

# ***TH?NKING***

## **EDUCATION**

---

PRESENTS

# ***Better Questioning***

## ***STUDENTS AS QUESTIONERS***



by

**Michael Pohl**  
**Facilitator**

---

3/56 Finnis Street North Adelaide Sth Aust. 5006  
Ph/Fax +61 8 82672050 Mob +61 417 857 658  
Web : [www.thinkingeducation.com.au](http://www.thinkingeducation.com.au)  
Email : [mpohl@thinkingeducation.com.au](mailto:mpohl@thinkingeducation.com.au)

		<b>CRITICAL QUESTIONS</b>
<b>C</b>	<b>CONSEQUENCES CONSISTENCY</b>	<i>What are the consequences of believing this? How consistent is the information?</i>
<b>A</b>	<b>ASSUMPTIONS ACCURACY</b>	<i>What assumption has been made here? How accurate is the data / information?</i>
<b>M</b>	<b>MEANING MAIN POINTS</b>	<i>What is the meaning of this? What is the main point here?</i>
<b>P</b>	<b>PREJUDICE POINT OF VIEW</b>	<i>What prejudice is being shown here? What other points of view could be expressed?</i>
<b>E</b>	<b>EVIDENCE EXAMPLES</b>	<i>What evidence is given to support the claims? What examples are given to back up claims?</i>
<b>R</b>	<b>RELEVANCE RELIABILITY</b>	<i>How relevant are the claims? How reliable is the source, writer, information?</i>

M. Pohl, (1999), *Teaching Complex Thinking* Hawker Brownlow Education.

		<b>CREATIVE QUESTIONS</b>
<b>S</b>	<b>Substitute</b>	<i>Substitute a person, object or serve in a different way or role</i>
<b>C</b>	<b>Combine</b>	<i>Bring together or unite Blend ideas, materials, situations</i>
<b>A</b>	<b>Adapt</b>	<i>Adjust to suit another purpose or set of conditions</i>
<b>M</b>	<b>Modify magnify, minify</b>	<i>Modify attributes, frequency or size. Enlarge to make larger in form or quality Reduce to make smaller , lighter, less frequent</i>
<b>P</b>	<b>Put to another use</b>	<i>Use for an alternative purpose, in another situation or in a different way</i>
<b>E</b>	<b>Eliminate</b>	<i>Remove or omit a quality, a part or the whole</i>
<b>R</b>	<b>Reverse Reorganize</b>	<i>Change order, adjust or create a new sequence, layout or scheme</i>

Adapted from Eberle (1991) SCAMPER—Games for Imagination Vic: Hawker Brownlow Education



## CAMPER IN MUSIC

The following may form the heart of a critical analysis of a known or an unknown piece of music.

Note that the order of questioning may not necessarily follow the given sequence.

As a result, this structure may best serve as a checklist of the critical questions to be addressed when evaluating the strengths and weaknesses of a given piece of music.

		CRITICAL QUESTIONS
<b>C</b>	<b>COMPOSITION</b>	How effective are the compositional devices employed by the composer / arranger?
<b>A</b>	<b>ACCOMPANIMENT</b>	Comment on the type and style of the accompaniment. What would you say about the chord selection?
<b>M</b>	<b>MELODY MOTIFS</b>	In terms of the melody, how appropriate was : <ul style="list-style-type: none"> <li>the selection of the key?</li> <li>the construction of the melodic line?</li> </ul> What comment would you make about the tonality?
<b>P</b>	<b>PLOT PIECE</b>	Comment on the overall plot ( or form) of the piece.
<b>E</b>	<b>EFFECTIVENESS</b>	How might you justify the effectiveness or otherwise, of this as a piece?
<b>R</b>	<b>RHYTHM</b>	Suggest how the use of specific rhythmic devices used by the composer has enhanced or detracted from the overall appeal of the piece.

## SCAMPER IN MUSIC

Use the following cues to change / improve an existing composition or arrangement.

<b>S</b>	<b>Substitute</b>	What else instead? What other instrument (s) ? Other time signatures? What else ? Who else instead?
<b>C</b>	<b>Combine</b>	Combine other : <ul style="list-style-type: none"> <li>harmonies?</li> <li>rhythms ?</li> <li>melodies ?</li> </ul>
<b>A</b>	<b>Adapt</b>	What other melodies might fit this context?
<b>M</b>	<b>Modify magnify, minify</b>	<b>Magnify - What might be added or increased?</b> <b>Minify- What might be reduced or subtracted?</b> Can we modify: <ul style="list-style-type: none"> <li>Tessitura?</li> <li>Instrumentation?</li> <li>Tonality?</li> <li>Rhythm?</li> </ul>
<b>P</b>	<b>Performance</b>	New or novel ways to perform it? Different instruments, arrangement, orchestration ?
<b>E</b>	<b>Eliminate</b>	What may be left out all together? What parts are not required?
<b>R</b>	<b>Review</b>	Is there anything else that can be done to enhance the piece?



## Students as Questioners

*If we are serious about encouraging student engagement and student ownership of their own learning, then opportunities for students to be involved in the planning stages of developing learning activities can only serve to encourage such an outcome.*

## STUDENT GENERATED QUESTIONS

Ideally we want students to generate not just questions, but to come up with questions that are truly worthy of investigation.

Questions that build the knowledge base of students; that seek to engage them in exploring consequences and alternatives and questions that will enrich and take understanding to a deeper level would clearly be worthy of investigation.

Here, the **ICE PRINCIPAL** may be a useful guide for students as they work together to formulate possible questions for inclusion in individual assignments or group research.

## ICE PRINCIPLE

Formulate questions that are:

INVESTIGATIVE - i.e. Generate Information about NOW and THEN

CONSEQUENTIAL - i.e. Explore possible IMPACT and OUTCOMES

ENRICHING - i.e. Require a CRITICAL / CREATIVE / CARING thinking responses.

The bottom line is we as teachers wish to see students creating not just many questions, but many *different* kinds of questions; some which may generate *new* ways of looking at things; perhaps with some questions that will require a good deal of elaboration and those types of questions that will require students to continually shift from convergent to divergent thought processes as a result.



# ICE PRINCIPLE

## Examples of Question Starters

**INVESTIGATIVE** - i.e. Generating Information about NOW and THEN

Can we list things...?	Can we find some examples of .....?
Who's responsible for...?	What happened when....?
What events assisted....?	Why did / didn't ....?
When does...?	Where could/couldn't one find...?
What is/was meant by...?	What happened before/after...?
How many...?	Who suggested that...?
Who was it that...?	Can you name ...?
What is clearly true...?	What is clearly false...?

Hint :

Questions containing “are” and “is” will often assist in generating Investigative type questions. These questions focus on facts and what is already known.

**CONSEQUENTIAL** - i.e. Exploring possible IMPACT and OUTCOMES

What are some effects of...?	How is this similar to...?
In what ways is this different from...?	What factors contributed to...?
Can this be compared with...?	Can this be simplified by...?
Short-term consequences might be...	Long-term consequences might be...
Who else might have a different view..?	Others might think...
A different perspective might be...	What else needs to be considered...?
Can you group by characteristics such as...?	What questions would you ask of...?

Hint :

A focus on questions that analyse *what could/ couldn't happen or compare and contrast both like and unlike scenarios* will assist in generating Consequential type questions. These questions focus on what might happen as a result of a given circumstance.

**ENRICHING** - i.e. Require a CRITICAL / CREATIVE / CARING thinking responses.

Is there a better solution to...?	Judge the value of...
What is your opinion of...?	How would you have handled...?
Can you defend your position about...?	How many ways can you...?
What changes to.. would you recommend?	Can you see a possible solution to...?
How effective are. ...?	What plan might we adopt to...?
What would happen if ...?	What emotions are stirred when...?
Can you develop a proposal which would...?	How might others feel should... happen...?

*What do you think and why* will evoke a critical thinking response.

*What if* questions focus on creative alternatives.

*How might you/others feel* will engender an affective (caring) response.

M Pohl (1997) *Teaching thinking in the primary years*. Hawker Brownlow Education. Melb., Vic.

# Question Chains

It is rarely possible to ask an open ended question without first establishing a closed question. This activity gets students to grow their own question chains and thus create questions that develop depth around a core idea. This helps them understand how knowledge moves from lower to higher order thinking and how we develop robustness in our ideas.

## **Getting the facts Question Chains**

**What + When + Where + Who?**

## **Reasoning Question Chains**

**What + Why?**

## **Explaining Question Chains**

**Who+ Why+ How?**

## **Making decisions Question Chains**

**What + Which + Why?**

*Evaluating question chains*

**What + Which+ Why + How?**

*Maybe it could be different Question Chains*

**What if..? + How?**

Reproduced withy permission : Hawker Brownlow Education 2005

## Question Chains

Using this technique children can be encouraged to grow mountains of questions, they could even grow mountain ranges of questions around similar ideas. An example of this is shown in the example below.

**Example** Students will be given the topic and be asked to generate questions.  
They may choose any of the question chains.

Using the '**Getting the Facts Question Chain**' children may generate the following questions

What national holidays do you know?  
When are some of these?  
Where are they celebrated?  
Who decides to create this special days?

The may follow up with **Reasoning Question Chain**

What do New Zealanders usually do to celebrate special days?  
Why do they do this?

Using the **Explaining Question Chain**

**Who then Why then How**

Who decided to create a special day for us?  
Why was it decided?  
How do you make a special holiday?

Using the **Making decisions question chains**

What holidays do we have in New Zealand?  
Which is the best holiday?  
Why is it the best?

Using the **Evaluating question chains**

What is people's opinion of national holidays?  
Why do they like/dislike the day?  
Which opinions/reasons are better?  
Why are they better?  
How could we collect more information about this?

Using the **Maybe it could be different question chains**

What if we didn't celebrate these events with a holiday?  
How would this affect people?

For younger children it can be worthwhile to make up paper chains with the question words on each link. Students can choose a chain or may be given a chain. There is always the possibility of making up more and even longer chains!!!

Reproduced withy permission : Hawker Brownlow Education 2005



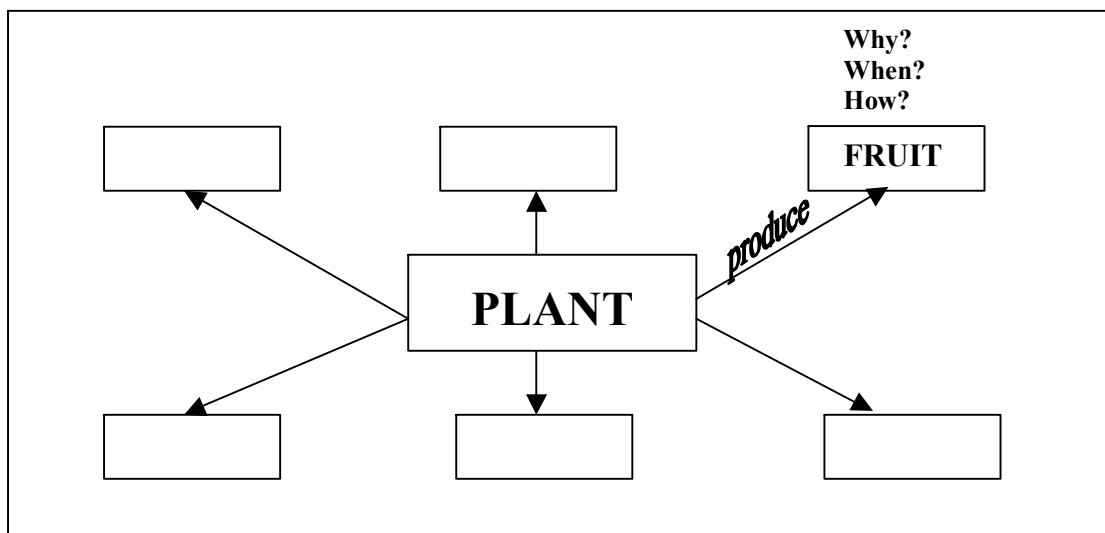
# QUESTION MAPPING



Question maps create a visual summary and conceptual overview of a topic for investigation.

## DRAWING YOUR OWN QUESTION MAP

1. The topic for questioning is written in a central box.
2. Key terms related to the topic are written in boxes surrounding the central box.  
(Generated from a brainstorming process or immersion video/ reading, etc)
3. Directional connectors are drawn from centre to surrounding boxes.
4. Words are added to connectors so that a statement is made starting with the central word and ending with the outside word each time.
5. Question starters such as Why ? and How? are recorded above each statement made on the map.
6. Suitable challenging questions for research are then created.



M Pohl (2005) *Lift-off to learning!*. Hawker Brownlow Education. Melbourne, Vic.



Assignment Points Allocation		
	Minimum	Total
R and U	4 points	At least 30 points
A and A	6 points	
E and C	8 points	

**Assignment Points Explanation**  
 This assignment must total at least .. points. You must complete 4 activities from the R&U section 3 activities from A&A, and 2 from the E&C section. This will give you ... points. You may choose the activities to make up the difference.

REMEMBERING		MY ASSIGNMENT QUESTIONS AND ACTIVITIES	
1 POINT	1		
	2		
	3		
	4		
	5		
	6		
UNDERSTANDING			
APPLYING			
2 POINTS	1		
	2		
	3		
	4		
	5		
	6		
ANALYSING			
EVALUATING			
4 POINTS	1		
	2		
	3		
	4		
	5		
	6		
CREATING			

Notes:

## - RYAN'S THINKERS KEYS -

Thinker's Keys are a set of twenty different activities designed to motivate and engage students in a wide range of thinking tasks. Whilst they have been in use for more than two decades, they still endure as a valuable teaching and learning tool for today's classrooms

A summary of the original twenty keys appears below:

### The Thinkers Keys



The Reverse	Places words such as 'cannot', 'never' and 'would not' in sentences, which are commonly displayed in a listing format.
The What If	You can ask virtually any What If question (serious or frivolous). Students can record thinking on a graphic organiser.
The Alphabet	Students compile a list of words from A to Z which have some relevance to a given category which features in an area of study.
The BAR	The acronym- BAR - can be used to improve the design of everyday objects. B = Bigger    A = AddR = Remove or Replace
The Construction	Problem-solving requiring the creative use of limited quantities of everyday materials.
The Disadvantages	Here, students choose an object or a practice, and list a number of its disadvantages. Then they list some ways of correcting or eliminating these disadvantages.
Different Uses	Students put their imaginations to work as they list some widely different uses for a chosen object from an area of study.
The Prediction	Students think critically as they predict possible outcomes to a set of given circumstances or a particular situation
The Picture	A simple diagram/graphic, which has no obvious relevance to the area of study, is presented and the students then try to work out ways in which it could be linked with that area of study.
The Ridiculous	Make a ridiculous statement that would virtually be impossible to implement and then have the students attempt to substantiate it.
The Commonality	Select two objects with little to do with each other and ask students to find points of commonality.
The Inventions	Students are encouraged to develop inventions which are constructed in an unusual manner or using unusual materials.
The Alternatives	Students list ways in which to complete a task without using the normal tools or implements.
The Question	Start with the answer, and try to list 5 questions, which could be linked with that answer only.
The Brainstorming	State a problem and have students brainstorm a list of solutions.
Forced Relationship	Students develop a solution to a problem by considering the attributes of a number of dissimilar objects.
The Combination	Students list the attributes of two unmatched objects, then combine the attributes to create a new or better product.
Interpretation	Describe an unusual situation and then ask students to think of some different explanations for the existence of that situation.
The Brick Wall	Make a statement which could not generally be questioned or disputed, and then try to break down the wall by finding other ways of dealing with the situation.
The Variations	Students find many ways to overcome an obstacle or solve a problem.



# Flintstone's Spelling Contract

Each week you need to complete the activities below for your spelling words. You may not use the same word for a particular activity in question.

1. Copy your list words into your spelling book.
  2. Write each word in a sentence.
  3. Each sentence must be longer than 6 words.
  4. Select **four** of the following activities.
- Try a different combination of activities each week.

**The Reverse.** Choose a list word and use it to write a reverse key. (For example - if your word was ladder write 5 things you could never do with a ladder.) Your reverse key must contain 'cannot', 'never', or 'would not'.)

**What if?** Select a word and write 5 'What If' questions for it. (For example - if your word was fuel you could write, "What if fuel prices doubled tomorrow?")

**The Disadvantages.** Choose a noun from your list and write all the disadvantages that you can find.

**The BAR.** Choose a noun from your list and use BAR to improve the design or use of the object.

**The Alphabet.** Select a word and compile a list of words from A-Z that relate to it.

**The Picture.** Draw a small picture of anything at all. Select a list word you haven't used and find as many links between it and your picture as possible.

**The Combination.** Combine parts all whole words from your list to make new words.

**The Commonality.** Find 2 words in your list that you think have little in common. Now find as many shared properties for them as you can.

**The Question.** Choose a list word and write 5 questions that could only have this word as the answer.

4. Find a partner and have a practice spelling test.



## NEW KEYS AND KEYS WITH NEW USES



### THE QUESTION KEY :

Brainstorm the most important possible question for your unit of work. It must be a question that would challenge everyone to think really deeply.

### THE MATRIX KEY :

This Key encourages the most amazing and different new products. Place the names of some things down the side of the and then place other names of objects along the top. Then create new objects by combining one thing from the side list with one from the top list.

### THE GRAPHICS KEY :

Instead of listing your information and ideas down the page in the normal boring way, use a graphic organizer to display your thinking on a specific issue.

### THE THREE WHYS KEY:

Make a statement, then ask "Why is that?" and write your response below the statement. After

that, ask "Why is that?" about that 2nd statement. When you give your answer, ask another "Why is that?" about the 3rd statement.

#### THE DECISION KEY :

Use this key to develop some criteria (reasons or guidelines) for making your choice in decision-making.

#### THE INFO KEY :

With this Key, you organize information according to specific headings. These headings could include A to Z ; Biggest to smallest; Most to least expensive , etc.

#### THE RUBRICS KEY :

With this Key, you work out the quality standards for the work - e.g. a project.

#### THE ACTION KEY :

With this Key, you clearly write out the steps you need to take in order to finish the task.






















#### PERSONAL KEY

This key allows you to tell your own personal thoughts and feelings about an idea or issue.

#### RIPPLE KEY :

This key allows you to suggest small actions that may have far-reaching effects.

### THINKER'S KEYS Theme / Topic \_\_\_\_\_ Year 7 Chemistry

<b>The Reverse</b> 	<b>The What If ?</b> 	<b>The Disadvantages</b> 	<b>The Combination</b> 	<b>The Alphabet</b> 
List 10 things that cannot be separated using scientific separation methods.	What if... gasses no longer existed? Use a consequence wheel to show some outcomes.	What are some disadvantages of Chromatography?	List attributes of conductors and insulators. Combine some of these to make a better product.	Create an A-Z for words to do chemical reactions.
<b>The B.A.R.</b> 	<b>The Variations</b> 	<b>The Picture</b> 	<b>The Prediction</b> 	<b>The Different Uses</b> 
Improve the efficiency of a refrigerator using the BAR technique	List a variety of ways of separating mixtures.	How does this relate to Chemistry? 	Describe materials used to conduct heat and electricity the year 2050.	Find 10 different uses for filter paper.
<b>The Ridiculous</b> 	<b>The Commonality</b> 	<b>The Question</b> 	<b>The Brainstorming</b> 	<b>The Inventions</b> 
Magnetic Separation should be the only form used. Justify this statement.	Find similarities between expansion and compression.	The answer is MATTER. Provide 5 questions .	List 20 things you would find in nature under the headings of solids, liquids and gasses.	Design a machine that separates mixtures.
<b>The Interpretation</b> 	<b>The Brick Wall</b> 	<b>The Construction</b> 	<b>The Forced Relationship</b> 	<b>The Alternative</b> 
Suggest why a block of ice in a furnace set at 1000 degrees Celsius is not melting. .	Suggest some alternatives to classifying things according to their states (solid, liquid, gas).	Make a model of a filter using 2 straws, 4 ice cream sticks and a piece of cardboard.	How might you melt a large block of ice using only a feather, a cricket bat and a piece of carpet.	Suggest ways to condense a gas into a liquid.

cur@mwsc.vic.edu.au / M. Pohl 2002

## SEQUENCING KEYS THINKERS KEYS TO....

### *DESIGN A SOLUTION*

INFO → QUESTION → BRAINSTORMING → DECISION → ACTION

### DEVELOP AN INVESTIGATION

QUESTION → PERSONAL → INFO → RUBRIC

### CREATE AN INNOVATIVE PRODUCT

INFO → IMPROVEMENT → BAR → INVENTIONS

### KEYS DELETED FROM ORIGINAL LIST OR INTEGRATED INTO NEW KEYS

The What if... Key    The Picture Key    The Disadvantage Key    The  
Combination Key    The Variations Key    The Different Uses Key    The Alphabet  
Key    The Interpretations Key    The Construction Key    The Alternatives Key



REFLECTING ON TEACHING WITH A THINKING FOCUS

- USING FREEDOM'S TAXONOMY -

NAME \_\_\_\_\_

YEAR LEVEL/FACULTY \_\_\_\_\_

<b>REMEMBERING</b> (Factual answers, recall and recognition.)	What do you consider will be the most enduring memory out of today for you?
<b>UNDERSTANDING</b> Translating, interpreting, showing understanding)	What aspect(s) of thinking do you understand more clearly out of today?
<b>APPLYING</b> (Using information gained in different, familiar situations)	How will you apply a tool / strategy introduced today in the near future?
<b>ANALYSING</b> (Break into parts to examine more closely)	What aspect of your teaching might be different as a result of today's input?
<b>EVALUATING</b> (Judge, use criteria, rank, substantiate)	<p>What was your opinion of the presentation today?</p> <p>What was your opinion of the presenter today?</p>
<b>CREATING</b> (Combining information, creating new products, ideas, etc.)	<p>Out of today, in terms of your general practice, what might you :</p> <p>Make <b>B</b>igger (i.e. do more of)</p> <p><b>A</b>dd (i.e. do differently)</p> <p><b>R</b>emove (i.e. abandon?)</p>
<b>Other Comments:</b>	

M Pohl (2005) *Lift-off to learning!*. Hawker Brownlow Education. Melbourne, Vic.

**THINKING EDUCATION - ORDER FORM**  
**ABN 50 694 866 547**

**THIS ORDER FORM IS FOR CASH ONLY SALES ON THE DAY.**

**RECEIPTS WILL ISSUED**

**Note – All items can be purchased through the website – [www.thinkingeducation.com.au](http://www.thinkingeducation.com.au).**

<b>Description</b>	<b>Unit Price (NZ\$)</b>	<b>Quantity</b>	<b>Total Cost</b>
Teaching Thinking in the Primary Years	\$42.00	<input type="text"/>	\$ <input type="text"/>
Learning to Think / Thinking to Learn	\$42.00	<input type="text"/>	\$ <input type="text"/>
Teaching Complex Thinking	\$42.00	<input type="text"/>	\$ <input type="text"/>
Developing the Thinking Curriculum in <i>your</i> School — A Handbook for Educators.	\$25.00	<input type="text"/>	\$ <input type="text"/>
Quizzes	\$16.95	<input type="text"/>	\$ <input type="text"/>
More Quizzes	\$16.95	<input type="text"/>	\$ <input type="text"/>
Thinker's Keys (Revised) Individual	\$79.00	<input type="text"/>	\$ <input type="text"/>
Thinker's Keys (Revised) Site Licence	\$790.00	<input type="text"/>	\$ <input type="text"/>
Lift Off to Learning	\$79.95	<input type="text"/>	\$ <input type="text"/>
<b><i>Thinking Resources for Secondary Schools Infusing Thinking Series</i></b>			
English, Performing & Visual Arts & LOTE	\$42.00	<input type="text"/>	\$ <input type="text"/>
Maths & Science	\$42.00	<input type="text"/>	\$ <input type="text"/>
Social Education	\$42.00	<input type="text"/>	\$ <input type="text"/>
A Resource Book for Schools	\$99.95	<input type="text"/>	\$ <input type="text"/>
<b><i>Balance Now Due:</i></b>			\$ <input type="text"/>


Received from : \_\_\_\_\_ The sum of NZ\$ \_\_\_\_\_

Purchase of Thinking Resources above. Date \_\_\_\_\_ Signed \_\_\_\_\_

# QUIZZLES — PUZZLES WITH A PURPOSE!!

Test your skill - can you decipher the hidden meanings ??

Good Luck !

<b>PLASMA</b>  $H_2O$		<b>FAIRY WOLF DUCKLING</b>	<b>3. O 2. U 1. T</b>
<b>Ho Ho + Ho</b> <hr/>	<b>HOUSE</b> <hr/> <b>PRAIRIE</b>	<i>That</i>	<b>GIVE    GET GIVE    GET GIVE    GET GIVE    GET</b>
<b>i.e. •</b>	<b>1 3 5 7 9</b> <hr/> <b>whelming</b>	<b>ALL</b> world	<b>Love Sight Sight Sight</b>
<b>0</b> <hr/> <b>AT ALL</b>	<b>PETS A</b>	<b>THROUGH</b>  	<b>Often    not Often    not Often    not</b>
<b>SEARCH</b>    <b>SEARCH</b>	<b>BsiEckD</b>	<b>ELEVAROT</b>	<b>24 Hours</b>



Quizzes - puzzles with a purpose 8