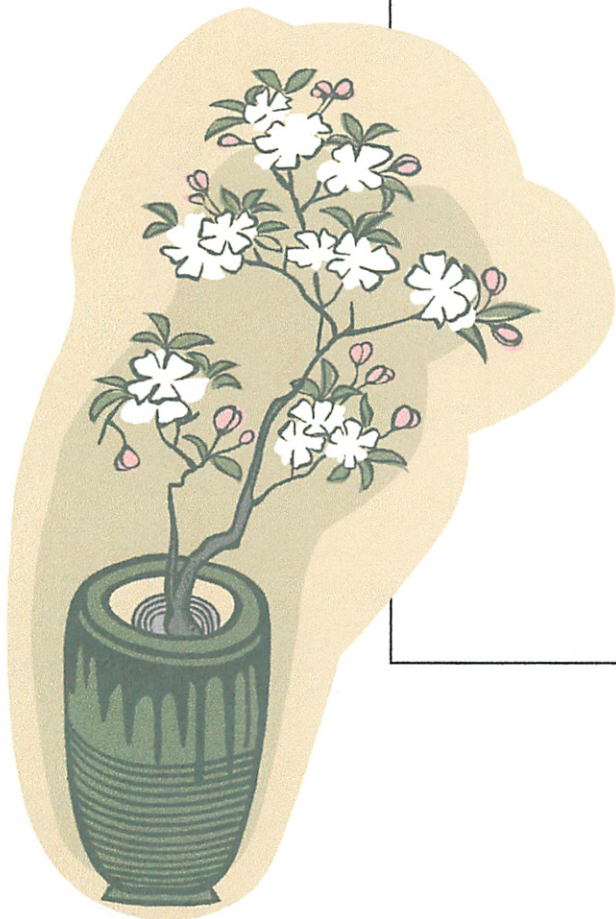


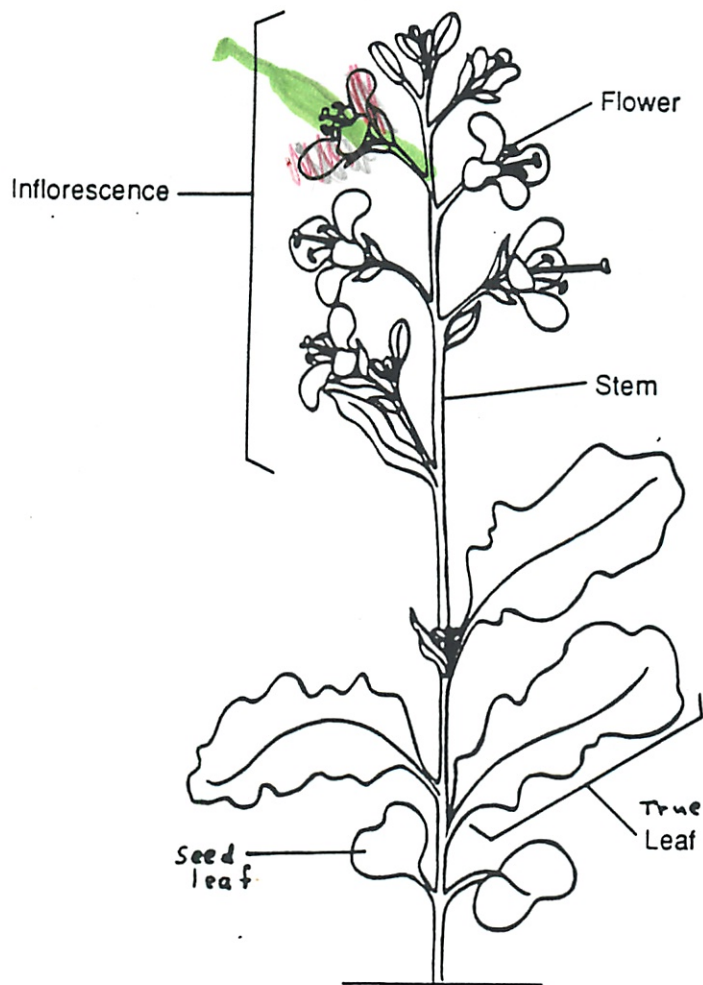
Science

Unit 8

Growing Plants



FAST PLANT JOURNAL

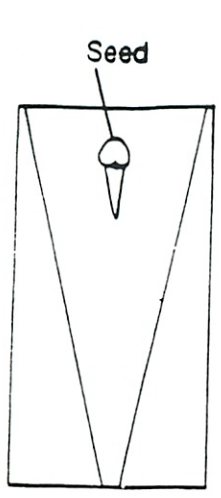


Name Michael Plasmeier

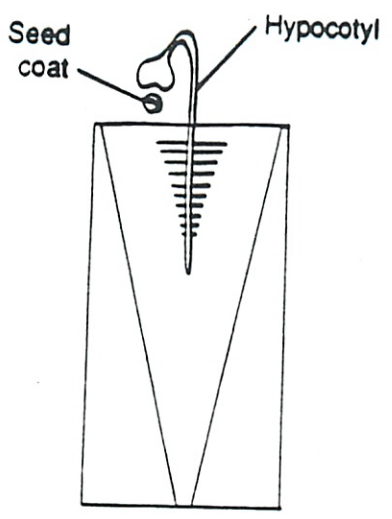
Partner Alex Shaffer

Date 4/19

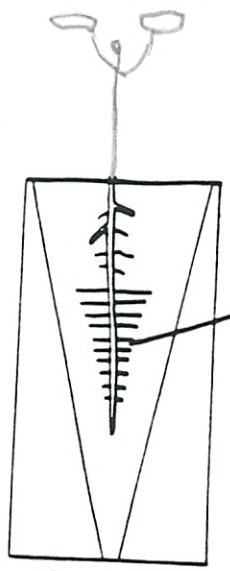
Fast Plant Drawings



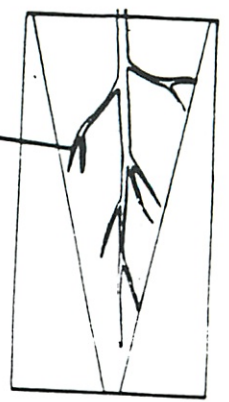
24 hours



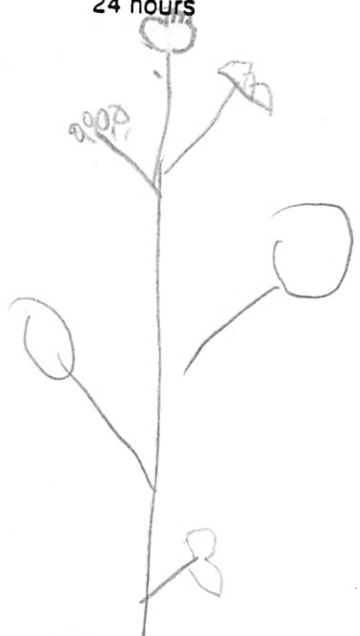
24 to 48 hours



Day 5



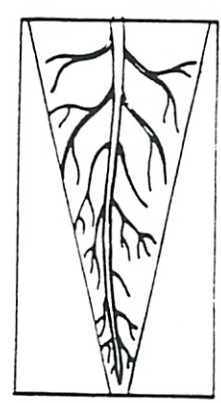
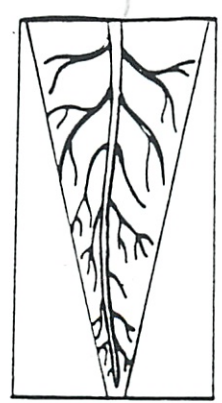
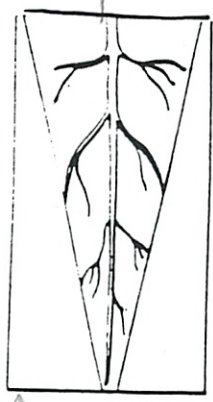
Roots



Day 16



Day 26



FAST PLANTS DAILY LOG

NAME Michael Plasmeier

Day #	Date	Observations	# true leaves	# flowers	# seed pods	Sum of plant heights	Average of plant hts.
1	4/19	Planting day, 3 in each pod w/ fertilizer				3.75	
3	4/21	11 plants growing	1				
5	4/23	11 plants growing, thinning day, All left. Heights 2 seed leaves each				3.75 cm	1.94 cm
8	4/26	True leaves growing, soil greenish, plants higher, knicked stem survived	7			9.3 cm	2.3 cm
10	4/28	Seed pods appearing, true leaves about 15 cm, 1 is really big. Seeds on all	10			11.5 cm	2.8 cm
12	4/30	Plants bigger, all have seed pods some really big true leaves, some small	10			21.25 cm	5.3 cm
16	5/4	Flowers opening up, pollinating, some open, some very tall		7		53.5 cm	13.3 cm
17	5/5	Pollinating, are taller of PD, more flores open		18		57.5 cm	14.3 cm
22	5/16	Flowers withering, flowers falling off, plant hot getting taller, pods longer, shake.		16	16	71 cm	17.7 cm
24	5/12	Seed pods growing, some have big + small pods		18	18		
↓	↓	↓	↓	↓	↓	↓	↓
N	E	X T	P	A	6	F	

FAST PLANT DAILY LOG (page 2)

Name Michael Plasmeier

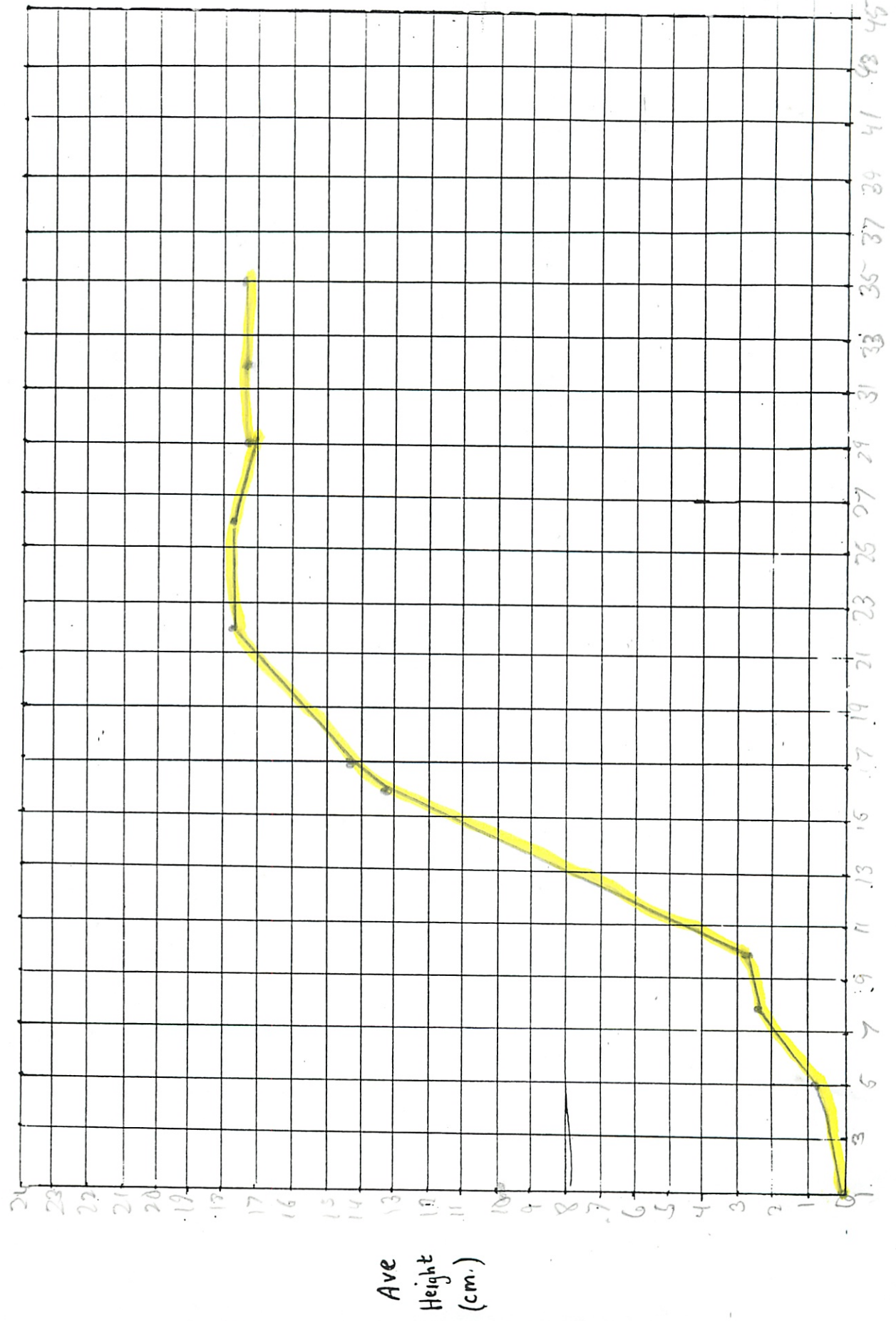
Day #	Date	Observations	# seed pods	sum of seed pod length	Average seed pod length	Sum of plant heights	Average plant height
26	5/14	Seed pods getting low, flowers wilting, falling off.	17	8.7cm	2.1cm	71cm	17.75cm
29	5/17	Some seed leaves turning yellow (esp tall flowers) Some no seeds, yellow still falling off.	18	8.6cm	2.1cm	68cm	17.17cm
32	5/20	leaves are wilting, only 1 plant has alot seed pods, others do.	14	9.5cm	2.3cm	68cm	17.7cm
33	5/21	tallest one, seed pods crumpled, harvested 1 seed (6 seeds)	20	4.2cm	2.3cm	68.5cm	17.12cm
44	6/1	Flowering done, plants are all dried out + wilted, light green End of Experiment	15	#Seeds 70			

791

Fast Plant Experiment - Data Analysis Graph - Plant Height

Name Plaz

Day#	ht (cm)
1	0
5	9.4
7	2.3
10	2.8
12	15.3
16	13.3
17	14.3
22	17.7
26	17.7
28	17.7
32	17.7
33	17.8



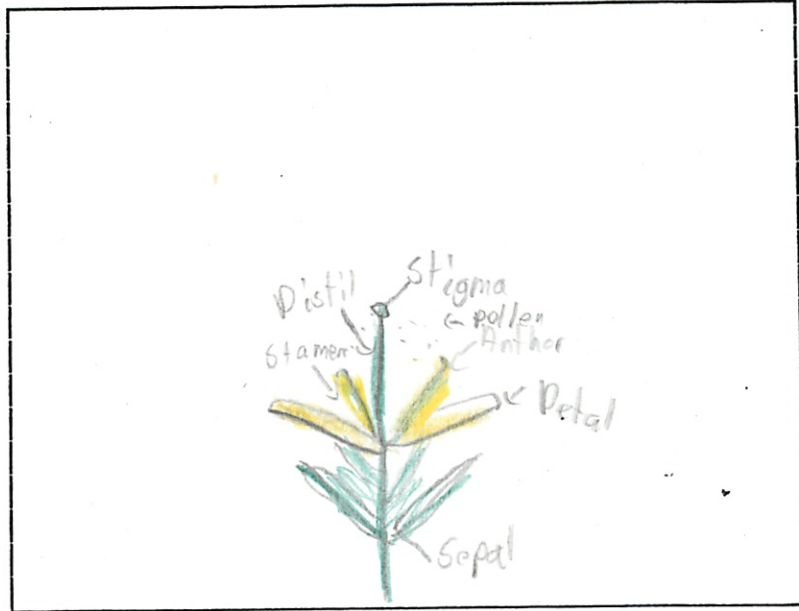
Day #

Name Michael Plasmer

Fast Plant - Flower Description

A. In the box below, draw one fast plant blossom. Color and label:

petal pistil stamen sepal stigma anther pollen

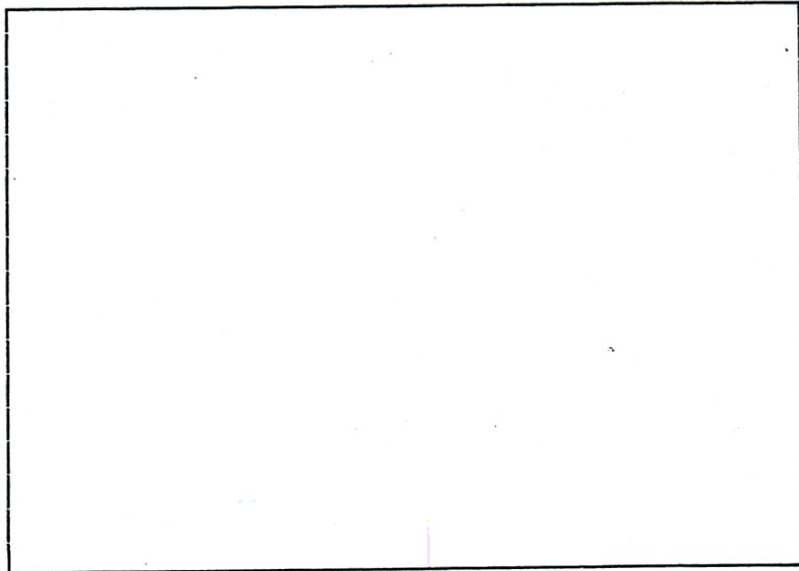


Day# 17

Date 5/5

B. 7 Days later

Draw your flower 7 days later, after pollination.



Day# _____

Date _____

Fast Plant Data Analysis

Calculating Percent Seed Germination:

I. Your Plants

A. Number of seeds planted = 12

B. Maximum # of seeds that grew before you thinned them - 11

C. % Germination = $\frac{\# \text{ grew}}{\# \text{ seeds planted}} = \frac{11}{12} = 91.6 \rightarrow 92\%$

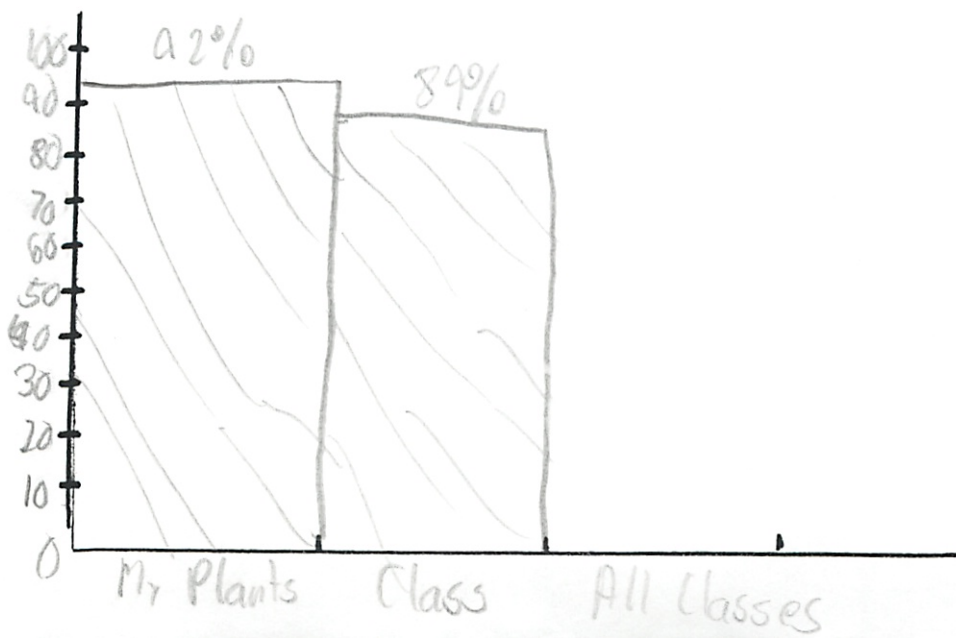
II. Class Germination rate

A. Number of seeds planted in class = 164

B. Max. number of seeds that grew = _____

C. Class % seed germination = $\frac{\# \text{ grew}}{\# \text{ seeds planted}} = \frac{124}{140} = 88.5 \rightarrow 89\%$

III. Graph



Michael Plame'or

Use of Plants

(10)

4/19

ps171-5172

<u>Roots</u>	<u>Stems</u>	<u>Leaves</u>	<u>Flowers</u> <u>/Fruit</u>	<u>Seeds</u>
Sugarcane	Sugarcane	Celery	broccoli	soybean
Tapioca	potatoes	lettuce	Rice	sunflower
asparagus	asparagus	spinach	Bananas	beans
carrots		cabbage	apples	lima
turnips		tea	oranges	etc.
radishes		parsley	grapes	peas
sw. potatoes		chives	tomatoes	peanuts
		basil	eggplant	
		rosemary	edamame	
		mint	peppers	
		Sage	cucumbers	
			green beans	
			oats	
			corn	
			wheat	
			barley	

10

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To Study
5/19

A. LEAVES

1. Leaves make food by the process of photosynthesis. During this process they use light as energy to turn:

water and Carbon dioxide into sugar and oxygen

2. The leaves make food with the help of special structures called chloroplasts.

These structures contain the chemical Chlorophyll which makes plants green.

3. What gases pass through the **stoma**? Carbon dioxide, oxygen, water vapor

4. What part of the leaf contains the most stoma? bottom Why is this the case?

so that the leaves don't dry out

B. STEMS

1. Why can wooden stems plants grow taller than herbaceous stems? they support

more weight, stiffer, stronger

2. Can you think of a way for a herbaceous stem plant to grow very high up in a forest?

it could grow against a wooden stem

3. What parts of the plant do cells on a **bud** become? the stem or leaf or flower

4. Stems grow by adding new cells at their buds and tips, around edges

C. Roots

1. Describe a **taproot**. large central roots that grow almost straight down
Give an example carrot, radishes

2. Describe a **fibrous root**. many thin roots that form complicated networks underground
Give an example grass

3. Roots grow by adding cells at the tips

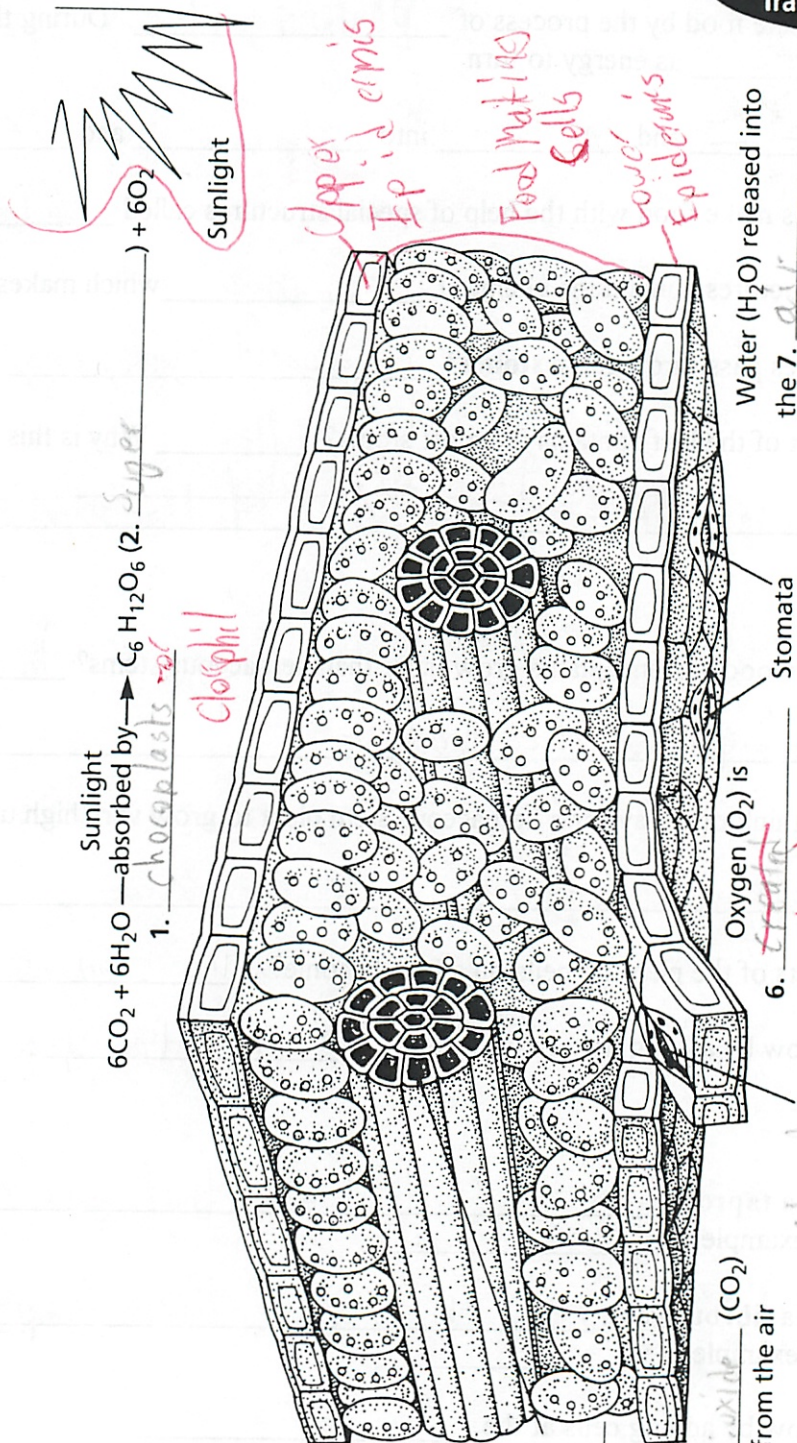
4. New root cells are protected by the epidermis

5. Most water and minerals in a root are absorbed by the tips

6. How can some plants MAKE food in their roots? they have chlorophyll

Cross Section of a Leaf

Chapter 24
Transparency Worksheet



Chlorophyll

3. Water (H₂O) from _____

4. Carbon dioxide (CO₂) absorbed from the air

5. Stomata (showing guard cells)

6. Oxygen (O₂) is released

Water (H₂O) released into the _____

5/19 Study

CHAPTER 11 Seed Plants (pages 292 - 295)

Plant Parts : Roots, Stems, Leaves

I. Roots:

A. Functions:

- 1. absorb water + minerals ~~enter plant here~~
- 2. anchor plants
- 3. store food (some)
- 4. sometimes absorb oxygen

II. Stems:

A. Functions:

- 1. support plant
- 2. allow movement of materials ^{between} leaves + stems
- 3. sometimes store food
- 4. sometimes photosynthesis

B. Vascular Tissue:

- 1. Xylem - water + minerals from roots to leaves
- 2. Phloem - moves food from leaves to storage or growth areas
- 3. Cambium - ^{growth} tissue that produces more xylem + phloem

C. Plant Stems :

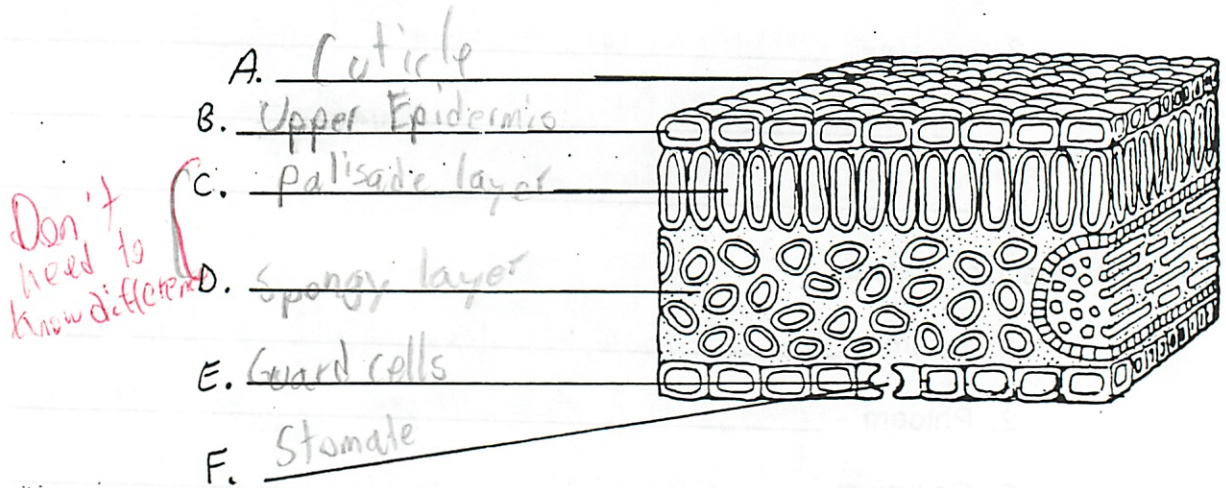
- 1. Herbaceous - soft green stems usu. annuals
Examples - peppercorn, tulips
- 2. Wooden - hard + rigid
Examples - oak, birch, trees, shrubs perennials

III. Leaves :

A. Parts:

1. Cuticle - a clear waxy coating on upper leaf
2. Epidermis - the outer layer of cells
3. Stomate - A tiny opening that allows gasses to go in and out
4. Palisade layer - Food making cells
5. Spongy layer - Food making cells

Label the leaf diagram below with the parts indicated above.



5/19-study

Chapter 23 QUIZ Plant Parts

Name Michael Blamire

Date 5/10

A. For the following questions, choose one of the words below.

Root Stem Leaf

- 1. It can be herbaceous or wooden. stem
- 2. Its major job is making food. leaf
- 3. Absorbs water and minerals for the plant. root
- 4. Contains cells which lose water through tiny openings. leaf
- 5. Anchors the plant to the ground. root
- 6. Carrot is an example of one. root

top
(50) A+
great

B. Answer the following questions on the lines provided.

- 1. What is the job of stomata? To let gasses come in and out of the plant
- 2. Water and minerals are moved through a plant mainly by (xylem or phloem) Circle one.
- 3. What is the cuticle of a leaf? The waxy coating on the top
- 4. What is cambium? Growth tissue in the stem
- 5. Give one major job of a plant stem. to raise the plant off ground, connect leaves
- 6. What is the job of phloem? To carry sugar from the leaves to throughout plant
- 7. What controls the opening of the stomata? the guard cells
- 8. In photosynthesis, plants use carbon dioxide and water to make sugar and oxygen.
- 9. Leaf cells make food with the help of tiny green structures called chloroplasts.
- 10. Why are most stomata on the bottom of a leaf? so that the leaf won't dry out through the stomata
- 11. Plant stems and roots grow by adding new cells at their tips/buds
- 12. Describe a taproot. A long almost straight root with little hairs going off it

13. Name a food that we eat that comes from the following plant part:

- a. root - Carrot
- b. stem - potato
- c. leaf - cabbage
- d. seed - poppy

14. Identify the leaf parts on the diagram below. Choose from the word bank below.

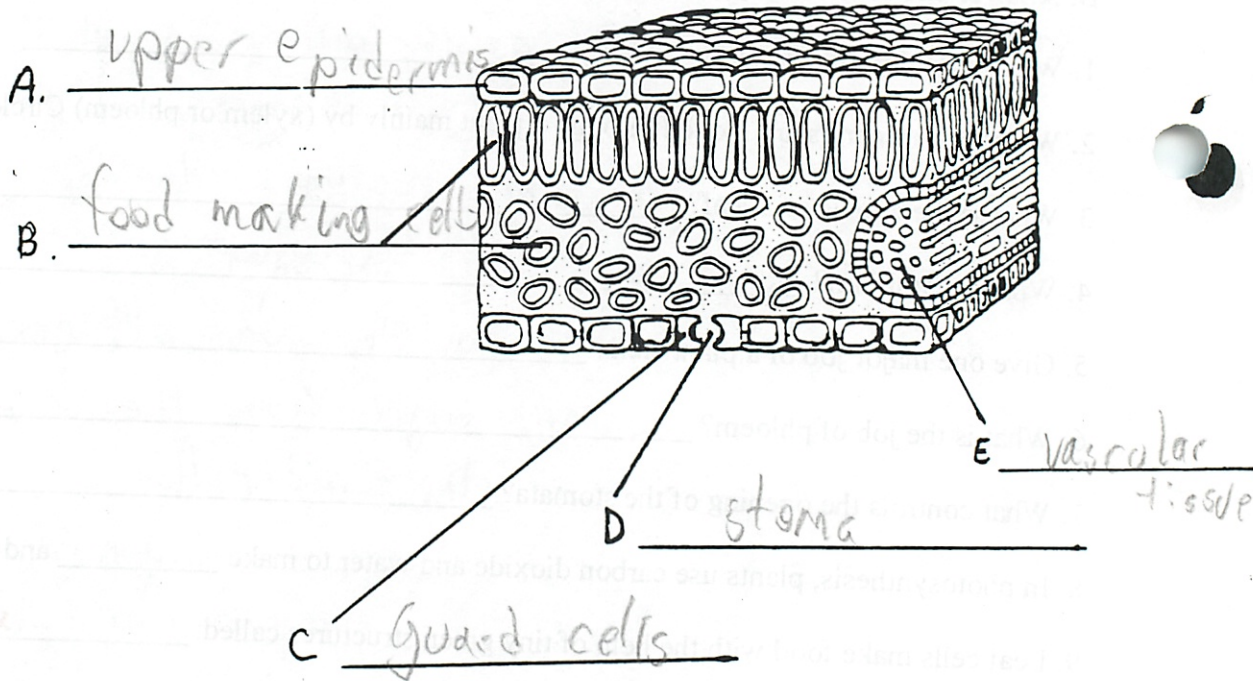
~~vascular tissue~~

~~food making cells~~

~~upper epidermis~~

~~stoma~~

~~guard cells~~



Michael Plasmeier

p 5/6 #3 (10)

sweet corn

grows

5/11

- a. You would need to plant 100 seeds to have 90 grow.
- b. You would need to plant 10 seeds to have 5 grow.
- c. You would plant the most spinach seeds.
- d. 75 of the pea plants would grow.
- e. Knowing germination levels helps because you want every available space used up and you don't want to hold up seeds that won't grow.

Group (10) # 10

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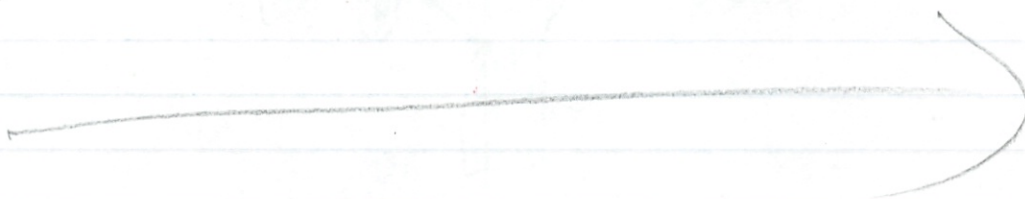
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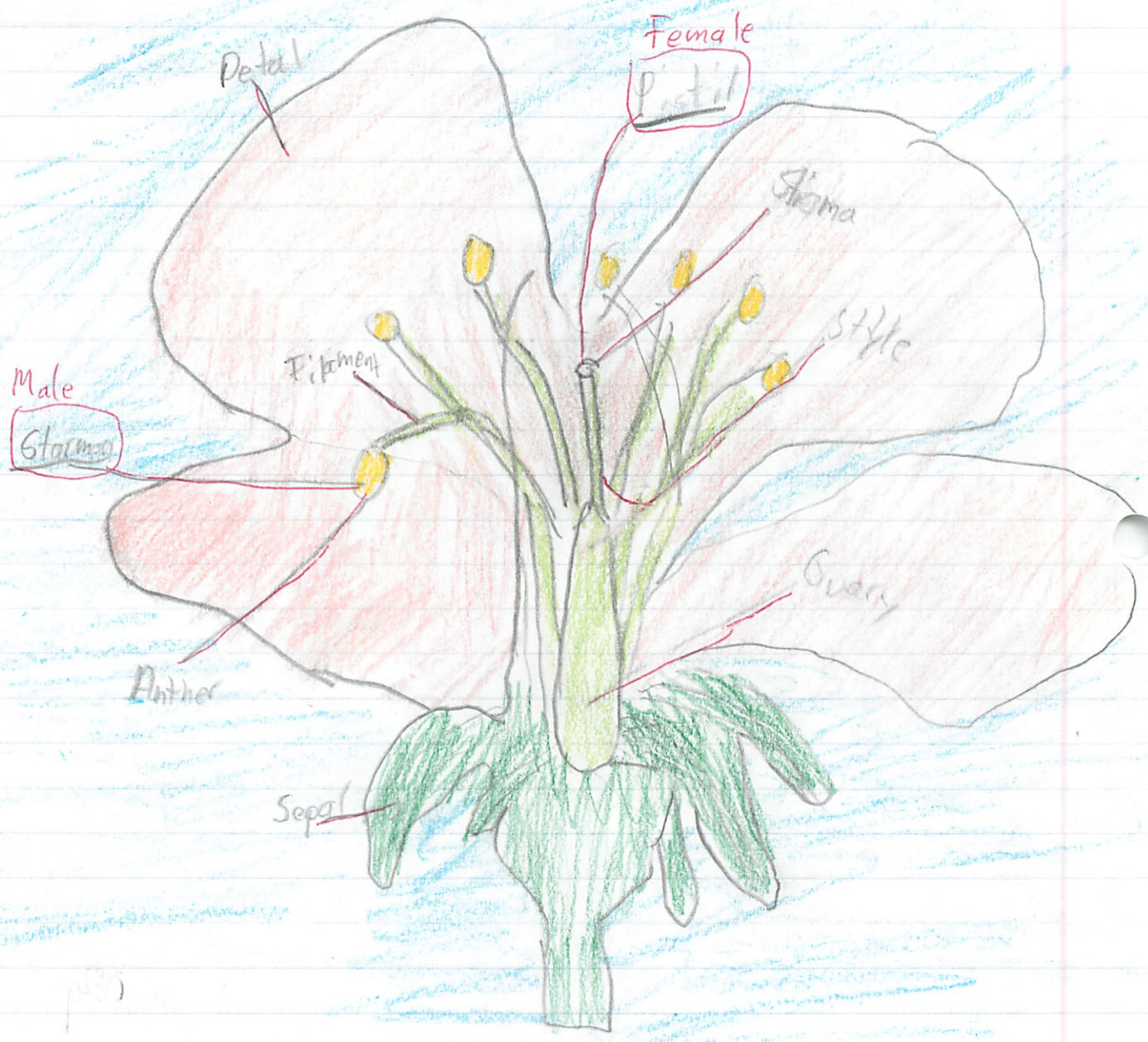
Michael Plasmeier

A Flower

p 530

13

5/4



Parts of a Flower

Definitions

5/4

petal - colorful parts that surrounds the flower and protect the reproductive organs. It also attracts birds

stamen - the male part of the flower which comprises of the anther and the filament which makes the pollen and makes it available to the birds

anther - a male part that makes + holds the pollen. This is usually on the inside perimeter of the flower

pistil - the female part of the flower or the stigma, style and ovary of the plant. This collects the pollen, forms the seeds and the fruits

ovary - the female part which produces the seeds and turns into a fruit when it swells.

Chapter 24 Seed Plant Reproduction Outline

I. Gymnosperm Reproduction

A. Most produce cones for reproduction (they are called conifers.)

1. Female cones - form eggs which are the female sex cells.

a. The cones are made of woody scales

b. The cones are larger than male cones

c. The seeds form in at least 2 years

2. Male cones - form pollen which contains the male sex cells.

a. Pollen is carried to the female cones by: wind

b. The fertilized egg forms a Zygote

B. Female cones release seeds during fall or winter months

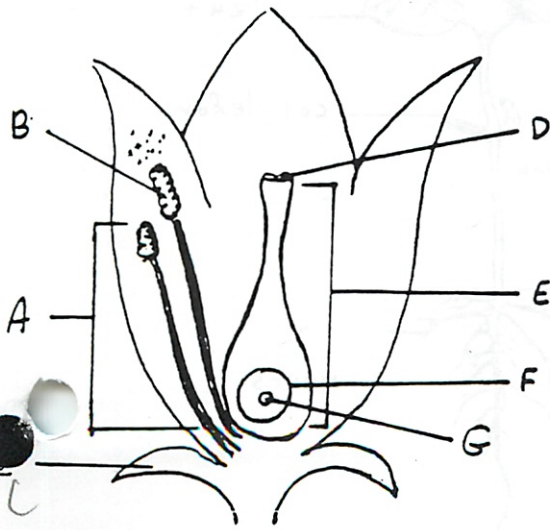
II. Angiosperm Reproduction

A. All produce flowers

B. Large, colorful, smelly flowers usually are to attract insects
for pollination

C. Other flowers depend on wind, water

D. Flower Parts - Name and describe below:



A. Stamen - male reproductive part

B. Anther - forms + holds pollen

C. Sepal - protect + support flower

D. Stigma - sticky top of pistil

E. Pistil - the female reproductive part

F. Ovary - forms eggs + fruit

G. Ovules - egg - female sex cell

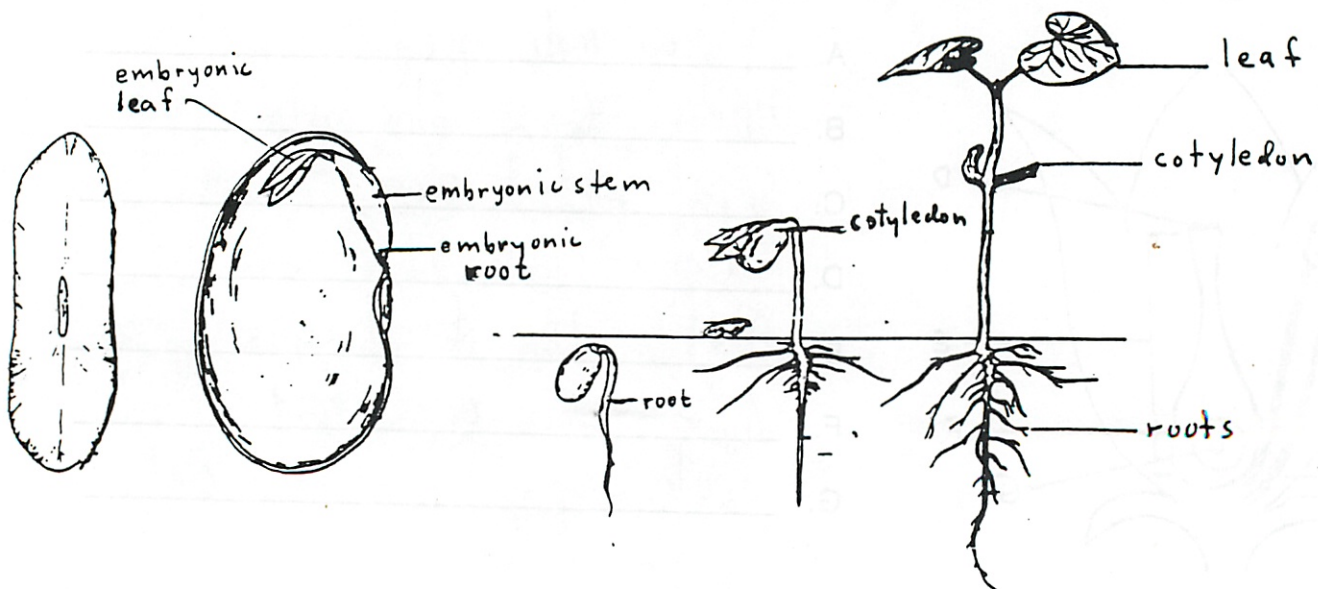
E. Seed Development

1. Pollen is carried by wind or animals (insects, birds)
2. Pollination is when pollen grains land on sticky stigma
when pollen reaches the pistil
3. Self-pollination is when pollen from the same plant fertilizes the egg.
4. Cross-pollination is when the pollen comes from another plant of the same species.
5. Fertilization - when the pollen tube grows down to the egg, and the sperm unites with the egg.
6. The fertilized egg (zygote) grows into the baby plant (the embryo.)

F. Seeds -

1. Contain embryo plant with stored food in the cotyledon (seed leaf)
and the seed is covered by a seed coat
2. Germination is early growth of seed
3. Seed dispersal is seed spreading away from plants

Seed and Seedling



III. Vegetative Reproduction - *Asexual reproduction*

A. Growing new plants without a seed.

1. Plant parts can be separated from a parent plant and grown into a new plant. These parts can include:

a. Stems -

(1) cut and placed in soil to grow new roots.

(2) burying part of a stem of a living plant (layering).

(3) Grafting - transferring a cut branch or twig to another plant of similar type that already has a root system.

b. Roots - separated and planted to grow new stems.

B. All these examples result in a clone of the parent plant.

IV. Plant Respiration

A. Plants take in oxygen (as do animals) and use it to break down the food they made.

1. This releases energy for them to grow, etc...

2. The plants also release carbon dioxide.

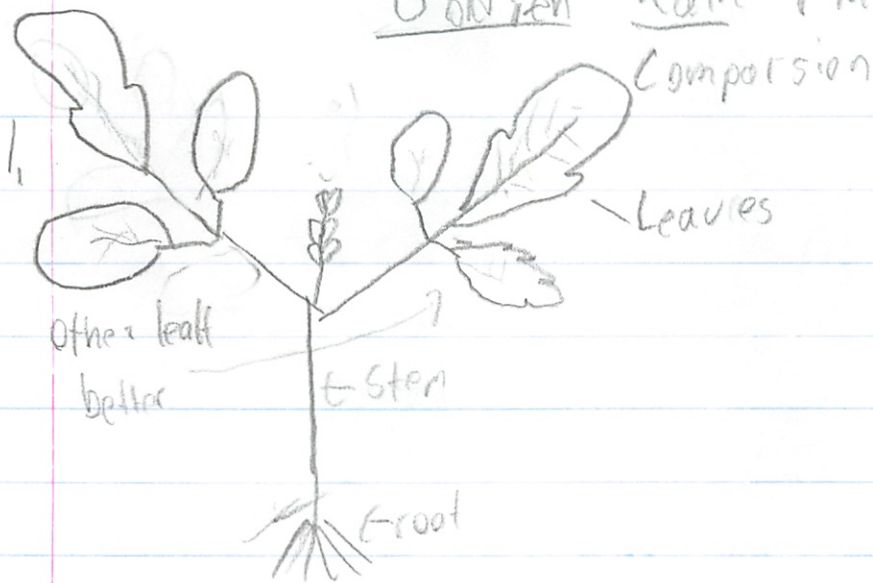
3. This takes place mostly in the leaves.

RESPIRATION REACTION

sugar + oxygen -----> energy + carbon dioxide + water

Photosynthesis is a reverse of this

Golden Rain Plant Seedling



2. The 2 both have 2 seed leaves and they both have chlorophyll and herbaceous stems.

One of them has the seed pods already developed. One of them also has compound leaves that have multiple leaflets.

3. I don't know if it will form flowers. If they are angiosperms then they will. It probably is an angiosperm because it has leaves not needles.

1930 1/19/30



on 1/19/30 in P. 2000 ft. H.
near the top of the mountain

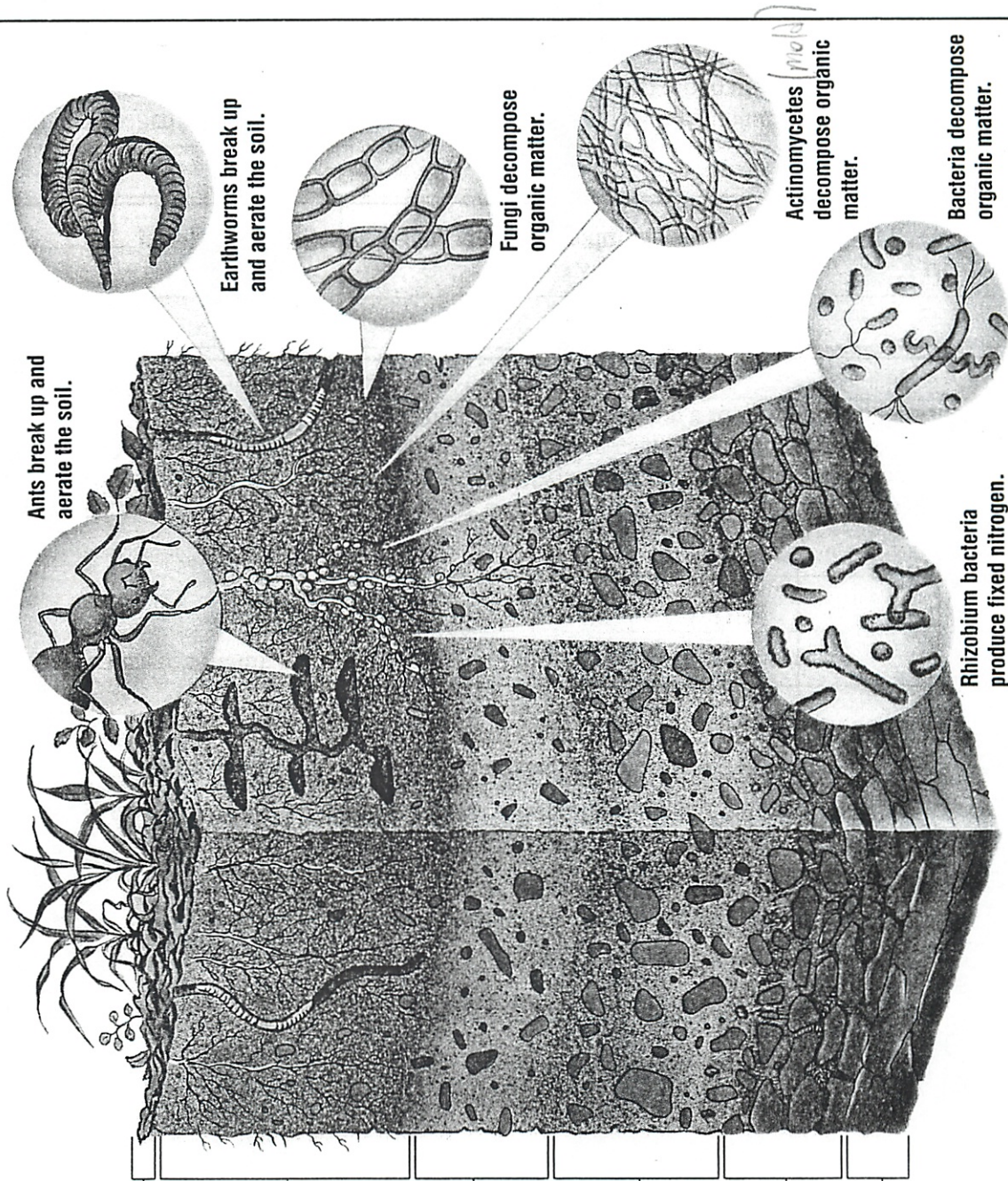
1930 1/19/30 in P. 2000 ft. H.
near the top of the mountain

1930 1/19/30 in P. 2000 ft. H.
near the top of the mountain

(5/19) To explain soil + animals

Chapter 23
Transparency Worksheet

The Structure of Fertile Soil



Earthworms break up and aerate the soil.

Fungi decompose organic matter.

Actinomycetes decompose organic matter.

Bacteria decompose organic matter.

Ants break up and aerate the soil.

Rhizobium bacteria produce fixed nitrogen.

Surface litter

fallen leaves and partially decomposed organic matter

Top soil

organic matter, living organisms, rock particles

sub soil

dissolved or suspended materials moving downward

subsoil

larger rock particles with organic matter, inorganic compounds, clay particles leached down from above

rock particles

rock that has undergone weathering

Bed rock

impenetrable rock layer

Chapter 23 - Structure of Fertile Soil

Ph2

(5/9) IMA

Soil can contain both organic and inorganic materials.

The organic materials come from animal wastes, dead animals and plants (or plant parts such as leaves) which decay (break down, decompose) due to the action of organisms such as fungi and bacteria. The top-most layer soil containing mostly dead and decaying organic matter is called humus.

The inorganic materials are made of weathered rocks. Rocks break apart due to the actions of roots and animals, due to moving water and wind, and due to freezing and thaw of water. A mass of ice is 9% larger than that same mass of water.. so water enters cracks in rock then freezes it pushes the rock apart... ice is also less dense than water which is why it floats.

Look at the soil cross section diagram in your notes, then answer the following questions.

1. What is humus?

The de-composed material from living things, some rock particles

2. What two things do earthworms and ants do for the soil?

They aerate it, put holes in the ground so water can get to roots

3. Where is most of the organic material located?

At the top of the soil, top soil

4. Which organisms help to decompose organic matter?

Fungi, mold, Bacteria

5. Rhizobium bacteria fix Nitrogen gas in the air into a form that plants can use. Where are they located?

~~On plant roots~~ in the top soil

6. Many minerals in soil dissolve in water. How do these minerals and other nutrients reach the lower levels of soil?

They dissolve in the water, which seeps down, and the minerals are then absorbed

Soil Outline Notes Chapt. 23

I. Soil is an important factor in the growth of plants.

A. Formation of Soil

- 1. It takes between 100 and 1000 years for 1 cm of soil to form.
- 2. In one "pinch" of soil, there may be millions of micro-organisms
- 3. Soil can be formed by the action of weather, moving water and living things all of which can break down rocks.

B. Composition of Soil

- 1. Soil is made of:
 - a. rock particles and decaying matter
- 2. Decaying matter is called humus, which is found mostly near the surface of the soil.
- 3. The more humus, the more fertile the soil.

C. Percolation rate of Soil - the time it takes water to pass through a soil sample

- 1. Different kinds of soil hold different amounts of water
- 2. The best soil holds some water, for plants to absorb through roots, but also allows drainage of water. This prevents flooding and allows air pockets in the soil which are also needed plants.
- 3. The amount of water soil can hold depends on the soil particle size

Soil types	particle size	drainage	holding of water	air
sand	large	good	poor	good
silt	average	average	average	average
clay	small	bad	good	poor

D. Importance of Soil for Plants

- 1. It provides support for roots.
- 2. It holds water, air, and nutrients
- 3. It holds heat at night.

E. Organisms' effects on Soil

- 1. Ants and earthworms - help by break up + aerating soil
- 2. Bacteria and fungus - help to cause decay of dead stuff

Michael Plasmeier

EXPLORATION 4 Sorting The Soil

Goal: To learn about the different components of soil.

Materials: Cup of soil, two 25 ml graduated cylinders, rubber stopper

Procedure:

1. Fill one 25 ml graduated cylinder half way with soil. *12.5*
2. Add water from the other 25 ml grad. cyl. until it reaches the 23 ml mark.
3. Stopper and place your thumb firmly over the top of the stopper.
4. Shake vigorously for one minute.
5. Place the soil/water cylinder on the desk and let it settle for 15 minutes.
6. After 15 minutes, draw and label the layers on the diagram below.

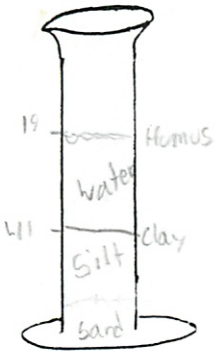
The soil layers should be arranged from bottom to top as follows:

pebbles, sand, silt, clay, water, humus.

7. Measure each layer with a ruler and record the heights of each layer below.

humus =	<u>2</u> mm	=	<u>5</u> %
clay =	<u>.1</u> mm	=	<u>.2</u> %
silt =	<u>3.2</u> mm	=	<u>84</u> %
sand =	<u>4</u> mm	=	<u>10</u> %
pebbles =	<u>0</u> mm	=	<u>0</u> %

3.2 cm water



Total thickness = 38.1 mm
(do not count the water layer)

8. Graph the percentages below.

10 20 30 40 50 60 70 80 90 100

Humus
Clay
Silt
Sand
Pebbles

Michael Plasmeyer

Soil Definitions

p 508-509

(10)

5/10

- #1 humus: a material made from once-living matter, now decayed this usually floats on top when soil is set.
- #2 soil texture: the feel of the soil, usually from how big the particles are
- #3 particle size: How big the pieces are. Humus you can't really tell, decaying matter ^(light) clay is the finest or smallest. Next comes silt and then sand being the largest
- #4 nutrients: things and chemicals in the soil that help plants to grow
- #5 loam: a mixture of sand, silt, and clay. A typical mixture is 40% sand, 40% silt, and 20% clay

(10)

NAME Michael Hasmeier
 CLASS _____
 DATE _____

Help Wanted!

Different parts of plants do different jobs. Read the classified advertisements and help each of the plant parts listed below to find the right job.

Cambium Guard cells Leaf Phloem Root cap Sepals Woody stems
 Epidermis Herbaceous stems Petals Pistil Root hair Taproot Xylem

HELP WANTED	HELP WANTED	HELP WANTED
ADVERTISING EXECUTIVE Colorful personality needed to advertise availability of pollen and nectar. Must have experience working with bees.	DOOR ATTENDANT Full-time positions available at entrance to stomates.	PLUMBER Vascular specialist needed to lay new plumbing each growing season. Experience making new xylem and phloem necessary. Potential for growth.
ANCHORPERSON Interested in holding a plant in place? If you have experience digging deep in search of water, we're looking for you. No branching necessary.	EGG FARMER Female needed to manage egg production and receive pollen.	SUPPORT TEAM Permanent position supporting leaves. Yearly growth.
BODYGUARD Help needed to protect buds. Apply before spring.	FACTORY WORKERS Make sugar and oxygen. Good conditions. Daylight hours and sunny days only. Apply.	TEMPORARY EMPLOYMENT One season only! Temporary work supporting leaves.
CONDUCTOR Individual needed to carry water. Rapid advancement. Start at the roots and work up to the top. Tubes with experience preferred.	HARDHATS Construction workers. Drill for water. Protect other members of water-search team while drilling. Apply at root tip.	WAITERS/WAITRESSES Deliver food to hungry plant cells. Work in busy roots, stems, and leaves.
	OUTDOOR WORK Protect and cover upper and lower leaf surfaces. Apply at leaf.	WATER RECEPTIONIST Absorb water and minerals. Work closely with others.

Write the name of the plant structure next to the job for which it is best qualified.

- Advertising Executive Petals
- Anchorperson Taproot
- Bodyguard Sepals
- Conductor Xylem
- Door Attendant Guard cells
- Egg Farmer Pistil
- Factory Workers leaf
- Hardhats root cap
- Outdoor Work Epidermis
- Plumber Cambium
- Support Team Woody stems
- Temporary Employment Herbaceous stems
- Waiters/Waitresses Phloem
- Water Receptionist Root hair

Samoaan Healers

10

Michael Plasmeier

5/20

A Samoaan healer was someone who healed their tribe. They knew and discovered cures not even modern scientists know. We need to find these people before their secrets are lost forever. Paul Cox is trying to help prevent that. Cox found a plant that helps reduce fever from help from his guide. Also they found bark that prevents swelling. How could they find these things out? It must take a lot of experimenting. Lets hope we can find out all of these secrets before they die.

(10)

Common Fraction



Name Michael Plasmeier
Date 5/19

Chapter 23 and 24 TEST PLANTS

A. Choose from the word bank on the right. You may use answers more than once or not at all.

1. Absorbs most water for a plant. D
2. Usually has male and female parts. F
3. Early growth of a plant is called A
4. Contains stored food for early growth. G
5. Where most stomates are found. C
6. Can be herbaceous or woody. B

- A. germination
- B. stem
- C. leaf
- D. root
- E. embryo
- F. flower
- G. seed

103
A++
great work!

B. Answer the questions on the lines provided.

1. What is humus? decaying matter, some rock particles in type of soil

2. Name two examples of food we eat that come from the following plant parts:

a. seeds - poppy seeds sunflower seeds

b. roots - sweet potatoes carrots

c. fruit - apples oranges

3. How do earthworms help the soil? They help by aerating the soil which lets air + water get to the roots

4. In a test of germination rate, a student placed 10 corn seeds in moist paper towel. After two weeks, 8 seeds were growing. What was the germination percentage?

80%

5. Name two factors that might affect germination rate? The temperature, how much water is touching the seed

6. Give two functions of roots. To support the plant + get water and mineral from soil

7. What is the job of xylem? To bring water from the roots to the leaves

8. Photosynthesis is used by plants for : making food

9. What is the difference between a taproot and a fibrous root? A taproot

is a single root growing down, and a fibrous root goes all over

10. Why can't most roots make food? They don't get light energy the plant

11. What is the leaf epidermis? The "skin" protecting and holding
the food making cells.

For questions #12 - 16 use the words ANGIOSPERM or GYMNOSPERM

12. Produce most of your food. angiosperm

13. Most seeds form in cones. Gymnosperm

14. Also known as flowering plants. angiosperm

15. Most leaves are needles. Gymnosperm

16. All produce fruit. angiosperm

17. What is the percolation rate of soil? The time it takes water to
drip through it

18. Sandy soil is not very good for most plants because: The water falls good
through too fast and plants can't absorb it

19. What is the difference between pollination and fertilization? Pollination
is when the pollen grain lands on the pistil and fertilization
is when the pollen reaches the egg in the ovary good

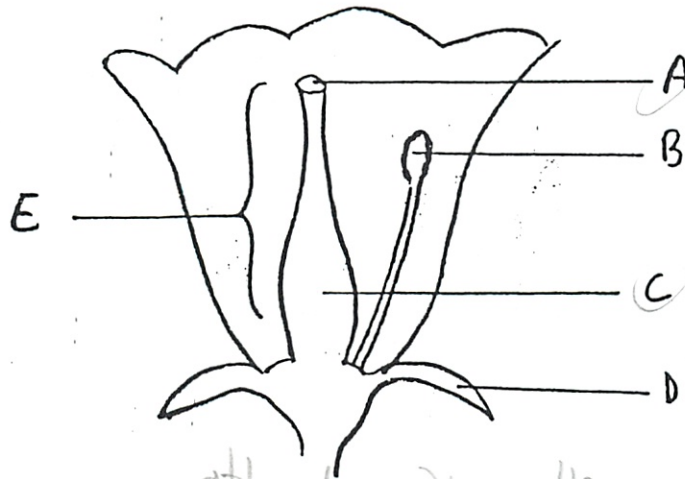
20. What ^{grows} appears first when a seed germinates, the stem or root? (Circle one.)

21. We can say that flowers and bees have a mutualistic relationship, that is, they help each other. Why is this the case?

The flowers get the pollen spread and the bees get nectar
or food. They both benefit

22. Identify the flower parts below using the word bank, then describe its job.

- Sepal
- ovary
- anther
- stigma
- pistil

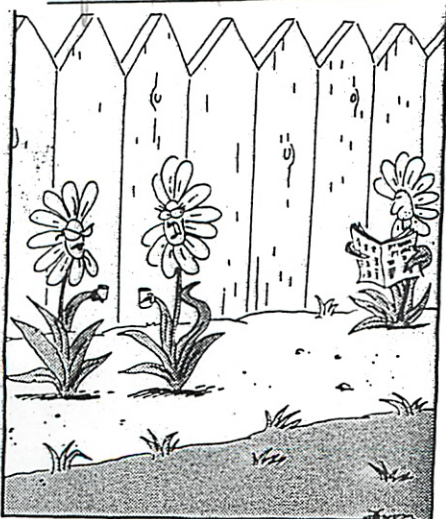


- A. Stigma - attracts the pollen
- B. Anther - gives off the pollen
- C. Ovary - eggs develop and grow into a fruit
- D. Sepal - protects + supports flower
- E. Pistil - the female part of the flower

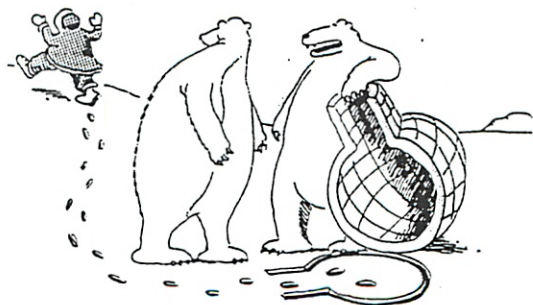
Extra Credit (3 points)

Describe how plants and animals get the Nitrogen they need. You need to tell how nitrogen-fixing bacteria are involved.

Plants + Animals get nitrogen not from the air but different places. The nitrogen-fixing bacteria takes nitrogen from the air and puts it in plants. Animals get it by eating the plants. Animals then put it back out in the air.



"I don't have any hard evidence, Connie — but my intuition tells me that Ed's been cross-pollinating."



"I lift, you grab. ... Was that concept just a little too complex, Carl?"

22. Draw a flower. Label it using the word bank. Then describe its job.



A _____

B _____

C _____

D _____

23. Draw a scene. (3 points)

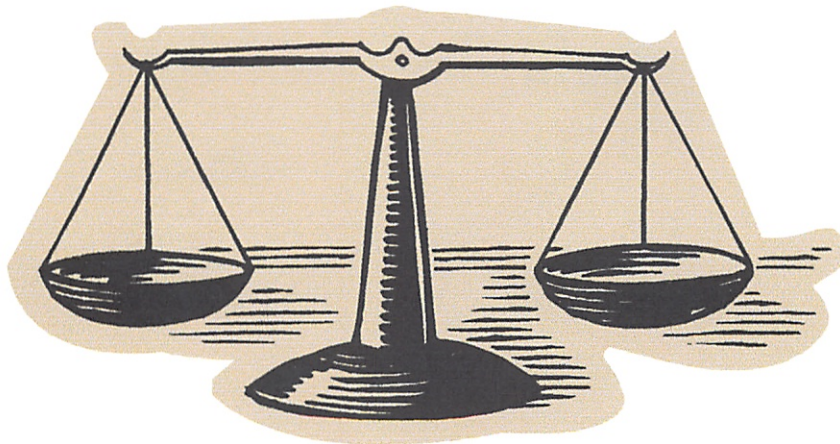
Describe how plants and animals get the things they need. You need to tell how things like plants and animals get the things they need.



Science

Unit 4

Forces and Motion



Forces in Sailing

Michael Plasmeier

p 217-218

10

5/24

1. No you can't have an object not exert force and some object receiving a force because it wouldn't be a force.
2. Some forces are gravity, drag, lift, thrust, I think there is also friction.
3. Yes there is a way for an object to exert force without touching. Gravity you don't touch the earth at times when you jump or when you blow on something.
4. In the story the ship pushed against the water, the sails pushed against the wind. He also pushed down on one side to make the other go up. ? I don't get it
5. A force is something moving against another thing either pushing or pulling it.
6. because of the drag and friction. Kimiko reached over and pulled Kathleen up using the boat as a lever and pulled her aboard. The swing the sail back in the wind and the thrust counteracted the drag and they were off! By a miracle they won. The prize was an airplane. The 2 were excited to tell about thrust, gravity, drag and lift.

(10)

UNIT 4 Chapter 10 FORCE and MOTION

I. What are Forces:

- A. Forces are defined as a push or a pull
- B. Forces can change the shape and motion of an object.
- C. Forces can act without touching an object.

II. Describing Forces

- A. The force that acts is called the agent
- B. The **receiver** is the thing agent acts on
- C. The **effect** is what happens to the receiver
- D. Forces are drawn using arrows
- E. The length of the arrow gives us an idea of the strength of the force.
- F. The direction of the arrow tells us the direction of the force.

III. Different Kinds of Forces

A. Some kinds of forces are:

- | | |
|--------------------|------------------------------|
| 1. <u>gravity</u> | 4. <u>magnetism</u> |
| 2. <u>friction</u> | 5. <u>elastic</u> |
| 3. <u>thrust</u> | 6. <u>static electricity</u> |

B. **Contact** forces require the agent to touch the receiver.

Examples friction, elastic

C. **Non contact** forces do not require touching.

Examples static electricity, gravity, magnetism

IV. What Makes Things Fall

A. Gravity is an attractive force between all objects that have Mass

1. All objects pull on all other objects.
2. The Earth's pull on an object is called the weight of the object.
3. Gravity pulls things toward the center of the Earth

B. Isaac Newton (1642-1727)

1. Compared the Earth's pull on an apple to the Earth's pull on the moon
2. Newton explained that the moon was kept in its circular orbit through the force of gravity

C. Newton's Law of Gravity

1. All objects in the universe exert a force on every other object in the universe
2. The strength of gravity's pull on an object depends on:
 - a. The mass of the objects. Larger objects exert harder pulls
 - b. The distance ~~space~~ between the objects.
Closer objects have harder pull.

D. Mass and Weight

1. Mass is defined as the amount of matter in an object.
2. Weight is a measure of the objects (Earth's) pull on the matter
3. Which one changes when you go into space? the weight
Why? because it is the earth's pull and if you are farther away from Earth, it is less

EXPLORATION 1

A Picture Puzzle, page 220

Your goal to learn to recognize and identify forces and their effects

What to Do

1. Several forces are illustrated in the pictures on pages 220–221 of your textbook. For each picture, determine the object (the agent) that is having a noticeable effect on another object (the receiver).
2. In your ScienceLog, sketch each situation, and draw arrows to indicate the direction of each force and the point where each force is being applied.
3. Then, in the table below, list the agent, the receiver, and the effect of the force for each picture.

Agent	Receiver	Effect
a. cue stick	cue ball	The cue ball moves and hits the other balls.
b. man	bow	the man pulls back the bow + changes its shape
c. helium	balloon skin	the helium expands balloon + makes it go up
d. gravety Ground	ball	Gravety pulls the ball down
e. Sack	car	the sack lift to the car
f. ax	wood	the ax splits the wood
g. air	parashoot	The air pulls back on the parashoot

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Are there cases where two forces are acting on the same object? If so, what is their combined effect on the object? Record your answer in your ScienceLog.

Name Michael Plasmees

Date 5/26

Reaction Time - Gravity Lab

Objective - determine your reaction time and use the data table to calculate the speed of falling objects.

Materials - meter stick

Procedure:

1. Have your partner suspend a wooden meter stick, zero end down, between your thumb and index finger. Your thumb and index finger should be about 3 cm apart.
2. Your partner will drop the meter stick without giving you any warning. Try to grab it as quickly as possible.
3. Note the level at which you grabbed the stick and record on the chart below.
4. Repeat the test three more times. Then do the same for your partner. Record all trials on the chart and calculate your average reaction time.

Data Table:

Trial #	1	2	3	4	Average
Distance	17	12	9	17	13.75
Time	.186	?	?	.186	?

12 (13.4)
?

Speed of Falling Objects

The formula for Speed is $S = \frac{\text{Distance}}{\text{Time}}$ ($S = \frac{D}{T}$)

Calculate how fast the stick is moving at 15 cm, 24 cm, and at 34 cm.

$$\left. \begin{aligned} 15 &= 85.7 \text{ cm/sec} \\ 24 &= 168.5 \text{ cm/sec} \\ 34 &= 129.2 \text{ cm/sec} \end{aligned} \right\} \text{adv time}$$

Reaction Time			
Distance (cm)	Time (s)	Distance (cm)	Time (s)
15	0.175	25	0.226
16	0.181	26	0.230
17	0.186	27	0.235
18	0.192	28	0.239
19	0.197	29	0.243
20	0.202	30	0.247
21	0.207	31	0.252
22	0.212	32	0.256
23	0.217	33	0.260
24	0.221	34	0.263

Name Midigel Plasmeier

Date 6/3

Chapter 10 Quiz

A. Use the word bank below for questions 1-7. You may use words more than once.

Mass Weight Gravity Matter Friction

- 1. The amount of matter in an object. mass
- 2. Earth's gravitational pull on an object. weight
- 3. Attractive force between all objects. gravity
- 4. Holds the moon in orbit around the Earth. gravity
- 5. Acts in a direction opposite to motion. Friction
- 6. Is a non contact force. gravity
- 7. Measured in grams. Mass

50
-3

47 A

good

B. Answer the following questions as completely as possible.

28 ~~60~~ x $\frac{1}{3}$ = 200 ~~600~~ $\frac{1}{3}$

1. Mars exerts a gravitational pull of about one-third that of Earth. If on Earth your mass is 60 Kg and your weight is 600 Newtons, what would they be on Mars?

a. Mars mass = ~~20~~ (20) Mass doesn't change b. Mars weight = ~~200~~ (200) (1) 1/3 of 600

- 2. Give two examples of non contact forces. gravity magnetism
- 3. What is the definition of Force? a push or a pull
- 4. Name two things that forces can do to objects. They can change its shape and motion

5. When the Apollo spacecraft were halfway to the moon, was the gravitational pull on them stronger from the Earth or from the moon? (or equal)? Explain your answer.

The Earth because the earth is bigger and has a stronger gravitational pull.

6. Imagine you are climbing a ladder. List two forces at work and for each one, name the force, agent, receiver and the effect.

Force	Agent	Receiver	Effect
Gravity	Earth	You	Gravity from the Earth pulls you
Friction	Joints in ladder	Other joints in ladder	The joints rub against each other + produce friction

pulls you
to the
earth

7. The strength of gravitational pull depends on what two factors?

- a. mass of objects
- b. Distance between objects

Name Michael Plasmaier

Date 8/7

Chapter 11 Exploration - Estimating and Measuring Forces

Goal: To test your ability to estimate different sizes of forces.
To use force measurers to determine the amount of force needed to move things.

Procedure:

1. Use the table below to record the information you gather during the exploration.
2. Apply each force first with your hand only, then estimate how many grams or Newtons of force will be needed to move the object.
3. Record your estimate on the chart below.
4. Measure the force using the appropriate gram force measurer, ~~then repeat with the Newton force measurer,~~ and record the results.

Situation	Estimated Force (g)	Measured Force (g)	Force in Newtons
a. Lifting a book	900 g	1900 g	19 N
b. Pulling a book across the table	800 g	700 g	7 N
c. Lifting a metal weight	1500 g	500 g	5 N
d. Pulling the metal weight <i>table</i>	2560 g	129 g	12.5 N
e. pulling the metal weight up an inclined plane	300 g	250 g	2.5 N
f. Lifting the weight up using a Pulley	150 g	500 g	5 N

Average

1900g

600g

500g

100g

Thought Experiments

Michael Plesch

3, 4, 5

10

5/7

p268 #1 The force is the thrust of the person's hand

#2 The force was removed they let go of the ball.

#3 They all don't show that but a to show a force changing the direction of an object

#4 Gravity is the opposing force

p269 #1 Pen was moving the thing and couldn't because of friction.

#2 There were unbalanced forces on weight A Diagram C/b

p271 Diagram B shows that

#3 Diagrams A+ (show this. Unbalanced forces can also change the shape of an item

(01)

Michael Plasmeier

FRICITION MEASUREMENT ACTIVITY

I. Purpose: Predict and measure force needed to move blocks across 4 surfaces.

II. Materials: 2 wooden blocks, friction board, 500g force measurer

III. Procedure:

A. Force Measurement

1. Record all measurements on the DATA TABLE below.
2. Predict the force necessary to pull the block(s) in each trial.
3. Pull one block across each surface and record the force needed to keep the block moving at a steady speed.
4. Repeat with 2 blocks (one stacked on top of the other.)
5. Repeat with both blocks in contact with the surface (hooked).

IV. DATA TABLE *in grams*

surface	One block		Stacked blocks		Hooked blocks	
	predicted force	moving force	predicted force	moving force	predicted force	moving force
cardboard	15g	10g	20g	10g	20g	30g
cork	20g	15g	15g	20g	40g	40g
rubber	15g	20g	20g	50g	100g	55g
sandpaper	35g	20g	35g	50g	40g	50g

Weight
40g

80g

V. Conclusions: What did your results show about friction forces?

Surface texture. The surface texture is affected of the force
Weight. The weight does not play a part
Surface Area. Surface area affect friction
as there is more area for friction esp for
Card Board/Block

*Rubber = more friction
On Card Board/ Cork.*

CHAPTER 12 *Friction Forces* Outline

I. Friction:

A. Caused by 2 surfaces rubbing together

1. Friction acts in direction opposite to motion.

2. It can slow/stop moving objects or prevent motion of non-moving objects.

3. It is greater when motion is started than when motion is constant

4. It is greater for heavier weights.

5. It depends on the kind of surface texture.

B. Friction can be reduced by:

1. Lubrication such as oil, graphite, ice

2. Using wheels.

3. Making surfaces smoother

4. Making weights lighter

C. Friction can be helpful when:

Examples stepping and slowing, walking, sanding wood
climbing, standing up, writing pencil, making fire

D. Friction can be harmful when:

Examples sliding something, scraping arms, causes fire
glows thins

E. Friction can occur in all states of matter (solids, liquids, gases.)

F. Friction always produces heat