

Dichotomous Key 2 Task Information

Grade: Biology, Middle School Science

Content:

- MST framework reference:
 - Standard 4-The Living Environment
- Regents Biology Syllabus:
 - Unit I, Topic II
- Variance Biology Program Guide:
 - Evolution: Unity & Diversity
- RCT Guide in Science:
 - 8 Middle School Block A

Format: Paper/pencil

Purpose: To use a dichotomous key to identify unknown organisms.

Skills:

Primary: Classifying
Secondary: Hypothesizing, Interpreting data

Time: 15 - 25 minutes

Materials:

- metric rulers

Preparation: None

Safety: N/A

Extensions/Modifications: None

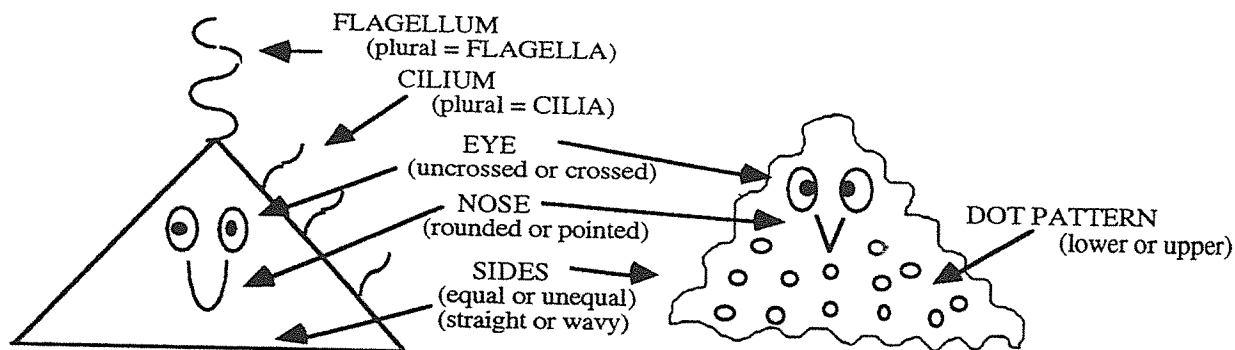
Dichotomous Key 2

Task: With the millions of living organisms in the world, scientists need a method of identifying an unknown organism. To do this, scientists use a dichotomous key. At this station, you will be using a dichotomous key to identify unknown organisms.

Directions

Use the dichotomous key below to identify any three (3) species of the genus *Triangulum* in the accompanying Species Sheet. Record the choices made, and the resulting scientific name, on the answer sheet provided.

Dichotomous Key



1. A. Three(3) sided with straight lines
B. Three (3) sided with wavy lines
2. A. Has no eyes
B. Has eyes
3. A. Has flagella for movement
B. Has cilia for movement
4. A. The three sides are of equal length
B. The three sides are not of equal length
5. A. Has crossed-eyes
B. Eyes not crossed
6. A. Has a single flagellum for movement
B. Has two or more flagella for movement
7. A. Total number of cilia for movement are odd
B. Total number of cilia for movement are even
8. A. Has a pointed nose
B. Has a rounded nose
9. A. Has two cilia on each side for movement
B. Has more than two cilia on each side
10. A. Has crossed-eyes
B. Eyes not crossed
11. A. Lower half of the body has a dot pattern
B. Upper half of the body has a dot pattern
12. A. Has a pointed nose
B. Has a rounded nose

Go to 2
Go to 10

Go to 3
Go to 5

Go to 4
Go to 7

Triangulum equalius
Go to 12

Go to 6
Go to 9

Triangulum monoflagelleum
Triangulum polyflagelleum

Triangulum oddcilius
Go to 8

Triangulum pointiatus
Triangulum roundiatus

Triangulum biciliatus
Triangulum polycilius

Go to 11
Triangulum waveus (*Samplest correctus*)

Triangulum lowdotteus
Triangulum upperdotteus

Triangulum pointiflagelleum
Triangulum roundiflagelleum

Answer Sheet

1. Choose any three of the species of *Triangulum* from the Species Sheet and key them to their scientific names. Be sure to write in the numbers of the species that you are trying to identify. In the proper spaces below write in the number and letter for each of the choices you made as you identified the species (see example with species #101). When you are sure of the species identification, write in the scientific name in the space provided.

Example #101

Species # _____

Species # _____

Species # _____

1B			
↓	↓	↓	↓
10B			
↓	↓	↓	↓
↓	↓	↓	↓
↓	↓	↓	↓
↓	↓	↓	↓
↓	↓	↓	↓
↓	↓	↓	↓

Scientific name of Example #101 = Samplest correctus

Scientific name of Species # _____ = _____

Scientific name for Species # _____ = _____

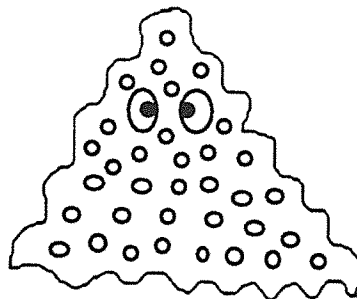
Scientific Name for Species # _____ = _____

2. The following *Triangulum* organism was created by a student. It is **not** the same as any of the thirteen organisms shown on the Species Sheet. Can you determine its species? If so, list the steps, as you did before, in making this determination.



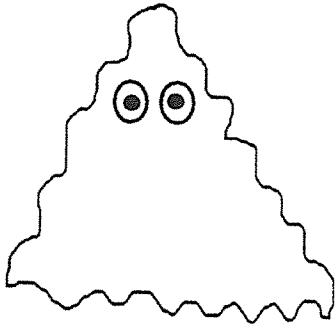
3. Draw another example of the organism in question #2 that would "key out" as being the same species.

4. A new species of *Triangulum* was discovered by a lab student in a sample of stagnant pond water. The dichotomous key must be modified to identify the new organism shown below.

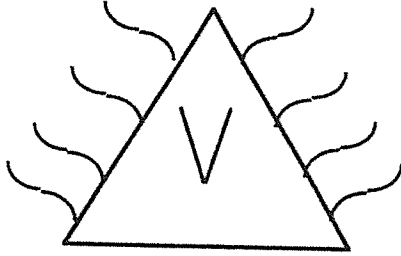


- A. Between which steps in the key should the new trait be added ?
- B. Write the new step to allow the key to fit the newly discovered organism.
- C. Write a complete scientific name for this new species.

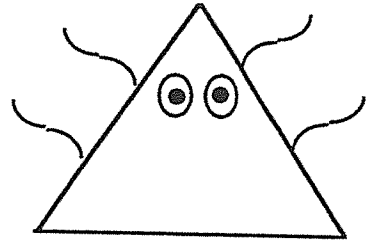
Species Sheet



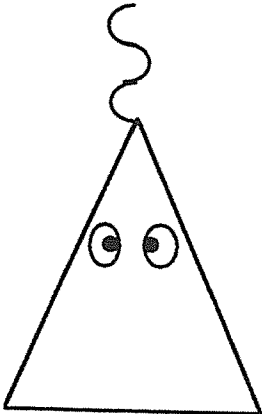
#101



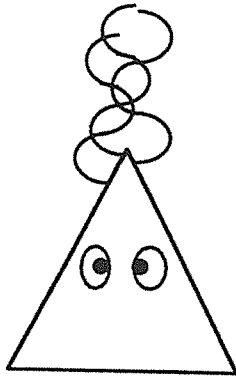
#105



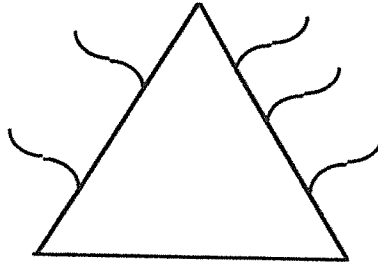
#109



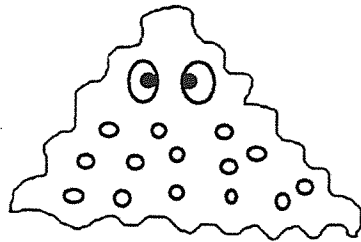
#102



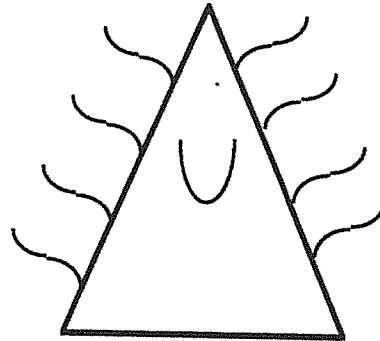
#106



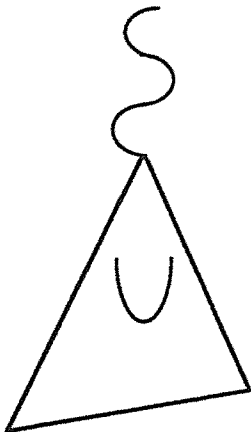
#110



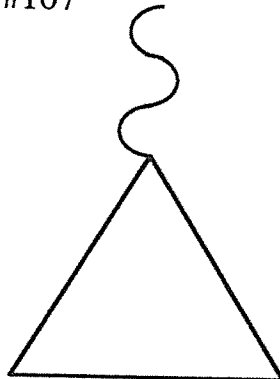
#107



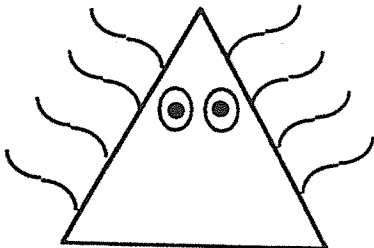
#111



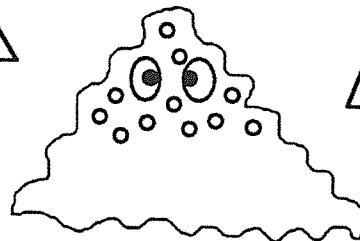
#103



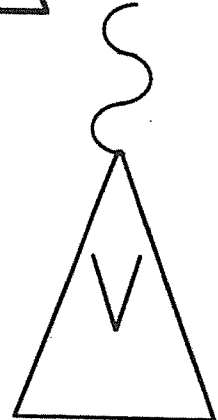
#108



#104



#113



#112

Dichotomous Key 2 - Scoring Rubric

April 30, 1996

1

This activity is to be used as an assessment after students have been exposed to the use of a dichotomous key, and therefore know what the term dichotomous refers to, and how it is used. There are 13 species of *Triangulum* pictured; it is suggested that each student identifies any three of the species.

Question 1

- 1 point is awarded for each correct name identification of each species.
- 1 point is awarded for each correct choice or step along the way.

The scoring of each species should continue until the last correct choice or step.

The Example given on the Student Answer Sheet (#101) would be awarded 3 points for a perfect answer. But if the student had only been able to reach choice 1B before making a mistake, only 1 point would be awarded.

Since a different number of choices is necessary to identify the different species, the students may end up with different total points. Therefore a percent grade may be given.

Total number of points for each species are given below, including the correct choice for each of the steps.

	<u>Species name</u>	<u>Correct steps</u>	<u>Possible points</u>
Species # 101	<i>T. waveus</i> (10B)	(1B - 10B)	3 points
Species # 102	<i>T. monoflagelleum</i> (6A)	(1A - 2B - 5B - 6A)	5 points
Species # 103	<i>T. roundflagelleum</i> (12B)	(1A - 2A - 3A - 4B - 12B)	6 points
Species # 104	<i>T. polycilius</i> (9B)	(1A - 2B - 5B - 9B)	5 points
Species # 105	<i>T. pointiatus</i> (8A)	(1A - 2A - 3B - 7B - 8A)	6 points
Species # 106	<i>T. polyflagelleum</i> (6B)	(1A - 2B - 5A - 6B)	5 points
Species # 107	<i>T. lowdotteus</i> (11A)	(1B - 10A - 11A)	4 points
Species # 108	<i>T. equalius</i> (4A)	(1A - 2A - 3A - 4A)	5 points
Species # 109	<i>T. biciliatus</i> (9A)	(1A - 2B - 5B - 9A)	5 points
Species # 110	<i>T. oddcilius</i> (7A)	(1A - 2A - 3B - 7A)	5 points
Species # 111	<i>T. roundiatus</i> (8B)	(1A - 2A - 3B - 7B - 8B)	6 points
Species # 112	<i>T. pointiflagelleum</i> (12A)	(1A - 2A - 3A - 4B - 12A)	6 points
Species # 113	<i>T. upperdotteus</i> (11B)	(1B - 10A - 11B)	4 points

Sample Answer Sheet

Choose any three of the species of *Triangulum* from the Species Sheet and key them to their scientific names. Be sure to write in the numbers of the species that you are trying to identify. In the proper spaces below write in the number and letter (example #101) for each of the choices you made as you identified the species. When you are sure of the species identification, write in the scientific name in the space provided.

Example #101	Species # <u>105</u>	Species # <u>112</u>	Species # <u>107</u>
1B ↓	1A ↓ (1 point)	1A ↓ (1 point)	1B ↓ (1 point)
10B ↓	2A ↓ (1 point)	2A ↓ (1 point)	10B ↓ (incorrect)
↓	3B ↓ (1 point)	3B ↓ (incorrect)	↓
↓	7B ↓ (1 point)	7A ↓ (incorrect)	↓
↓	8A ↓ (1 point)	↓	↓
↓	↓	↓	↓

• Scientific name of Example #101 = *Samlest correctus*

Question 1.

Scientific name of Species #105 = *Triangulum pointiatus*
 Actual points 6 Possible Points = 6

Scientific name for Species #112 = *Triangulum oddcilius*
 Actual Points 2 Possible points = 6

Scientific Name for Species #107 = *Triangulum waveus*
 Actual Points 1 Possible Points = 4

Question 2**5 points total**

- Award 1 point for each correct step in the determination and correct naming of the organism *Triangulum oddcilius*. (steps; 1A, 2A, 3B, 7A)

Question 3**4 points total**

- Allow **4 points** if each of the following traits are shown in the student drawing:
 - * Sides are straight lines
 - * Has no eyes
 - * Has cilia for movement
 - * Total number of cilia for movement are odd(Note: The number must be odd and other than 3)
- **3 points** if any three of the above traits are shown correctly
- **2 points** if any two of the above traits are shown correctly
- **1 point** if any one of the above traits is shown correctly
- **0 points** if responses are incorrect, or no response is provided.

Note: Deduct 1 point from the total points for this question for each trait shown that should not be present (e.g.: a nose)

Question 4**7 points total**

- A.
 - Allow **1 point** if the student correctly identifies steps ten (10) and eleven (11).
 - Allow **0 points** for incorrect responses, or no response provided.
- B.
 - Allow **2 points** if the student correctly describes two different conditions for the new trait.
(Example: A. Half the body has a dot pattern
B. The whole body has a dot pattern.)
 - Allow **1 point** if the student correctly describes one condition for the new trait.
 - Allow **0 points** for incorrect responses, or no response provided.
- C.
 - Allow **4 points** if the student properly writes the scientific name of the new species using each of the following conventions:
 - * name consists of genus and species
 - * the genus name is *Triangulum*
 - * underlining entire name
 - * first letter of the genus name capitalized, first letter of the species name lower-case
 - Allow **3 points** if any three (3) of the above conventions are used correctly.
 - Allow **2 points** if any two (2) of the above conventions are used correctly.
 - Allow **1 point** if any one (1) of the above conventions is used correctly.
 - Allow **0 points** for incorrect responses, or no response provided.

Student ID _____

Scoring Form - Dichotomous Key 2

Male / Female (circle one)

Question 1:

Directions: Circle each of the species chosen.

Species #	Points Possible	Points Awarded

Possible Points _____ Points Awarded: _____

Triangulum Identification score: $\frac{\text{points awarded}}{\text{possible points}} = \underline{\underline{\hspace{2cm}}}$

Question 2:

Correct steps and naming of *T. oddcilius* 0 1 2 3 4 5

Question 3:

Traits shown in student drawing (including deductions) 0 1 2 3 4

*** NOTE: Lowest possible score 0 points ***

Question 4:

- A Correctly identifies steps 0 1
- B Writes accurate descriptions of the new trait 0 1 2
- C Writes a scientific name using binomial nomenclature 0 1 2 3 4

Total question score: _____
Total possible score questions #2 - #4 - 16 points

Student ID B10 - DK - 1

Scoring Form - Dichotomous Key 2

Male / Female (circle one)

Question 1:

Directions: Circle each of the species chosen.

Species #	Points Possible	Points Awarded
102	5	4
103	6	6
104	5	5

Possible Points 16 Points Awarded: 15

Triangulum Identification score: $\frac{\text{points awarded}}{\text{possible points}} = \frac{15}{16} = 93.8\%$

Question 2:

Correct steps and naming of *T. oddcilus* 0 1 2 3 4 5

Question 3:

Traits shown in student drawing (including deductions) 0 1 2 3 4

*** NOTE: Lowest possible score 0 points ***

Question 4:

A Correctly identifies steps 0 1

B Writes accurate descriptions of the new trait 0 1 2

C Writes a scientific name using binomial nomenclature 0 1 2 3 4

Total question score: 15 pts
Total possible score questions #2 - #4 - 16 points

Answer Sheet

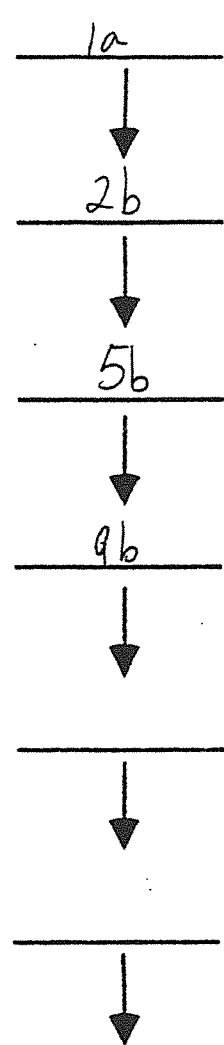
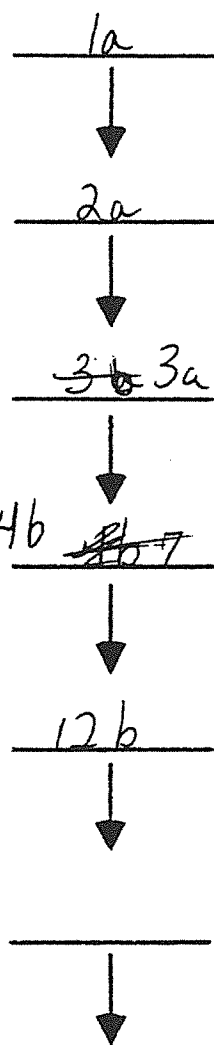
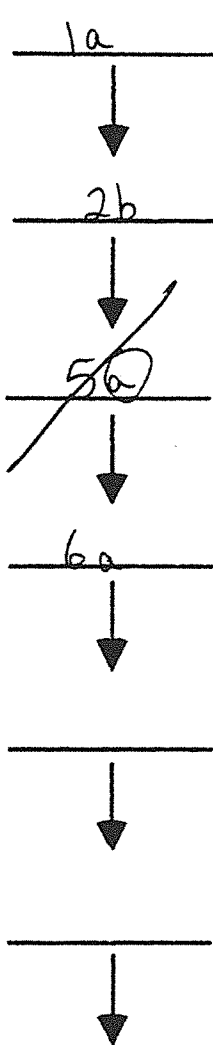
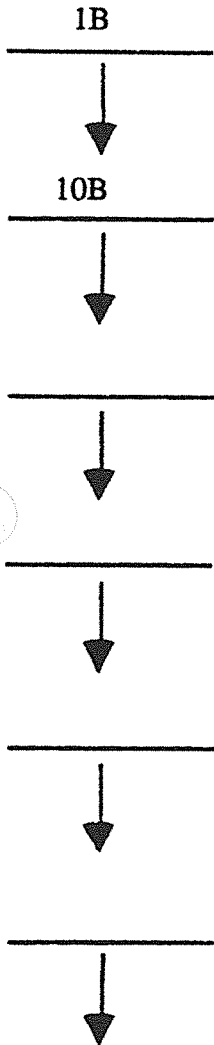
Choose any three of the species of *Triangulum* from the Species Sheet and key them to their scientific names. Be sure to write in the numbers of the species that you are trying to identify. In the proper spaces below write in the number and letter for each of the choices you made as you identified the species (see example with species #101). When you are sure of the species identification, write in the scientific name in the space provided.

Example #101

Species # 102

Species # 103

Species # 104



Scientific name of Example #101 = Samplest correctus

Scientific name of Species # 102 = Triangulum monoflagellum

Scientific name for Species # 103 = ~~Triangulum adductus~~ Triangulum roundiflagellum

Scientific Name for Species # 104 = Triangulum polycilius

2. The following *Triangulum* organism was created by a student. It is not one of the thirteen shown on the Species Sheet. Can you determine its species? If so, list the steps, as you did before, in making this determination.

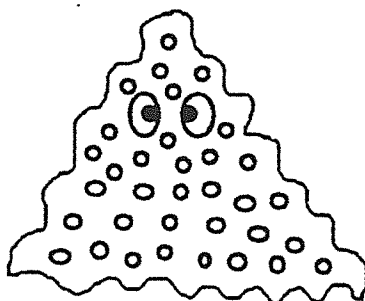


1a, 2a, 3b, 7a *Triangulum additius*

3. Draw another example of the organism in question #2 that would "key out" as being the same species.



4. A new species of *Triangulum* was discovered by a lab student in a sample of stagnant pond water. The dichotomous key must be modified to identify the new organism shown below.



- A. Between which steps in the key should the new trait be added ?

10 & 12 step 11 should be a new trait.

- B. Write descriptions of this of this trait, for this step, based on the drawing of the newly discovered organism.

The organism has dots on the upper & lower part of its body.

- C. Write the scientific name for this new organism.

Triangulum lowiupperdotteus

Student ID Bio-DK-2

Scoring Form - Dichotomous Key 2

Male / Female (circle one)

Question 1:

Directions: Circle each of the species chosen.

Species #	Points Possible	Points Awarded
110	5	5
111	6	6
113	4	4

Possible Points 15 Points Awarded: 15

Triangulum Identification score: $\frac{\text{points awarded}}{\text{possible points}} = \frac{15}{15} = 100\%$

Question 2:

Correct steps and naming of *T. oddcilius* 0 1 2 3 4 5

Question 3:

Traits shown in student drawing (including deductions) 0 1 2 3 4

*** NOTE: Lowest possible score 0 points ***

Question 4:

A Correctly identifies steps 0 1

B Writes accurate descriptions of the new trait 0 1 2

C Writes a scientific name using binomial nomenclature 0 1 2 3 4

Total question score: 11 pts
Total possible score questions #2 - #4 - 16 points

Answer Sheet

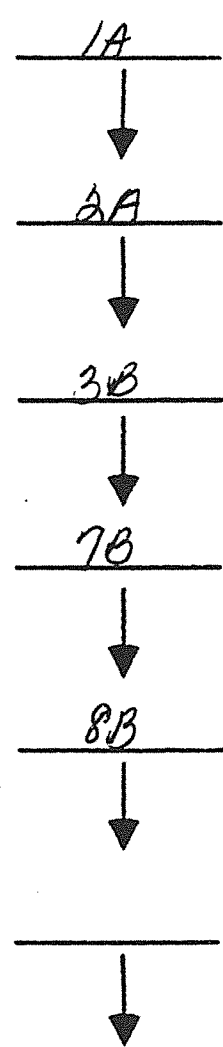
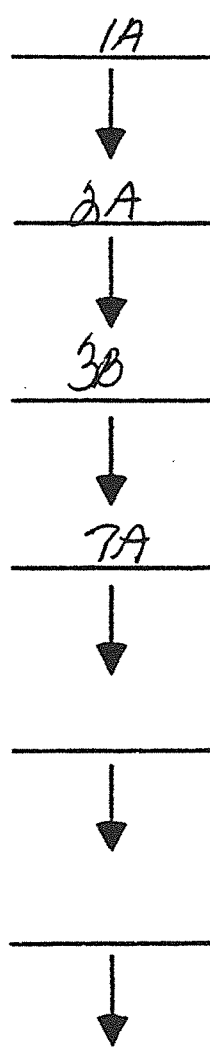
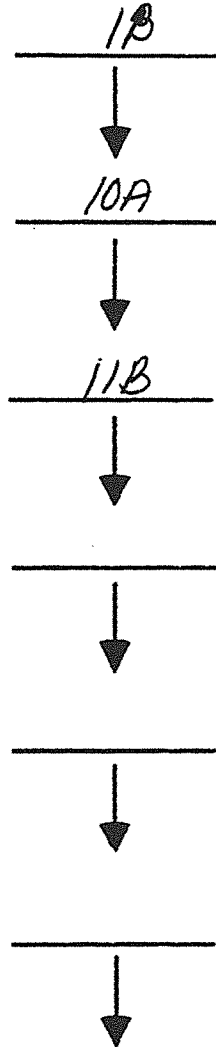
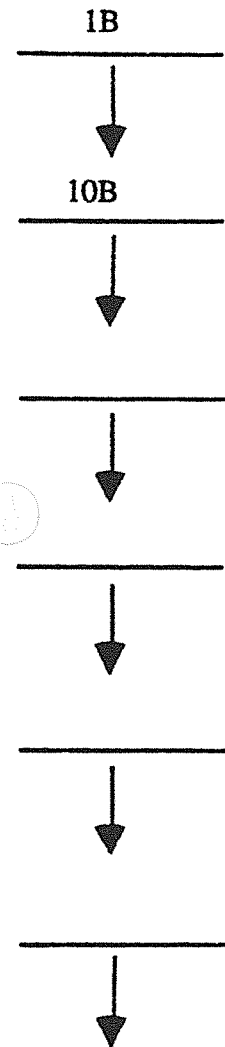
1. Choose any three of the species of *Triangulum* from the Species Sheet and key them to their scientific names. Be sure to write in the numbers of the species that you are trying to identify. In the proper spaces below write in the number and letter for each of the choices you made as you identified the species (see example with species #101). When you are sure of the species identification, write in the scientific name in the space provided.

Example #101

Species # 113

Species # 110

Species # 111



Scientific name of Example #101 = Samplest correctus

Scientific name of Species # 113 = Triangulum upperdottus

Scientific name for Species # 110 = Triangulum oddicilius

Scientific Name for Species # 111 = Triangulum roundatus

2. The following *Triangulum* organism was created by a student. It is not one of the thirteen shown on the Species Sheet. Can you determine its species? If so, list the steps, as you did before, in making this determination.

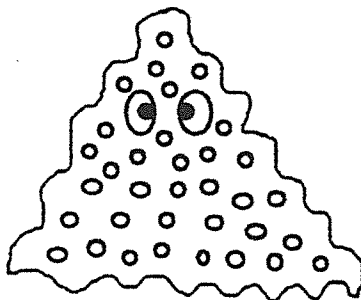


1A → 2A → 3B → 7A Answer: Triangulum oddcilius

3. Draw another example of the organism in question #2 that would "key out" as being the same species.



4. A new species of *Triangulum* was discovered by a lab student in a sample of stagnant pond water. The dichotomous key must be modified to identify the new organism shown below.



A. Between which steps in the key should the new trait be added?

1B → 10A → 11A & B Between: 10 and 11

B. Write descriptions of this of this trait, for this step, based on the drawing of the newly discovered organism.

1B → 10A → 11A & B

C. Write the scientific name for this new organism.

Triangulum 10dotus triangulum upper dots

Student ID B10 - DK - 3

Scoring Form - Dichotomous Key 2

Male / Female (circle one)

Question 1:

Directions: Circle each of the species chosen.

Species #	Points Possible	Points Awarded
108	5	2
111	6	4
112	6	2

Possible Points 17 Points Awarded: 8

Triangulum Identification score: $\frac{\text{points awarded}}{\text{possible points}} = \frac{8}{17} = 41.2\%$

Question 2:

Correct steps and naming of *T. oddcilius* 0 1 2 3 4 5

Question 3:

Traits shown in student drawing (including deductions) (-2) 0 1 2 3 4

*** NOTE: Lowest possible score 0 points ***

Question 4:

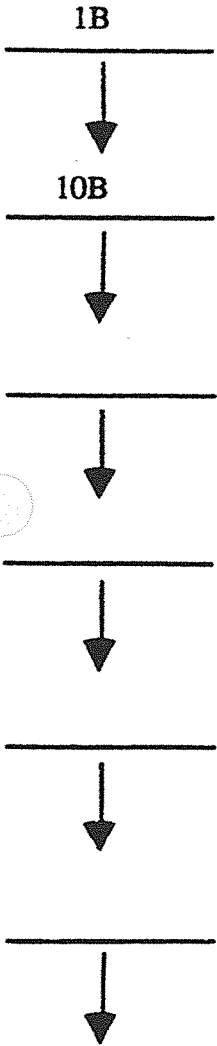
- A Correctly identifies steps 0 1
- B Writes accurate descriptions of the new trait 0 1 2
- C Writes a scientific name using binomial nomenclature 0 1 2 3 4

Total question score: 10pts
Total possible score questions #2 - #4 - 16 points

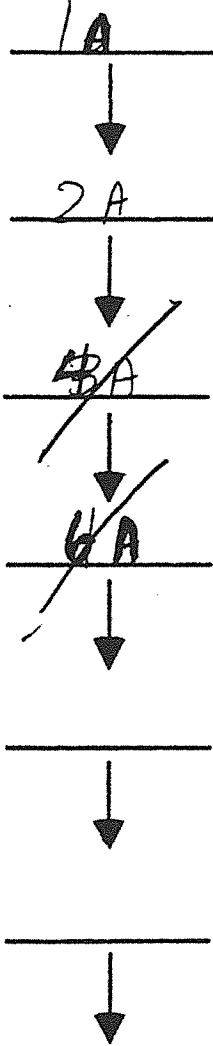
Answer Sheet

1. Choose any three of the species of *Triangulum* from the Species Sheet and key them to their scientific names. Be sure to write in the numbers of the species that you are trying to identify. In the proper spaces below write in the number and letter for each of the choices you made as you identified the species (see example with species #101). When you are sure of the species identification, write in the scientific name in the space provided.

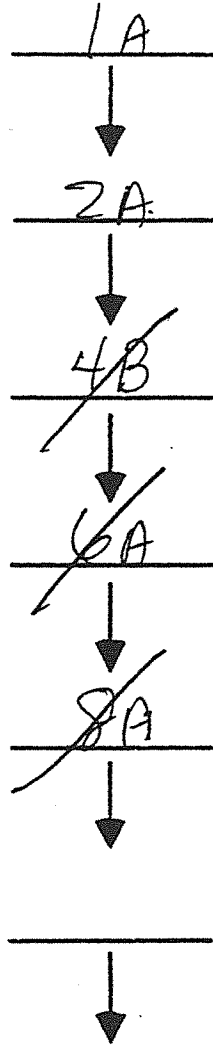
Example #101



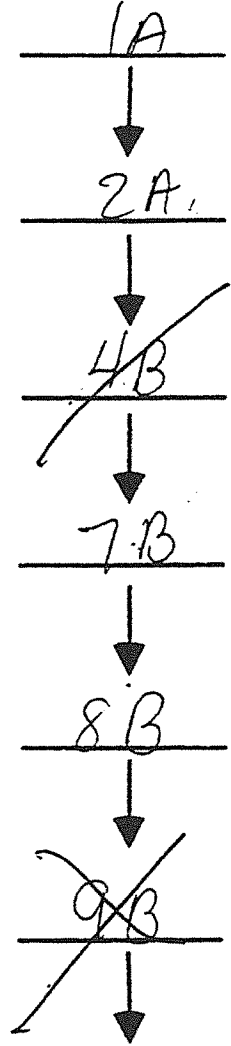
Species # 108



Species # 112



Species # 111



Scientific name of Example #101 =

Samlest correctus

Scientific name of Species # 108 =

Triangulum monoflagellum

Scientific name for Species # 112 =

Triangulum pointatus

Scientific Name for Species # 111 =

Triangulum polytilus

2. The following *Triangulum* organism was created by a student. It is **not** one of the thirteen shown on the Species Sheet. Can you determine its species? If so, list the steps, as you did before, in making this determination.

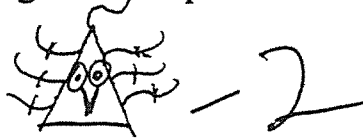
Triangulum oddcilus



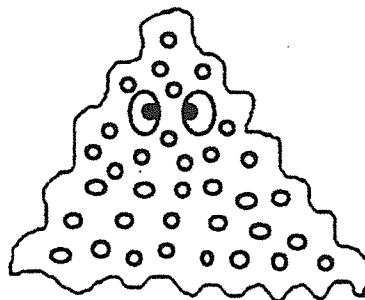
1A
2A
~~3A~~
7A

I determined its characteristics using the dichotomous key and then when I found the last characteristic I looked across from it and found its binomial nomenclature.

3. Draw another example of the organism in question #2 that would "key out" as being the same species.



4. A new species of *Triangulum* was discovered by a lab student in a sample of stagnant pond water. The dichotomous key must be modified to identify the new organism shown below.



1B
2B
4B
5A
10A
11C

- *Triangulum whole dottedus*

A. Between which steps in the key should the new trait be added?

between 11 A+B whole body has dotted pattern

B. Write descriptions of this of this trait, for this step, based on the drawing of the newly discovered organism.

whole body has dotted pattern.

C. Write the scientific name for this new organism.

Triangulum whole dottedus