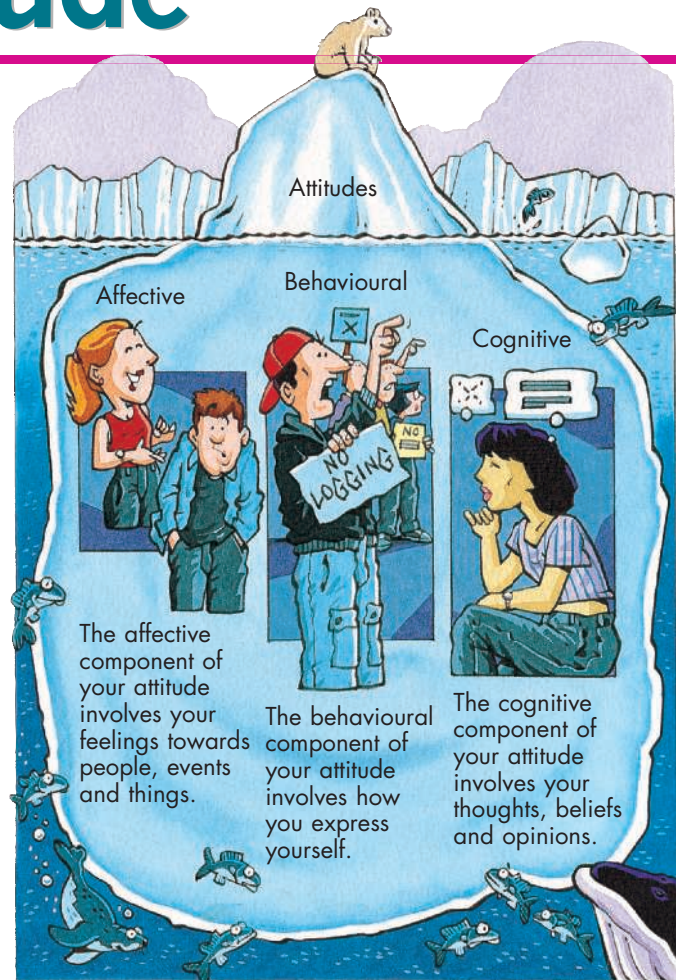
ABCs of attitude

Humpty Dumpty sat on the wall. Unless you fall and become immortalised in a nursery rhyme, sitting on the fence can be boring! It's okay to have an attitude. In fact, you can have lots of attitudes.



try This

Create your own story that includes comments for each of the characters in the Humpty Dumpty cartoon shown above. Share your story with your team and then listen to their stories. Make a note of any similarities or differences between the stories and discuss possible reasons for them. Suggest examples of how science could be seen from different viewpoints or perspectives.



The ABCs of attitude

whereas beliefs usually do not. Your **values** may involve making personal judgements and represent a deeper commitment than an attitude would. Values also act as standards in your decision making. **Opinions** can be expressed as a point of view that is based on known facts or available information. Although **beliefs** reflect what we think and know about the world, they do not have to be based on fact. While you may see the world through the lenses in your eyes, your perceptions are filtered through your beliefs and assumptions.

Other lenses

Your family, cultural and social environments also play a part in how you perceive the world. Your attitudes, values and beliefs may be quite different due to the influence that these factors have on how you 'shape' and organise your understanding of what happens around you. The time that you live in is also important. Imagine the impact this has had on scientists throughout different times in history.

Who are you?

Attitudes

Who you are, or your sense of identity, is a result of your **attitudes**, opinions, values and beliefs. Attitudes are a combination of feelings, beliefs and actions. These may be negative or positive and may be towards an event, object or person.

Social psychologists generally agree that there are three main components to any attitude:

- A**ffective
- B**ehavioural
- C**ognitive.

Coloured glasses

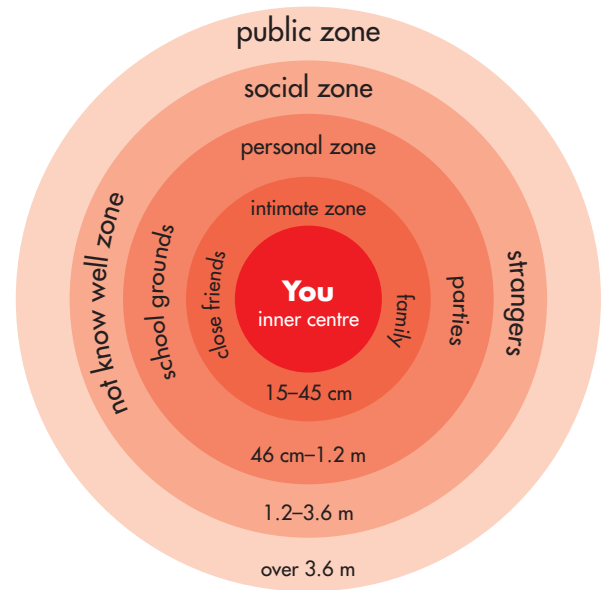
Opinions, values and attitudes involve making **judgements** about the desirability of something,

Showing an attitude

Attitudes can be communicated both verbally and non-verbally. We express them in the words that we speak, our posture, our use of space, gestures, facial expressions, and the tones, inflections, volume and pauses in our speech. Another way of communicating our attitudes may be through the use of **paralanguage**. Paralanguage is communicating your specific meaning through the way that you speak, as well as what you say.

Not too close!

Our attitudes can also be expressed by the distance that we place between ourselves and others. **Proximate rules** determine the physical distance (in zones) that is comfortable between people depending on their relationships.



Proximate rules: Think of specific examples of how they apply to you and others around you.

activities

THINK AND DISCUSS

- Think about your reactions over the last week. Is there anything that makes you feel uneasy or uncomfortable? If so, ask yourself:
 - Is this how I really want to behave?
 - Is this who I am or who I want to be?
 - What are my core values?
 - What can I do to realign my actions with my values?
- Create your own cartoon that could be used to promote thinking about attitudes.
 - Share your cartoon with others in the class in a 'class cartoon attitude gallery'.
 - As a class, select four cartoons from the class gallery.
 - Individually, write a background story for one cartoon to describe what has led to the attitude shown.
 - Share your stories with your team.
 - Share and discuss your stories with others who have written for the same cartoon. Comment on any similarities or differences in the stories.
- List three things that you value. Give reasons why you value them.
- A bias is a preference that may inhibit your impartial judgement.
 - Give an example of how you are biased.
 - Bias may be revealed by comments that are exaggerations, generalisations, imbalanced opinions stated as facts and emotionally charged words. Look through a newspaper and select two articles that show examples of bias. Bring these articles to school and discuss the bias with members of your class.
 - Suggest why it is important to know your biases.
- Discuss the following statements with your team, then summarise your discussions in a PMI.
 - Teenagers between the ages of 14 and 16 should be isolated from the rest of the community and schooled in live-in camps.
 - Abortion for any reason should be illegal.
 - Vaccinations against measles, whooping cough and meningitis should be compulsory for all Year 10 students.
- Think of examples of cues (what it looks and sounds like) that convey:
 - a positive attitude
 - a negative attitude
 - disbelief
 - agreement.
- A stereotype is a collection of beliefs that are held about people belonging to a particular category. While they can help us make sense of the world, they can also lead to discrimination and self-fulfilling prophecies. Suggest a stereotype for each of the following.
 - physicist
 - environmentalist
 - dentist
 - chemist
 - psychiatrist
- What do you think is meant by a 'self-fulfilling prophecy'? Give an example.
- It has been said that 'Our beliefs and values are hard to think about because they are what we think with' (K. Egan). What is your opinion on this statement? Share your opinion with your team. Use a cluster or mind map to summarise your discussion.
- Use a target map to sort the words below. Show the positive words in the centre circle and the negative words in the outer circle.
accept, harmful, undesirable, like, believe in, agree with, morality, disagree with, tolerate, desire, dislike, ethics, important, unethical, desirable, beliefs, virtues
 - Share your target map with your team. Comment on any similarities or differences.

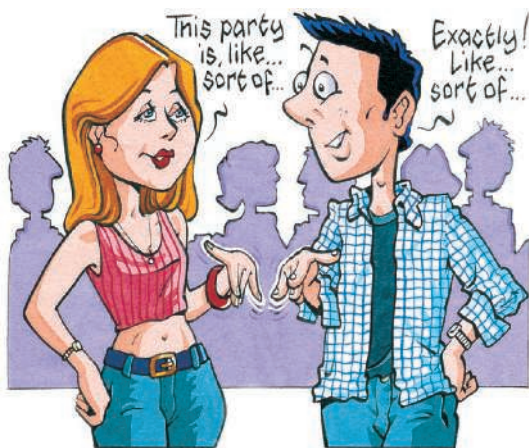
At first glance

Your understanding can be influenced by trust. When you meet someone for the first time, you may be lucky enough to have **rapport**; however, trust needs time to develop. Your verbal and non-verbal communication can influence not only how others see you, but also how you see yourself.

Rapid rapport

You meet someone for the first time and want to make a good impression. In fact, you *really* want to make a good first impression! Good rapport may be initiated by non-verbal signals such as eye contact, mirroring behaviour, posture or breathing. In fact, non-verbal cues are thought to make up about 65 per cent of your first impression. Only 35 per cent of your impact is due to verbal cues such as words, pace, inflection, pitch and volume.

If you want to develop rapport, then you can pay attention to another person's body language and subtly mirror it. For example, you could mirror their gestures, postures, muscle tension and facial expressions. You can also show active listening skills in both verbal and non-verbal ways.



When you meet someone for the first time, what sorts of things make a good impression on you? What sorts of things make a bad impression?

Listening skills

The Big Bad Ws

Are you a good listener? Do you really listen to what the other person is saying, or do you:

- **w**ant to interrupt?
- **w**ant to have your own conversation within (rehearsing what you want to say)?
- **w**ait for an opportunity to make public only your own wishes and wants?

Three Ps of listening skills

When you are listening, do you:

- **p**ause your lips and don't talk over the other person?
- **p**robe what they are really saying? Are there generalisations, omissions or distortions in their comments? Do you need to ask questions to gain clarity about what they really mean?
- **p**araphrase what they have said to show that you have been listening and to develop rapport?



try This

Another perspective

Little Miss Muffet sat on her tuffet, eating her curds and whey. Along came a spider who sat down beside her, and frightened Miss Muffet away.

- (a) Suggest reasons why Miss Muffet went away when the spider sat down beside her.
- (b) Suggest reasons why the spider sat down beside her.
- Was Miss Muffet or the spider more entitled to sit there? Explain your response to your team.
- How does this nursery rhyme relate to the importance and dangers of first impressions?
- Suggest a different ending to the nursery rhyme.
- Rewrite the Miss Muffet nursery rhyme from the perspective of the spider.



Active listening

There are many ways to help you develop your active listening skills. Some people use the PACTS method:

- P**araphrase or play back what has been said in your own words.
- A**ffirm or appreciate what has been said.
- C**larify or check on specific details of what has been said.
- T**est options and prompt talk that tempts new ideas.
- S**eek out and be sensitive to the talker's feelings.

Practise the PACTS method:

1. In a team of three, decide who will be Person A, B and C.
2. Person C watches and records a PMI on what happens between Person A and Person B.
 - Person A talks about 'someone they admire' for two minutes, while person B listens.
 - Person B then paraphrases what Person A has said, asks questions to clarify, and provides affirming comments to show what they particularly appreciated.
 - Person C shares their PMI with Person A and B and the team discuss it.
3. Now, swap roles, with Person A watching and recording a PMI on what happens between Person B and Person C. Person B talks about 'foods that they hate' for two minutes, while Person C listens. Repeat the steps from the previous exercise.
4. Individually reflect on what you have learnt, and how you could use this to become a more effective listener.



What are you saying?

Whether you are talking informally or giving a formal presentation, it is good to consider how you communicate your thoughts, emotions and attitudes. For instance, when you are having a conversation, do you map what you or the other person is saying, in your mind? This can help to clarify and give structure to your shared dialogue.

If you were to look at a road map, you would find that locations are indicated by different fonts (for example, larger or coloured letters) and areas are indicated by colours or shading. In a conversation, your non-verbal signs indicate parts that have greater influence or meaning (for example, when you increase your volume or alter your tone). There are often hidden meanings (assumptions and beliefs) below the surface of language. Can you think of any examples?

First impressions

1. (a) Think about an occasion when you met someone for the first time. List the sort of things you noticed about them in the first few minutes.
 - (b) Compare your list with others in your team. Use a Venn diagram to show any similarities and differences.
 - (c) With your team, discuss the similarities and suggest reasons for your shared first impressions. Use a cluster map to summarise the key points of your discussion.
 - (d) With your team, discuss whether the features of a good first impression are always the same or if they change in different situations.
 - (e) Use a diagram, sketch or caricature of yourself to describe the first impressions that you give to others.
2. On the basis of this activity, are you likely to change anything you do or say prior to meeting someone you want to impress? Jot these ideas down in your personal learning journal and think about how you can go about incorporating them into situations when meeting someone for the first time.

Are you listening?

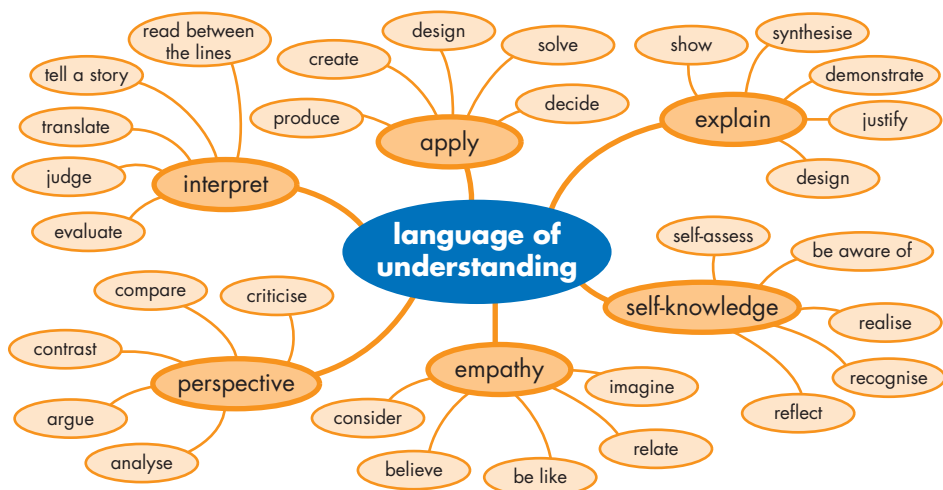
1. Score yourself between 0 and 4 on the following questions (where 0 is *never* and 4 is *always*).
 - (a) I fidget when someone is talking to me.
 - (b) I finish other people's sentences.
 - (c) I talk over other people.
 - (d) My body language suggests that I'm not interested in what people are saying.
 - (e) I interrupt when someone else is talking.
 - (f) I don't look at the speaker when they are talking to me.
 - (g) I think about what I will say next, rather than listening to the person talking.
 - (h) While listening, I sneak a look at my watch.
2. Comment on what you have learnt from this quiz and what you could do to be a more effective listener.

The language of understanding

To understand something, you need to know more than 'what' and 'when'; you need to be able to explain the 'why' and 'how'. Evidence of understanding comes when you are able to apply or transfer the new knowledge to a different situation and are able to explain it.

Are you wearing your words?

The words that you use to communicate reveal a lot about you — your beliefs and assumptions, and your feelings about yourself and others. When speaking to others, try to use language that is inclusive (that doesn't make people feel left out and uncomfortable), avoid putting yourself or others down, refrain from labelling others and use proactive rather than reactive language. For example, instead of saying 'There's nothing I can do about it', say 'Let's think of the alternatives'.

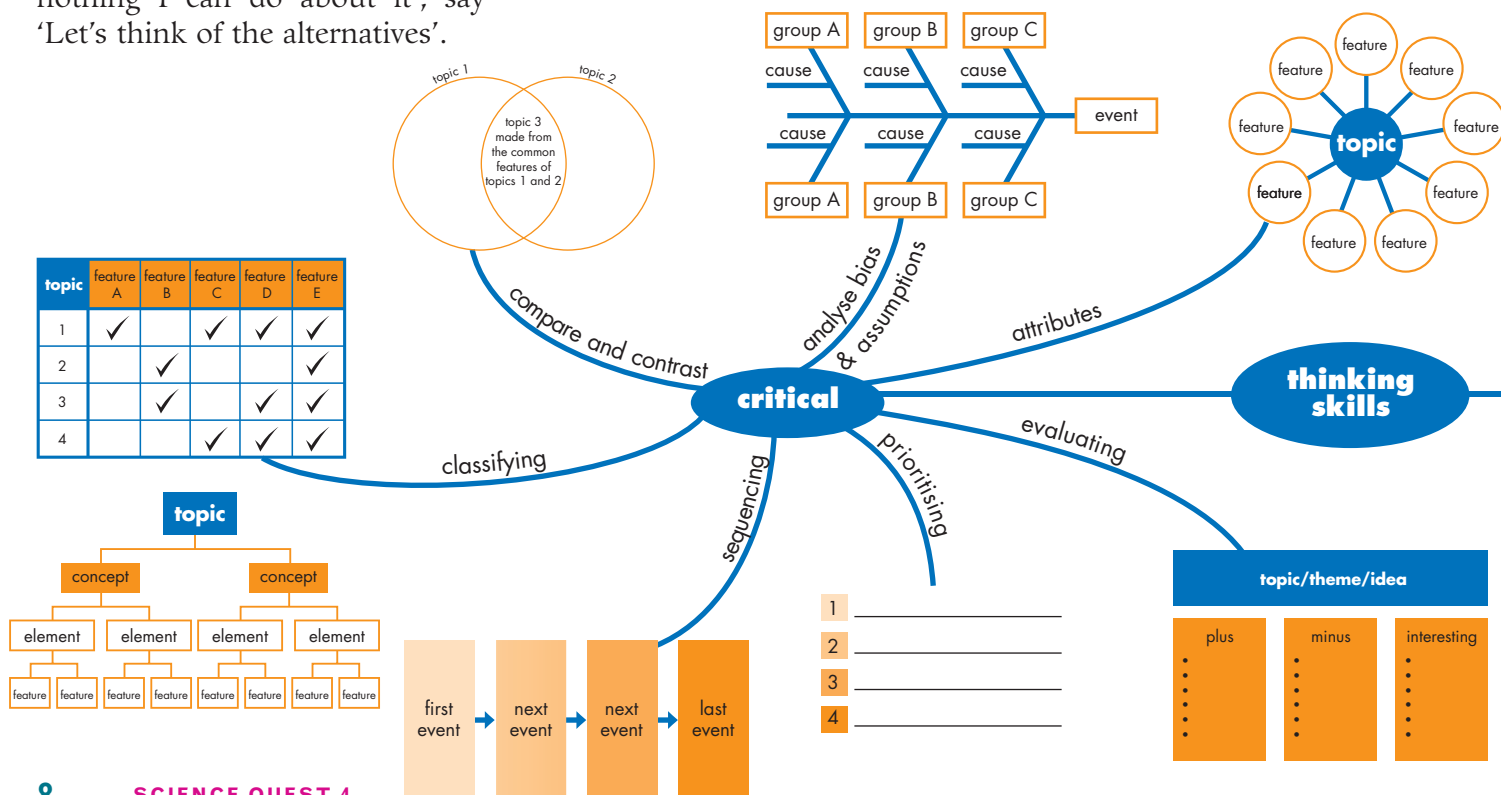


Understanding language

When you are trying to make sense of words associated with understanding, it is helpful to divide them up into categories:

- **apply** — how and where can I use this knowledge?
- **explain** — why is it so? How does it work?
- **self-knowledge** — what are my weaknesses? How do I best learn?
- **interpret** — what does this mean?
- **perspective** — is it reasonable? Whose point of view is this?
- **empathy** — what are others aware of that I am missing?

An awareness and working knowledge of these types of thinking can increase the depth of your understanding.



Is your learning bag packed?

One of the goals of learning is to make information portable, so that it can be used in new situations and locations. Transfer of learning occurs when learning is taken into new contexts and applied in innovative ways.

At first glance, transfer of learning may seem to be difficult and out of reach. You may need to use your critical and creative thinking to make the task more manageable. Visual thinking tools can provide you with opportunities to practise these types of thinking.

Fat and skinny questions

If you don't ask the right question, you won't get the right answer! 'Skinny questions' usually require only a brief, simple response. For example, 'Name your best friend' or 'Have you had science class yet?'.

'Who influences you and how?' is an example of a 'fat question'. These questions take time to think through. This is because they require deeper understanding. They need a lot of discussion, and explanations that include relevant examples.

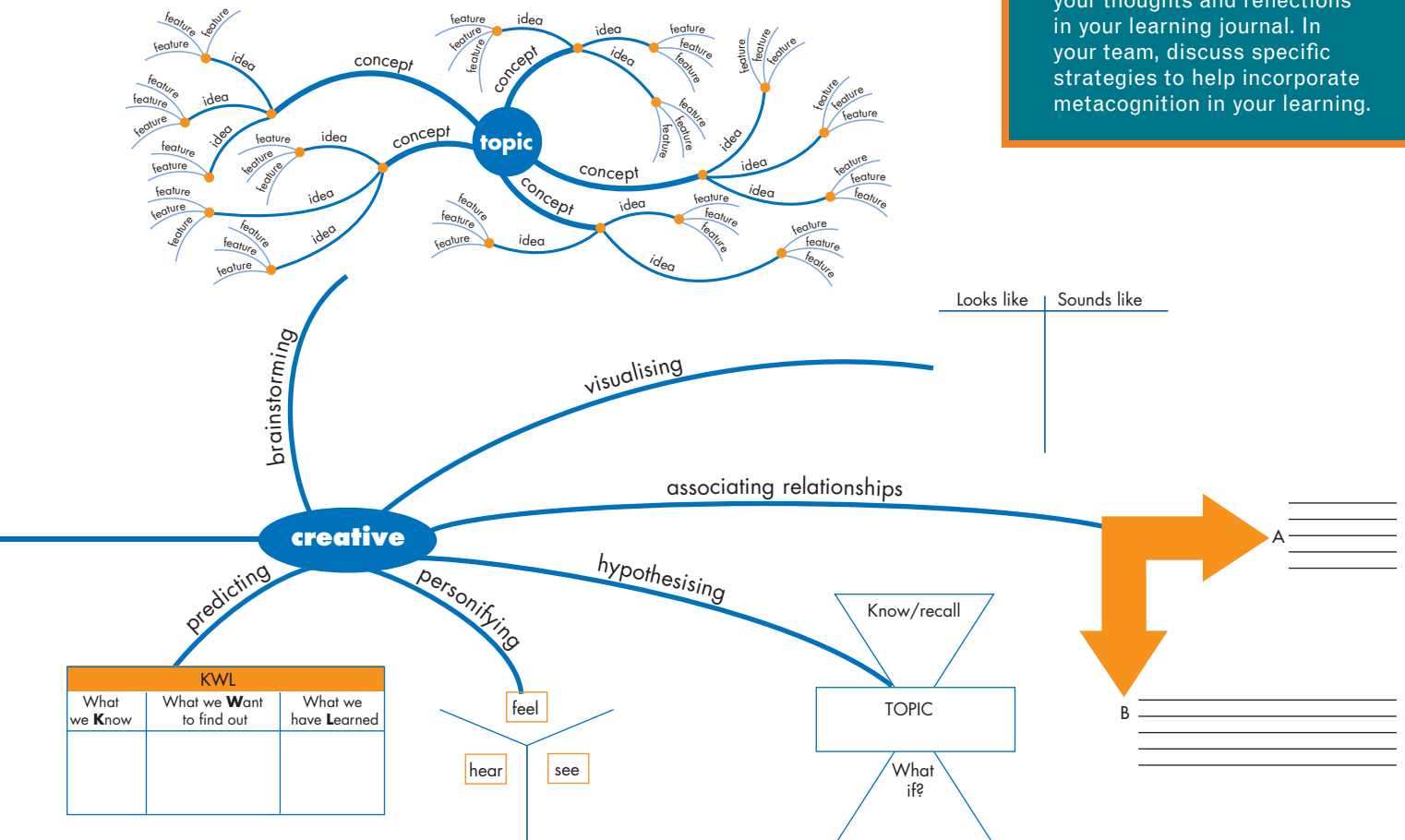


Which question is fat and which is skinny?

activities

THINK AND DISCUSS

- 1 Suggest ways that you can use language positively when you are communicating with others.
- 2 For each of the questions below, provide a response and suggest which type of understanding it belongs to.
 - (a) What are some common misconceptions about spiders?
 - (b) What does your language reveal about your self-confidence?
 - (c) How and when could you use a toothbrush?
 - (d) What are the different points of view about stem cell research?
 - (e) What would it be like to be a genetic engineer?
 - (f) What are my strengths and weaknesses in science?
- 3 When you 'think about your thinking' you are being metacognitive. You can develop this type of learning by writing your thoughts and reflections in your learning journal. In your team, discuss specific strategies to help incorporate metacognition in your learning.



Layers of learning



imagination
using skills of fantasy, visualisation and storytelling. These skills help you to create and explore hypothetical worlds.

intuition
where your creative ideas germinate and develop.

intellectual skills of language and reasoning. You use these to segment, analyse and communicate your experience.

immersion in the experience using practical tools to explore, investigate and experiment.

The Rs of learning power

Resilience is about believing in yourself and having the ability to tolerate sometimes feeling a little uncomfortable. As learning is an emotional business, your ability to tolerate emotions is important. Learning is not always fast and smooth; there can be frustrating flat spots, exhilarating highs and upsetting setbacks. Resilience helps you to stick with it and recover from any disappointments. It is important in learning to help you tolerate your emotional seesaw.

Reflectiveness is being self-aware and mindful of what could be and what has been. It involves being open-minded and sometimes standing back and looking at the big picture; asking yourself if your own assumptions are getting in the way of the truth.

Responsibility is being able to manage yourself and your learning. It's about monitoring your progress and thinking about other options and different perspectives.

Resourcefulness is knowing what tools you have and when to use them. It's about taking responsible risks and using a range of appropriate learning tools and strategies.

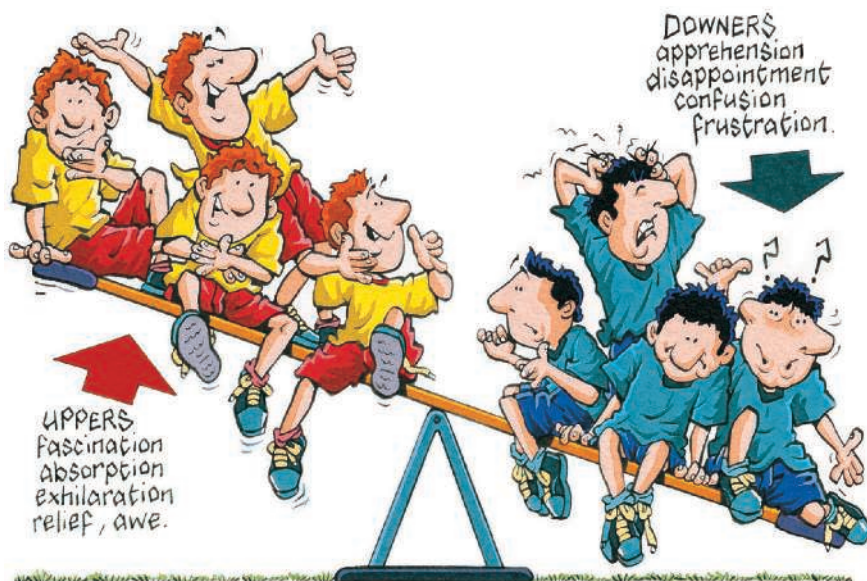
The Is of learning

Learning can happen in layers. For instance, when you learn a new game you start by learning what the game is about — you acquire the specific conscious knowledge. As you play the game, you begin to develop the more intuitive know-how that is necessary to play it well.

Your learning may involve the use of tools from 'drawers' in your learning cupboard:

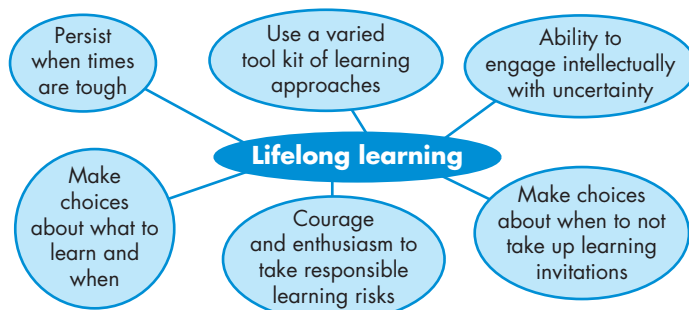
- imagination
- intuition
- intellectual skills
- immersion.

The illustration above describes how these tools can be put to use to enhance your learning.



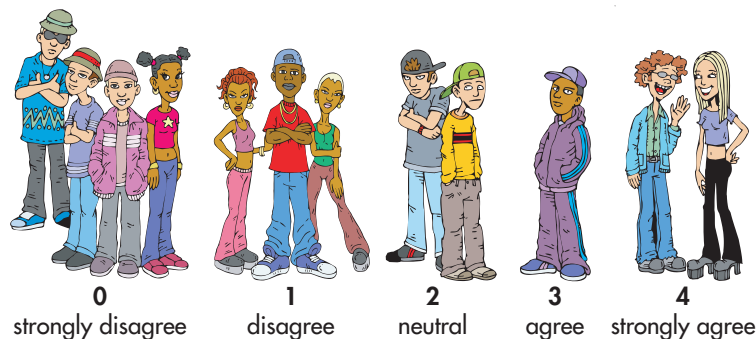
Lifelong learning

Learning can be considered as 'what you do when you don't know what to do'. Learning to learn can involve using your social and material tools and resources to get better at knowing when, how and what to do when you don't know what to do.



Where do you stand?

1. (a) On your own, score each of the statements below on a scale of 0 to 4. (0 = strongly disagree and 4 = strongly agree)
 - Books are better than movies.
 - Fiction is more interesting than non-fiction.
 - Only wealthy students should get an education.
 - Science classes should include science fiction stories.
 - If something is too hard, it's not worth trying.
 - Students who get below 50 per cent on a test do not deserve an education.
 - At 15 years of age you have a sense of who you are.
 - You are weak if you feel the need to belong.
 - If you failed before, don't bother trying again.
 - You can have ownership without possession.



- (b) For three of the statements at left, share your opinions by being involved in constructing a class 'opinionogram'.
 - (i) Divide the classroom into five zones, and assign a score of 0 to 4 to each zone.
 - (ii) Each student now stands in the zone that indicates their score for the first statement.
 - (iii) Discuss the reasons for your opinion with the students in your zone.
 - (iv) Suggest questions that could be used to probe students in different opinion zones.
 - (v) With students in other zones, discuss their views and share with them the reasons for your opinion.
 - (vi) Reflect on what you have heard from others. Decide if you want to change positions and if so change. Give a reason why you are changing.
 - (vii) Repeat steps (ii)–(vi) for two other statements.
 - (viii) Reflect on what you have learnt about the opinions and perspectives of others.
 - (ix) In your teams, discuss any insightful comments, ideas or opinions.
 - (x) Suggest questions that could be used to more closely probe reasons for your classmates' opinions. Share these probing questions with your class.
 - (xi) Suggest how you have demonstrated resilience, reflectiveness, responsibility and resourcefulness during this activity. Comment on things that you may change if you were to do the activity again.

activities

REMEMBER, THINK AND SHARE

- 1 (a) In what order do you think that immersion, intuition, imagination and use of intellectual skills happen in your learning? Give an example.
(b) Do you think it is the same order for all types of learning? Explain.
- 2 What are your *attitudes* to your learning? Do you *believe* that learning is important to you? If you do not *value* your learning, your

learning power will be weakened. Discuss your responses to these statements with your class. Comment on similarities and differences highlighted from your discussion.

- 3 Do you think strategically about your learning? Give an example of how you do this. What are your goals? What resources do you need to achieve them? What are your current strengths and weaknesses? Suggest how you can utilise your strengths and develop your weaknesses.

- 4 (a) Construct a mind map on the four Rs of learning power.
(b) Add to this map examples of how you could show and develop each of these. You may wish to include sketches, figures or quotes.
(c) Share your mind map with others and add any of their ideas that you think are helpful in developing these Rs.
- 5 Use a Y chart to show what resilience looks, sounds and smells like.

Health: Food rules!

Imagine being told 'No treats for you! You will have spinach, capsicum and tomato on whole-grain bread and no butter!' Who tells you what to eat? Should you listen? Do others *really* care what you put into your mouth?

In 2006, the Victorian Government decided to address the types of food that are available

to school students. One of the reasons for this was the growing concern about the number of obese children in the state. Soft drinks containing sugar were the first to be on their 'no go' list. Do you think the government has the right to make such a decision? What is your opinion on this issue?

Schools set to lose their fizz

Lollies and chips next on hit list

MARY PAPADAKIS

Education reporter

SUGAR-loaded soft drinks will be banned at all Victorian state schools by the end of the year.

Lollies, chocolate and high-fat foods are also on the anti-obesity schools hit list.

The State Government will today announce plans to stop high-kilojoule fizzy drinks being sold at school or brought in by students.

Diet versions of popular soft drinks will be exempt.

The ban, aimed at curbing childhood obesity, will also apply to fruit juices and sports drinks with high amounts of added sugar.

The sugar cut-off point is still being determined.

Most soft drinks contain about 12 per cent sugar, or 12 g per 100 ml.

The government also plans to restrict access to confectionery at school.

The soft drink ban will affect about 1600 state schools. Non-government schools will be encouraged to follow the move.

Education Minister Lynne Kosky said the ban aimed to improve the health of school children.

'Anything that has a large amount of added sugar we obviously want to ban,' she said.

Ms Kosky said while many canteens now served healthy food, tougher measures were needed to curb obesity.

About a quarter of Australian children are considered overweight or obese, putting them at an increased risk of serious medical conditions including heart disease, diabetes, cancer and asthma.

Fizzy drinks have long been considered by health experts to be a key contributor to the obesity crisis and growing dental decay.

Ms Kosky said research shows almost 80 per cent of teenagers consume soft drinks weekly, with one in 10 having more than a litre per day.

'Children treat soft drink now as we treat water. We have to have water to survive. We don't have to have soft drink to survive,' she said.

Ms Kosky said low-joule soft drink versions would be exempt from the ban, with drinks such as Coke and Pepsi, for example, replaced with sugar-free Coca-Cola Zero and Pepsi Max.

US research shows teenagers who consume one can of soft drink a day are likely to be up to 6.4 kg heavier after a year than those drinking artificially-sweetened versions.

Ms Kosky said the government would also restrict the type, quantity or availability of confectionery at school.

But she said the government needed to ensure the bans did not create a junk food 'black market'.

Fatty foods were next on the hit list, she said.

Australian Medical Association president Dr Mukesh Haikerwal said the ban was welcome, but did not go far enough. 'Water is the only drink that should be available in schools,' he said.

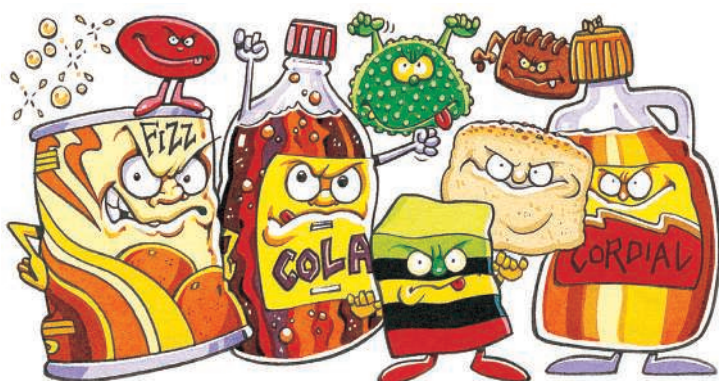
Source: Herald Sun, food and schools articles www.heraldsun.com.au

23 April 2006

FALLING FLAT AT CANTEENS					
BANNED					
	PEPSI	COKE	SUNKIST	SCHWEPES LEMONADE	SOLO
HEALTHIER CHOICES					
	COKE ZERO	PEPSI MAX	WATER	REV low-fat milk	POPPER JUICE, APPLE
SUGAR CONTENT	11.04g sugar per 100ml; 196.5kJ per 100ml	10.6g sugar per 100ml; 180kJ per 100ml	13.5g sugar per 100ml; 232.4kJ per 100ml	11.3g sugar per 100ml; 195.8kJ per 100ml	12.1g sugar per 100ml; 212kJ per 100ml
	Nil sugar; 1.4kJ per 100ml	Nil sugar; 1.20kJ per 100ml	Nil sugar; Nil kJ	4.9g sugar (naturally occurring lactose or milk sugar) per 100ml; 191kJ per 100ml	No added sugar; 10.5g sugar (naturally occurring fructose) per 100ml; 204kJ per 100ml

Fizz and tell

1. Survey the class to find out:
 - (a) how much soft drink they consume in a week (in millilitres)
 - (b) which types of soft drinks are consumed.
2. (a) Present your results in a format that can be shared with others.
 (b) Comment on your results. Were they what you expected or were you surprised? Were there patterns? What other sorts of information would you like to know to further analyse the data?
3. The article 'Schools set to lose their fizz' states that almost 80 per cent of teenagers consume soft drinks weekly, with 10 per cent of teenagers drinking more than a litre a day. Comment on whether your data support this statement.



More fizz and tell

Consider the statement:

'Sugar-loaded soft drinks should be banned from all Australian schools to reduce teenage obesity.'

1. Construct a PMI on the statement.
2. Do you agree with this statement?
3. (a) In the classroom, construct a human graph to show people's opinions on the statement. Stand in positions to indicate:
 strongly disagree (0) — stand next to the left-hand wall
 agree (2) — stand in the centre of the room
 strongly agree (4) — stand next to the right-hand wall
 (b) Have a discussion with students standing near you to find out the reasons for their opinion.
 (c) Listen to students' discussions in other positions.
 (d) Construct a SWOT diagram to summarise what you have found out.
 (e) Record the results of the human graph and examine them to answer the following questions.
 (i) What was the most popular attitude? Suggest a reason for this.
 (ii) What was the least popular attitude? Suggest a reason for this
 (iii) Do you think this attitude pattern is representative of other Australians your age? Explain.
 (f) On the basis of your discussions, have you changed your attitude since the start of this activity? If so, how is it different and why?

activities

ANALYSE AND EVALUATE

- 1 Read the article 'Schools set to lose their fizz' and answer the following questions.
 - (a) Which types of drinks will be banned from all Victorian state schools?
 - (b) How much sugar do most non-diet soft drinks contain?
 - (c) What fraction of Australian children are considered overweight?
 - (d) What may overweight children have an increased risk of?
 - (e) What other types of foods may be next on the hit list?

- (f) Calculate and graph the amount of sugar in a 375 mL can of Pepsi, Coke, Sunkist, lemonade and Solo.

THINK AND DISCUSS

- 2 Do you think that too much soft drink is being drunk by people your age? Should it be changed or monitored? What are some implications about the amount of soft drink consumed?
- 3 What are your opinions on the state government being able to dictate the types of foods that are available to children in schools?
- 4 Do you think the Victorian Government's ban on soft drinks in

schools will help reduce obesity in teenagers? Give reasons to support your opinion.

- 5 What other lifestyle habits should the government be involved in? How should they approach this? Provide reasons why you think they should be involved.

INVESTIGATE AND SHARE

- 6 Is childhood obesity a real issue in Australia? Research various resources to gather as much relevant information as you can. On the basis of your research and personal beliefs, construct an argument to prepare for a debate with someone who has an opposing view.

Remember me?

While learning is about gaining new knowledge, memory is about retaining and then retrieving that knowledge.

Learning memories

You have a number of **memory systems** for different types of learning. These include: spatial memory, procedural memory, episodic memory, working memory and semantic memory.

Mental mapping

Your **spatial memory** is your 'map' memory. You use this memory to make mental maps of where things are and how to get from one place to another. You can strengthen this memory by drawing maps, using visual thinking tools or graphic organisers.



Skill learning

Your **procedural memory** is your 'skill' or 'how to' memory. This memory system is often involved in learning physical activities such as throwing a ball, writing your name or riding a bicycle. Although skills can be difficult to master at first, repeatedly practising them can eventually make them easy and automatic.

Eventful episodes

Episodic memory is designed for 'episodes' or events that occur at one time and place. When events are emotionally charged or rich in sensory details, they are more likely to be stored in long-term memory. When you are emotionally engaged in an event, your brain's neurons fire faster and increase the chances of you remembering it. Using memory journals, reliving the event or changing your learning environment can enhance this type of memory.



What's on your mind?

Your **working memory** is your 'thinking' memory. It refers to what you remember at a given moment — literally 'what's on your mind'. It allows you to deal with recent information and temporarily store it. Studies suggest that you can keep up to seven pieces of information in mind at one time. You can develop this memory by reflecting on your own thinking, taking notes and sharing your thinking with others.



Tell me facts

Your **semantic memory** is your 'fact' memory. These memories are created through practising repeatedly, connecting your new learning to your old learning, using mnemonics and making the information meaningful to you.



Unlocking your memory doors

There are keys that you can use to unlock your memory doors. Seven of these are primacy, recency, repetition, standing out, association, chunking and visuals.

Primacy and recency

When you read a book or see a movie you will usually remember the beginning and the ending. **Primacy** is about recalling and remembering the first time that you do something. **Recency** is the opposite. It is remembering the last time or the ending.

Repetition

Repetition, or regularly reviewing information, is needed to reactivate your stored memory and prevent it from being buried under layers of other information. Research suggests that you can achieve about 90 per cent recall if you review content within 24 hours. This drops to 30 per cent if you review after 72 hours (3 days). Repetition can be achieved visually, by reading, playing games with the new information, highlighting or using visual thinking tools.

Standing out

Think about a lesson that you remember well. What made it more memorable than other lessons? Was it fun? Was there something different or new about the experience? Did you use mnemonics or analogies? All of these things can help content **stand out** and make it easier for you to remember it.

Association

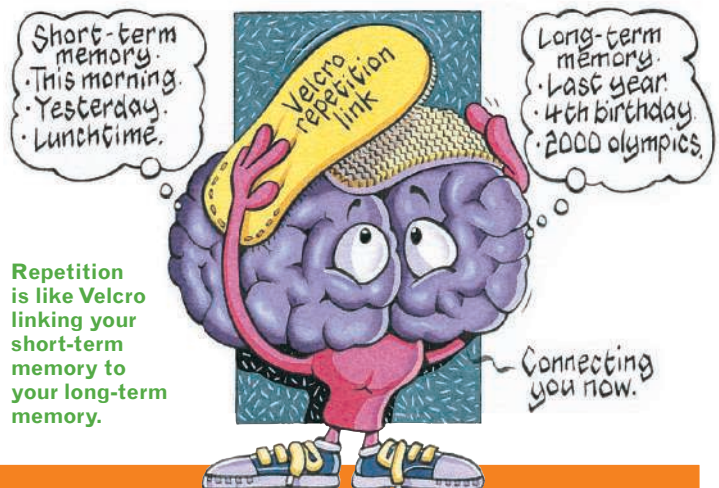
If new knowledge is linked to previous knowledge your recall is greatly enhanced. This is called learning by **association**. It helps you to anchor the information in time and space. Using real-life examples or metaphors can assist in this, as can the use of smell, music and colour.

Chunking

How do you eat a whole elephant? The answer of course is 'a bit at a time'. Learning is similar. You don't have to learn it all at once. The short-term memory of teenagers can usually contain only five (plus or minus two) bits of information at once. By organising information into small **chunks**, it is easier to remember it.

Visuals

Reading text in colour can help you to use both sides of your brain. The same can be said for a dramatic acting out; for example, performing the story of how blood flows through your body.



activities

REMEMBER

- 1 How can you transfer short-term memory into long-term memory?
- 2 Construct a mind map to summarise the five memory systems.
- 3 Sketch seven keys. On each key describe a memory key strategy.

THINK, CREATE AND SHARE

- 4 (a) Name the memory system that:
 - (i) is most useful during a geography lesson
 - (ii) becomes 'automatic' with lots of practice
 - (iii) helps you to remember facts and formulae
 - (iv) engages your emotions.

- (b) Give examples of when and how you have used each of the memory systems.

- 5 The colour red is directly stored in your long-term memory. List examples of vehicles, signs and symbols that have applied this knowledge. Suggest reasons why your brain processes the colour red in this way.
- 6 Create and present a rhyme, song or poem about:
 - (a) your memory systems
 - (b) memory keys.

INVESTIGATE AND SHARE

- 7 Research one of the memory systems and construct a booklet, poster, PowerPoint presentation, web page, brochure or manual to show how you can use this system to improve your learning and memory.

Chemistry of love

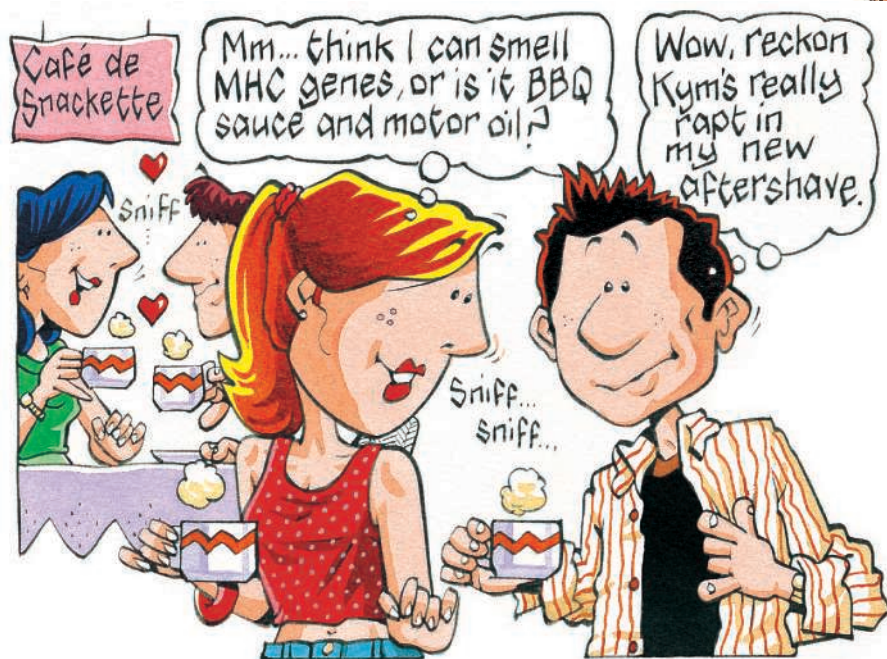
Selecting a mate can be one of the most crucial decisions of your life. This may be the person who you mix your nuclear DNA with! This selection process involves both conscious and unconscious choices. In the conscious part, there are some things that you might find attractive. For males, these are features that suggest youth and fertility, such as low waist-to-hip ratio, full lips and soft facial features. Females may be attracted to males with taut bodies, broad shoulders and masculine facial features that suggest sexual potency and good genes. Overall, there appears to be a universal preference for beauty, brains and resources. We also generally 'fall in love' with someone who has a similar 'attractiveness ranking' to ourselves.

Pick up lines?

The perfect chat up line? Don't bother! When you meet a stranger, it is estimated that what you say makes up only about 7 per cent of their impression of you. Your appearance and body language contribute a hefty 55 per cent and your style of speaking 38 per cent. So what can you do to increase your chances of impressing someone? Try not folding your arms so that you have an open posture, and mirror the other person's posture. This helps create a feeling of affinity. You could even indulge in a 'gestural dance' and synchronise your gestures and body movements with them (for example, sipping drinks at the same time).

Sniffing out a mate

Research on mate selection and genetics has shown that a particular set of genes known as the **major histocompatibility complex (MHC)** plays a part in who we are attracted to. These genes also play a role in our ability to fight pathogens. If mates have dissimilar MHC genes they will produce offspring with broader immune systems. Our ability to detect the similarity or differences in these MHC genes is not fully understood, but it is thought that smell provides an important cue.



On cloud nine

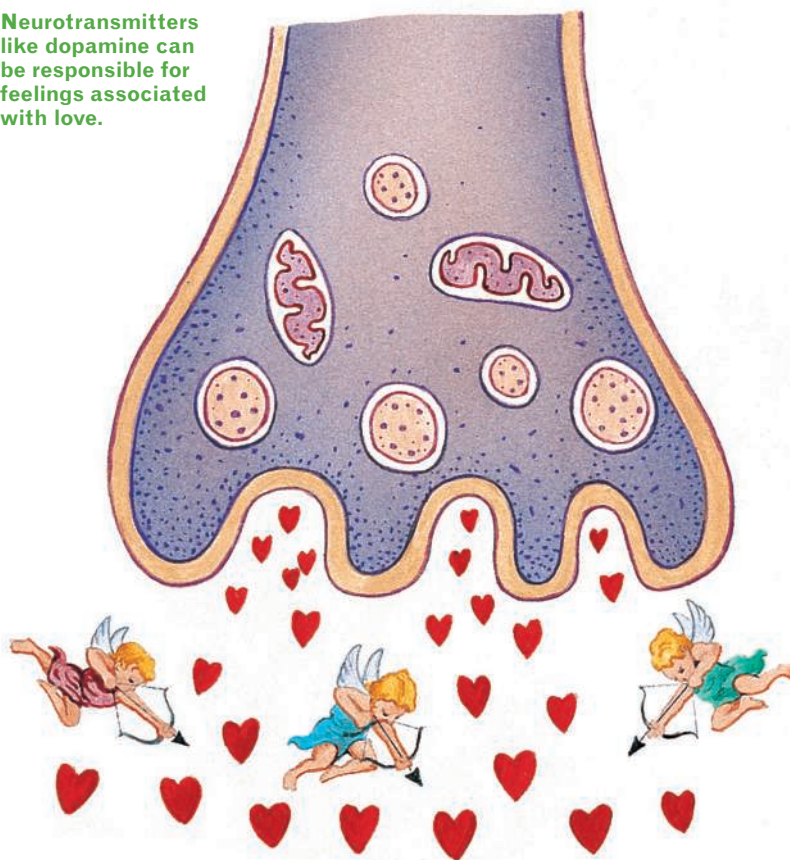
'Falling in love' activates the hypothalamus, which results in testosterone production. Lust can be switched on as a result. Raising levels of the neurotransmitter dopamine can also give you feelings associated with love. Drugs such as cocaine and amphetamines can simulate this by increasing levels of dopamine. Chocolate contains the 'love molecule' phenylethylamine, which can induce feelings of excitement and apprehension. Exercising can also give you the 'love hit'.

The trust hormone

Levels of the hormone **oxytocin** rise during sexual arousal. Oxytocin can boost feelings of trust as this hormone reduces activity in your amygdala — the part of your brain that signals fear. This makes it easier to bond with another person — an important step in developing a loving relationship.

Research also indicates that oxytocin may be the critical link between newborn infants and their mothers. Raised levels of **oestrogen** late in pregnancy boost the number of receptors for oxytocin in various parts of the brain. During birth, labour triggers the release of oxytocin and causes a type of 'addiction' between the mother and her baby. This bonding process involves powerful activation of the dopamine reward circuit of your brain.

Neurotransmitters like dopamine can be responsible for feelings associated with love.



activities

REMEMBER

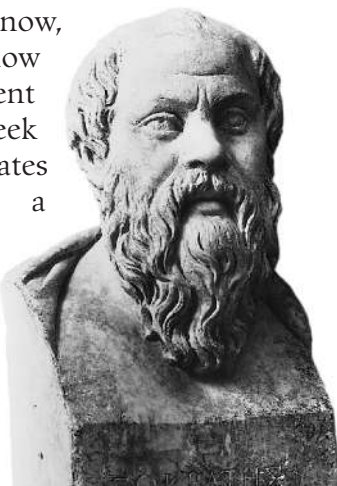
- 1 What are some physical attributes of males that suggest sexual potency and good genes?
- 2 Suggest what the major histocompatibility complex has to do with mate selection.
- 3 How can you increase your chances of impressing someone using only non-verbal communication?
- 4 State how the following hormones and neurotransmitters may be involved in mate selection or feelings of love: testosterone, oxytocin, dopamine, oestrogen, phenylethylamine.

INVESTIGATE, THINK AND DISCUSS

- 5 (a) What is sexual selection? Give two examples.
(b) How is sexual selection different from natural selection?
(c) Suggest implications of sexual selection for our species.
(d) Suggest the possible impact of sexual selection on your future reproductive life.
- 6 While the science of love is still in its infancy, advances in molecular biology and technology have increasingly allowed us to peer through its window.
(a) Find out examples of research on the chemistry of love or love potions.
(b) Do you believe that this research should be continued? Give reasons.
(c) Suggest possible issues that may arise with the knowledge obtained and its possible applications.
(d) Discuss if, how and who should regulate or control this type of research.
- 7 Research one of the hormones or neurotransmitters mentioned.
- 8 The term love can mean different things to different people: the love of a mother, passionate love, the long-term love of a companion, or religious love.
(a) Why have we evolved to feel love? Suggest ways in which these feelings may increase our chances of survival.
(b) Find out more about the different types of love. Research their similarities and differences.
(c) Are some types of love more important than others? Give reasons for your opinion.
- 9 What are pheromones? How may they be involved in mate selection?
- 10 Increasing numbers of people are finding love and their partners on the Internet.
(a) What is your opinion on this?
(b) Discuss your opinion with others in your team.
(c) Discuss the use of Internet-dating from biological, cultural, social and ethical viewpoints and construct a PMI to summarise your discussion.

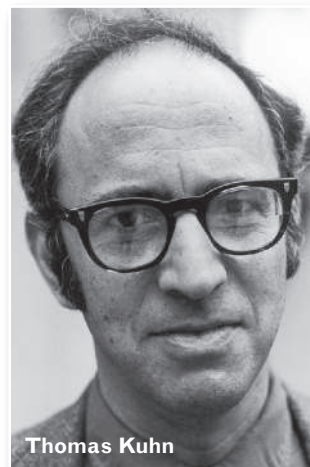
Change my mind . . .

‘One thing only I know, and that is that I know nothing.’ This statement is often linked to a Greek philosopher called Socrates (470–399 BC) who had a major impact on Western thinking and philosophy. This statement, however, also goes against what is commonly thought about science and scientists. Some consider that science will always have the answers and that scientists ‘know all’. Not only is such a belief untrue, it is also potentially dangerous. Thinking flexibly and with an open mind are better traits for a scientist to possess. The history of science and philosophy is littered with theories that at one time were considered to be the answer, but were later disregarded.



Socrates

- **paradigms** — or ways of thinking. Thomas Kuhn (1922–1996) saw science as being generated by basic theories or groups of ideas that are followed and defended by scientists. These paradigms are accepted even when data suggest that they may not be true. Only when the evidence against the theory becomes too great does the paradigm change, to be replaced by another, until it, too, is replaced.

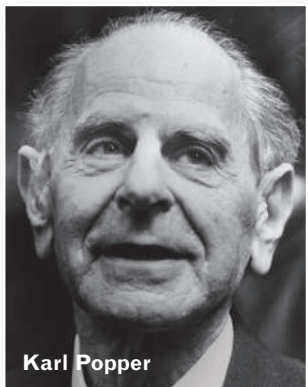


Thomas Kuhn

A tree of knowledge?

What is now considered as science may also be described as a branch of philosophy. This branch is involved in trying to explain our observations from both inside and outside our bodies. There are many different ways to analyse the ‘tree of knowledge’ that we call science. Three of these ways are:

- **inductionism** — suggests that scientific knowledge is proven knowledge and that large amounts of first-hand data, unbiased observations and a structured method can lead to theories that can become universal laws.
- **falsification** — the philosopher Karl Popper (1902–1994) believed that no theory was ever proven beyond doubt. He believed that theories were just educated guesses and if they failed rigorous testing they should be thrown out.



Karl Popper

Newton (1643–1727) and Descartes (1596–1650)

Newton's theory of universal gravitation stated that everything was attracted to everything else. This would mean that the sun's gravity would keep the Earth and other planets in orbit. Descartes, however, did not think that force could be transmitted through empty space and suggested that the Earth was in some kind of whirlpool that revolved around the sun.

Another difference between these theories was their predictions about the shape of the Earth. Newton's theory suggested that the Earth would be flatter at the poles and fatter at the equators due to the effects of gravitational force.

Descartes' theory suggested the opposite. In 1737, two expeditions left France to travel around the world and measure the curvature of the Earth to resolve the dispute. Upon their return, both expeditions provided measurements that supported Newton's prediction.



Changing theories

Theories can change overnight, or take a very long time to change. Theories that were once popular and well accepted may be discarded when too much evidence builds up against them. They are replaced by a theory which better fits the observations. The examples on this spread describe a past instance of rival theories and a current debate in astrophysics.

Invisible stuff?

Until recently, it was accepted that about 23 per cent of our universe was made up of stuff that we can't even see. This invisible 'dark matter' is said to lurk in the hearts of galaxies and keep the outermost stars from flying off into the void. It is thought to be responsible for the appearance of clusters of galaxies. But what if this isn't the case?

Newton's theories are again being questioned. A growing number of astrophysicists support a controversial new theory called Modified Newtonian Dynamics (MOND), which has led to some surprising predictions about the evolution of the universe. Previously, galaxies were thought to have formed from relatively dense pockets of matter with dark matter holding them together. The 'laws' of the MOND theory suggest a different picture is possible. If correct, this theory could overthrow the established view of gravity and dark matter. These two areas underpin almost everything 'known' about astronomy. MOND may also lead to a rethinking of Einstein's theory of relativity.

1933	Fritz Zwicky coins the term 'dark matter' to describe unseen mass or 'gravitational glue' in galaxy clusters.
1978	Astronomers show that many galaxies are spinning too quickly to hold themselves together unless they are full of dark matter.
1983	Mordehai Milgrom publishes a modified gravity theory called MOND. It explains why galaxies don't fly apart without using dark matter, but remains at odds with Einstein's relativity.
1990s	Studies of galaxies and galaxy clusters show that their gravity bends light more strongly than is expected without dark matter. MOND researchers start devising improved theories to explain extra light bending.
1994	Jacob Bekenstein and Roger Sanders prove that any theory that resolves the light bending issue and meshes MOND with relativity must involve at least three mathematical fields.
2000	New data on the cosmic microwave background reinforces the standard, dark matter picture of the universe.
2004	Jacob Bekenstein devises a version of MOND that is consistent with relativity.
2005	Constantinos Skordis and others show that relativistic MOND provides a good fit to the microwave background data.

Dark matter vs MOND. Will the MAXIM Pathfinder spacecraft detect gravitational anomalies that will support MOND?

activities

THINK AND DISCUSS

- 1 Brainstorm and list scientific theories that are no longer in favour.
- 2 Isaac Newton defined his three 'laws' of motion. What were they and are they still accepted?
- 3 What is 'bad' science? Give examples.
- 4 (a) State what you think the modern goals of science are.
(b) Suggest the goals of science 100 years ago.
(c) Comment on any similarities and differences.
- 5 (a) Use an annotated sketch to describe what you believe the commonly held image of 'a scientist' is.
(b) Use a visual thinking tool to describe the media's representation of 'scientific research'.

INVESTIGATE AND PRESENT

- 6 Find out more about the life and times of Newton and Descartes. Write a newspaper article of the times to describe their rival theories.
- 7 Research one of the following scientists and outline a theory that they have been involved in constructing.
Charles Darwin, Michael Faraday, Ernest Rutherford, Jean-Baptiste Lamarck, Francis Crick, Gregor Mendel or Albert Einstein
- 8 Research a scientist of your choice and find out some of their contributions to science and what life was like when they were alive. Dress up as the scientist and take on their character in discussions with other classmates.
- 9 What is herb lore? Does it have any place in science?

Difficult decisions

How far would you go to get into your school musical? Here are some of the things you might do.

- Try harder in your drama lessons.
- Trip up your fellow auditioners to try to injure them.
- Go along to singing lessons once a week.
- Go along to all the drama workshops available.
- Practise on your own as well as in the singing and drama classes.
- Do odd jobs in order to pay for private drama and voice classes.
- Be really nice to the teacher running the auditions.
- Get your parents to pay for private coaching.
- Play truant to work in a fast-food restaurant in order to pay for private coaching.
- Drink a special 'herbal' drink that your singing teacher recommends to improve your pitch.
- Steal the scripts from the contenders for the lead role.

Science and rights and wrongs

Science often helps us to answer questions about what we can do. For example, if someone wants to know about the effect of diet or drugs on their athletic performance, science can provide answers. Science can also provide information about the other possible effects that these things might have on an athlete's body. But science is no help to us when we want to know what we *should* do. To help us decide how to behave, we use ideas about right

and wrong, which is where **ethics** come in.

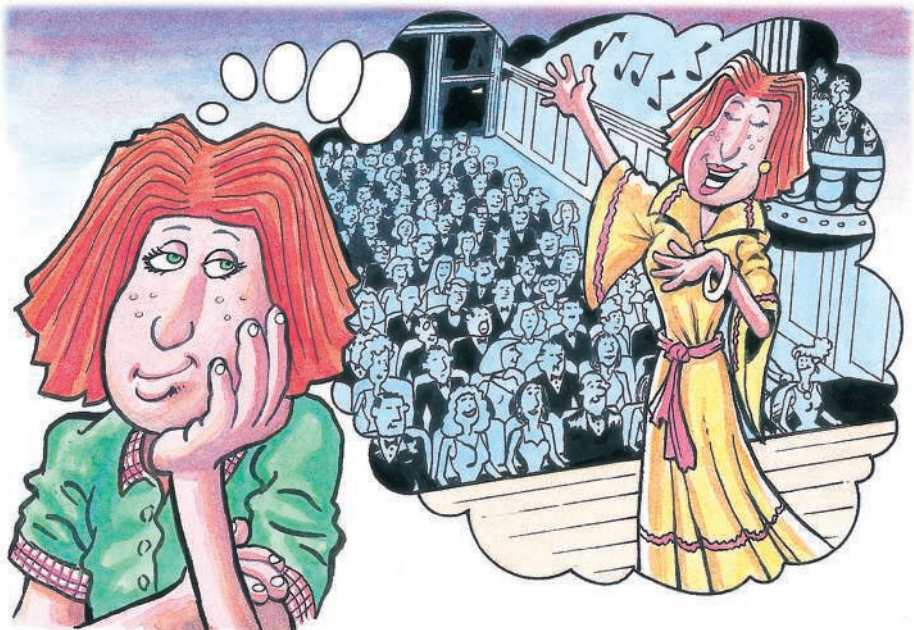
Scientists study the world around us and try to come up with explanations of why it behaves as it does. Ethicists try to understand human behaviour, particularly when it involves decisions about right and wrong. These decisions are not always easy, especially when we have two or more possible courses of action, each with its good and bad points. One way of helping to make difficult decisions is to consider the goals, rights, needs and duties of all those involved in a decision or those who could be affected by it.

Shona in the illustration below wants to get a place in the school musical. This is Shona's **goal** — it is something she wants to achieve. However, Shona does not have a **right** to a place in the musical, although, as a student of the school, she does have the right to try for a place. A right is something we have if we can expect to be treated in a certain way, no matter what the consequences. A right is different from a need.

A **need** is something we require. We all have the need to feel we are doing something worthwhile. If Shona gets a place in the musical, she will have a **duty** towards her fellow actors. We often think of having a duty as being required to act in a certain way; for example, telling the truth. Shona may have several duties, such as learning her lines and attending rehearsal sessions.

Duties often derive from goals and rights. For example, if you are accused of a crime and appear in court, you have a right to a lawyer, regardless of whether you are innocent or guilty. Your lawyer has a duty to try to get you acquitted — this is your lawyer's goal.

Some situations can become very complicated. For example, a dying man asks his doctor not to keep him alive any longer. Does the doctor have a duty to carry out the man's wishes because of the man's right to decide when and how to die? Or does the doctor have a duty to ignore the man's wishes because of the goal of preserving life?



REMEMBER

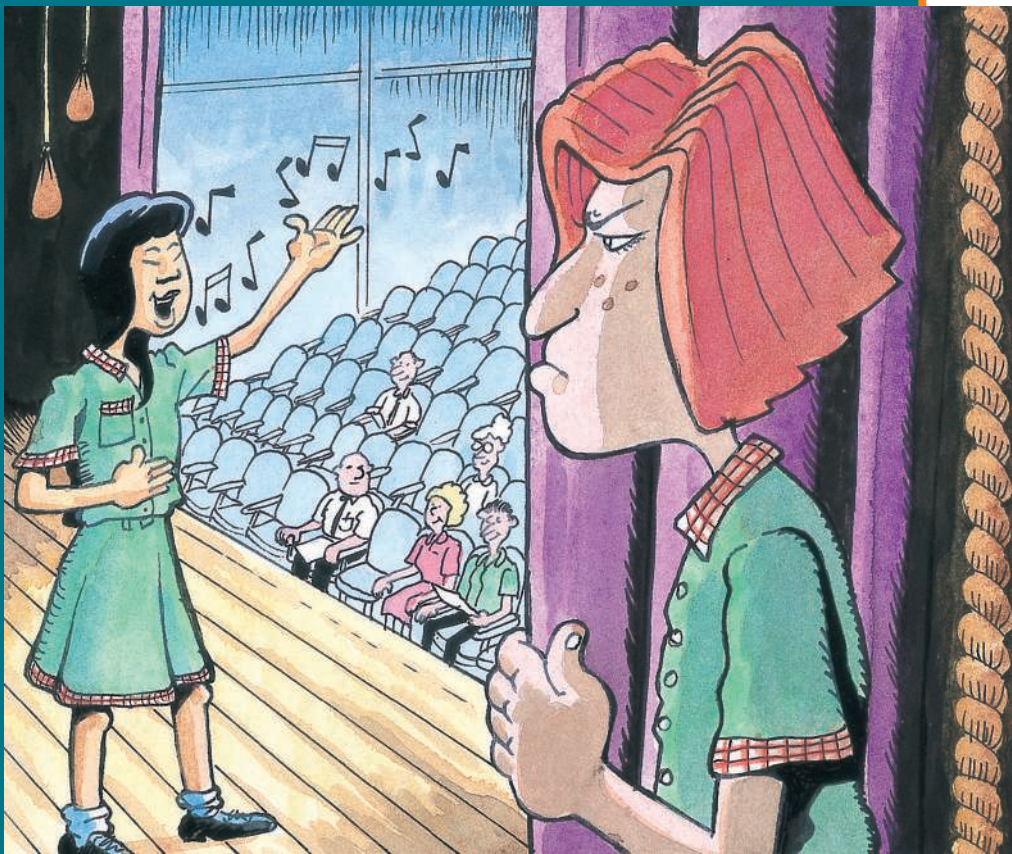
- 1 (a) When it comes to making decisions, how can science help us?
(b) What can science not help us with?
- 2 What is meant by the terms: 'goals', 'rights', 'needs' and 'duties'?

THINK

- 3 (a) Laura is a member of the pre-musical performance squad. Shona would like to be a member of the squad. Think about this situation and the goals, rights, needs and duties that Laura and Shona each have, and then copy and complete the table below.
(b) How people behave in any situation is largely determined by how they perceive the relative importance of their goals, rights, needs and duties.
 - (i) Describe how Shona may have behaved if she perceived that her goals and needs were of greater importance than those of others.
 - (ii) Contrast this with the behaviour you may expect if she had perceived her duties as being less important than those of others.
 - (iii) How do you think Laura and Shona should behave towards each other?

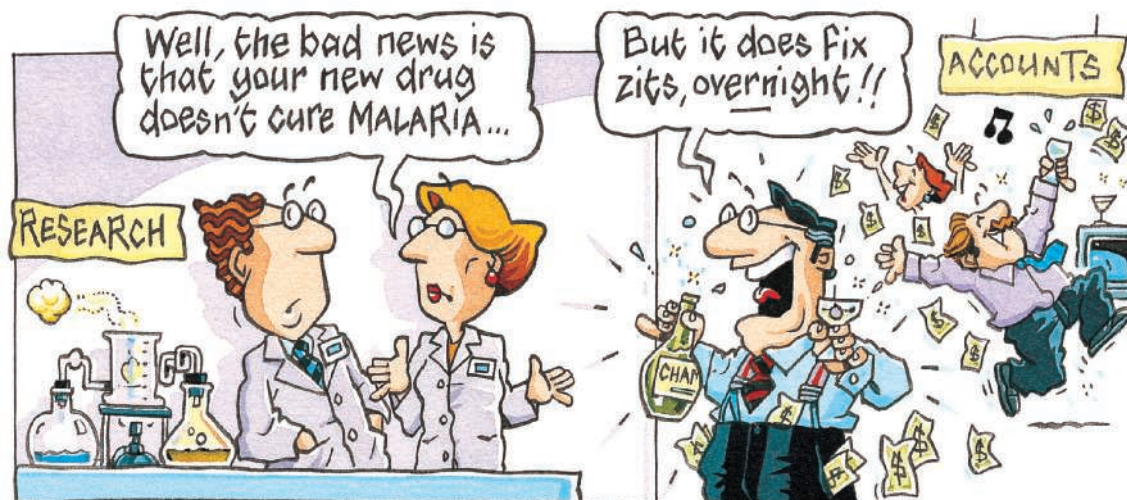
RESEARCH

- 4 We have had to face some very complex and difficult issues because of recent scientific and technological advances. Examples of issues being faced in Australia include:
 - compulsory immunisation of children
 - genetic manipulation of food crops and animals to optimise such things as their resistance to pests and their growth rate
 - irradiating food to maximise its shelf life
 - public funding of IVF technology
 - reducing irrigation to improve water quality of rivers
 - building a new nuclear reactor in Australia.
- Research one of the issues above. Make a table of the reasons for and against the issue and present your findings to the class.



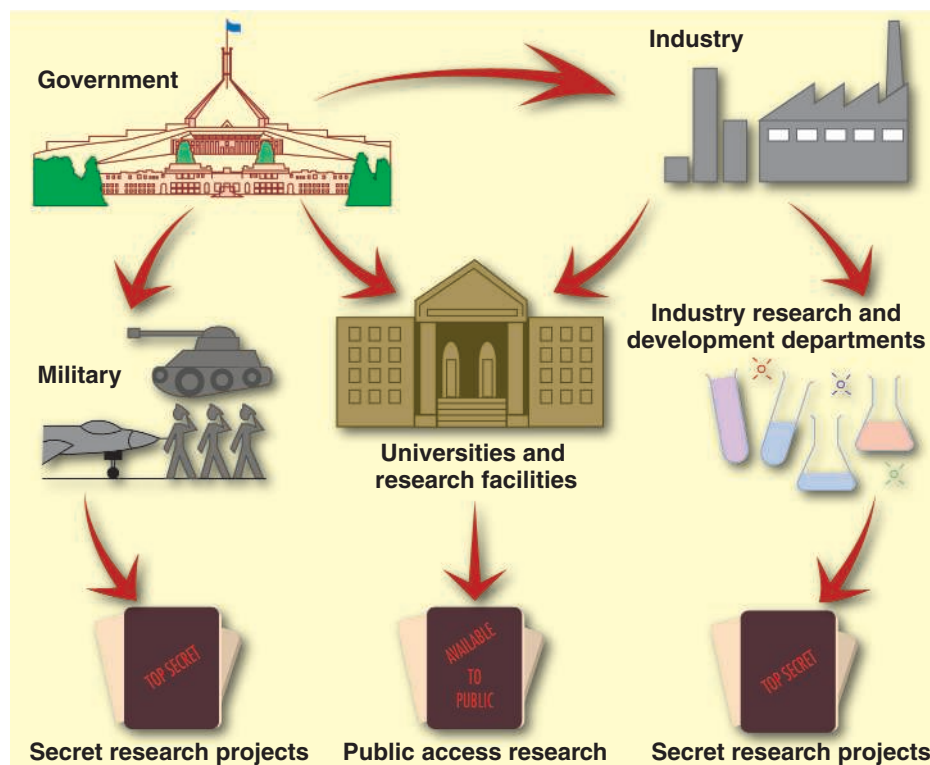
Person	Goals	Rights	Needs	Duties
Laura				
Shona				
teacher in charge of casting				
audience for the musical				
rest of the cast				

Who is responsible?



Should science delve into 'the mysteries of life'? Who decides what will be researched and how discoveries will be used? Is science all about fame and fortune, or is it about seeking the truth? What is your image of science?

Scientific research is responsible for discoveries that have been of great value to humankind. A quick glance around us shows lots of products of science that increase our efficiency and improve our lifestyles. Scientific research is also responsible for discoveries that have had negative impacts on individuals, communities, countries and our environment. But when we talk about responsibility, is it science and the discoveries that are responsible, or is it the way in which the knowledge has been used? Who is responsible for how the knowledge is used? These issues are relevant to many examples of current scientific research. Bird flu, vaccines and drug testing on humans are discussed here.



An example of the movement of money in science

Bird flu

In the past century, variations of the 'bird flu' virus H5N1 have been responsible for pandemics in which large numbers of humans died. The viruses H1N1 in 1933, H2N2 in 1957 and H3N2 in 1968 preceded the appearance of H5N1 in 1997.

Some articles in the media suggest that the offspring of a modified H5N1 virus may contribute to the end of the human race. Scientists have stated that if there is mixing of the genetic material of the human flu virus with this bird flu virus then it may create something that our immune systems can't fight. In such a situation, millions of people may die. Individual genetic variations may be a key factor in 'deciding' who will live and who will not survive.

Our main chance of survival may be the development of a vaccine against a virus that does not yet exist. It is another example of how possible need can direct the journey of scientific discoveries. In this frenzy to create vaccines, many issues arise. How much information should be shared with companies, governments, countries and the public? Will only those who can afford treatment receive it? Is this the new form of natural selection? Who is responsible for taking control and regulating the research and its discoveries?

Human guinea pigs

A new drug, TGN1412, was designed to treat leukaemia and certain autoimmune diseases such as rheumatoid arthritis. In rheumatoid arthritis, the body's immune system turns upon its own tissue and attacks it. TGN1412 is a powerful antibody that works by binding to the immune system's T cells, causing them to activate and multiply rapidly.

TGN1412 made headlines in 2006 after its first trial on human subjects. It was given to six healthy young men in the UK, and caused severe adverse reactions that required intensive care. One man's head swelled to three times its normal size, causing excruciating pain. The worst affected trial volunteer was 20-year-old Ryan Wilson, who was in a coma for three weeks after taking the drug. Drug trial volunteers are mainly young people, and many are backpackers and students who are attracted to the payments made by pharmaceutical companies. Other controversies have arisen following drug trials in Nigeria and India, where it was unclear whether patients had given their informed consent.

How much information should be given to drug trial volunteers? Who should be involved in trialling new drugs?

'Old' viruses

Only about 75 per cent of the world's children are being vaccinated against viruses such as measles, whooping cough and chickenpox. Some of the new vaccines, for example against hepatitis and meningitis, have hardly been used at all. If these vaccines can reduce the chance of others becoming ill or dying from particular diseases, who has the responsibility to make sure that they are effectively used? Should the individual take responsibility, or should it be the community, government or scientists?

Bid to activate cells goes horribly wrong

LONDON: The drug involved in the trial that resulted in six volunteers becoming critically ill is designed to activate the killer cells of the immune system. TGN1412 appears to have done so in this case to spectacularly damaging effect.

The Australian, 17 March 2006

Global pleas for drug test victims

DOCTORS in London treating six young men who became seriously ill after taking part in a drug trial are consulting experts around the world to try to save their lives.

The Age, 18 March 2006

Human guinea pigs in agony

THE ads made the job sound more like a holiday at Club Med than a medical experiment.

Their heads felt like they were going to explode. 'Free food for the duration of your stay — and no shopping or washing up', promised the internet site calling for healthy young men to volunteer.

The Advertiser, 19 March 2006

Drug trial sent men's immunity 'haywire'

A PROTOTYPE drug that went catastrophically wrong, leaving six young British men dangerously ill, may have caused the victims' immune system to go haywire.

The Age, 23 March 2006

DOUBT CAST OVER DRUG TRIAL SAFETY

THE adverse side effects that occurred in a drug trial that hospitalised six healthy volunteers could have been predicted.

BBC News

activities

THINK AND DISCUSS

- 1 Discuss the following statements with your team.
 - Scientists have a responsibility to consider the wider impact of their research.
 - Science should have an international rule book that states what is allowed and what is not.
 - Individuals can influence the type of scientific research performed.
 - The government controls what is done with scientific research.
 - Science should not have to answer to anyone!
 - Companies should have total ownership of any research they financially support.
 - Scientific discoveries should belong to everyone.

INVESTIGATE AND REPORT

- 2 (a) Select a topic from the following list and research the types of issues facing science and scientists.
Stem cells, nanotechnology, virology, radiation, nuclear power, genetic engineering, genetic testing, IVF, abortion,

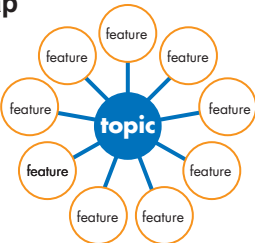
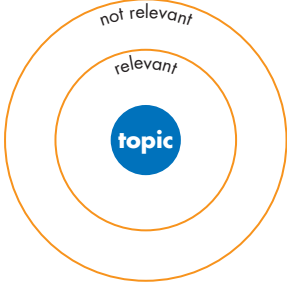
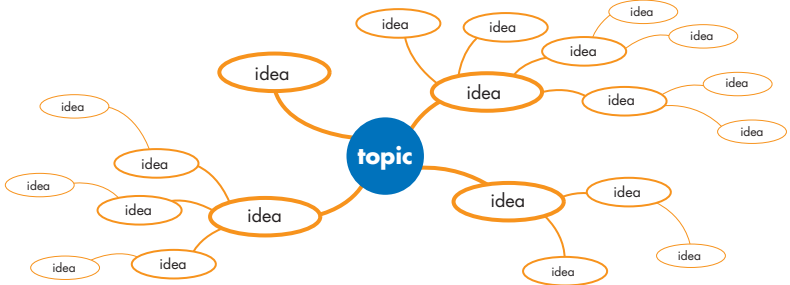
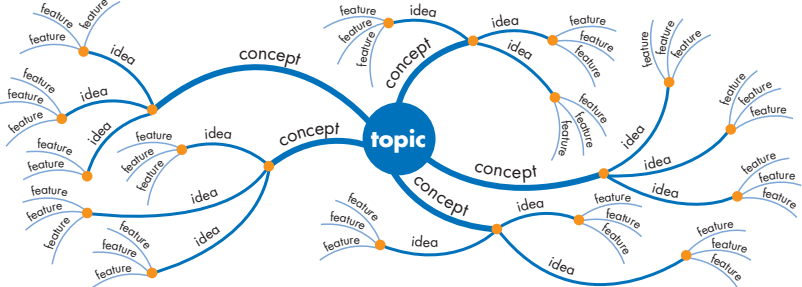
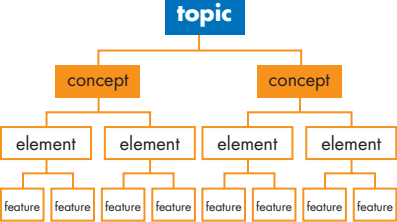
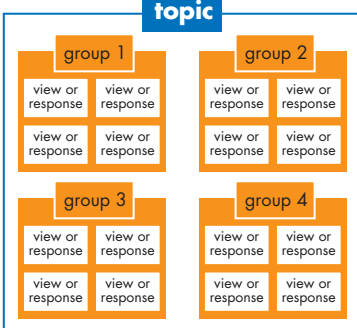
vaccinations, AIDS, H5N1 or mad cow disease.

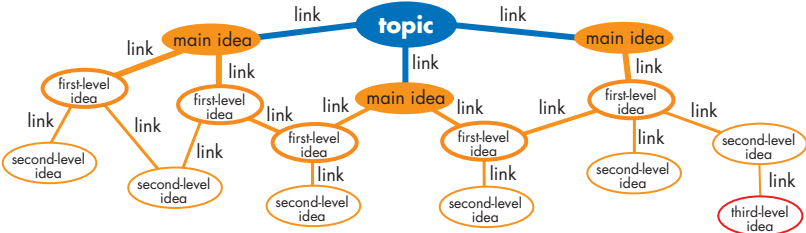
- (b) Organise your findings in a web page, PowerPoint presentation, poster or visual thinking tool.
- (c) Discuss your findings with others in your team. As a team, try to identify relevant values, beliefs, opinions and attitudes which may contribute to people having different perspectives.
- (d) Present your findings to the class and get them to construct their own PMIs based on the information that you provide.
- 3 (a) Find out more about pandemics H1N1 in 1933, H2N2 in 1957, H3N2 in 1968 and H5N1 in 1997.
 - (b) Could they have been avoided? If so, suggest how.
 - (c) Write a story from the perspective of a child who lost one of their family or friends to one of these pandemics.
- 4 Research and organise a class debate on one of the following:
 - (a) the Manhattan Project
 - (b) embryonic stem cell research
 - (c) Chernobyl and nuclear power stations
 - (d) genetic testing
 - (e) organ transplants.

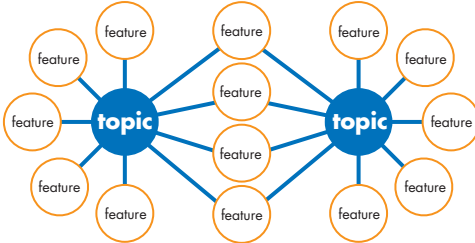
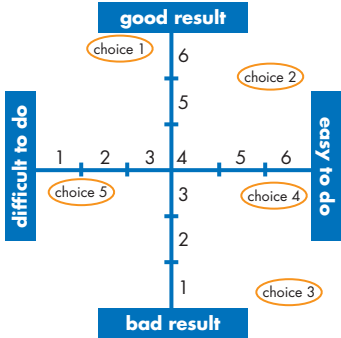
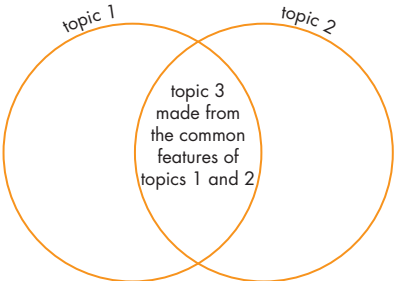
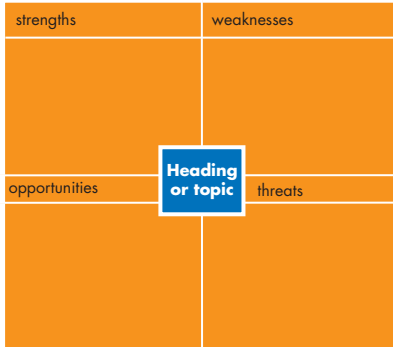
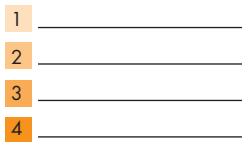
See quest

Visual thinking tools can be used to help share your thinking and to be able to see how and what other people are thinking. They can be used to clarify key ideas, show links and suggest relationships, and prompt discussions on many different

topics and issues. They can also be useful in helping you to evaluate ideas and to consider various alternatives in your decision making. Examples of some of the types of thinking and their visual tools are shown in the table on pages 24–7.

Type of thinking	Thinking tools
Think about topic and organise content 	Single bubble map <i>Q: What do I already know about this topic?</i>  Target map <i>Q: How can we agree on what is relevant to our discussion?</i> 
Cluster map <i>Q: How could I develop this idea?</i>	
Mind map <i>Q: What are the main points?</i>	
Tree map <i>Q: How do the parts of a topic relate to each other?</i> 	Affinity map <i>Q: What are the common themes in different viewpoints?</i> 

Type of thinking	Thinking tools										
Think about topic and organise content 	Plus, minus, interesting <i>Q: What are other points of view? How can I prepare to make a decision?</i> topic/theme/idea plus minus interesting	KWL <i>Q: What do I know about this topic? What do I want to know about it? What have I learnt?</i> <table border="1" data-bbox="1070 338 1417 499"> <thead> <tr> <th colspan="3">KWL</th></tr> <tr> <th>What we Know</th><th>What we Want to find out</th><th>What we have Learned</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td></tr> </tbody> </table>	KWL			What we K now	What we W ant to find out	What we have L earned			
KWL											
What we K now	What we W ant to find out	What we have L earned									
	T chart <i>Q: What does the problem or situation look and sound like?</i> Looks like Sounds like	Y chart <i>Q: What does the problem or topic look like, sound like and feel like?</i> feel hear see									
	Corner thinking <i>Q: What is the relationship between these ideas?</i> A B	Hourglass <i>Q: What is the topic? What do I/we know about it? What if ... ?</i> Know/recall TOPIC What if?									
	Concept map <i>Q: How can I describe this topic to someone else?</i> 										

Type of thinking Compare and contrast 	Thinking tools																															
Double bubble map <i>Q: What are the main points?</i> 																																
Priority grid <i>Q: What are the relative strengths and weaknesses of this idea? What is the best way to tackle the problem?</i> 	Continuum <i>Q: How extreme is this idea? How strongly do I and others feel about it?</i> 																															
Venn diagram <i>Q: How can I describe this topic to someone else?</i> 	SWOT analysis <i>Q: What are the strengths and weaknesses of the idea?</i> 																															
Ranking ladder <i>Q: How important is this? Which is the highest priority?</i> 	Matrix <i>Q: How do the parts of a topic relate to each other?</i> <table border="1" data-bbox="1002 1677 1401 1934"><thead><tr><th>topic</th><th>feature A</th><th>feature B</th><th>feature C</th><th>feature D</th><th>feature E</th></tr></thead><tbody><tr><td>1</td><td>✓</td><td></td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2</td><td></td><td>✓</td><td></td><td></td><td>✓</td></tr><tr><td>3</td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td></tr><tr><td>4</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr></tbody></table>		topic	feature A	feature B	feature C	feature D	feature E	1	✓		✓	✓	✓	2		✓			✓	3		✓		✓	✓	4			✓	✓	✓
topic	feature A	feature B	feature C	feature D	feature E																											
1	✓		✓	✓	✓																											
2		✓			✓																											
3		✓		✓	✓																											
4			✓	✓	✓																											

Type of thinking

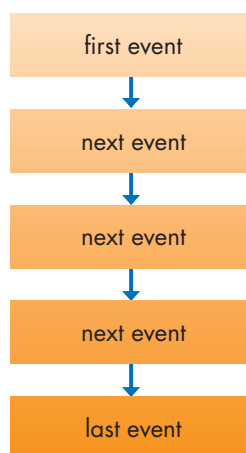
Sequence of events



Thinking tools

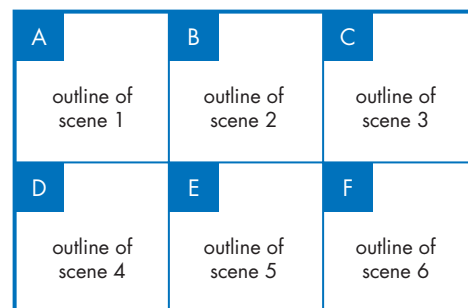
Flowchart

Q: How can you record the stages that occurred?



Storyboard

Q: What are the main ideas or scenes?



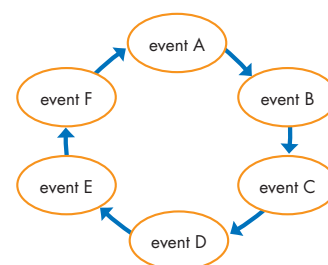
Gantt chart

Q: How do actions in the story or event overlap?

action	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1							
2							
3							
4							
5							
6							
7							
8							

Cycle map

Q: What patterns can be seen in these events?

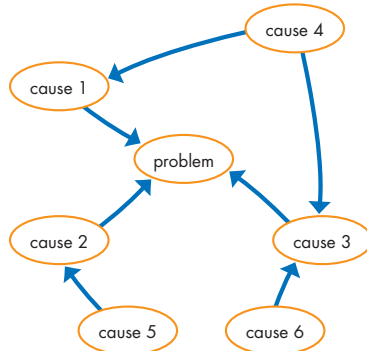


Cause and effect



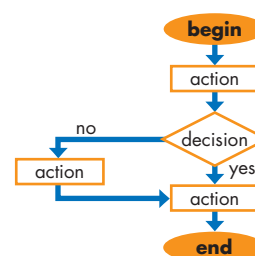
Relations diagram

Q: What is causing the problem?



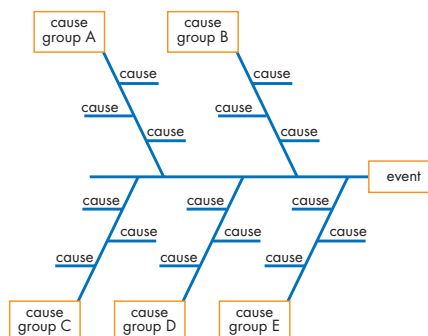
Algorithm

Q: How can different decisions I make solve this problem?



Fishbone

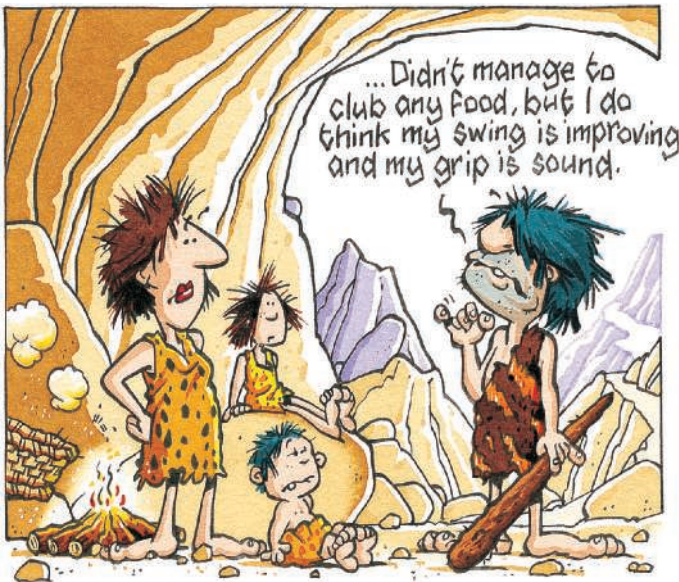
Q: What could have caused this event to happen?



Looking back



1. Carefully study the cartoon below.
 - (a) Paraphrase what the caveman is saying.
 - (b) Predict what his wife will say in return.
 - (c) Suggest what the caveman may say to his wife's comment.
 - (d) Describe a time when you were in a similar situation.
 - (e) Create your own cartoon to describe a situation in which you effectively learnt something.



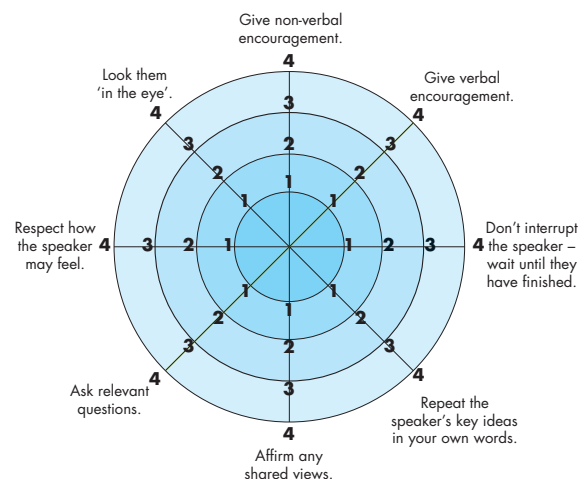
2. (a) Suggest how people remembered and communicated ideas before pen and paper.
- (b) What evidence is there that humans have tried to pass knowledge from generation to generation?
- (c) Which type of memory system would have been most useful to cave people? Justify your selection with examples.
- (d) Suggest examples of inventions that would have been useful to cave people.
- (e) Design and construct an 'invention' for cave people. Describe how and when it would be used.
3. In your team, research each of the following memory topics and construct at least five question cards for each area:
 - memory medicine
 - memory pseudoscience
 - sociology of memory

- philosophy of memory
 - phenomenology of memory
 - memory mythology
 - psychology of memory
 - classical biology of memory
 - molecular biology of memory
 - cognitive science
 - artificial memory.
4. (a) Create the board for your own 'Memoropoly' board game.
 - (b) Decide on the rules for your game and make an instruction booklet.
 - (c) Design and construct memory playing objects to move around the board.
 - (d) Try out your game and make any necessary modifications.
 - (e) Play your game with another team.

try This

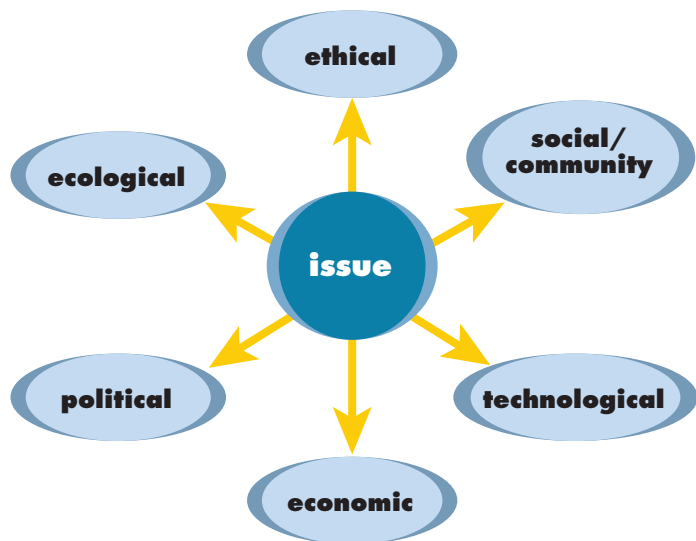
EEKK

Sit with a partner and position yourself 'Eye-to-Eye and Knee-to-Knee'. This will help you to maintain eye contact and will promote active listening. While positioned this way, take turns to tell each other about the sort of things that you think are important to make a good first impression. Use the active listening wheel below to score how effectively you think you actively listened and then score your partner for their active listening. Discuss what you found easy or difficult, and what you would try next time to enhance your listening skills.



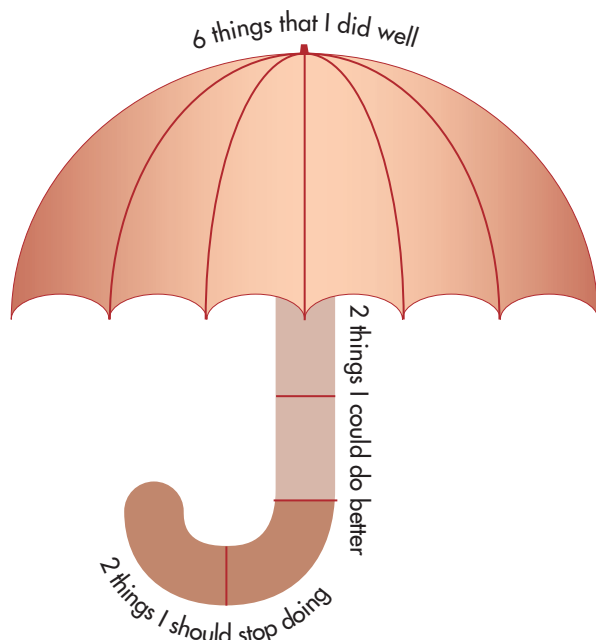
5. Use the issues map below to help you identify various perspectives on one of the following issues:

- Should watering of gardens be illegal?
- Cars should be driven only when there are at least four occupants.
- Scientists should be allowed to research whatever they want.
- If a vaccine for the dangerous variant of H5N1 is synthesised, it should be given only to children under 10 years of age.

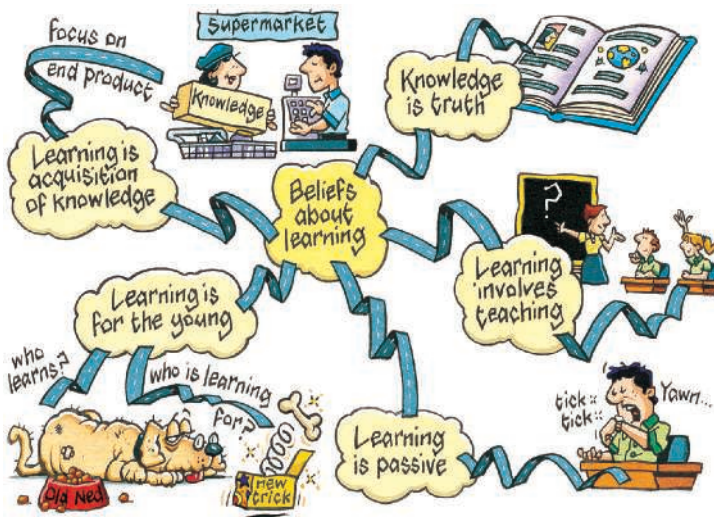


6. Use diagrams and thinking tools to describe yourself in the past, present and future. Explain how and why you arrived there.

7. Use the reflection umbrella to list six things that you do well, two things you could do better and two things that you should stop doing.



8. Consider each of the belief statements in the mind map below. Rank them from those you agree with the most to those you agree with the least. Explain your ranking. Compare and discuss your ranking with others.



9. Self-analysis reflection

I tried to have an open mind and think flexibly.	 0 1 2 3 4 5
I understood what I was to do.	 0 1 2 3 4 5
I asked when I was not sure what was expected of me.	 0 1 2 3 4 5
I persisted, even when the going was tough.	 0 1 2 3 4 5
I used my time effectively.	 0 1 2 3 4 5
I was well organised.	 0 1 2 3 4 5
I contributed to team discussions.	 0 1 2 3 4 5
I encouraged others.	 0 1 2 3 4 5
I actively listened to others.	 0 1 2 3 4 5

The most important thing that I learned during this chapter was ...