

And the Children Shall Lead

Creating a Student-Centered Classroom



As a teacher you certainly want your students to learn the material; but keep in mind, the vast majority of students will use most of the math skills they acquire for a relatively short time. Consequently, **as educators, we should infuse skills that students will use for the rest of their lives into our classrooms.**

Rinaldi's Routine is a classroom management strategy that incorporates several **life skills**. Students learn how to stay on task, become autonomous learners, collaborate on problem solving, improve interpersonal relationships, and develop leadership abilities. This classroom-tested procedure which was fine-tuned over many years, transforms the traditional teacher-centered classroom into one that is more ***student-centered***.

Rinaldi's Routine

Objectives:

- To help keep the students on-task
- To help students to learn the material
- To help students to become autonomous learners
- To make the daily operation of class more time effective
- To teach the value of collaborating on problems
- To help students to improve interpersonal relationships
- To help students develop leadership skills

As you can see, many of these skills are 'people' skills which I introduced in class and taught as part of the curriculum.

Procedure:

The implementation of 'Rinaldi's Routine' begins on the second or third day of the course.

- **To begin, on paper arrange students into heterogeneous cooperative learning groups** based on the final grades in their previous math course(s). The teams are organized to be as academically balanced as possible; that is, each team has approximately the same number of A, B, C and D students. **Strong math students are appointed to be taskmasters, one for each team.**

- **Explain to the students the daily routine that will be followed.** (You will find that you have to remind the students of the procedure only once or twice thereafter before it becomes a natural part of the class.)
- **Students are then told the team groupings and are assigned seats so that team members sit close to each other.** Each taskmaster is given a written explanation of his role, (see below) which is also described to the other students. Everyone is told that the taskmasters will be evaluated (not graded) by team members at the end quarter and that every student will be a Taskmaster during the year.



Taskmaster's Tasks

Taskmaster's Name _____

Period _____ Date _____

The primary duties of the taskmaster are to ...

- (1) ... help the team to focus on the task(s) at hand.
- (2) ... lead the team in determining with which homework problems the team had trouble.
- (3) ... accurately communicate the team's questions/concerns to the teacher.

- **The team's first task is to fill out a team profile (see below),** a non-threatening information sheet asking about the students' favorite TV show, favorite band, etc. This team profile is an 'ice breaker' and allows the students to get to know each other a little better. Each team then decides upon a team name. It could be based on information from the profile, or anything else they come up with. The only rules regarding the name is that it must be agreed upon by all team members, and it may not be derogatory to any person or group; the teacher is the judge in regard to this matter.

Team Profile

Name	Weirdest Food You Have Eaten	Favorite T.V. Show	Farthest You Have Been From Home	Favorite Band	Favorite Sport's Team	Favorite Hobby or Activity	Favorite School Subject

What do the members of this team have in common?

What have you learned about your team?

- **Daily Procedure**

On a typical day, **class begins with an opening activity, a “brain teaser”, for example.**

The activity/problem is almost always displayed on the room’s white board (from an overhead projector or computer) or hand-written on the board. This is done shortly before class begins. When students enter the room, most begin working on the problem. While students are doing this, attendance is taken and/or some other administrative task is performed. After a few minutes, the students and teacher discuss the solution to the opening activity.

Notes:

- Some holiday “brain teasers” are below on pages 19 – 21.
- In this workshop, someone asked if I could suggest a source of “brain teasers”. You can find many on-line. Also, in my first two books, *The Math Teacher’s Toolbox* or *How to Teach Math to Teenagers and Survive*, pages 14 -17, and *Communication and Creativity in the Math Classroom*, pages 2 - 7, there are enough “brain teasers” to open approximately 35 - 40 classes. For more information on these books, see page 24 below.

Then the lesson begins. If new material is to be presented, it is done during the *first part to the class*, usually 15 to 30 minutes, depending on the nature of the material and the teaching strategy to be used. After this is completed, answers to the previous assignment are given.

The task master now takes control of the group, asking teammates if they were unable to do any problems from the previous assignment. If **no one** in the group could get a certain problem, it is considered to be an "**undoable**." If at least one student in the team was able to solve the problem, it is not considered an undoable, and is to be handled within the team; that is, someone in the team who solved the problem is to teach it to anyone who was unable to get a solution.

While students are working, **the teacher walks around the room** and **checks homework**. Once that task is completed, the teacher floats from group to group, pad and pencil in hand, **asking the taskmaster for any undoables the group had**. (You may feel like a waiter taking orders.)



Once the teacher has communicated with each group and written down **all the undoables, they are addressed**. If more than one team was unable to do a particular problem, the teacher writes the solution on the board or displays it on the board from the overhead projector or computer. (With experience, you can usually anticipate which types of problems cause trouble and prepare them ahead of time. This takes some extra effort, but you then have the solutions to these problems for other classes later in the day or later in your career. It is a real classroom time saver.)

After the problem is displayed, the teacher moves out of the way. The hope here is that upon seeing the solution, at least one member of the team requesting help with the problem will now understand how to do it and be able to explain it to his teammates. This is usually what happens.

If the solution is still unclear, the teacher will give a more detailed explanation at the board. If that is not sufficient, the teacher will work with the group still having difficulty. If only one group was unable to do a certain problem, the teacher goes to their area and works directly with them. While this is happening, **any group that has finished going over the homework and has no undoables, is now free to work on the next assignment**, which is on an assignment sheet that is given out at the beginning of each unit of work. (See below)

Algebra II, Chapter 7 Assignment Sheet

Note: students are responsible for reading the corresponding textbook sections.

<u>Section</u>	<u>Pages</u>	<u>Exercises</u>
7.1	234-235	1-21 odd, 24, 26
7.2	239-240	2-30 even, 35
7.3	244-246	1, 2, 5, 7, 8, 10, 15, 26



Quiz: sections 7.1-7.3

7.4 250-251 1-10 all, 11-25 odd, 28

7.5 255-256 1-19 odd, 22, 26, 3020

Review 265- 268 1-30 (omit #s 22, 28); 32, 35

Test: Chapter 7

Before the class ends, closure is provided, usually by a student verbally summarizing the lesson; or perhaps the entire class writing down the most important concepts discussed. In some instances, an "Exit Slip" might be used.

The procedure explained above is used perhaps three or four days per week throughout the quarter. It is not used on test days or during classes where something special is happening, like a Team Tournament, a communication activity (such as "Chalk Talk"), or an inquiry-based lesson (See *The Math Teacher's Toolbox* for these and many more special activities.)

Near the **end of the quarter, teams meet for one last time**. Each person is now required to make at least **one complimentary statement about each group member**.

Also, the **taskmaster is evaluated by having his/her teammates** fill out the Taskmaster Evaluation Form (see below). The completed forms are given to the taskmaster for self-reflection and self-evaluation.

Taskmaster Evaluation Form

Taskmaster's Name _____ Team Name _____
Period _____ Date _____

Circle the number which you feel is a fair evaluation of your taskmaster's performance on the given tasks.

Our taskmaster...

...helps us to focus on the task at hand.

Poor 1 2 3 4 5 Excellent

Comments:

... leads us in determining with which homework problems the team had trouble.

Poor 1 2 3 4 5 Excellent

Comments:

... accurately communicates our questions/concerns to the teacher.

Poor 1 2 3 4 5 Excellent

Comments:

After completing this form, please give it to your taskmaster.

I changed teams every quarter for two reasons.

First, I feel it is beneficial to the students to work with a variety of personalities. Second, in every class there are usually some excellent student “teachers.” I like to give them the opportunity to work with as many other students as possible.



For the **second quarter**, based on first quarter grades and other factors, such as compatibility, new teams are formed, with everyone having different teammates. New taskmasters are appointed, and the procedure implemented for the first quarter is followed.

During the **third quarter**, new teams are again formed, although it is more difficult to maintain an academic balance and not repeat teammates. The roles of taskmasters are assigned, preferably to students who have not previously had that responsibility.

During the **fourth quarter**, students pick their own teams and taskmasters.

Formal and informal feedback from students indicates that this routine is beneficial to the vast majority of students.

Early in my career, I tried **group work** as a learning strategy. **Sometimes it was successful, while other times it was not.** I eventually realized that many students need some type of **extrinsic motivation** in order to help their teammates. If students do not help each other, group work is ineffective. I tried the motivation explained below in an attempt to make group work successful.

If **all** team members earn a score of 70 or better on the chapter test, then each is rewarded by having 3 extra credit points added to the test score; scores of 80 or better by **all** members earn 4 extra credit points, and 90 or better, earn 5 extra credit points.



After using this policy for a while, I began to wonder, is the possibility of earning a few extra credit points a strong motivating factor for students to help each other? In an attempt to answer this question I administered surveys to the students.

Mathematics Team Survey Results

(Summary of 426 Responses)

Course: _____ Period: _____ Date: _____

I am interested in your opinion regarding certain aspects of team learning in this class. Below are three statements. Please respond to each by indicating the degree with which you agree or disagree with the statement. Use the following codes:

SA means you **Strongly Agree** with the statement.
MA means you **Mostly Agree** with the statement.
MD means you **Mostly Disagree** with the statement.
SD means you **Strongly Disagree** with the statement.



Circle your choice.

The 3-5 extra credit points that could be added to my test score if all members of my team score 70 or better on their tests...

... motivate me to work harder to get better test scores.

SA	MA	MD	SD
209 or 49%	188 or 44%	23 or 5%	6 or 1%
93%		7%	

...motivate me to help my teammates to learn the material.

SA	MA	MD	SD
166 or 39%	221 or 52%	32 or 8%	7 or 2%
91%		9%	

... create in me anxiety/stress because I fear I will be the only one in my team NOT to score 70 or better causing my teammates not to get extra credit.

SA	MA	MD	SD
44 or 10%	77 or 18%	168 or 39%	137 or 32%
28%		72%	

The results of this survey completed over a period of several years by the students in various courses indicate that the possibility of earning extra credit is a strong factor motivating students to help each other.

This extrinsic motivation is one of the differences between simple group work and cooperative learning, upon which Rinaldi's Routine revolves.

- **Simple Group Work**
Students work in groups

- **Cooperative Learning**

1. **Students must be motivated extrinsically to work together.**
2. **They must develop a "swim or sink together" attitude.**
Students must realize that the only way they can earn the reward is for each team member to be successful.
3. Students must be periodically given the opportunity to **process the degree of the effectiveness** at which an individual member and the group are working.



Cooperative Learning

Group Processing

Groups need time to reflect on how well they are working together. They need to discuss what behaviors promote team harmony and which detract from it. These discussions, aided by group processing forms, help the groups to function efficiently. Also, completing the forms guarantees that group members have the opportunity to express their opinions and receive feedback.

Through group processing, students can determine how well they are collaborating. Sometimes group processing can be very brief and require a minimum of time, while on other occasions it can be very thorough and time consuming. Whether brief or thorough, groups need to reflect on their effectiveness if cooperative learning is to be successful.

Below, there are several models of group processing forms. Some are to be completed by individual students, while others are to be completed by group members working together under the leadership of the taskmaster. If you are going to use groups in your classes, you are encouraged to use these, or similar forms.

More forms are available online. You can use a search engine, like Google, and use the key words, "cooperative learning, and group processing forms". Exactly how these materials are used is up to you; however it is suggested that simple forms are used first and gradually, after students gain experience, more complex sheets are used.

Team Processing -- Individual Evaluation: Form A

Circle the response which best represents how you interact in this team.

I share my work and information with others in my group.

YES

NO

Others in my group share their work and information with me.

YES

NO

I support others in my group.

YES

NO

Others in my group support me.

YES

NO

In general, I work well with my group.

YES

NO



COMMENTS: _____

Team Processing -- Individual Evaluation, Form B

Circle the number which best represents your participation in your team.

I check to make sure everyone understand the directions.

Poor 1 2 3 4 5 Excellent

I share my materials and ideas.

Poor 1 2 3 4 5 Excellent

I am willing to give help.

Poor 1 2 3 4 5 Excellent

I encourage others to participate.

Poor 1 2 3 4 5 Excellent

I listen to others when they speak.

Poor 1 2 3 4 5 Excellent



COMMENTS: _____

Team Processing -- Individual Evaluation, Form C

1. List things that you do in your team that help the team to work effectively?

2. List things that you see that cause difficulties in your team?

3. What can your team do to improve how well you work together?

Team Processing -- Team Evaluation: Form A

Under the leadership of the taskmaster, discuss the statement and then circle the code which best describes your team's behavior.

Use the following code:

SA...Strongly Agree

MA...Mostly Agree

MD...Mostly Disagree

SD...Strongly Disagree



1. We check to make sure we understand directions.

SA MA MD SD

2. We give everyone the opportunity to express his/her point of view.

SA MA MD SD

3. We listen without interrupting.

SA MA MD SD

4. We help each other.

SA MA MD SD

5. We support each other.

SA MA MD SD

COMMENTS: _____

Team Processing -- Team Evaluation: Form B

Team Name _____ Date _____

Under the leadership of the taskmaster, discuss the statement, try to agree on your responses, and then write them in the spaces below.

List three things we can do to help one another to learn in our teams:

1. _____
2. _____
3. _____

List three things we can do to improve group harmony:

1. _____
2. _____
3. _____

List three things the teacher can do to help to make our team more successful:

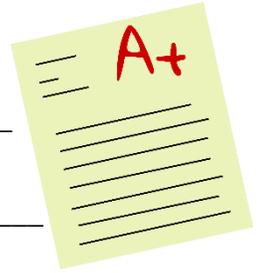
1. _____
2. _____
3. _____

Signatures: _____



Note: the signatures indicate that each student agrees with the assessment.

Post Test Team Processing



Course _____ Period _____ Date _____

Team _____ Chapter/Topic _____

The Taskmaster is expected to lead the discussion and to fill in the appropriate portion of this form. Upon completion, this paper is to be given to the teacher.

Did anyone in your team score **below** 70 on the last test? Circle one: Yes No

If "Yes", complete part A only. If "No", complete part B only.

[A] As a team, list 3 things you can do in an attempt to get anyone who scored below 70 to improve future test scores (and, consequently, improve everyone's chances of earning extra credit).

(1) _____

(2) _____

(3) _____

[B] If everyone on your team scored 70 or better, list 3 things you did as a team that you feel contributed to your success.

(1) _____

(2) _____

(3) _____

Does this teaching strategy (Rinaldi's Routine) really help kids?

To answer this question I again used a student survey which was completed by my students in various courses over a three year period.

The results are below.



Cooperative Learning Evaluation Survey (Summary of 226 Responses)

Course: _____ Period: _____ Date: _____

I would appreciate your help in evaluating the cooperative learning groups we have used in our classroom. Please indicate your degree of agreement or disagreement with each statement by circling the appropriate letter. Use the following codes:

SA means you **Strongly Agree**

MA means you **Mostly Agree**

MD means you **Mostly Disagree**

SD means you **Strongly Disagree**

Circle your choice.

Because of my work in cooperative learning groups...

1. I have learned more and retained it longer.

SA	MA	MD	SD
16%	71%	11%	1%
	87%		12%

2. I am able to reason at a higher level.

SA	MA	MD	SD
18%	60%	21%	1%
	78%		22%

3. I have a greater ability to view situations from another's perspective.

SA	MA	MD	SD
30%	51%	17%	2%
81%		19%	

4. I am more highly motivated

SA	MA	MD	SD
23%	50%	24%	3%
73%		27%	

5. I have a more positive, accepting and supportive relationship with my peers.

SA	MA	MD	SD
33%	58%	7%	2%
91%		9%	

6. I have a more positive attitude toward math, learning, and school.

SA	MA	MD	SD
19%	50%	27%	4%
69%		31%	

7. I have a more positive attitude toward teachers, principals and other school personnel.

SA	MA	MD	SD
11%	50%	33%	6%
61%		39%	

8. I have higher self-esteem based on basic self-acceptance.

SA	MA	MD	SD
18%	51%	26%	5%
69%		31%	

9. I am receiving greater social support.

SA	MA	MD	SD
24%	56%	17%	2%
80%		19%	

10. I am better adjusted psychologically.

SA	MA	MD	SD
13%	51%	29%	7%
64%		36%	

11. I spend more time on-task (working on the subject matter).

SA	MA	MD	SD
30%	44%	21%	5%
74%		26%	

12. I have greater collaborative skills and attitudes necessary for working effectively with others.

SA	MA	MD	SD
43%	48%	8%	1%



The results of this survey seem to indicate that the objectives of Rinaldi's Routine were met and that this teaching strategy is beneficial to students.

SUMMARY



Rinaldi's Routine, is a classroom management strategy that incorporates several life skills. This classroom-tested procedure which was fine-tuned over many years, transforms the traditional **teacher-centered classroom** into one that is more **student-centered**.

Based on personal observation, verbal comments from students, input from colleagues, administrators, parents, and surveys completed by students, **this approach is a very effective classroom management tool and is beneficial and enjoyable to students.**

A Suggestion: if you are thinking of trying this strategy, I suggest you try it with one class, preferably your best class. Explain the system to your students and then try it for a unit of work (2-3 weeks). After the trial period, tell the students that you would appreciate their input and honest constructive criticism. Have an open discussion with your students and/or prepare a written evaluation for them to complete. Then decide whether or not to continue with this strategy, and if so what modifications should be made.

Note: Chapter 4 of *The Math Teacher's Toolbox* or *How to Teach Math to Teenagers and Survive* is dedicated entirely to *Rinaldi's Routine* and has a detailed description of the strategy along with background information, survey results, and easily reproducible materials.

Holiday Opening of Class Activities (“brain teasers”)

Fraction Frazzle

Santa goes to the supermarket to buy some carrots for his reindeer. The clerk says they are offering a special deal on carrots, but to qualify Santa must buy one twentieth of one half of one tenth of 10000 pounds of carrots. To qualify for the special deal, how many pounds must Santa buy?



Solution: to calculate $\frac{1}{20}$ of $\frac{1}{2}$ of $\frac{1}{10}$ of 10000, begin at the end.

$\frac{1}{20}$ of $\frac{1}{2}$ of 1000

$\frac{1}{20}$ of 500

25



OR

$\frac{1}{20}$ of $\frac{1}{2}$ of $\frac{1}{10}$ = $\frac{1}{400}$

$\frac{1}{400}$ of 10000 = 25

Santa must buy 25 pounds of carrots.

'Twas the Nines before Christmas

It's Christmas Eve and Santa's elves are putting the finishing touches on 100 doll houses they have made. The houses are to be numbered from 1 to 100. The elves are now making the numbers to put on the houses. How many 9's will be needed?

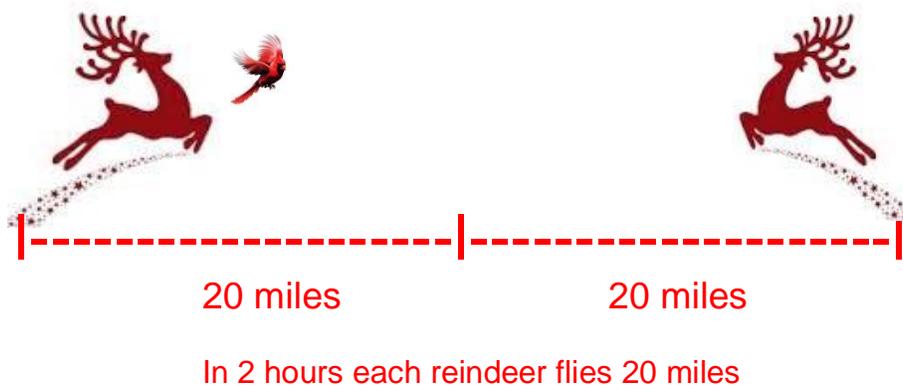


Answer: **Twenty 9's will be needed**, one for the numbers 9, 19, 29, 39, 49, 59, 69, 79, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, and two for 99.

The Reindeer and the Cardinal

Two of Santa's reindeer, which are 40 miles apart, begin flying toward each other. The instant they start, a cardinal that is next to one of the reindeer, starts flying toward the other. When the cardinal reaches the second reindeer, it turns around and flies back to the first. The cardinal flies back and forth this way until the two reindeer meet.

If each reindeer flew at a constant speed of 10 miles per hour, and the cardinal flew at a constant speed of 15 miles per hour, how far did the cardinal fly?



Solution: Since the reindeer are 40 miles apart and fly at 10 miles per hour, they fly for exactly 2 hours and then meet. The cardinal also flies for 2 hours. Since the cardinal flies at 15 miles per hour, it flies **30 miles.**

A Christmas Team Activity

Team Name _____ Period _____

Santa Claus has invited you and some friends to come to the North Pole to see Santa's Village. Since this is a rare honor, you must demonstrate you are worthy by solving some algebra problems.

After you arrive in the general area of the Santa's Village, you are directed to find four landmarks which are the vertices of a quadrilateral. To find the coordinates of these points you must solve the four pairs of problems given below.

Work in your team. Each team member will do one (or more) of the problem sets. Plot all four points on graph paper (draw the axes close to the left side and bottom of the graph paper). Connect the four vertices to form a quadrilateral, and then draw the diagonals. Santa's Village can be found at the point of intersection of the diagonals. Bring the graph of the quadrilateral and the coordinates of the point of intersection to me. If you are correct you can visit Santa's Village. But you must hurry, for Santa's Village has enough room remaining for only three teams.

- (1) Find the values of x and y . Plot the point (x, y) , call it **N** (for **N**orth Pole)

$$6x + 10 + 4x + 30 + 12x + 8 = 180$$

$$3y + 17 = 4y - 4$$



- (2) Find the values of x and y . Plot the point (x, y) , call it **S** (for **S**nowman)



$$\begin{aligned} 2x - y &= 16 \\ x + 2y &= 68 \end{aligned}$$

- (3) Find the values of x and y . Plot the point (x, y) , call it **C** (for **C**hristmas Tree)

Four more than twice some number x is 40. Find x .

If $y = 2x^3 + (2x)^2 - 3$ and $x = 2$, find y .



- (4) Find the values of x and y . Plot the point (x, y) , call it **I** (for **I**gloo)



The **positive** root of $x^2 + 3x - 28 = 0$

If $a = 1$ and $b = 2$, find y if $y = (a^2 + b^2)^2 + 1$

Solution: N (6, 21)

S (20, 24)

C (18, 29)

I (4, 26)

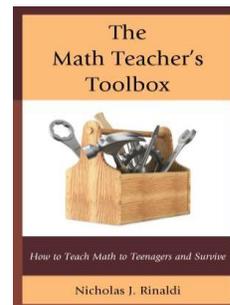
The point of intersection is (12, 25).....Christmas Day

If you wish to have more activities of the nature, with a different theme (Halloween, for example) or no theme at all, I suggest you begin with the answer; that is begin with the coordinates of the intersection of the diagonals of the quadrilateral. Plot this point on graph paper and then extend the diagonals through it so the endpoints have integral coordinates. Then construct your problems based on these coordinates.

Innovative Resources for Teachers

Resources for *Math Teachers*

The Math Teacher's Tool Box (or *How to Teach Math to Teenagers and Survive*) provides math teachers with various tools to improve their classroom management skills, to actively involve students in lessons, and as a result raise their interest level and improve learning. This book could be very helpful to a new mathematics teacher or a veteran looking for new ideas.



Communication and Creativity in the Math Classroom provides teachers with classroom-tested activities which stress life skills such as communicating more effectively, being creative, analyzing a variety of problems, following directions, and working cooperatively with others. These valuable skills are rarely addressed in the traditional math curriculum.

Also available from the same author:



It's Game Time! Games to Enhance Classroom Learning,

is a resource for K – 12 teachers. Besides being a welcome change of pace to routine lessons, games can be a lot of fun for both the students and the teacher. This book contains more than 40 games which are adaptable to virtually any discipline at any level.

All three books are published by Rowman & Littlefield and have many ready-to-use, easily reproducible materials.

For more information, including a table of contents and professional reviews, log on to www.rowman.com and enter "Nicholas J. Rinaldi" in the search box.

About the author: Nicholas J. Rinaldi has been an educator for well over four decades. He has written three books in which he shares strategies, ideas, and materials he developed during his distinguished teaching career. Many of these concepts cannot be found in standard resources on the market. Classroom activities are student-centered, fun, and instructive, enabling teachers to engage their students in meaningful and interesting learning.



HAPPY HOLIDAYS!

