



Planting a Promise

Daffodils at School



BC
Agriculture
in the Classroom
Foundation
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Introduction

Welcome to the BC Agriculture in the Classroom Foundation's Planting a Promise program.

Planting a Promise was created to enable teachers and their students to experience gardening in the fall. Choosing a bright, low traffic area in the front of the school in the fall ensures the promise of beautiful flowers in the spring. Imagine planting large bulbs knowing they hold this promise.

In mid September teachers enrolled in Planting a Promise can pick up large daffodil bulbs from their local garden centres for use with the activities found in this booklet. With the help of their teachers, students can plant the bulbs directly in the ground and then enjoy the flowers that bloom in the early spring. Throughout the winter months when the ground is not too frozen, some bulbs can be lifted for observations.

We hope that you will enjoy Planting a Promise with your students.

WELCOME

Planting a Promise involves a series of activities that take place over several months. The activities begin in the classroom in September, where daffodil bulbs are examined, then planted in a designated garden area for a school. In the spring when the bulbs begin to sprout and bloom, the activities continue as the daffodil plants are observed and measured while they grow. In late June, the daffodils enter their dormant stage and are readied to start the daffodil life cycle all over again.

Daffodils are plants. Plants are organisms that grow and reproduce their own kind. They need air, soil, water, light and space to grow. Water and minerals are taken from the soil through roots. Soil also provides support for the plant and an anchor for the roots. Decaying plants leave minerals in the soil that are essential for future plant growth.

Plants also need sunlight in order to grow properly. They use light energy from the sun to change carbon dioxide from the air and water from the soil into food substances (sugars) through a process called photosynthesis. A green plant can only make these sugars when it is in the light.

Plants need water. Water is essential for all life on earth. Plant stems carry water and nutrients from the roots to the leaves and food back down to the roots. Plants also need space. They can't grow too close together or their roots and leaves will compete for the limited resources they need.

Goals and Objectives

This activity was created to help students explore plants (a daffodil) and what they need to grow. It will do this through an investigation of the following concepts:

- * Plants are diverse in the way they grow. They are different in their appearance, in their use and in their life cycle.
- * Seasonal changes happen in plants as well as animals.
- * Plants have basic needs (air, water, soil and light) that must be met in order for them to grow.
- * Air, water and soil have different physical characteristics that can affect the growth of plants.
- * Personal choices have environmental consequences that can affect living resources, like plants.

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Curriculum Connections

Although any elementary grade will enjoy this activity, the lessons are designed for late primary grades where there are more curriculum connections. The best connections are in the Processes and Skills of Science, Life, Earth and Space Science areas but prescribed learning outcomes for Language Arts and Fine Arts can be met as well.

Planting a Promise Curriculum Connections at a Glance

Grade	Processes and Skills of Science	Life Science	Earth and Space Science
Kindergarten	<ul style="list-style-type: none">• Observing• Communicating (Sharing)	Characteristics of Living Things	
Grade 1	<ul style="list-style-type: none">• Communicating (Recording)• Classifying	Needs of Living Things	Daily and Seasonal Changes
Grade 2	<ul style="list-style-type: none">• Interpreting Observations• Making Inferences		Air, Water and Soil
Grade 3	<ul style="list-style-type: none">• Questioning• Measuring and Reporting	Plant Growth and Changes	
Grade 4	<ul style="list-style-type: none">• Interpreting Data• Predicting	Habitats and Communities	Weather
Grade 5	<ul style="list-style-type: none">• Designing Experiments• Fair Testing		Renewable and non-renewable Resources
Grade 6	<ul style="list-style-type: none">• Controlling Variables• Scientific Problem Solving	Diversity of Life	
Grade 7	<ul style="list-style-type: none">• Hypothesizing• Developing Models	Ecosystems	Earth's Crust

Constructivism and Teaching Planting a Promise

Planting a Promise is based on a learning model called “constructivism” or “concept change learning.” Constructivism believes that the learner constructs knowledge and understanding through interacting with meaningful experiences.

Constructivism assumes that students always have previous ideas and that they learn by combining new information with earlier ideas, creating new knowledge and understanding.

Often, new ideas challenge or conflict with original ones. This leads to questioning, which in turn leads to modification and reorganization of ideas into new understandings. This way of learning is adaptive. People make sense of the world for themselves. Constructivism suggests that the best way to teach is not simply to transmit knowledge to students but to help them expand or reconstruct their original beliefs with more sophisticated ones.

Planting a Promise activities are organized into different constructivism phases to help students acquire and use new ideas. The phases are:

1. Orientation – This phase helps students focus attention on the problem or idea to be introduced.
2. Elicitation – This phase allows students to identify their original thoughts and ideas. This is their starting place for learning.
3. Restructuring – This phase is where student activities are focused on new learning.
4. Application – This phase is where students use their new understanding to draw conclusions, make decisions, or summarize their understanding of the topic.
5. Review – In this phase, students recap their new ideas to see how they have added to their understanding.

To maximize learning, it is important to include all of these elements when teaching an educational unit or lesson. Although you don't need to undertake everything in this activity, if you do, they represent all phases of constructivism to maximize student learning and understanding.

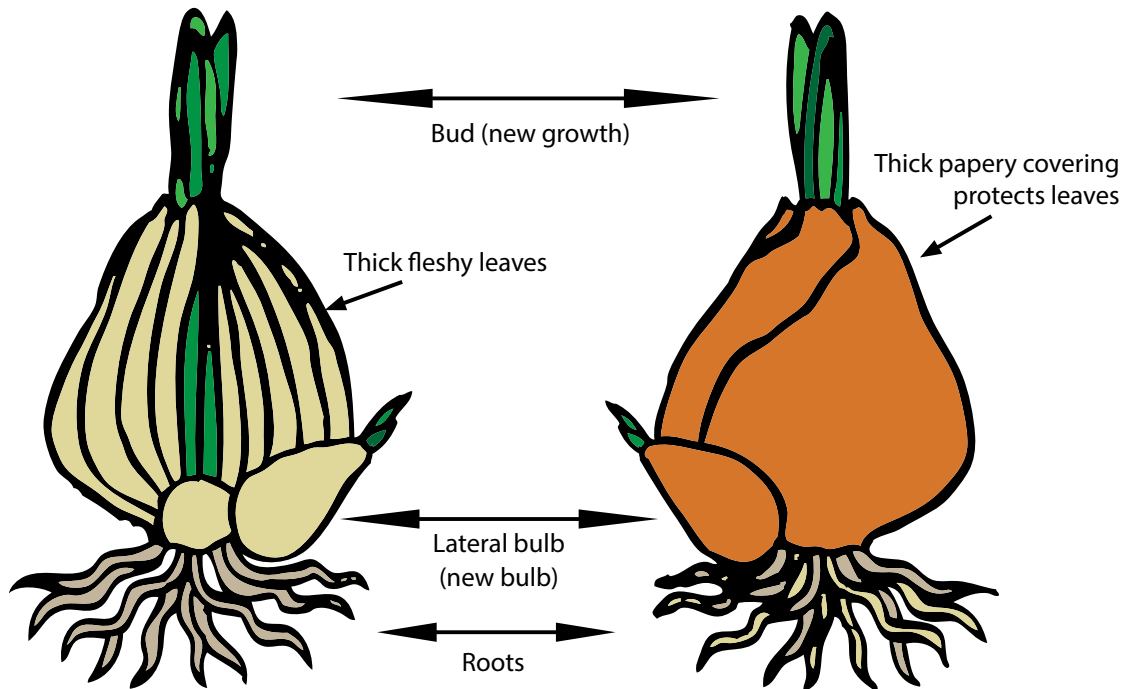
Teacher Background Information

The daffodil is a member of the narcissus genus of hardy, mostly spring-flowering bulbous perennials. Common varieties are native to meadows and woods in Europe, North Africa, West Asia and North America. There are over 30 species. The genus gets its name from the myth of Narcissus, who became so obsessed with his own reflection that as he knelt and gazed into a pool of water, he fell into the water and drowned (in other variations of the myth he died of starvation and thirst). In both versions, the narcissus plant sprang up from where he died. The name for the daffodil plant itself is usually related to Dutch origin in the 16th century.

A daffodil bulb is an underground, modified stem that functions as food and water storage tissue for the plant to survive through a cold or dry season. The thin outer skin on a daffodil bulb is the tunic. The tunic helps to protect the inside from damage and drying out. The daffodil bulb is layered with layers of scales below the tunic. Scales are leaves that provide food for the bulb. The scales fit together like layers of an onion and provide food to the developing plant. The scale leaves are held together by the basal stem, which is located at the bottom of the bulb where the roots will also grow. The basal stem connects the flower, scales, and roots. The embryonic (or baby) plant develops

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from the center of the basal plate, and grows up and out of the top of the bulb. The parts of the plant that can be seen inside are the flower bud, stem, and leaves. The purpose of the roots of a plant is to absorb water and nutrients from the soil. The plant stem gives support to the plant structure, both leaves and flowers. Inside the stem is a system of small tubes that transport water and nutrients up from the roots to the rest of the plant and moves sugar made in the leaves down to lower parts of the plant and roots. The plant flowers are necessary for reproduction of the plants.



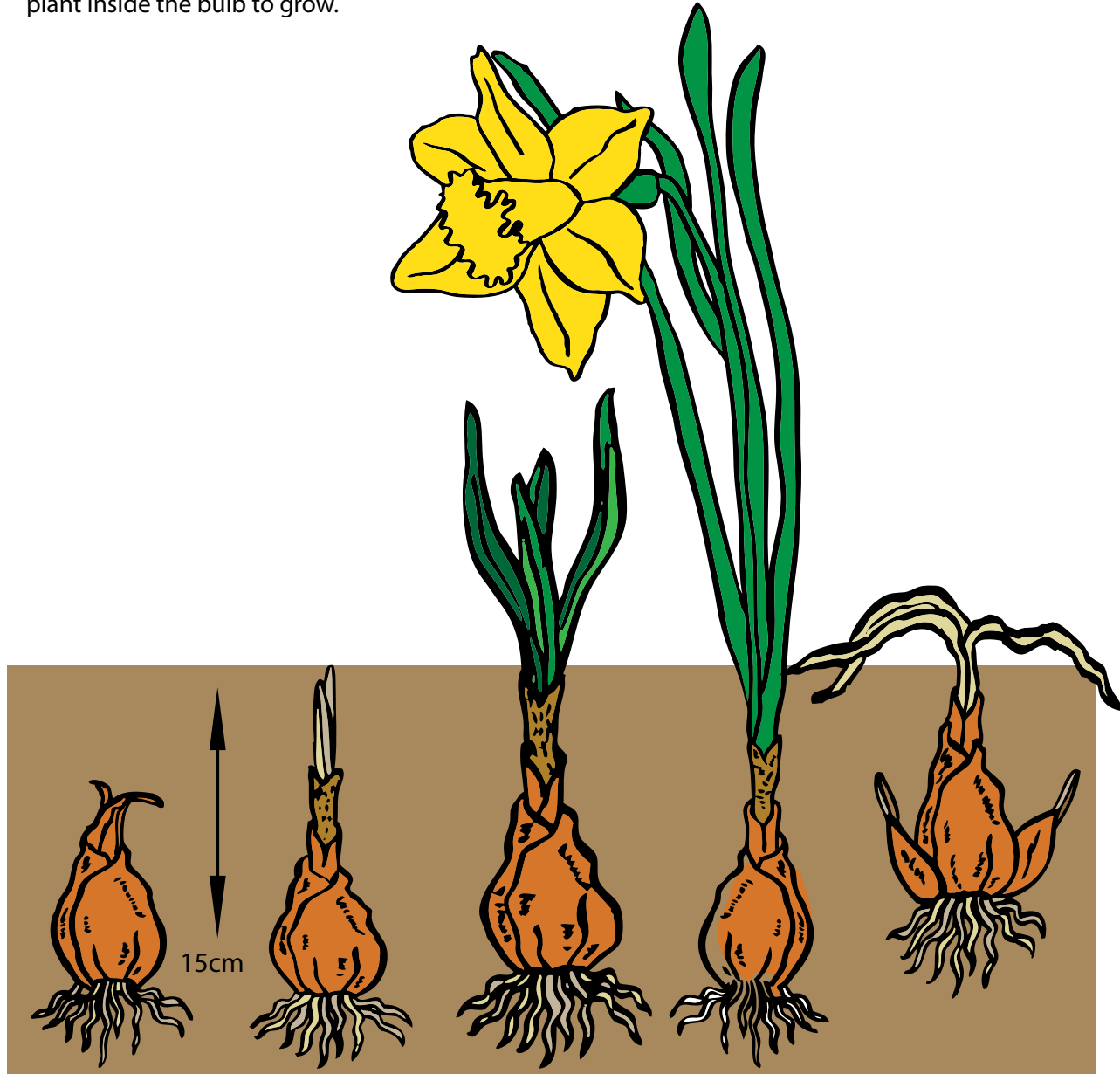
The life cycle of spring-flowering bulbs, like daffodils, starts in the fall and ends when the bulb goes dormant (living but not actively growing) in the summer. Bulbs are planted in the fall so they will flower in the spring. Roots begin to grow as soon as the bulb is planted in the fall. The best time to plant is when the soil is approximately 10° - 13° C. Bulbs require a period of low temperature dormancy in the fall and winter for the bulb to flower. Plant growth normally stays underground until spring.

The daffodil flower emerges from the bulb and blooms in the spring. After flowering in the spring, the bulb begins to reproduce itself. Some spring bulbs produce new plants underground called bulblets from the mother bulb. The green foliage of the leaves makes food to provide energy for the new plant that forms inside the bulb and for new bulbs to form. The daffodil will need 4-6 daffodil leaves after the blooms fade and die to promote this process. Daffodil bulbs are fully developed by the middle of July.

By summer, the daffodil flowers have died and seed pods have formed in the area behind the flower. The leaves turn yellow then brown, and the bulb enters a dormant period. Removing the seed pods is important for larger bulbs to develop. Bulbs can be grown from harvested seeds, but the period of time from seed planting to having a flower bloom is several years. In the case of a daffodil, the period of seed germination to blooming flower is five years. Bulbs that are too small will not produce flowers. The bulb must continue to grow year after year.

When flowers become smaller or fewer, it's time to dig up the daffodil bulbs and divide them. You can dig up and separate the bulbs around the middle of July. Remove the tops, wash the soil from them, and allow them to dry. The separated bulbs can then be planted in the fall.

A bulb is dormant until the soil temperature is warm enough and there is enough water to signal the plant inside the bulb to grow.



Fall planting

Plant 15 cm below the ground.

Winter slow growth

Roots and stems make substantial growth before ground freezes.

Spring growth

By March or early April, stems push through soil and prepare for bloom.

Spring blooming

Spring full blossom.

Summer dormancy

Summer bloom dries up and bulb lies dormant. New lateral bulbs develop.

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Getting Started with Planting a Promise

Before you can start these activities you will need permission from your principal or other school official to plant the daffodil bulbs in a designated area. Some schools and/or districts might have policies concerning planting in the school yard and it is necessary for you to obtain permission for this part of the project.

Also, ensure you have all the materials you need for the activities. This includes garden trowels, soil, rulers, etc. If you are a Spuds and Tubs teacher, you can recycle the soil from your potato harvest to improve the soil for your daffodil garden. You might also obtain pictures of daffodils in bloom as part of your room decoration. See pages 25-30 for these images.

Read over the activities and determine how they will fit in with your unit plans for the year. Because the activities take place over a number of months, careful planning is a must. These activities can be used by themselves or in conjunction with other units on plants, soil and habitats, as well as the science processes.

Teaching Activities

Orientation and Elicitation

Purpose:

To orient students to the activity and to discover what they already know about daffodils, plants and the things they need to grow.

Suggested Time

30 minutes

Materials

Daffodil bulb

Knife

Illustration of a daffodil bulb and the life cycle of a daffodil (page 11 and 12)

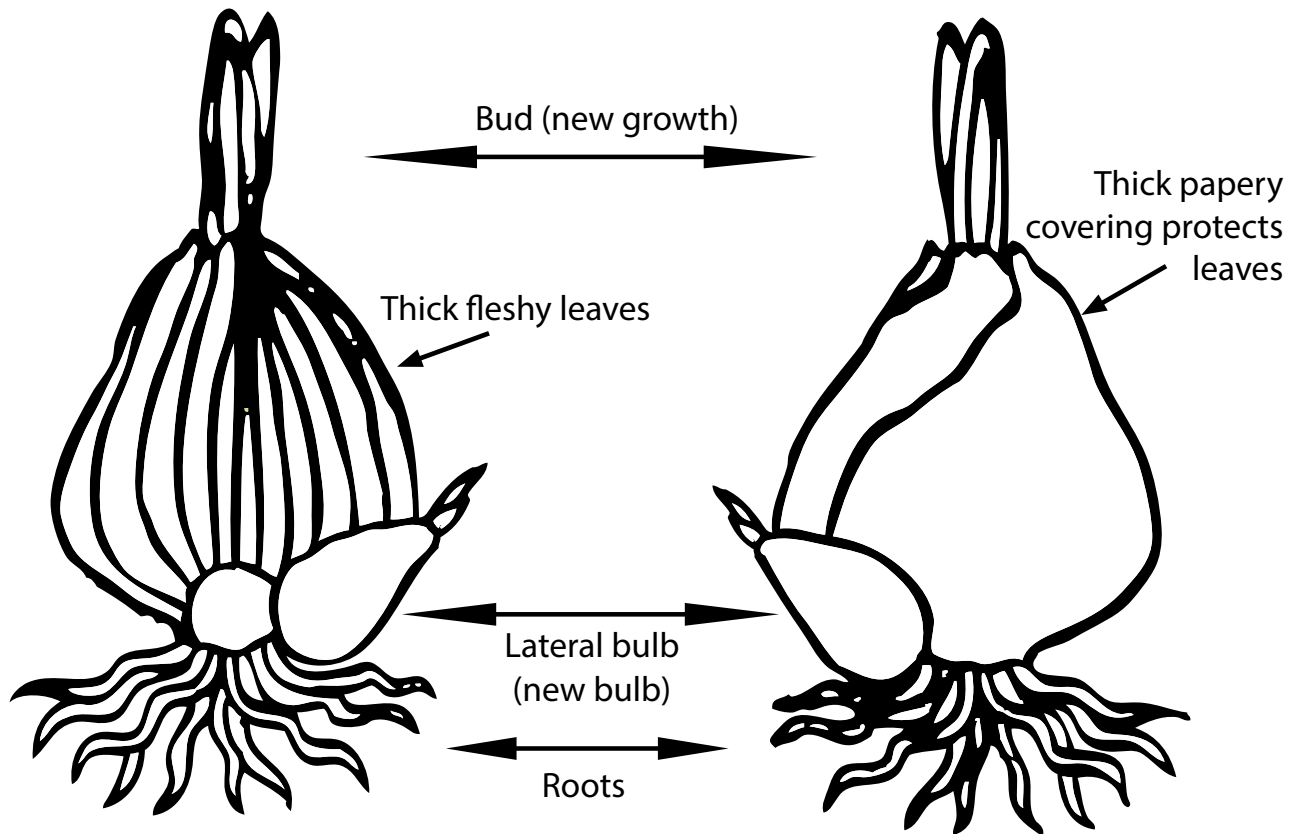
Student Activity Sheet #1 (page 13)

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Presentation Suggestions and Teacher Notes

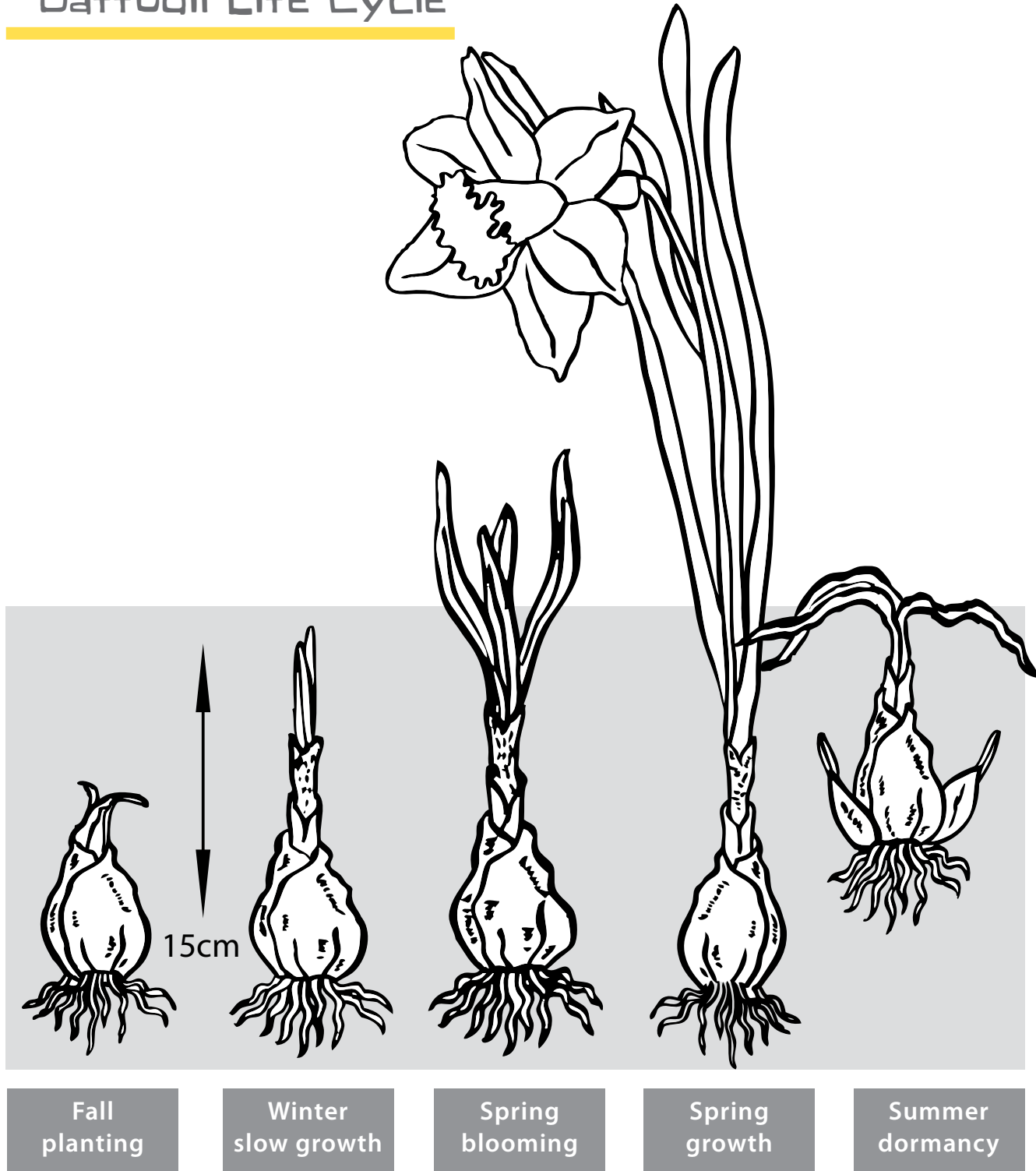
1. Gather the class together and show them the daffodil bulb. If you have time, pass the bulb around the class so students get a better view of it. Ask, "Does anyone know what this is?" Listen for their responses. They may think it looks like garlic or an onion.
2. Explain to the students that what you have is a daffodil bulb. Unlike some plants which grow from seeds, daffodils grow from bulbs. Actually a daffodil bulb started as a seed but needs to grow for about 5 years to get to the bulb stage so they can grow a flower. Explain also, that unlike some other plants, daffodils are planted in the fall, rather than the spring. Daffodils need several weeks of cold weather before they can bloom.
3. Ask, "What do you need to live and grow?" Listen to their responses and write them on the board. Humans need food, water, air and space to live.
4. Write on the board and then ask the class, "What do plants need to live and grow? How are they different from you?" Listen to their responses and write them on the board. Plants need air, water, soil and a space to grow. The needs for plants are similar to what humans, like all animals, need to live.
5. Next ask and write on the board, "What are the basic parts of a plant and how do they help a plant meet its needs?" Listen to their responses. They may know that the leaves provide nourishment to the plant when sun shines on them or that the roots bring water into the plant. They may also recognize that the stem holds the plant up and that the flowers are part of plant reproduction.
6. Cut the daffodil bulb in half and show the students what's inside. Tell them that inside each mature bulb is a promise of the flower that will come later. You can point out the areas of the bulb that will become the roots, stem, leaves and even the flower. Use the illustration on page 11 to show the parts.
7. Have students return to their desks and complete Student Activity Sheet #1 on page 13.
8. Tell the class that they are going to plant their daffodil bulbs and then follow their development over the next few months. You can show them the illustration on page 12 of a daffodil's life cycle. Point out where you are in the cycle today and what will happen in each season.

Daffodil Bulb



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Daffodil Life Cycle



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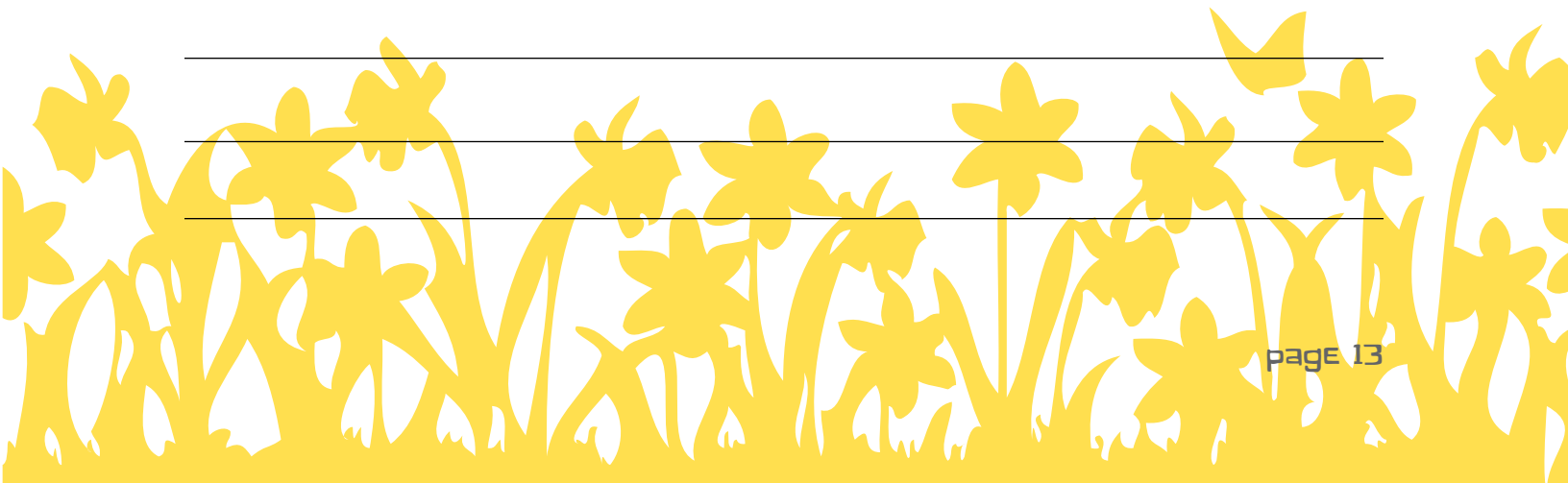
Student Activity Sheet 1

Name: _____

Draw a picture of the inside of a daffodil bulb.



What do plants need to grow?



Restructuring

Purpose:

To teach students about daffodils, plants and what they need in order to grow. To plant the daffodils in the school's designated garden area.

Suggested Time

In the fall: 30 minutes to plant the daffodil bulbs

In the spring: 30 minutes a day over two weeks during their growing stage to observe the daffodil plant and its flower

Materials

In the Fall

- * A bulb for each student to plant. Planting a Promise provides 35 bulbs per classroom.
- * Pictures of daffodils on pages 25-30
- * A trowel or spade for each student or group of students placed in a bucket for easy access
- * Soil
- * Water in a bucket or watering can
- * Popsicle sticks with student names on them or a map of the planting area (optional)
- * Student Activity Sheet #2 on page 19

In the Spring

- * Rulers
- * Magnifying glasses
- * Student Activity Sheet #3a and #3b on pages 21 and 22

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Presentation Suggestions and Teacher Notes

Planting In The Fall

1. Before you do this activity, ensure that you have permission to plant the daffodil bulbs outside of your school. The bulbs can be planted in a designated garden area, in a forested area on the school grounds, or any other appropriate outdoor place.
2. You may want to review the concepts students learned in the first activity. Use the illustrations to review the parts of a daffodil bulb and the daffodil life cycle. Remember that the inside of the bulb holds the promise of the flower that is to come later. All the parts of the daffodil are there at the start. They just need time to develop.
3. Remind students that it is important for daffodil bulbs to be planted in the fall so that the bulb can develop underground before spring arrives.
4. Explain how the bulbs are to be planted. You can begin with a demonstration of how the hand trowel is to be used safely. Remind students that we don't point the trowel at other students or use them inappropriately. Demonstrate how to dig a hole that is 15 cm deep (this is usually about as deep as the blade of the trowel). The hole should be about half as wide as it is deep. Since the daffodil bulbs should be about 15 cm apart, the holes to plant them in should also be at least 15 cm away from each other. If the trowels are a different size, you can use rulers to measure the distances. The hole should be about 3 or 4 times as deep as the height of a daffodil bulb.
5. Tell the students to pile the soil they remove from the hole next to the hole so they can cover the bulb up later. Add a small bit of soil into the hole and mix with the soil in the bottom of the hole. *Spuds in Tubs* teachers may have already mixed in their soil.
6. Show the students the pointed end of the bulb. Demonstrate how the bulb is placed in the hole with the pointed end up.
7. The soil in the pile can then be returned to the hole and the bulb is covered up. Pack the soil down lightly.
8. As an optional activity, have students place a popsicle stick with their name on it near where they planted their bulb so they can remember where they planted it when they return in the spring. Alternately, have students make a map of the area where the daffodils are planted and write their name where they planted their bulb.
9. Water thoroughly after planting.
10. Return the trowels to a designated area and return to the classroom.

11. Option if you have extra time: Have the student be a bulb. Have the students squat down with their head tucked in. They have been planted underground. In the fall, rain starts root growth. Students can wiggle toes and feet. In the spring the soil warms up. Students begin to stand with arms at their sides and heads tucked. Leaves appear above the soil. Students extend their arms for leaves and their bodies are the stem. Their tucked head is the flower bud. Sun warms the plant. The bud opens. Students lift their head to show the bud has opened.

Note: Keep the daffodil bed watered during any dry times in the fall and winter.

In The Spring

1. Keep an eye on the area where the daffodil bulbs were planted. Once the daffodils emerge and begin to push through the soil, bring the students out to the area again.
2. Remind students what you did in the fall when you planted the daffodil bulbs. The promise that the bulb represented is now ready to come true. Have students find where their bulbs were planted. If they can't find their bulb area, tell them not to be discouraged and that their bulb may come up in a day or two. (If a student bulb doesn't come up, have them team up with another student for this part of the activity).
3. Have students use a ruler to measure the height of their daffodil. Record the information on Activity Sheet #2.
4. Students should come out every day to measure and record their daffodil height for two weeks.
5. In the classroom, have students complete activities 2a and 2b on page 19 and 20
6. When the daffodil flowers bloom, have students observe their flowers. They can use a magnifying glass to see the smaller parts.
7. Have students return to class and draw a picture of their flower on Activity Sheet #3a (page 21). They can compare it with the diagram on Activity Sheet #3b (page 22) and label the parts of the daffodil plant. Remind them to draw both what they see above ground and what they can't see under ground (if they can). Can they tell the purpose of each part of the plant?
8. Ask students, "What can we do to help plants to grow?" Listen to their responses. We can water them and make sure they get sunshine. We can make their soil better as well. When we build homes and buildings, we take the land that plants used to grow on. The forests that once were in the area are removed and the daffodils lose their place to live.

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Extension

- * You can begin to plant other plants in the spring to show students different kinds of plants. For example, you can plant potato tubers, bean or corn seeds, etc. Have students compare and contrast each kind of plant and note how they have adapted their life cycle to meet their needs. How does each plant get the things it needs to survive?
- * To show students what happens in the flower stem, place a light coloured flower, such as a carnation or daffodil, in a glass filled with water and (15 – 20) drops of food colouring. Ask students, “What do you think will happen over the next few days?” Listen to their responses then tell them that they can observe what happens for themselves for the next few days. Place the flower in coloured water in a safe place and have students observe any changes they see for the next week. The flower will begin to change to the colour of the food colouring you put in the water as the tubes in the stem transport the coloured water from the glass up to the flower, just as it does when it moves water and nutrients up from the soil to the rest of the plant.
- * Consider a field trip to a daffodil, tulip or other flower farm or greenhouse. They are a beautiful place to visit when the flowers are in full bloom. They show students that farmers can also bring beauty into our homes, as well as food. Canada is currently the sixth-largest exporter of cut flowers to the US market and floriculture (flower growing) provides jobs and income to many Canadian farmers.

What to do with Plants after they Bloom

Once your ‘promises’ (daffodils) have reached full bloom and hopefully made your school yard just a little bit sunnier in the spring, there are a few more steps you need to take ensure your plant goes into a dormant stage.

1. Deadhead the flowers:

Why?

Deadheading the daffodils will allow the bulb to store more energy for next year. Removing the seed pod will allow for your plants to store food instead of making seeds which draws energy and nutrients from the bulb.

How?

- Once your flower has completely finished blooming, the flower should turn a yellowish-brown.
- Behind the flower head there is an area that looks swollen when compared with the flower stalk, have students cut off the flower head there.
- They can use scissors or simply 'pinch' off the flower top along with the swollen area just below where the flower was.

2. Flower Tops and Foliage:

- Have students compost the flower tops. Use this opportunity to talk about composting.
- Leave the foliage (leaves) as is and let them die off and turn yellow.
- Once the foliage dies off (turns yellow), students can tend to their bulbs for the last time.
- Have students gently tear off or cut with scissors all the yellow foliage to avoid pulling the bulb out of the soil.
- The bulb has now taken all the energy it needs and will go into a dormant stage during the summer, winter months.

3. Bulbs in the Soil:

- No need to remove the bulbs!
- Leave the bulbs in the ground and watch your promises grow again for years to come (5-7 years).
- They can be dug up, divided and relocated in a few years as they will multiply.

4. Extension:

- Use example of the daffodils on the TransCanada Hwy to discuss how resilient they are! (They are there for years, no one touches them, but they come back year after year.)

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Student Activity Sheet 2a

Name: _____

My Daffodil Plant

Day Number	Height of my daffodil plant
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

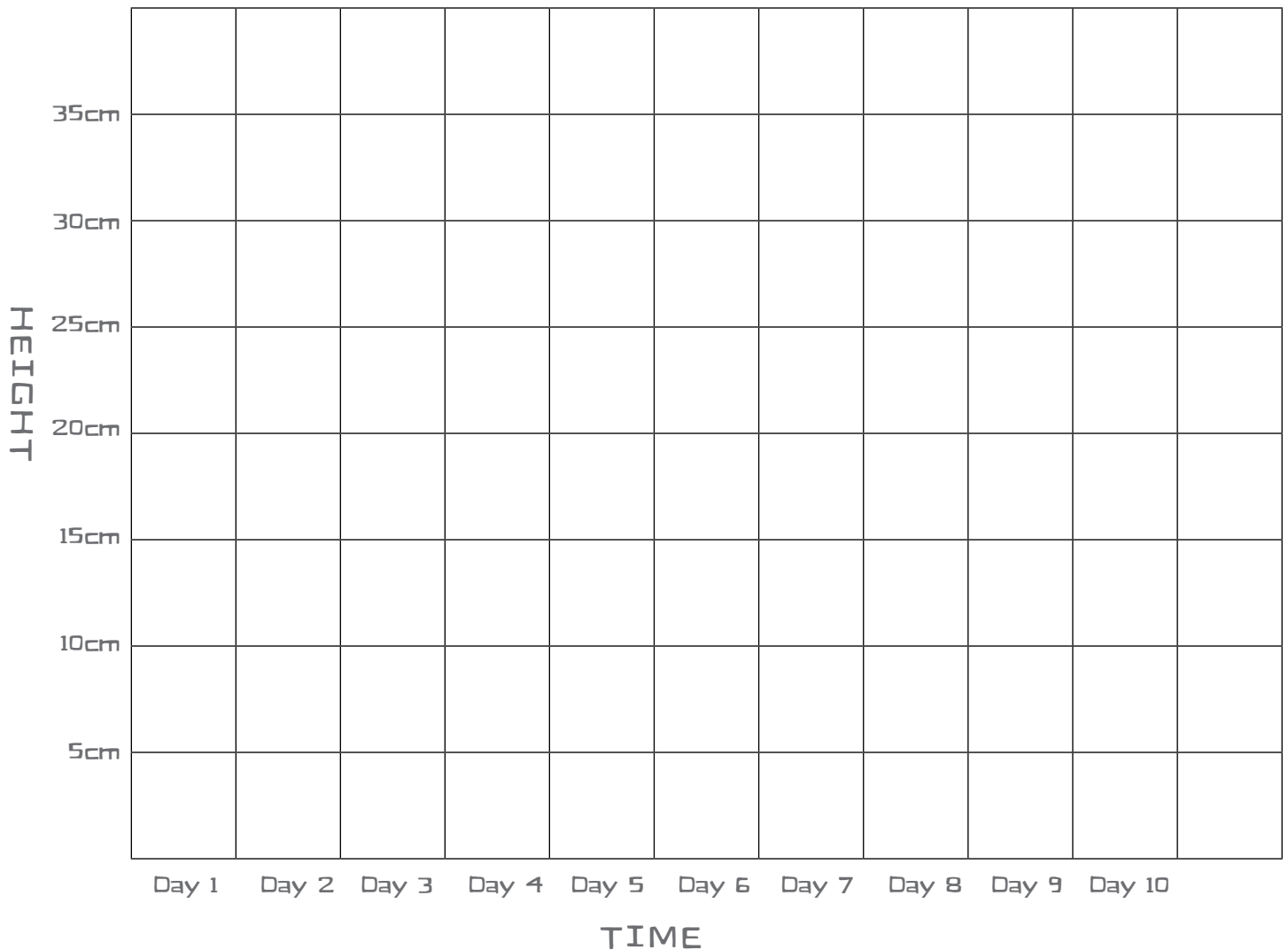


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Student Activity Sheet 2b

Name: _____

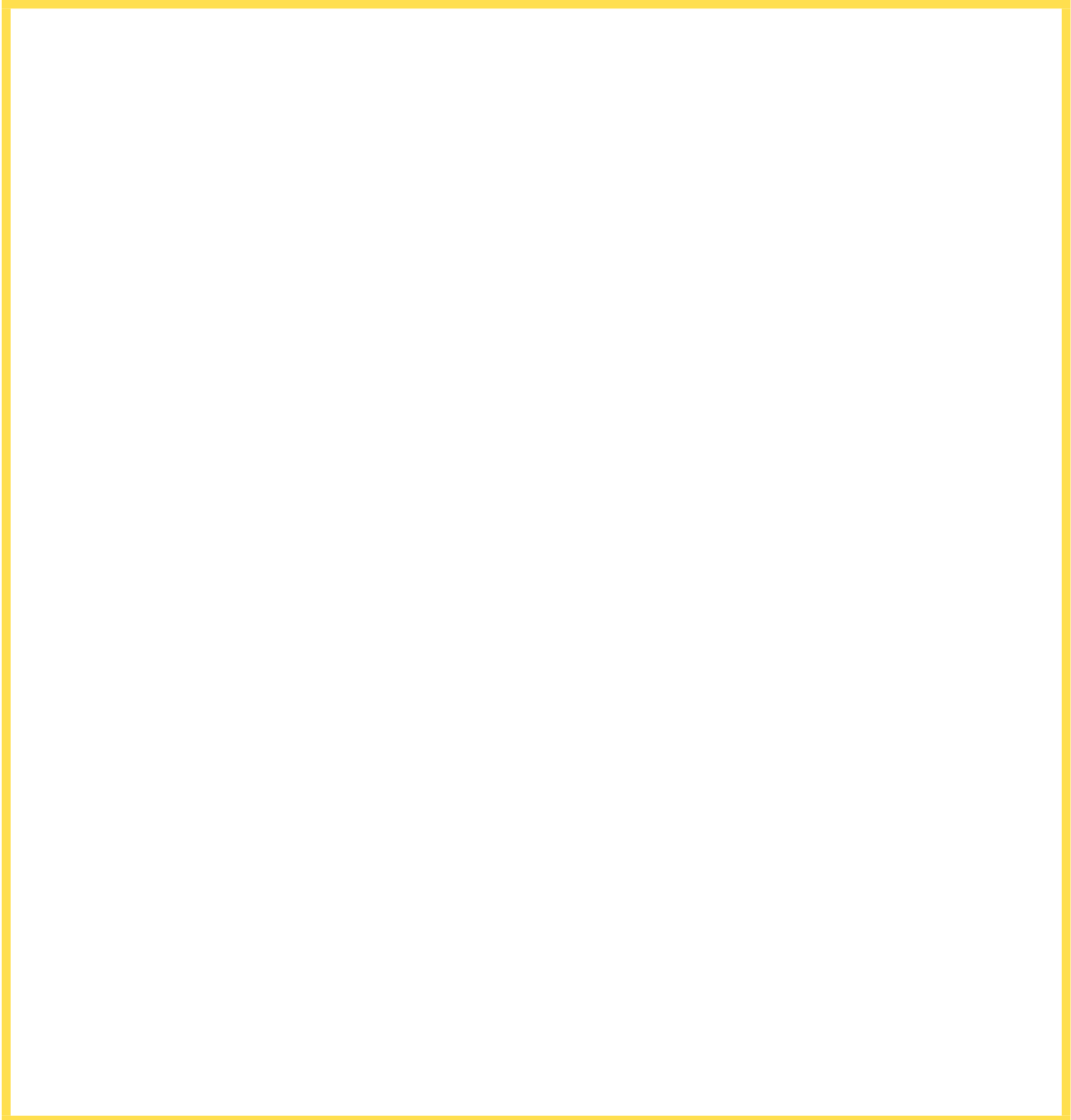
A bar graph of my plant's height



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Student Activity Sheet 3a Name: _____

My Daffodil Flower



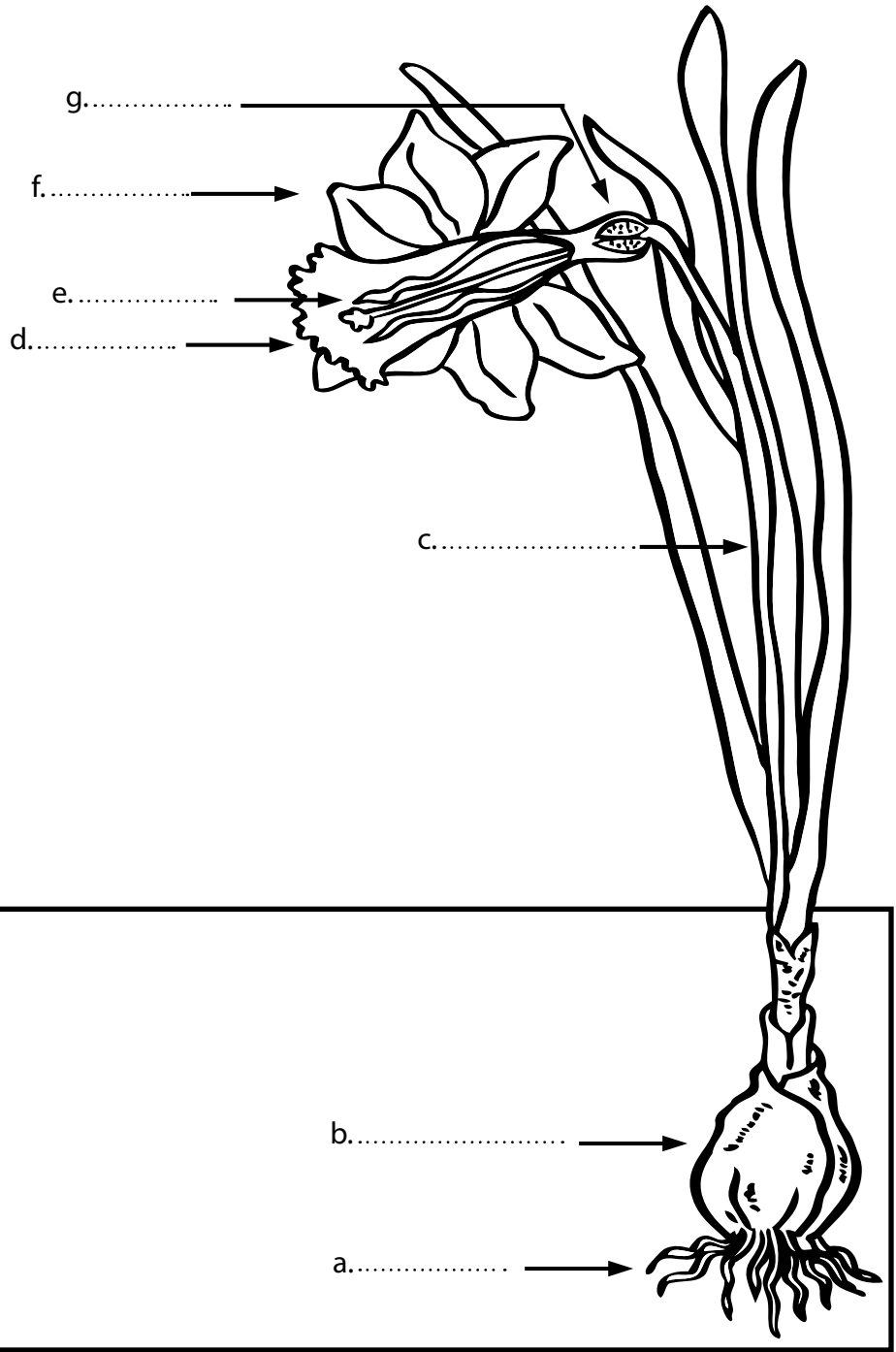
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Student Activity Sheet 3b Name: _____

A Daffodil Flower and its parts - both what I see and what's below ground

Colour the Daffodil and label its parts.

- Label these parts**
- Roots
 - Seed pods
 - Petals
 - Cup or Corona
 - Stamens
 - Stem
 - Bulb



Application and Review

Purpose:

To find out what students learned about daffodils, plants and their needs to grow.

Suggested Time

30 minutes

Materials

- * Student Activity Sheet #4 (page 24)

Presentation Suggestions and Teacher Notes

1. Distribute Activity Sheet #4 to the students. This is a placemat activity and the sheets could also be placed on the students' desks before they arrive in class. They can start working on the placemats as soon as they enter the classroom.
2. Have students complete the activity sheet.
3. Have students share their answers with the class.

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Student Activity Sheet 4 Name: _____

Draw or write the four things that a plant needs to grow.

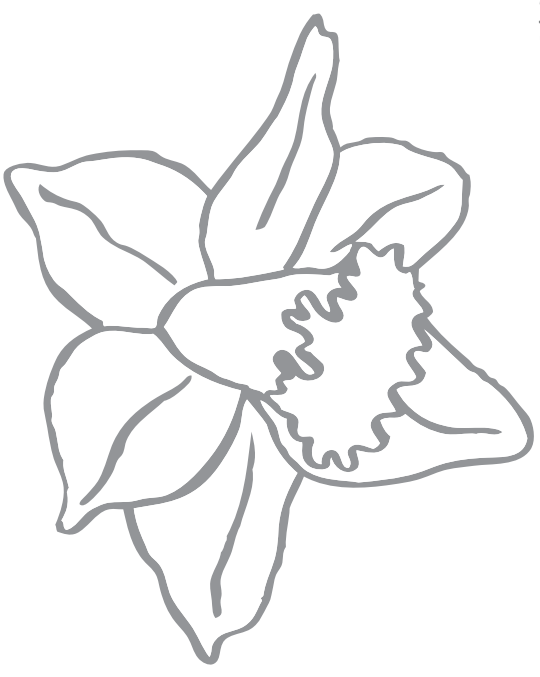
- 1.
- 2.
- 3.
- 4.

Write or draw a picture of your favourite part of learning about plants and daffodils.

Write three things you still want to know about plants and daffodils.

- 1.
- 2.
- 3.

Draw a picture of what you think an imaginary daffodil animal would look like. Use the daffodil flower below as a starting place for your animal.



Daffodils in a field



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Narcissus Fortissimo



Narcissus Canaliculatis



Narcissus Tripartite



Narcissus Centanees



Narcissus Golden Bells





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