Transition Tasks
for Mathematics
Grade 7

WALCH EDUCATION®

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Introduction

Use these engaging problem-solving tasks to help transition your mathematics program to the knowledge and skills required by the Common Core State Standards for Mathematics.

This collection of tasks addresses some of the new, rigorous content found in the Common Core State Standards (CCSS) for seventh grade. The tasks support students in developing and using the Mathematical Practices that are a fundamental part of the CCSS. You can implement these tasks periodically throughout the school year to infuse any math program with the content and skills of the CCSS.

These tasks generally take 30 to 45 minutes and can be used to replace class work or guided practice during selected class periods. Depending on the background knowledge and structure of your class, however, the tasks could take less or more time. To aid with your planning, tasks are divided into two parts. This flexible structure allows you to differentiate according to your students' needs—some classes or advanced students may need only one class period for both parts, while others may need to defer Part 2 for another day or altogether. Use your own judgment regarding the amount of time your students will need to complete Parts 1 and 2. Another strategy for compressing the time necessary to complete a task is to divide the problems or calculation associated with a task among students or small groups of students. Then students can "pool" their information and proceed with solving the task.

Each Transition Task is set in a meaningful real-world context to engage student interest and reinforce the relevance of mathematics. Each is tightly aligned to a specific standard from the Grade 7 CCSS. The tasks provide Teacher Notes with Implementation Suggestions that include ideas for Introducing, Monitoring/Facilitating, and Debriefing the tasks in order to engage students in meaningful discourse. Debriefing the tasks helps students develop and enhance their understanding of important mathematics, as well as their reasoning and communication skills. The Teacher Notes also offer specific strategies for Differentiation, Technology Connections, and Recommended Resources to access online.

Student pages present the problem-solving tasks in familiar and intriguing contexts, and require collaboration, problem solving, reasoning, and communication. You may choose to assign the tasks with little scaffolding (by removing the sequence of steps/questions after the task), or with the series of "coaching" questions that currently follow each task to lead students through the important steps of the problem.

We developed these Transition Tasks at the request of math educators and with advice and feedback from math supervisors and middle-school math teachers. Please let us know how they work in your classroom. We'd love suggestions for improving the tasks, or topics and contexts for creating additional tasks. Visit us at www.walch.com, follow us on Twitter (@WalchEd), or e-mail suggestions to customerservice@walch.com.

Blood Groups

Instruction

Introduction

Introduce the task by asking students if they know their blood type. Ask students if anyone in their family has ever donated blood. Question students about their knowledge of different blood types and the implications of blood type on receiving a transfusion. Point out the distinction between the four blood *groups*—A, B, AB, and O—and the eight major blood *types*—A+, A–, B+, B–, AB+, AB–, O+, and O–. For the purposes of this task, we will focus on the probabilities associated with the four blood groups.

There are four general blood groups: A, B, AB, and O. Doctors need to know what type of blood you have before giving you a blood transfusion because not all blood types mix safely. Type O blood is said to be the universal donor because anyone can receive type O. Type AB is said to be the universal recipient because someone with type AB blood can receive any other type of blood.

Monitoring/Facilitating the Task

Ask questions and prompt student thinking so that they:

- Understand what spinning the spinner represents and what each section of the spinner represents.
- Recognize that each group is creating data that will be combined to create a large sample of data.
- Recognize the mathematical operations they are using in calculating relative frequencies. Make sure that students articulate where and when they are using addition, multiplication, and division during each calculation.
- Defend their responses. Make sure that students articulate how they used their calculations to answer a question.
- Recognize the arithmetic they are doing, particularly in reference to converting percents to decimals and vice versa. If students are having difficulty writing descriptions of their arithmetic or explaining their responses, ask them to discuss how they determined their answers with you. Prompt for and encourage the use of proper mathematic terms.
- Recognize the difference between experimental and theoretical probability models.
- Realize that collecting more data means the experimental results will be closer to the theoretical results.

Instruction

Debriefing the Task

- Students will be calculating relative frequencies. They must know the procedure for calculating relative frequencies, as well as the relationship between percentages in a population and relative frequencies. Ask students to explain how they calculated their relative frequencies.
- Ask students about their observations of the class data as compared to the theoretical data. Students should notice that the experimental data typically does not result in the exact theoretical data. Encourage students to think about why this is and to explain their thinking.
- Ask students about the benefits of using a simulation. Students should report that simulations are easier and usually faster to conduct.
- Encourage discussion about student experiences with games of chance, such as flipping a coin to make a decision, and if they ever chose a side of a coin based on the results of previous flips. Ask them to explain their thinking and to evaluate their method of choosing a side. Students might think that evaluating the previous flips will give some insight into the results of a subsequent flip, when in reality there is always a 50% chance of flipping heads.
- To extend the task, ask students to look at their small-group data and compare their relative frequencies to the class data and then to the theoretical data. Small-group data could be vastly different from the theoretical data. Encourage students to discuss why this is and to examine what happened to the data as compared to the theoretical data as they began combining the class and small-group data.
- Assess understanding by expanding the parameters used in the task. Encourage students to develop a new probability model based on a different geographical region.

Answer Key

1. Answers will vary. Check to see that students spun the spinner the appropriate number of times and that the frequency column agrees with the tally column.
2. You need the frequency of each blood type and the total number of spins to calculate the relative frequency.
3. Answers will vary depending on experimental results. Make sure students report relative frequencies as whole percentages and that the total of the relative frequency column adds to 100%.
4. Answers will vary according to experimental results.
5. Since 44% of the population reportedly has type O blood, find 44% of 800: 0.44 • 800 = 352; 352 people are predicted to have type O blood.

6. Answers may vary. It's unlikely that the experimental distribution was exactly the same as the theoretical distribution, but it is possible that it is similar. Students should recognize that chance events are more predictable with long-run frequencies, and that the more data that is collected, the closer the results are to the theoretical distribution.

7. 10 people; 10 people would theoretically result in 4.4 people having type O blood.

   There are multiple ways to think about this problem. One way is to set up a proportion: $\frac{44}{100} = \frac{4}{x}; 44x = 400; x \approx 9.09$. Since you can't have 0.09 of a person, round up to 10.

8. Theoretical: 0.44 + 0.10 = 0.54 or 54%

   Experimental: Answers will vary. Student explanations should echo the rationale used in the answer to problem 6.

9. 0.31 + 0.19 = 0.50 or 50%

10. Yes, it is possible but unlikely. Just as with the spinner, it is possible for the spinner to land on the AB section on the first spin, but there is only a 4% chance of that.

Differentiation

Some students may benefit from the use of calculators during this task. Students who finish early might want to explore the blood types of differing regions and create a new spinner with the appropriate percentages. Then, these students could generate more experimental data and run through the task a second time, calculating relative frequencies with the new data. Additional data can be found in a table at www.walch.com/rr/CCTTG7WikiBlood. You may also direct advanced students to research the percentages for all eight primary blood types (Rh positive and negative), create a spinner that reflects these percentages, and redo the task using the new spinner.

Technology Connection

As an alternative to creating a physical spinner, students could use one of the virtual manipulative spinners provided in the Recommended Resources list. Additionally, students could use a spreadsheet to record their results and make calculations of relative frequencies.

Choices for Students

The task focuses on blood group O. Students could choose a different blood group.

Instruction

Meaningful Context

Agencies use the percentages of each blood group in a population to generate probability models and estimate how many donors they will need to ensure they have enough blood of a specific type. Students may contact their local Red Cross or blood donation clinic to obtain blood group population numbers for their community.

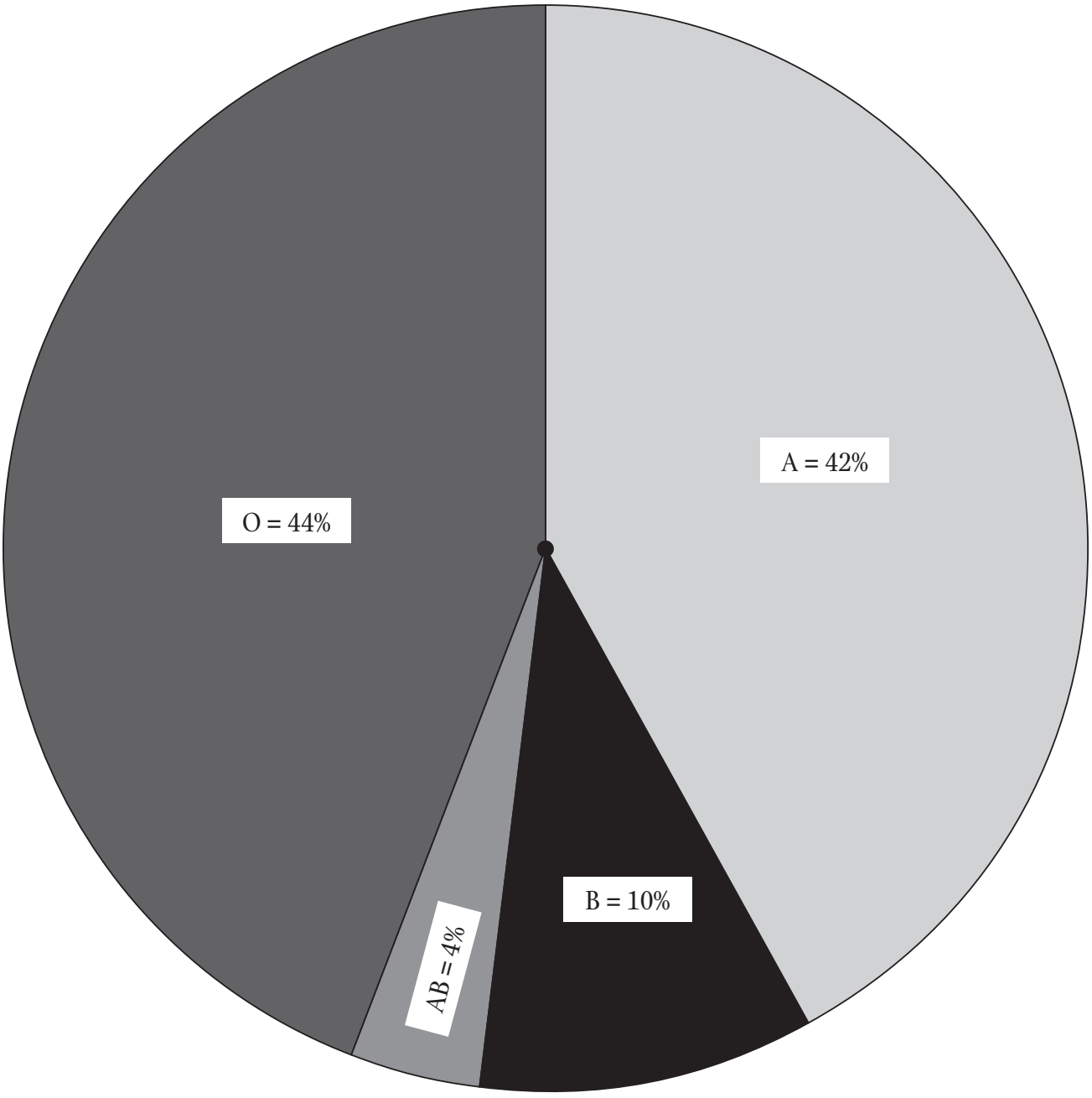
Recommended Resources

- American Red Cross: Blood Types
  www.walch.com/rr/CCTTG7BloodTypes
  Along with an excellent explanation of the blood groups and types, this site from the American Red Cross includes an interactive chart depicting the ease of donation between different types, as well as a breakdown of the percentage of each blood type in the U.S. population.
- National Library of Virtual Manipulatives—Spinners
  www.walch.com/rr/CCTTG7CustomSpinners
  This virtual manipulative allows students to customize a spinner. The application is also able to record the results of multiple spins and displays the results as a histogram. Requires Java.
- Shodor Interactivate: Adjustable Spinner
  www.walch.com/rr/CCTTG7AdjustableSpinner
  This virtual spinner can be customized. The application allows you to set a number of spins and it then keeps track of the count and the experimental probabilities. The table also has a column for the theoretical probabilities for easy comparison. When the simulation is complete, students can use the program to display a pie chart of the experimental results.
- Wikipedia article: "Blood type"
  www.walch.com/rr/CCTTG7WikiBlood
  This article offers further explanation of blood types, and includes a table listing blood type distribution by country.

NAME:

7.SP.6 Task • Statistics and Probability
Blood Groups

Spinner Template



NAME:

7.SP.6 Task • Statistics and Probability
Blood Groups

Introduction

Imagine if a train collided with a city bus and 20 people were injured. In a situation like this, Red Cross agencies would ask for blood donations to help victims in need. How many donors would be needed to guarantee that enough blood of a specific type was received to help the injured?

The table below shows the four blood groups—A, B, AB, and O—and the percentage of Americans with each blood type. Your group will use a spinner that reflects these percentages to answer questions. Your teacher will provide the spinner or guide you in putting it together yourself.

Blood group/type	A	B	AB	O
Percent of U.S. population:	42	10	4	44

Part 1

1. In your group, spin the spinner the number of times assigned to you by your teacher. (Each group might have a different number of spins, but the class total will be 200 spins.) Each time you finish a spin, make a tally mark in the appropriate column of the following table. When you are done spinning, tally the marks and write the total of each blood type in the "Group frequency" column. You will use this data in Part 2 of the task.

Type	Tally	Group frequency
A		
B		
AB		
O		

2. In the next part of the task you will be calculating relative frequencies. What information do you need to know in order to calculate relative frequencies?

continued

7.SP.6 Task • Statistics and Probability
Blood Groups

Part 2

The Red Cross needs to collect blood from enough people so that they can have a minimum number of universal blood donors. People with type O blood are considered to be "universal donors" because anybody with any blood type can receive type O blood. Determine how many people need to donate blood to ensure that enough donors are type O.

3. Combine your class data from the "Group frequency" column in the table from Part 1 and record the results in the table below. When you have all the data, calculate the relative frequencies of each blood type and enter that percentage in the "Relative frequency" column. Round your relative frequencies to the nearest whole percentage.

Type	Frequency	Relative frequency
A		
B		
AB		
O		
		Total:

4. Based on your **experimental** results (collected data), if 800 people donate blood, how many people would you predict have type O blood? Explain your reasoning.

5. Based on the **theoretical** probabilities (the table provided in Part 1), if 800 people donate blood, how many people would you predict have type O blood? Explain your reasoning.

continued

6. Are your predictions in numbers 5 and 6 identical? Explain why or why not.

7. A local hospital needs four people to donate type O blood for transfusions. How many people would you predict need to donate blood to ensure that four of the donors have type O blood? Explain how you determined your answer.

8. An accident victim has blood type B. This person can receive type O or type B blood. What is the probability that one person walking into the Red Cross has either of these types based on the **theoretical** probability? _____

   Based on the **experimental** probability? _____

   If your answers are different, explain why this might be.

continued

9. The relative frequencies of blood types are different in other countries. For example, in Hungary, 31% of the people have type O blood and 19% have type B blood. If a person in Hungary were to donate blood, what is the **theoretical** probability that this person would have either of these types of blood? Show your work.

10. Type AB is the most rare blood type in the United States. Is it possible that, on any given day, the first person to come in to the Red Cross at random has type AB blood? Explain your reasoning.