start time:

Model I. (20 min) Group Roles

The goals of this class are to:
1. Learn Computer Science concepts that will help you develop working computer programs.
2. Learn how to think and learn.
3. Learn how to work with others.

For this reason, group work will be a large component of this class. You will work better with people if you know a little about each other. Introduce yourselves to your group, and make sure you will remember everyone's names.

Critical Thinking Questions

1. List the names of the four roles that are on the cards on your desk.

2. Assign each person in your group one of the role cards. Once this is done, each person needs to read the job description on the card. Write the summary of your job individually and be ready to share these with your group.

3. Each person in your group must share your summary of the job description on the role card that you have with your group. Write a brief description of the job of the other roles.

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4. Since we are using Google Docs to create one copy of this activity for each group, only one person needs to record the group's answers. Which role would be most appropriate to serve as a recorder?

5. For each role, give an example of how someone observing your group would know that a **person is not doing their job well**.
   - Facilitator
   - Spokesperson
   - Quality Control
   - Process Analyst

If there are only three people in your group, have one person serve as both facilitator and spokesperson for the rest of this activity.

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Model II. (15 min) The % Operator

9 % 4	*evaluates to*	1
10 % 4	*evaluates to*	2
11 % 4	*evaluates to*	3
12 % 4	*evaluates to*	0
13 % 4	*evaluates to*	1
14 % 4	*evaluates to*	2
15 % 4	*evaluates to*	3
16 % 4	*evaluates to*	0

Critical Thinking Questions

6. Examine the expressions and values in Model 2. Which number(s) % 4 evaluate to 0?

7. List two other numbers % 3 that will evaluate to 0.

8. Look at the expressions that evaluate to 1. How do the first numbers in these expressions (10, 13, 16) differ from those that evaluate to 0?

9. Evaluate the following Java expressions:
    a. 17 % 3
    b. 18 % 3
    c. 18 % 4
    d. 18 % 5

10. Describe in your own words what the % operator does. Use a full sentence.

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Model III. (10 min) The / Operator

9 / 4	*evaluates to*	2
10 / 4	*evaluates to*	2
11 / 4	*evaluates to*	2
12 / 4	*evaluates to*	3
13 / 4	*evaluates to*	3
14 / 4	*evaluates to*	3

Critical Thinking Questions

11. In Model 3, which number(s) / 4 evaluate to 3?

12. How do the above answers differ from what you would get if you entered the same expressions into a calculator?

13. Compare the answers you have from Model 2 and Model 3 for 9%4 and 9/4. How are the % and the / operators related?

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Model IV. (15 min) The / Operator Revisited

9.0 / 4.0	*evaluates to*	2.25	*rounds to*	2
10. / 4.	*evaluates to*	2.5	*rounds to*	
11 / 4.0	*evaluates to*	2.75	*rounds to*	
12. / 4	*evaluates to*	3.0	*rounds to*	
13 / 4.0	*evaluates to*	3.25	*rounds to*	

Critical Thinking Questions

14. Fill in the right column of Table 3, by rounding each number.

15. Compare the *evaluated* values of 9.0 / 4.0 (from Model 4) to 9/4 (from Model 3). How do the "evaluates to" answers differ?

16. What do you think the Java expression "14.0 / 4.0" would evaluate to?

17. Based on what you see in the rest of Table 3, what values would you see for the following divisions? Notice 14.0 and 4.0 are being represented slightly differently each time.

14. / 4.	*evaluates to*	
14. / 4	*evaluates to*	
14 / 4.	*evaluates to*	
14 / 4	*evaluates to*	

18. Define the effect of including the period (.) in numbers with the / operator.

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19. Dividing a number with fractional parts (known as a **floating-point number**) gives you different results from dividing two **integers**. If you are writing a Java program that requires division, what must be true about the **operands** (the numbers around the operators) for you to get the arithmetically correct answer? Does it need to be true for *both* operands?

20. Consider what you know about addition (+). If you add two integers in a Java expression, will the answer be arithmetically correct?

21. What about subtraction (-) and multiplication (*)? If you subtract or multiply two integers, will the answer be arithmetically correct?

Group Reflection

A. Everyone: Review the job descriptions on your role card. Evaluate privately on how well you performed in your role. You do not need to record your answer.

B. Process Analyst: Get an 'Evidence of Competencies' paper and provide one piece of positive evidence for each members of the group. Only give each person **one** piece of positive feedback right now. Then, complete the section for the 'Group's Area for Improvement' by recording **one** specific suggestion that will improve your group's success in the future. Cut out and give each of your group members their 'Evidence' section and give the group improvement section to your instructor. All students should be collecting pieces of evidence for their end of the semester reflection.

C. Quality Control: Summarize the activity for your group members, by answering the following two questions in Canvas. Then share your answer with your classmates.

   a. What does the % operator do?

   b. What does the / operator do?

D. Facilitator: List below how long each Model took your group:
   - Model 1:
   - Model 2:
   - Model 3:
   - Model 4: