Tennessee Comprehensive Assessment Program

TCAP

Science
Grade 7 Test Practice

TN Department of Education

Metadata—Science

Items

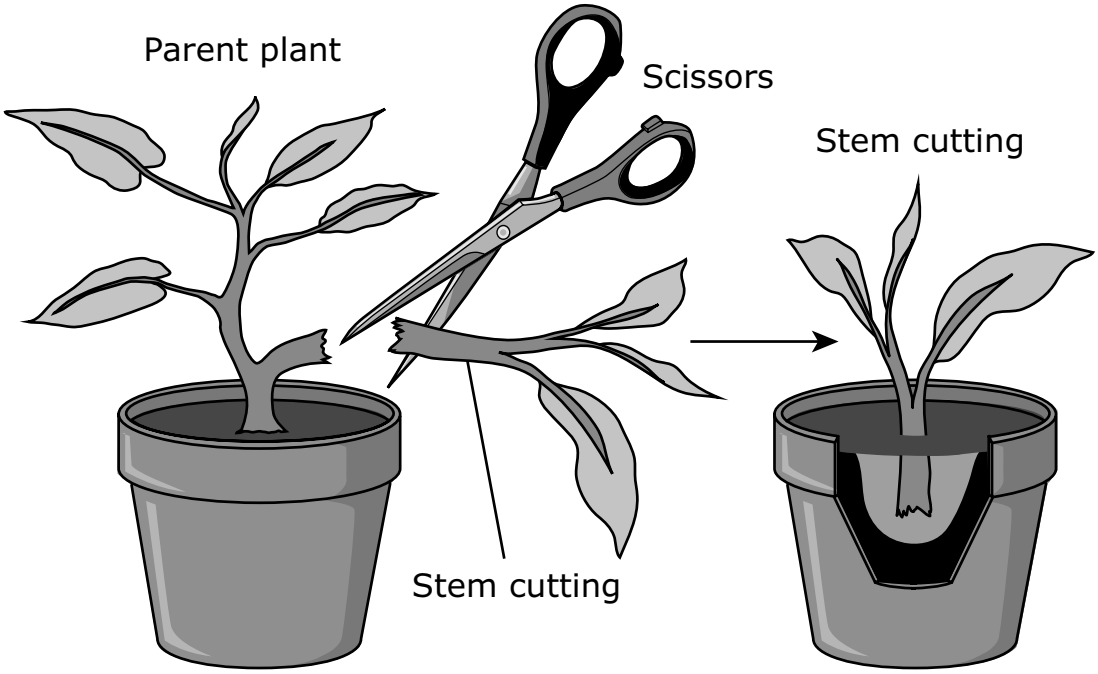
Page Number	Cluster (N/A for Standalone items)	Grade	Item Type	Key	TN Standards	SEP	CCC
1	N/A	7	MC	A	7.LS1.6	INFO	SF
3	N/A	7	MC	C	7.PS1.3	CEDS	EM
4	N/A	7	MS	B, E	7.LS1.1	-	SF
5	N/A	7	MC	B	7.LS3.3	MATH	SPQ
7	N/A	7	MC	A	7.LS1.2	INFO	SF
14	Mutations in Fruit Flies	7	MC	B	7.LS3.2	INFO	SF
15	Mutations in Fruit Flies	7	MC	D	7.LS3.2	INFO	SF
16	Mutations in Fruit Flies	7	MC	B	7.LS3.2	INFO	SF
17	Mutations in Fruit Flies	7	MC	A	7.LS3.3	DATA	PAT
18	Mutations in Fruit Flies	7	MC	A	7.LS3.3	DATA	PAT
19	N/A	7	TE	–170°C and 10 atm, slide past one another	7.PS1.3	MATH	EM
20	N/A	7	MS	A, C	7.LS1.3	DATA	SYS
21	N/A	7	MC	C	7.LS1.3	-	SYS
22	N/A	7	MS	A, D	7.LS1.6	INFO	SC
24	N/A	7	MC	B	7.PS1.4	-	EM

Metadata Definitions

Grade	Grade level or Course.
Item Type	Indicates the type of item. MC= Multiple Choice; MS= Multiple Select; TE= Technology Enhanced
Key	Correct answer.
TN Standards	Primary educational standard assessed.
SEP	SEP Science and Engineering Practices: These are the essential practices of scientists and engineers which help students figure out explanations for phenomena or solutions for design problems.
CCC	CCC Cross Cutting Concepts: These are concepts that permeate all science disciplines and provide a lens through which students can apply their science ideas to phenomena or design problems.

00. A plant that is from a desert environment can produce new plants from either fertilized seeds or stem cuttings. The figure shows a portion of a parent plant stem that is cut and placed into a separate container.

Stem Cutting



The table describes traits of the parent plant.

Parent Plant Traits

Trait	Description
Immunity	Susceptible to a virus
Leaf texture	Waxy
Leaf size	Long and broad
Growth time	3 weeks from seed to mature plant

Which statement describes an advantage of growing a new plant from a seed of the parent plant rather than from a stem cutting of the parent plant?

A. A new plant grown from a seed may not be susceptible to the same virus that the parent plant is.

B. A new plant grown from a seed may not have waxy leaves like the parent plant does.

C. A new plant grown from a seed has the same combination of genes as the parent plant.

D. A new plant grown from a seed will grow faster than the parent plant.

00. A student observes a beaker filled with water as it is heated. The student plans to make a model of the water molecules as the temperature rises.

As the temperature of the water rises, what should the model of the water molecules show?

A. The mass of each water molecule will get heavier.

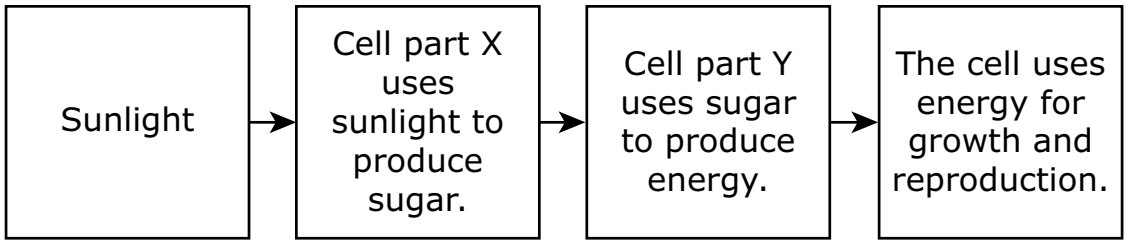
B. Each water molecule will get smaller.

C. The average speed of the water molecules will increase.

D. Each water molecule will break apart into hydrogen and oxygen atoms.

00. The figure shows how plants obtain and modify energy for cell processes, growth, and reproduction.

Cell Processes



Which **two** cell organelles should replace Cell part X and Cell part Y in the figure?

A. Cell part X**:** The ribosome

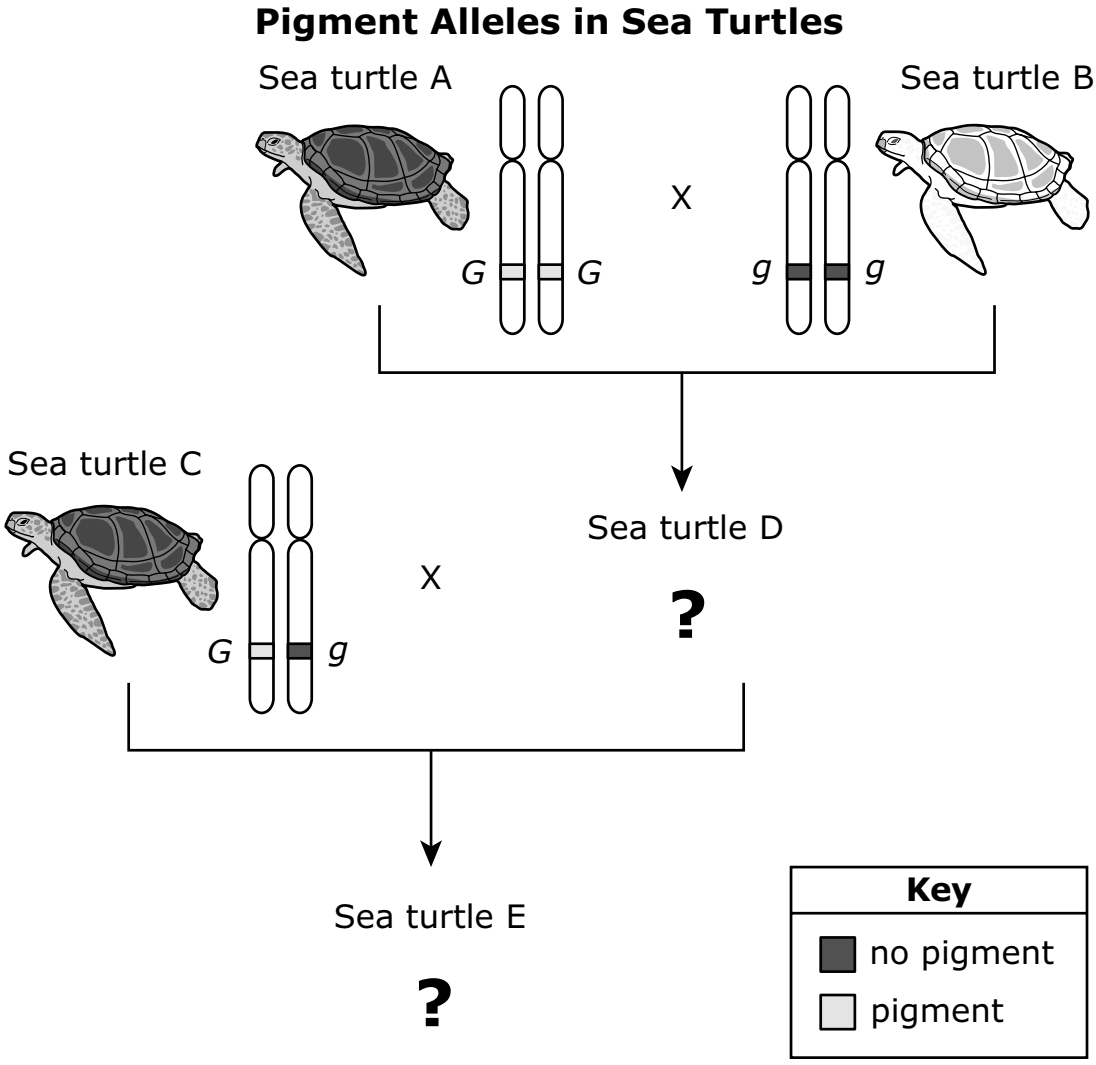
B. Cell part X**:** The chloroplast

C. Cell part Y**:** The nucleus

D. Cell part Y**:** The vacuole

E. Cell part Y**:** The mitochondrion

00. Green sea turtles get their color from the pigment in their skin and shells, but some sea turtles are born without any pigment, making them appear white. The figure shows the alleles that different sea turtles have for this recessive trait.



Based on the figure, what is the probability that Sea turtle E will appear white?

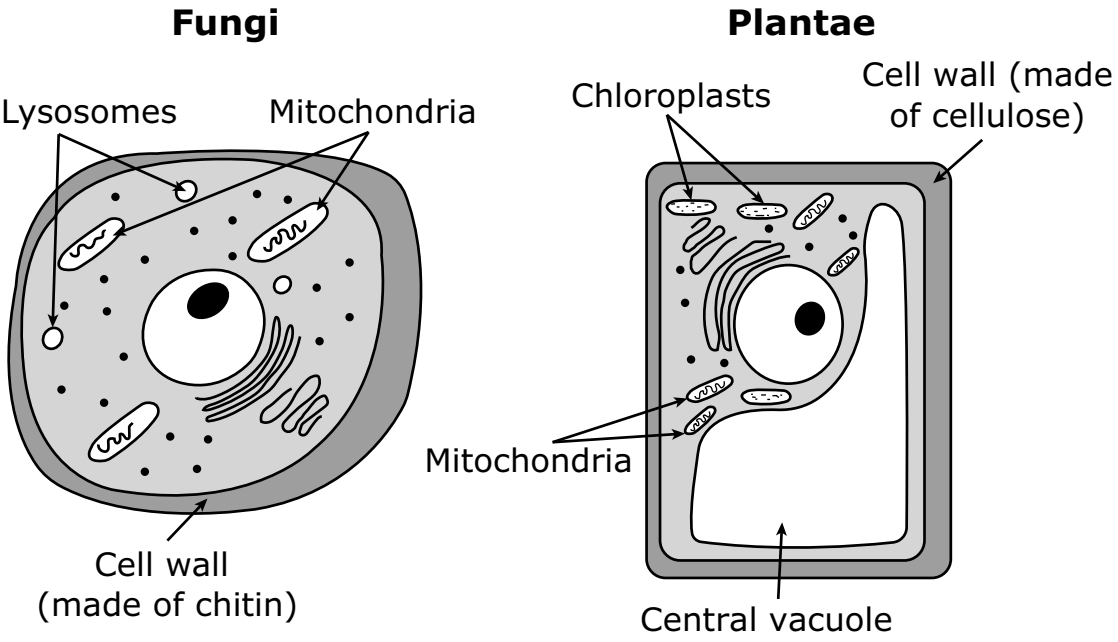
A. 0%

B. 25%

C. 75%

D. 100%

00. A student compares a cell from kingdom Fungi and a cell from kingdom Plantae. The student notices that there are similarities and differences between both cells.



Based on the figures, which statement **best** explains how each cell obtains its energy?

A. Both cells have mitochondria, so both obtain energy by performing cellular respiration.

B. Both cells have chloroplasts, so both obtain energy by performing photosynthesis.

C. Fungi have a cell wall made of chitin to help them digest other organisms; plant cells have a cell wall made of cellulose to help them perform photosynthesis.

D. Fungi have mitochondria, so they obtain energy by digesting other organisms; plant cells have chloroplasts to break down sugar for energy.

Questions XX–XX refer to the passage(s) and image(s) shown.

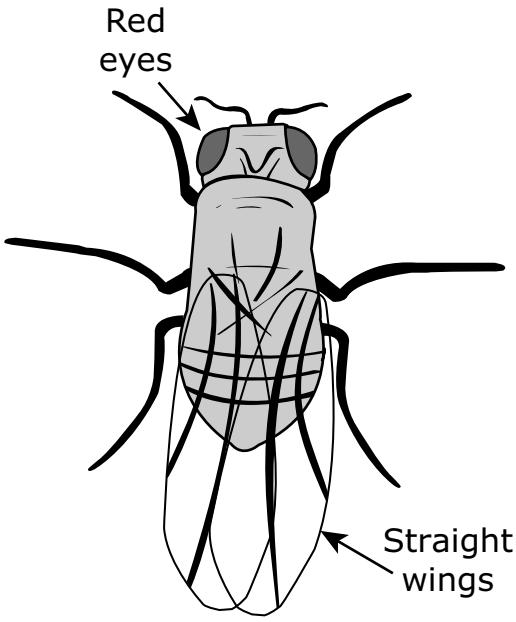
Mutations in Fruit Flies – Part 1

A student studying genetics reads about a species of fruit fly *Drosophila melanogaster*, also known as the common fruit fly. The common fruit fly has been used to study genetics since the early 1900s for these reasons**:**

- It reproduces quickly, producing more flies in a little more than two weeks.
- Its chromosomes are large and easy to see under a microscope.
- It has four pairs of chromosomes in each cell for a total of eight individual chromosomes.
- One set of chromosomes are the sex chromosomes, X and Y.

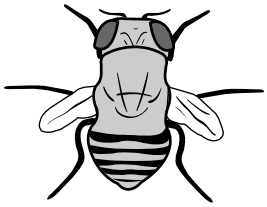
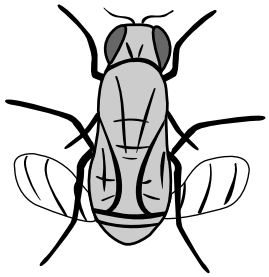
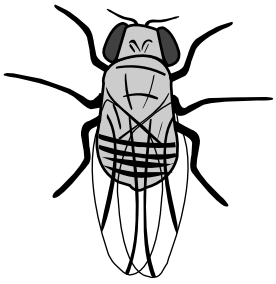
Most fruit flies have red eyes and straight wings, which help the flies survive. A common fruit fly is shown in Figure 1.

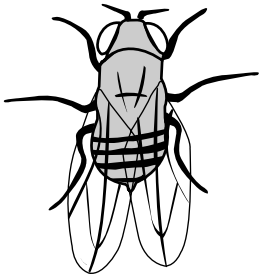
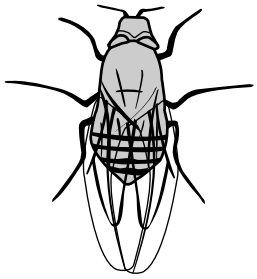
Figure 1. Common Fruit Fly



In some populations of flies, chromosome mutations can occur. A few of the mutations that occur are described in Table 1.

Table 1. Mutations in the Common Fruit Fly

Mutation	Picture of Fly	Chromosome Location of Mutation	Effect
Short wings		Chromosome 2	Flies with short wings cannot fly.
Curly wings		Chromosome 2	Flies with curly wings cannot fly.
Orange eyes		X chromosome	The mutation has no effect on vision.

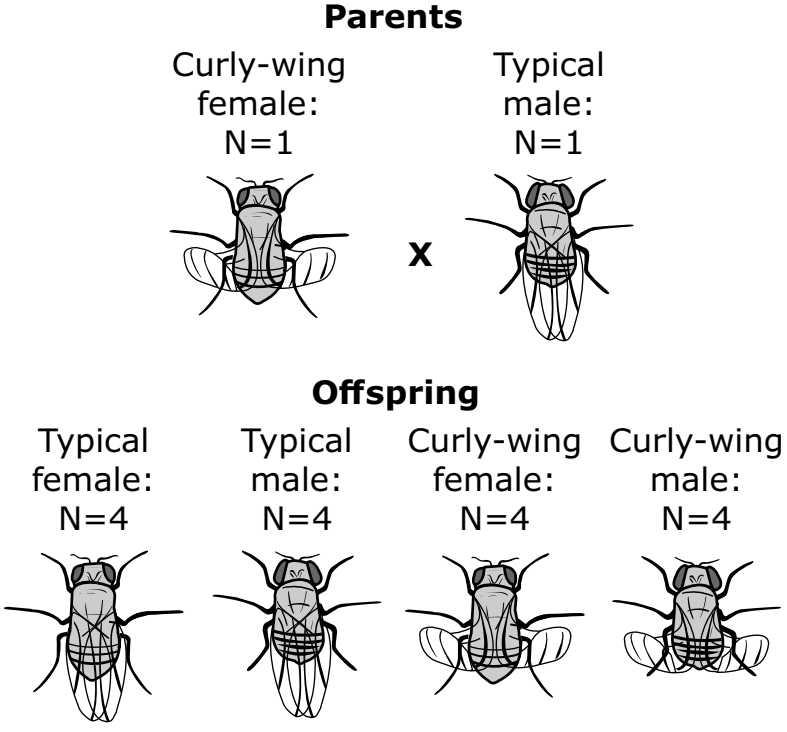
White eyes		X chromosome	The mutation has no effect on vision.
No eyes		Chromosome 2	Flies with no eyes cannot see.

Mutations in Fruit Flies – Part 2

The student wants to understand how the mutations of the common fruit fly are passed to other generations. The student performs a simulation in which a typical fly breeds with a fruit fly that has a mutation. The mutated fly has curly wings.

Figure 2 shows the results of Cross #1 of the simulation.

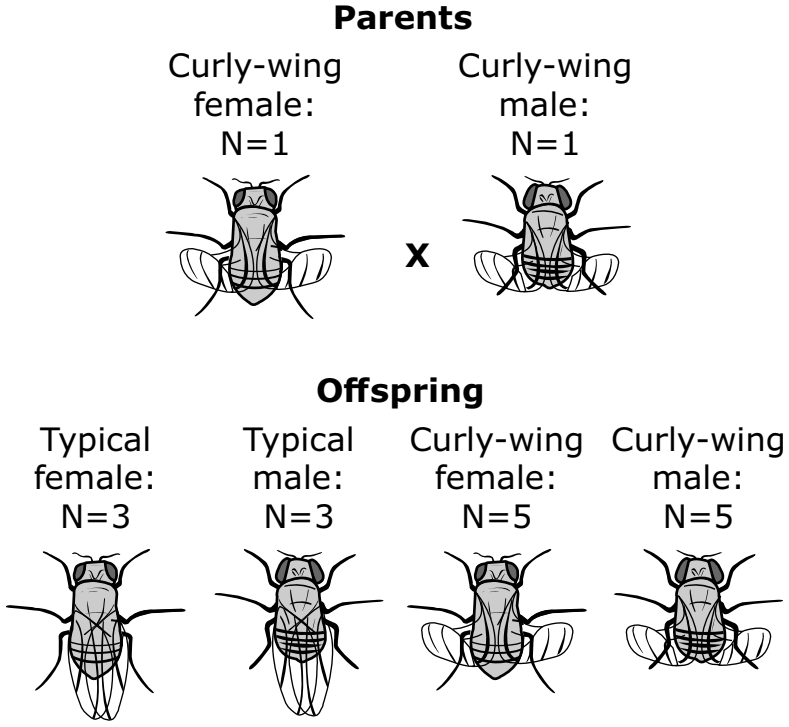
Figure 2. Cross #1



The student uses the simulator to do another cross between two of the mutant offspring.

Figure 3 shows the results of Cross #2 of the simulation.

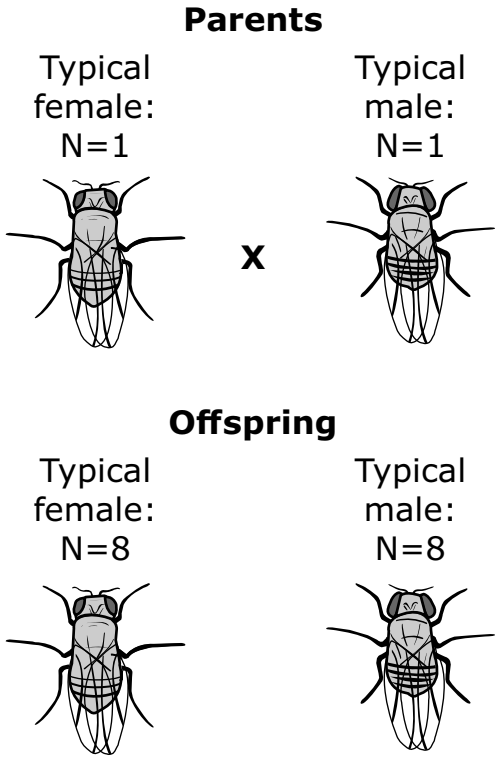
Figure 3. Cross #2



The student uses the simulator to do another cross between two of the typical offspring from Cross #1.

Figure 4 shows the results of Cross #3 of the simulation.

Figure 4. Cross #3



00. Based on the information in Table 1 (Part 1), how would the mutations located on the X chromosome **most likely** decrease the ability of a fruit fly to reproduce?

A. Potential mates may not be attracted to flies that have curly or short wings.

B. Potential mates may not be attracted to flies that have orange or white eyes.

C. Flies born with differently shaped wings do not live long enough to reproduce.

D. Flies born with white eyes cannot see very well and so do not live long enough to reproduce.

00. Based on the information in Table 1 (Part 1), which mutation would be **least likely** to affect the survival of a fruit fly?

A. no eyes

B. short wings

C. curly wings

D. orange eyes

00. Based on the information in Table 1 (Part 1), which statement **best** describes how mutations can affect the chances of survival of a fruit fly?

A. The mutation that results in white eyes can increase the chances of survival of a fruit fly.

B. The mutation that results in short wings can decrease the chances of survival of a fruit fly.

C. The mutation that results in curly wings has no effect on the chances of survival of a fruit fly.

D. The mutations that result in more harm are located on the X chromosome rather than on chromosome 2.

00. Based on the information in Figure 3 (Part 2), why are there typical offspring in Cross #2?

A. Both parents are heterozygous.

B. Both parents are homozygous recessive.

C. Both parents are homozygous dominant.

D. One parent is homozygous dominant, and one parent is heterozygous.

00. Based on the information in Figure 4 (Part 2), why are there no mutant offspring in Cross #3?

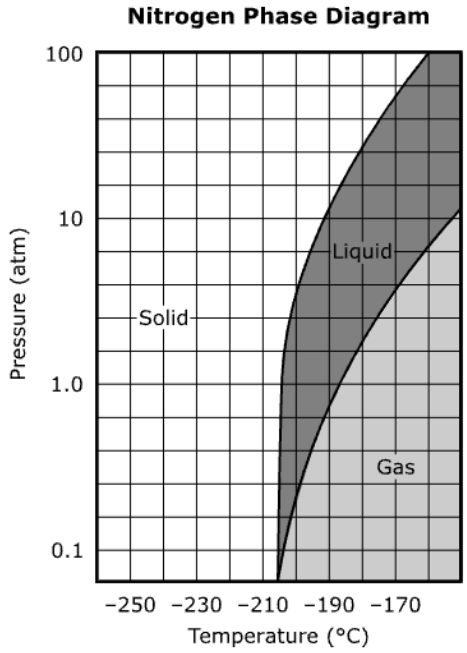
A. The parents in Cross #3 are both homozygous for the typical phenotype.

B. The parents in Cross #3 are both heterozygous for the typical phenotype.

C. The mutant genotype mutated, and now all fruit flies show the typical phenotype.

D. The mutant genotype is recessive and will not appear in a cross with two typical parents that carry the trait.

Cryotherapy is a procedure that is used to treat skin diseases. This procedure uses extremely cold liquid nitrogen to freeze and destroy skin tissue. Liquid nitrogen can be used to freeze tissue because of nitrogen's physical properties. The diagram shows the phases nitrogen takes at different temperatures, measured in degrees Celsius (°C), and pressures, measured in atmospheres (atm).



Complete the sentences to describe nitrogen's physical properties while in the liquid phase.

Select the correct answer from **each** drop-down menu.

Nitrogen exists as a liquid at the temperature and pressure of [Choose...] . At this temperature and pressure, the nitrogen molecules are able to [Choose...] .

00. During an investigation, the resting heart rate of a student was recorded. She then exercised by stepping up and down from a low stool continuously for five minutes. After each minute, the student's heart rate was recorded. The data table shows the student's recorded heart rate at each interval.

Student Data

Time Spent Exercising (minutes)	Heart Rate (beats per minute)
0	65
1	72
2	80
3	87
4	93
5	98

Which **two** changes in body systems are likely to have occurred as the student exercised?

A. Contractions of the heart muscle increased in the circulatory system.

B. Stomach acids increased in the digestive system.

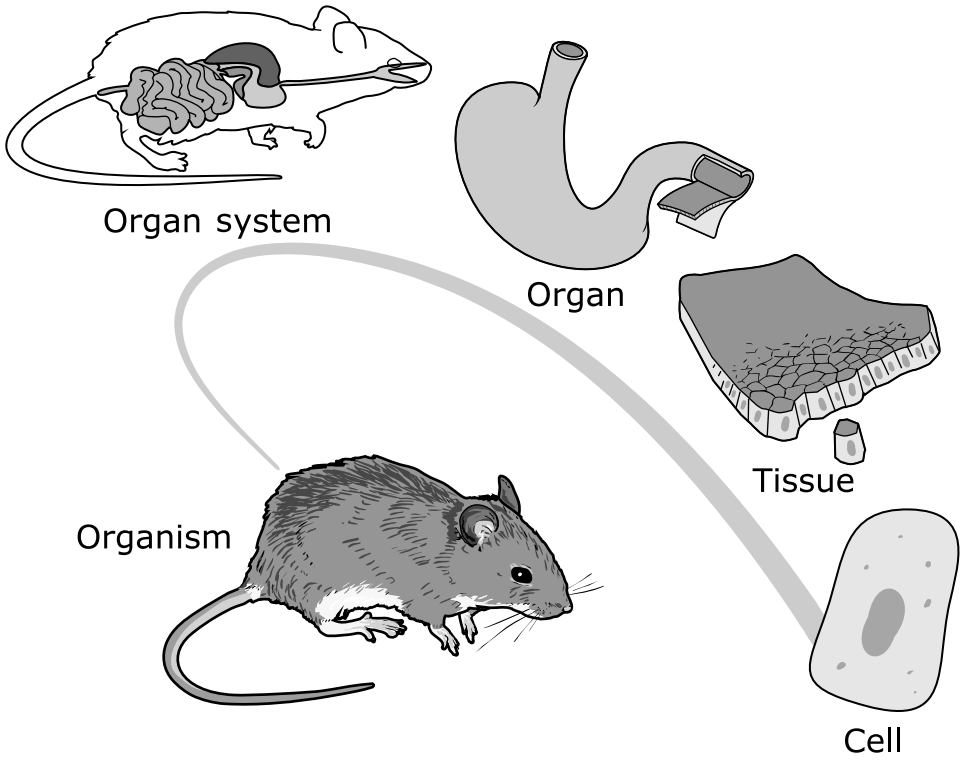
C. Breathing rate increased in the respiratory system.

D. Urine output increased in the excretory system.

E. Blood flow decreased in the circulatory system.

00. The levels of organization for a rat are shown.

Levels of Organization of a Rat



Based on the diagram, which statement explains one way that the body of a rat is organized?

A. Cells are built directly from multiple types of organs.

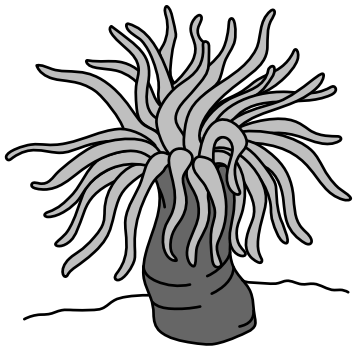
B. Organs are found in organelles.

C. Tissues are needed to build the body.

D. Small groups of atoms form organ systems.

00. Sea anemones can reproduce asexually or sexually. The figure shows a sea anemone.

Sea Anemone



The table lists conditions in which sea anemones reproduce asexually or sexually.

Conditions for Types of Reproduction

Type of Reproduction	Conditions
Asexual Reproduction	• Abundant food supply • Suitable shelter • Favorable climate • Low risk of disease
Sexual Reproduction	• Food scarcity • Limited living spaces • Changing climatic conditions • High risk of disease

Which **two** statements **best** explain the benefits of switching between asexual and sexual reproduction?

A. Asexual reproduction produces many more offspring when abundant food is available.

B. Asexual reproduction relies on mutations as the main source of genetic variation when there is a high risk of disease.

C. Sexual reproduction requires more energy as this happens when food resources are abundant.

D. Sexual reproduction results in genetic variation in future generations.

E. Sexual reproduction requires a large habitat for the parents.

00. A scientist conducted an experiment with a magnesium sulfate ($MgSO_4$) solution and a sodium carbonate (Na_2CO_3) solution. When the two solutions were mixed, a reaction occurred that formed two new substances, a magnesium carbonate ($MgCO_3$) solid and a sodium sulfate (Na_2SO_4) solution. The equation for the reaction is shown**:**

$$MgSO_4 + Na_2CO_3 \rightarrow MgCO_3 + Na_2SO_4$$

How did mass change during the reaction?

A. Mass increased because some new atoms in the products are created during the chemical reaction.

B. Mass stayed the same because the total number of atoms in the reactants and the total number of atoms in the products are the same.

C. Mass decreased because some of the atoms of the reactants are destroyed during the chemical reaction.

D. Mass increased because the total number of atoms in the liquid reactants is less than the total number of atoms in the solid and liquid products.

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