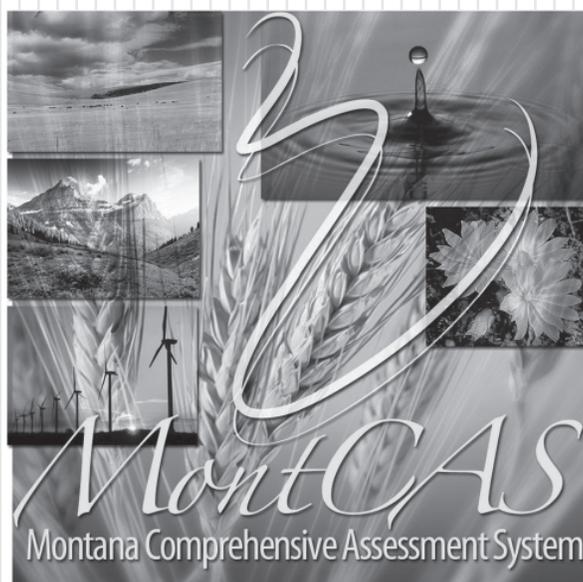


Montana Comprehensive Assessment System (MontCAS CRT)

GRADE 8
COMMON RELEASED ITEMS
SPRING 2015



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Montana
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Denise Juneau, State Superintendent

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Science Directions

This Science test contains three test sessions. Mark or write your answers in the Answer Booklet. Use a pencil to mark or write your answers.

This test includes two types of questions: multiple-choice and constructed-response questions.

For the multiple-choice questions, you will be given four answer choices—A, B, C, and D. You are to choose the correct answer from the four choices. Each question has only one answer. After you have chosen the correct answer to a question, find the question number in your Answer Booklet and completely fill in the circle for the answer you chose. Be sure the question number in the Answer Booklet matches the question number in the Test Booklet. The example below shows how to completely fill in the circle.

CORRECT MARK 	INCORRECT MARKS 
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If you decide to change your answer to a question, erase the wrong mark completely before filling in the circle of the new answer. Be sure you have only one answer marked for each question. **If two circles are bubbled in for the same question, that question will be scored as incorrect.**

If you are having difficulty answering a question, skip the question and come back to it later. Make sure you skip the circle for the question in your Answer Booklet.

For the other types of questions in the Test Booklet, you will be asked to write your answers in the box provided. Read the question carefully. If a question asks you to explain your answer or to show your work, be sure to do so.

You may make notes or use highlighters in your Test Booklet, but you must bubble or write your final answers in your Answer Booklet. **Do not make any stray or unnecessary marks in your Answer Booklet.**

Let's work through a sample question together to be sure you understand the directions.

Sample Question

1. What is the state animal of Montana?
 - A. elephant
 - B. grizzly bear
 - C. zebra
 - D. giraffe

Science

1. Which evidence helped scientists determine that parts of Montana were covered by a large inland sea 100 million years ago?
 - A. fossilized remains of organisms
 - B. present-day bodies of water
 - C. dinosaur tracks in mudstone
 - D. ancient stones in the Rocky Mountains

2. Which characteristics are **most** useful for classifying related flowers?
 - A. smell and color of petals
 - B. color and shape of leaves
 - C. height and width of plant
 - D. shape and number of petals

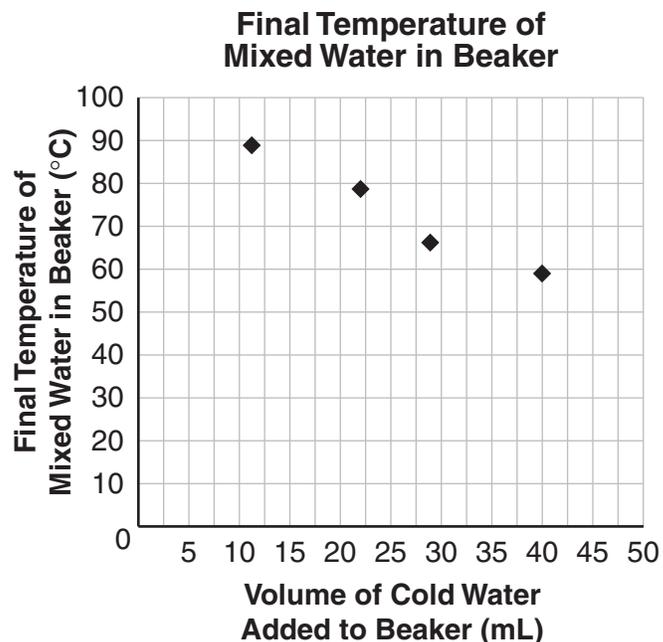
3. Which statement describes the nature of science?
 - A. Scientific conclusions are unchanging over time.
 - B. Scientific ideas are accepted or rejected based on evidence.
 - C. Scientific conclusions are accepted only if most scientists agree.
 - D. Scientific ideas are accepted or rejected based on the ethics and values of scientists.

4. An object has a certain weight and mass on Earth. If the object were placed on Mercury, what would happen to the object's weight and mass?
 - A. The weight and mass would increase.
 - B. The weight would increase, but the mass would remain the same.
 - C. The weight and mass would decrease.
 - D. The weight would decrease, but the mass would remain the same.

5. What **always** happens when unbalanced forces act on an object?
- A. The object remains in a state of rest.
 - B. The velocity of the object changes.
 - C. The object loses some of its mass.
 - D. The speed of the object stays the same.

6. Which statement **best** describes how species in a population acquire new characteristics?
- A. Organisms change their genetic makeup before they reproduce.
 - B. Organisms within a population adapt to changes through a sudden process.
 - C. An organism changes its behavior or structure and passes the change on to its offspring.
 - D. Variations of traits better suited to the environment are passed on to new generations.

7. A group of students had four beakers, each holding 100 mL of boiling water. The students added different volumes of cold water to each beaker and measured the final temperature of the water. The graph of their data is shown below.



Based on the graph, what is the **best** estimate of the final temperature after 50 mL of cold water is added to 100 mL of boiling water?

- A. 20°C
- B. 30°C
- C. 50°C
- D. 65°C

8. Volcanoes on Earth are located in a pattern. Which of the following **best** explains why volcanoes on Earth appear in a pattern?
- A. theory of evolution
 - B. theory of plate tectonics
 - C. conservation of mass law
 - D. Newton's laws of motion
9. A student put plants in a dark room to see whether they could grow. She predicted that the plants would stop growing within one day because plants need light to grow. The plants continued to grow taller for a week with no light. What should the student do next?
- A. discard the results
 - B. use a different type of plant
 - C. put the plants in a different dark room
 - D. consider an alternative explanation
10. Which change in Earth's movement would increase the length of a year?
- A. spinning more slowly
 - B. spinning more quickly
 - C. orbiting more slowly
 - D. orbiting more quickly

11. A student wants to design an experiment to identify the most absorbent of several types of cat litter. Which steps represent a reasonable procedure for conducting this experiment?

A.

1. Research different types of cat litter.
2. Write a conclusion.
3. Pour the same mass of the different cat litters into separate but identical containers.
4. Pour the same volume of water onto each type of cat litter in each container.
5. Measure the total amount of dry cat litter.

C.

1. Research different types of cat litter.
2. Create a hypothesis.
3. Pour different masses of the different cat litters into separate but identical containers.
4. Pour the same volume of water onto each type of cat litter in each container.
5. Measure the masses of the wet and dry cat litters in each container.

B.

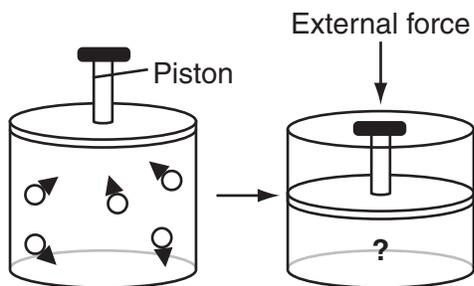
1. Research different types of cat litter.
2. Create a hypothesis.
3. Pour the same mass of the different cat litters into separate but identical filters.
4. Pour the same volume of water onto each type of cat litter in each filter.
5. Measure the volume of water that pours through each type of cat litter.

D.

1. Research one type of cat litter.
2. Identify a question.
3. Pour the researched cat litter into a filter.
4. Pour water onto the cat litter in the filter.
5. Measure the volume of water that pours through the cat litter in the filter.

12. Ponderosa pine trees have fire-resistant characteristics that allow them to survive forest fires. Which of the following is an example of one of these characteristics?
- A. thick bark
 - B. shallow roots
 - C. dry, narrow leaves
 - D. pollen-producing cones
13. A dye made from cabbage turns red when placed in an acidic solution. What safety measure should a scientist take before using the dye to test a strong acid sample?
- A. wear safety goggles and rubber gloves
 - B. put out all flames and turn off electric lights
 - C. add baking soda to the acid sample and wait until the reaction stops
 - D. take the acid sample outside and allow all gases to escape
14. Which property is a chemical property?
- A. color
 - B. boiling point
 - C. dissolves in water
 - D. reacts with oxygen
15. A scientist is trying to identify an unknown organism that reproduces **only** through binary fission (asexual reproduction). In which kingdom would the scientist **most likely** classify the organism?
- A. animal (human)
 - B. fungi (mushroom)
 - C. moneran (bacteria)
 - D. plant (tree)

16. A closed cylinder with a piston is filled with a gas. An external force presses down on the piston, as shown in the diagram below.



What happens to the particles of gas in the cylinder when the piston moves down?

- A. They expand.
- B. They come closer together.
- C. They chemically react with one another.
- D. They break into smaller pieces.

17. Which natural feature directly resulted from constructive forces caused by the movement of Earth's tectonic plates?

- A. Grand Canyon
- B. Great Salt Lake
- C. Mississippi River delta
- D. Mount Saint Helens volcano

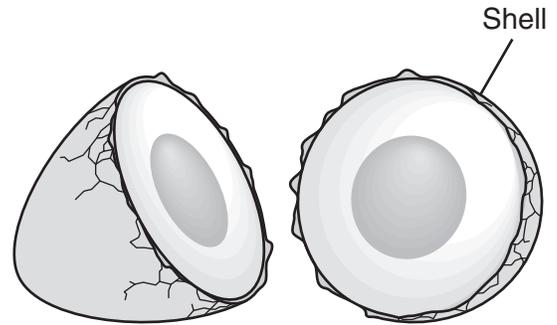
18. In the past, while hunting and gathering for food, people of the Blackfeet nation observed the behavior of animals. Some behaviors they observed were

- a moose eating water algae and grasses,
- a squirrel gathering seeds and nuts, and
- a wolf digging up roots along the banks of a river.

How did some Blackfeet people use their observations of animals?

- A. They decided which foods would be easy to grow.
- B. They decided which foods would be the best medicines.
- C. They decided which foods would be safe for humans to eat.
- D. They decided which foods would be suitable for storing over long periods of time.

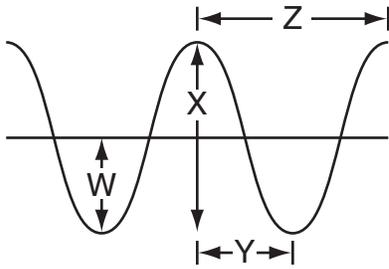
19. The picture below shows a hard-boiled egg that has been cut in half.



Students use the hard-boiled egg as a model of Earth's interior. Which of Earth's layers is represented by the shell of the egg?

- A. crust
- B. inner core
- C. mantle
- D. outer core

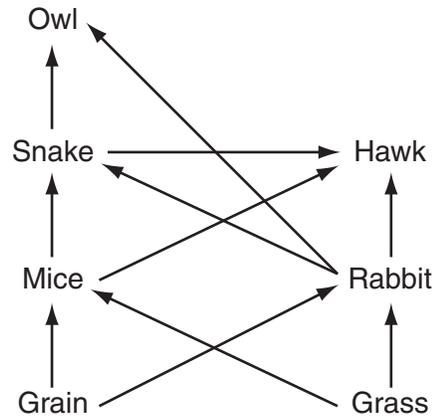
20. The labeled diagram below shows a wave.



Which letter in the diagram represents the distance between wave crests?

- A. letter W
- B. letter X
- C. letter Y
- D. letter Z

21. The diagram below shows a food web.



Food Web

Through which organism does energy enter this food web?

- A. grain
- B. hawk
- C. owl
- D. snake

22. The key below is used to identify some trees and shrubs on Grant-Kohrs Ranch in Montana.

Classification Key

- | |
|---|
| 1. a. plant has a central trunk (tree) go to step 2 |
| b. plant has one or more upright stems (shrub) go to step 3 |
| 2. a. smooth, white bark; tooth-edged leaves with mid-vein quaking aspen |
| b. whitish or gray grooved bark; oval leaves that are dark above, light below..... black cottonwood |
| 3. a. evergreen leaves common juniper |
| b. deciduous leaves (leaves that fall off in the winter) go to step 4 |
| 4. a. flowers form small cone-like seed structures water birch |
| b. flowers form dense, white clusters chokecherry |

A student finds a shrub on Grant-Kohrs Ranch that keeps its leaves all winter. Which plant is most similar to the student's shrub?

- A. quaking aspen
- B. black cottonwood
- C. common juniper
- D. chokecherry

23. Which scientist would provide the **best** advice to someone designing a roller coaster?

- A. a biologist
- B. a chemist
- C. a geologist
- D. a physicist

24. Which body structure is made of several different types of tissues that work together to perform a specific function?

- A. a cell
- B. a hair
- C. an organ
- D. a pore

25. Students measured the height of a bean plant every week for two months. Which unit of measurement is most appropriate for the students to use when recording their data?

- A. centimeters
- B. grams
- C. kilograms
- D. liters

26. What happens to a liquid that loses heat energy?

- A. It freezes into a solid and loses some of its mass.
- B. It evaporates into a gas with no change in mass.
- C. It freezes into a solid with no change in mass.
- D. It evaporates into a gas and loses some of its mass.

27. Two students designed an experiment to test the effect of plant fertilizers on earthworms. They collected 500 cubic centimeters of soil from three different places and put the soil in three identical containers. They placed 25 earthworms in each container. They mixed the fertilizers with water and then added water to each container until the soil was damp. They repeated this process three times. After two weeks, they counted the number of earthworms in each soil sample on the same date and time.
- a. Identify **two** strengths in the experimental design.
 - b. Identify **two** weaknesses in the experimental design. For each weakness, describe what the students should do to improve the design.

Scoring Guide

Score	Description
4	Response demonstrates a thorough understanding of strengths and weaknesses in experimental design. Response describes two strengths and two weaknesses, including a description of how to address each weakness. Response has no errors.
3	Response demonstrates a general understanding of strengths and weaknesses in experimental design. Response has an error or omission.
2	Response demonstrates a limited understanding of strengths and weaknesses in experimental design. Response has errors or omissions.
1	Response demonstrates a minimal understanding of strengths and weaknesses in experimental design. Response has several errors and omissions.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Training Notes

(2 points for each part)

a. Strengths:

- They used the same amount of soil for each test.
- They used the same type of container for each test.
- They used the same number of earthworms for each test.
- They included multiple trials.
- They used the same number of trials.
- They examined their results after the same time period.

Because the goal of the experiment is not clearly defined, students may be given credit for either response:

- The same type (brand) fertilizer was used.
- Different types of fertilizer were used.

b. Weaknesses and how to address them:

- The soils used were not the same—use the same type of soil from the same location.
- There is no mention of the earthworms being similar—control the earthworm population by selecting worms that are of similar size, gather the worms from the same location, make sure all are healthy earthworms, etc.
- There is no mention of how much fertilizer and how much water was mixed together—use the same concentration of fertilizer and water for all three samples.
- There is no mention of a control group—include one container of earthworms that receive water only.

- Watering until the soil is damp does not mean each container received the same amount of fertilizer—add the same amount of water rather than judging by dampness.
- It does not mention if the three trials were all repeated at the same time intervals—repeat the trials at the same time.
- Students may reference the following weaknesses:
 - A reference to characteristics of the worms’ environment that may hinder their survival: the size of the area where they are being contained—the area should be large enough for the number of worms.
 - The characteristics of the soil that the worms are used to (e.g., pH, components of soil)—the soil should be from the worms’ native habitat.
 - The amount of soil where they are being contained—there should be enough soil for the number of worms.
 - The goal of the experiment is not clearly defined—the student may describe a goal.

Example of Score Point 4

- a. Two strengths are that they took more than one sample of soil and they used three identical containers for the earthworms.
- b. The first weakness I saw was that they used three different types of soil and one soil could have been more fertile than the other. To improve this I would have taken three samples from the same area. The other weakness I saw was they fertilized all of the samples. To fix this I would have put some fertilizer in one, less fertilizer in the other, and no fertilizer in the last because then you would know how it effects the earthworms.

Example of Score Point 3

A. One strength of the experimental design I will identify is putting the soil in the same identical containers. The second strength I will identify is that the two students places 25 worms in each container.

B. The two weaknesses in the experimental design is how they added the water. To improve that they should of measured the water they were going to put in exactly the same. And the other weakness is the repeated process. To improve that they could have done it more or less than three times.

Example of Score Point 2

a. Two strengths of this experiment are that they are controlling their variables and they are conducting the experiment more than once to get the most accurate information. When you control your variables you are doing the exact same project so you don't affect your results. When you do an experiment more than once you will get the best results because you can average your experiment together.

b. Two weaknesses are: they should have measured how much water they were adding to the soil instead of just until it was damp. They should have also tried different fertilizers to see the differences it makes.

Example of Score Point 1

A. Two strengths from this paragraph is that they mixed the fertilizers with water to each container until the soil was damp. The other strength is that they repeated the process several times.

B. Two weaknesses about the design is that they had it for two weeks later they counted they should of done it longer for about 4 weeks.

Example of Score Point 0

- (a) earth worms, different types of sand.
- (b) fertilizers, to many earth worms.

