

Question-Answer Relationships

Question-Answer Relationships (QAR) provides a strategy for identifying different types of questions and sources of information for answering these questions. Taffy Raphael, a Michigan State University reading comprehension instructor, in the 1980s, designed QAR. QAR should help students locate information, analyze text for information, and help determine when inference is required.

QAR has four types of questions

Right There

Right there questions will have answers in the text in the same sentence. Right there questions often begin with "Who is", "What is", "When is", "What kind of", "Name", or "List"

These questions are answered by locating and copying the information.

Think and Search

Think and search questions require you to read several sentences or sections of text and combine the information together. The questions often begin with "Summarize", "What caused", "Contrast", "Compare", or "Explain"

Students need to put information from several locations together in a way that is meaningful to them to answer the question.

Author and Me

Author and Me questions require students to answer with information beyond what is in the text. The basic material to be elaborated on must be read and understood before students can add additional information to it. A typical question in Chemistry might be "How could you tell if a substance is a metal or nonmetal?"

The question assumes students know the properties of metal and nonmetals and will be able to generate lab test based on these properties.

On My Own

On my own questions require answers not in the book at all. The questions require that students use background knowledge to support their opinions. A typical On My Own question might be "How can plastics be most effectively designed to serve society rather than harm it?"

Applying Bloom's Taxonomy to QAR:

- The **Right There questions** only require the **Knowledge** level of abstraction.
- The **Think and Search questions** add the **Comprehension and Application** levels of abstraction
- The **Author and Me questions** add the **Analysis level** of abstraction.
- The **On My Own questions** can require students to weigh several points of view (**Evaluation**) and support their points of view based on research (**Synthesis**).



THE BEEKEEPER AND HIS BEES

Part 1

In the article, the beekeeper has many tasks he performs during each season of the year. In the spaces below, write what the beekeeper does and why it helps the bees.

	Beekeeper action	Why it helps the bees
Winter (January)		
Spring (April & May)		
Summer (June through August)		
Fall (October)		

The Beekeeper and His Bees

Snowshoeing near his hives in the deep snow of January, the beekeeper can hear the hum of his bees. Tightly clustered together in the hive, the bees are in constant motion. They are moving themselves back and forth, up and down, and side to side. They change position with each other from the warm center of the bee cluster to the outside and back again. The cluster moves upward toward the honey source, keeping itself warm and fed. No short sleeps, no long hibernations, the honeybees are awake all winter.

To the beekeeper, the winter hum is a good sign. It tells him that he had prepared his hives well for winter. He had left enough honey in the hives so the bees would not starve. He had provided ventilation. He had even given them medicines in a sugar and water syrup so they would not get sick. He sees many bees leaving the hives and returning again in the January sun. They are taking “cleansing flights” – mid-winter bathroom breaks. The hives are healthy, but the beekeeper will keep a winter’s eye on them until spring.

When the beekeeper sees the first pussy willows turning yellow in early April, he sees his bees collecting their first powdery pollen of the year. The honeybee’s year has begun! The foraging worker bees begin gathering pollen, nectar and water. They are the food-gathering specialists in the highly organized colony within the hive. When they return to the hive with the

pollen baskets on their legs full of pollen and their stomachs full of nectar, they give their harvest to the younger worker bees.

The foraging bees perform dances to give information to other foraging bees about food and water sources. They perform the "circle" or "round" dance when the food source is within 100 meters of the hive. The bees make circles in one direction and then in the opposite direction in front of an audience of foraging worker bees that are ready to go out. The dance does not give the precise direction or distance of the food source, but merely informs the waiting bees that there is food nearby. The dancing bees also give the watching bees samples of the nectar they have gathered. In this way, the source can be identified by scent and taste.

When the food source is more than 100 meters away, the returning foraging bees perform the "waggle" or "figure-eight" dance. The bees move in a figure-eight pattern. Then they perform a waggle-run in a straight line between the two loops of the figure eight. This dance tells the distance, direction, and quality of the food source. The distance of the source is communicated by the tempo of the dance. With distance, the movement of the bees in the loops slows down but the time of waggling and buzzing in the straight-line increases. The direction of the food source is shown by the direction of the waggle-run in the straight line between the circles of the figure eight. The bees position the straight line to indicate the food source in relation to the sun. The quality of the food source is indicated by the number

of cycles of the dance and the vigor of the buzzing and wagging. Like the round dance, the waggle dance is often interrupted by the ready-to-go foragers' sampling of the returning foragers' harvest. Lastly, the number of dancing bees communicates the quantity of the food source.

After the dance of the returning forager bees, the younger worker bees called "house bees" store the pollen and nectar in the cells. They make honey and the honeycomb. Other worker bees are nurses that take care of the brood – the eggs, the larvae, and pupae. Others are guards that protect the entrance to the hive. And still other workers attend to the queen – feeding, grooming, and protecting her. The workers are all female and they do all the work of the hive.

May is upon the land. The beekeeper looks out on his crops. Low bell-shaped blueberry blossoms cover the distant rocky hillside and dandelions spread yellow on his lawns and nearby roadside. The peak time for collecting nectar is coming – the time of the honey flow. This will last through the blooming of other favorite flowers of the honeybee - raspberry in late June and the clovers and alfalfa in June, July, and August.

The beekeeper watches his hives closely. It is June; the time of the honey flow has come. He observes intense activity in and about the hives.

Thousands of house bees are vigorously building wax cells and producing honey. Thousands of foraging bees are vigorously collecting food and

bringing it to the hives. He checks the hives to see if there is enough storage room for the honey. He wants to make sure there is no overcrowding. He adds box layers called "supers" on top of the brood chamber super so the bees will have more room to store their honey. A "super" is a box with four sides but no top or bottom. Typically, ten rectangular frames are hung 3/8 inches apart in each "super". It is on these frames that the worker bees build the wax cells in which to store their honey.

The beekeeper even starts collecting honey. He is worried. He knows that when there is overcrowding, the workers will instinctively prepare to swarm. The queen will stop laying eggs. The workers will stop feeding her and begin preparing the hive for a new queen. The old queen will take off with half of her hive for a new home!

Despite his attention to the overcrowding of the hives, the beekeeper has not been able to prevent a swarm. At noontime on a warm sunny day at the peak of the honey flow, he hears a loud noise coming from one hive. He looks to see thousands of bees flying up out of the hive in a swarm and taking off across the field and down the road. He calls a neighbor who has an apple orchard. The swarm of bees has clustered on a branch of an apple tree. The beekeeper dons his bee suit and veil. He puts on his gloves. He takes a box in his pick-up and goes to get his hive to bring it home. The bees are usually docile in a swarm that has just emerged from a hive. They don't try to sting. The bees are so tightly clustered together when at rest that the

beekeeper can actually pick up the swarm and dump it into a box. He then takes it home to a new hive.

Meanwhile, in the old hive a new queen emerges from a queen cell in the lower box of the hive called the brood chamber. She has developed from a worker larva that has been fed the "royal jelly". With her stinger, she kills any other rival queens that would emerge from their queen cells to be her competitors. She then prepares for her mating flights. Male drone bees, idle in the hive, are ready for the flights of the new queen. They do no work in the bee society. They are fed and cared for by the worker bees for the sole purpose of mating with the new queen. When the new queen takes her flights, many drones pursue her. Many different drones will mate with her, and then die. The new queen returns to the hive where she will begin her life of egg laying. A new hive in the old hive has been born!

With August comes the time of the honey harvest. The hives have quieted down after the summer honey flow. Many exhausted worker bees have died. It is time for the beekeeper to collect honey. Healthy hives have four to six honey "supers" and produce 75 to 150 pounds of honey! The beekeeper collects a large harvest but he makes sure to leave enough honey for the bees' winter food.

In September the bee colonies prepare themselves for winter by evicting the drones. The workers put them out and establish guards at the hive entrances

to prevent their return. If the drones try to return to the hive, the worker guards sting them. Their precious winter honey must not be wasted on idle drones.

The slight warmth of an October day reminds the beekeeper to prepare his bees well for another winter. He insulates the hives. He makes sure they have their medication to prevent disease and enough honey for the winter months ahead. Then the bees are on their own. But the beekeeper does not forget them. On a cold, snow-piled afternoon in January, he will put on his snowshoes. He will walk across his backfield to the hives. There he will stand for a long time - listening to the winter hum of his bees and thinking of spring.

Bibliography

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“The Beekeeper and His Bees” Scoring Guide

Standard: Students will apply reading, listening, and viewing strategies to informational texts across all areas of curriculum.

Performance Indicator	1 Doesn't Meet	2 Partially Meets	3 Meets	4 Exceeds
D.6 Describe new knowledge presented in informational texts and how it can be used.	<ul style="list-style-type: none"> • Major omissions in organizer (e.g. missing seasons and 'whys') • Limited to no translation of new knowledge is evident in the student's response. 	<ul style="list-style-type: none"> • Minor omissions in organizer (e.g. limited information or one missing season) • Some translation of new knowledge is evident in the student's response. • Flaws indicate gaps in understanding. 	<ul style="list-style-type: none"> • Adequate information in organizer includes all seasons. May have minor flaws. • Sufficient translation of new knowledge is evident in the student's response. • Minor flaws do not indicate gaps in understanding. 	<ul style="list-style-type: none"> • Thorough information in organizer with insightful representation of 'whys.' especially spring. • Sophisticated or insightful translation of new knowledge is evident in the student's response.

Ingredients that high papers have in common:

- Recognition that there is a cycle
- Interdependence between the bees and the beekeeper
- Ability to stay focused on the beekeeper
- Relationship between the beekeeper and the bees
- Constant work – routines – high maintenance – no “down time” (bee cycles drive beekeeper cycle)
- Caring for the bees safety
- Recognition that the seasons graphically organize the cycles