

PLAN®

# TEST QUESTION ANALYSIS ACTIVITY BOOKLET

## PLAN COLLEGE READINESS STANDARDS

### Contents

This booklet contains information to help you complete the workshop activity for each of the four content areas PLAN measures:

	Page
Description of the Workshop Activity (all four content areas) .....	1
English (essay, selected test questions, guiding questions, and worksheet).....	2
Mathematics (selected test questions, guiding questions, and worksheet).....	4
Reading (passage, selected test questions, guiding questions, and worksheet).....	6
Science (passage, selected test questions, guiding questions, and worksheet) .....	8

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## Description of the Workshop Activity (All Contents)

Each activity in this booklet helps you become more familiar with ACT's College Readiness Standards—sets of statements that communicate educational expectations for junior high/middle school and high school students. College Readiness Standards have been written for all four academic areas measured in PLAN®: English, Mathematics, Reading, and Science. The Standards for each academic area are organized by *score range* (13–15, 16–19, 20–23, 24–27, and 28–32) and by *strand* (distinct yet overlapping areas of knowledge and skill).

Please follow the steps outlined below to explore the relationship between the PLAN test questions and the PLAN College Readiness Standards. If you have questions, ask your workshop coordinator.

**Step A:** Find and briefly review the College Readiness Standards table for your respective content area. Please note that the College Readiness Standards are organized both by score range (along the left-hand side) and by strand (across the top).

- Step B:** Read the explanatory text and/or the guiding questions for your content area.
- Step C:** Read the sample test questions (and [except in Mathematics] their corresponding passage); then determine which strand(s) and Standards link to each test question. Space has been provided below each test question to write notes about what is measured in each test question. Write the College Readiness Standards number (e.g., 301, 502) and the strand abbreviation (e.g., in English, TOD, OUC) in the second column of the worksheet. Please note that the score range for each test question appears in column one.
- Step D:** Discuss your findings with the other participants in the workshop.

English Essay  
from the Abbreviated PLAN Test

PASSAGE I

An Extension of My Fingers

I learned to eat with chopsticks when I was seven years old. According to my grandparents, who were brought up in China, I was terribly old to be learning such a basic skill. “Children in China *never* eat with forks,” my grandfather said. “Chinese children learn to eat with chopsticks from the beginning.” [2]

“Think of the chopsticks as an extension of your fingers,” my grandmother advised. “You can learn to control them as well as you control your own fingers.”

In my experience, though, the bamboo sticks were nothing like my fingers.

With a certain amount of clumsiness, I would manage to wedge a piece of food between the long, stiff chopsticks.

Then, as I rose the food to my mouth, the chopsticks would suddenly slip or shift beyond control and that my dinner would land on the table with an embarrassing plop. For a long time, I could not finish a meal without creating greasy blotches around my plate.

As I began to try my new skill in Chinese restaurants, I discovered through necessity the different techniques required to manage the many types of chopsticks available. Each type presenting another challenge. Bone chopsticks thick, and square, and heavy, were considered appropriate for formal occasions but definitely were especially difficult for my childish hands. When complaining to my grandmother, she said that the most difficult chopsticks of all had appeared a thousand years ago in the emperors court.

“In those ancient times,” my grandmother said, “the test for any woman wanting to marry a prince was to eat a meal of pigeon’s eggs with delicate silver chopsticks.” Managing the slippery, marble-sized eggs with the gleaming, pointed chopsticks required a sensitivity at that of most normal people. I knew then that I did not want to be a princess.

Question 13 asks about the preceding passage as a whole.

## Guiding Questions for English Workshop Activity

1. What judgment or editing decision (e.g., choosing transition words, correcting verb tense, determining the purpose of the essay) is the student asked to make in the test question?
2. Which strand most directly addresses that judgment or editing decision?
3. Which standard within that strand (and score range) do you think best describes the test question?
4. Think of one classroom activity that you've used successfully that either requires students to use the skill you've identified or that helps students learn the skill you've identified. Please informally describe that activity to your fellow educators.

### Worksheet

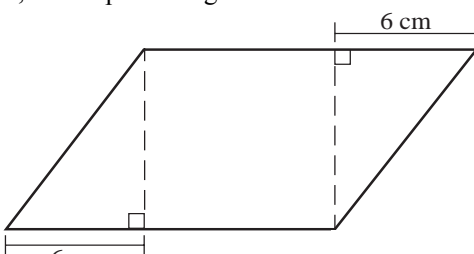
Sample Test Question	Strand(s) College Readiness Standards
<p><b>Score Range 16–19</b></p> <p>1.*A. NO CHANGE            B. skill, “Children            C. skill “Children            D. skill “children</p> <p><b>Judgment/Decision:</b></p>	
<p><b>Score Range 28–32</b></p> <p>8. F. NO CHANGE            G. chopsticks thick and square and heavy            *H. chopsticks, thick and square and heavy,            J. chopsticks, thick square and heavy,</p> <p><b>Judgment/Decision:</b></p>	
<p><b>Score Range 24–27</b></p> <p>13. Suppose the writer had chosen to write a brief essay about a particular experience from childhood that changed the way she viewed her grandparents. Would this essay successfully fulfill the writer’s goal?</p> <p>A. Yes, because the writer realized that her grandparents wanted her to experience Chinese culture.            B. Yes, because the writer suddenly saw that her grandparents were more strict than her parents.            C. No, because the essay indicates that the writer was unable to learn what her grandparents were trying to teach her.            *D. No, because the essay gives no indication that the relationship between the writer and her grandparents changed in any way.</p> <p><b>Judgment/Decision:</b></p>	

# Guiding Questions for Mathematics Workshop Activity

1. What topic (e.g., algebra, geometry, statistics) is the test question about?
2. Which strand focuses on the topic you chose?
3. What knowledge and skills does a student need to successfully respond to the test question?
4. Which standard within that strand (and score range) best describes the knowledge or skills you listed?
5. Think of one classroom activity that you've used successfully that requires students to use the skill you've identified or helps students learn the skill you've identified. Please informally describe that activity to your fellow teachers.

## Worksheet

Sample Test Question	Strand(s) College Readiness Standards												
<p><b>Score Range 16–19</b></p> <p>3. Robin asked 50 classmates to name their favorite color and gathered the following information.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 2px 10px;">Favorite color</th> <th style="padding: 2px 10px;">blue</th> <th style="padding: 2px 10px;">purple</th> <th style="padding: 2px 10px;">red</th> <th style="padding: 2px 10px;">yellow</th> <th style="padding: 2px 10px;">green</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px 10px;">Number of classmates</td> <td style="padding: 2px 10px;">18</td> <td style="padding: 2px 10px;">11</td> <td style="padding: 2px 10px;">6</td> <td style="padding: 2px 10px;">5</td> <td style="padding: 2px 10px;">10</td> </tr> </tbody> </table> <p>Robin decided to display the information in a bar graph on graph paper as shown below. If the bar labeled <i>blue</i> is 9 blocks tall, how many blocks tall should the bar labeled <i>green</i> be?</p> <div style="text-align: center; margin: 10px 0;"> </div> <p>A. <math>2\frac{1}{2}</math>            B. <math>4\frac{1}{2}</math>            *C. 5            D. <math>5\frac{1}{2}</math>            E. 10</p>	Favorite color	blue	purple	red	yellow	green	Number of classmates	18	11	6	5	10	
Favorite color	blue	purple	red	yellow	green								
Number of classmates	18	11	6	5	10								
<b>Knowledge and Skills:</b>													

Sample Test Question	Strand(s) College Readiness Standards
<p><b>Score Range 24–27</b></p> <p>8. Which of the following lists the fractions <math>\frac{4}{7}</math>, <math>\frac{5}{9}</math>, and <math>\frac{2}{3}</math> in order from least to greatest?</p> <p>F. <math>\frac{2}{3} &lt; \frac{4}{7} &lt; \frac{5}{9}</math></p> <p>G. <math>\frac{4}{7} &lt; \frac{5}{9} &lt; \frac{2}{3}</math></p> <p>H. <math>\frac{4}{7} &lt; \frac{2}{3} &lt; \frac{5}{9}</math></p> <p>J. <math>\frac{5}{9} &lt; \frac{2}{3} &lt; \frac{4}{7}</math></p> <p>*K. <math>\frac{5}{9} &lt; \frac{4}{7} &lt; \frac{2}{3}</math></p> <p><b>Knowledge and Skills:</b></p>	
<p><b>Score Range 28–32</b></p> <p>14. One of the numbers in the set <math>\{2, 3, 4\}</math> is chosen at random and raised to the power of a different one of these numbers, also chosen at random. What is the probability that the resulting number will be even?</p> <p>F. <math>\frac{1}{6}</math></p> <p>G. <math>\frac{1}{3}</math></p> <p>H. <math>\frac{1}{2}</math></p> <p>J. <math>\frac{5}{9}</math></p> <p>*K. <math>\frac{2}{3}</math></p> <p><b>Knowledge and Skills:</b></p>	
<p><b>Score Range 28–32</b></p> <p>15. The figure below shows a parallelogram that is composed of a square and 2 right triangles. The <i>perimeter</i> of the square is 32 centimeters, and the lengths of the bases of the triangles are as indicated. What is the <i>area</i>, in square centimeters, of the parallelogram?</p> <p>*A. 112</p> <p>B. 64</p> <p>C. 56</p> <p>D. 48</p> <p>E. Cannot be determined from the given information</p> <p><b>Knowledge and Skills:</b></p>	

# PLAN Reading Test

The PLAN Reading Test includes three types of passages: Prose Fiction, Humanities (classified as literary narratives), and Social Science (classified as informational). Passages also differ in level of difficulty: uncomplicated, more challenging, or complex. When determining the difficulty of the passage below, please think in terms of a “typical (average) tenth-grade student.”

Most of the College Readiness Standards mention a specific type of passage and level of difficulty. When a Standard mentions level of difficulty only, students should be able to display the skill while reading both literary narratives and informational passages.

## Reading Passage from the Abbreviated PLAN Test

### Passage I

**SOCIAL SCIENCE:** This passage is adapted from an essay by Ellen Goodman that appeared in *Keeping in Touch* (©1985 by The Washington Post Company).

Twenty years ago, when Valentina Tereshkova went into space, she was followed by an appalling trail of words. The Russians’ “smiling cosmonette” and “dimpled space sister” had “her feminine curves hidden  
5 in a clumsy space suit.” You get the idea.

Sally Ride, in turn, suffered some before she went up in the Challenger. Johnny Carson quipped that the launch was being postponed until Sally could find the purse to match her shoes. A *Time* magazine writer asked if she  
10 wept when things went wrong.

By lift-off, however, the media were just about as (1) tamed, (2) repressed, or (3) enlightened as we could have hoped. Indeed, it was Sally Ride’s name which seemed to provide more twists, puns, and plays on words  
15 for headline writers than her sex. To wit: “Ride, Sally Ride,” “Sally Rides High,” and “Sally’s Joy Ride.”

Still, what we are witnessing is a classic case of First Womanitis, a social disease that comes with prolonged exposure to the spotlight. Sally Ride, First American  
20 Woman in Space, is taking this trip right into history while her male companions are destined for the trivia shows.

She is also, like it or not, joining a large sorority whose ranks include Elizabeth Blackwell, the first  
25 woman to be graduated from an American medical school, in 1849, and Ruth Wilson, the first woman hired as a street cleaner by the Philadelphia Sanitation Department, in 1976.

When all is said and done, Sally Ride is just another  
30 First Woman.

Ride is luckier than many of the others in this sorority. People are rooting for her, rather than against her. But the initiation rites are by now familiar.

As a First Woman, she is watched and called upon to  
35 explain her very existence in a way that her co-travelers are not. She is asked opinions on everything “female”—from fashion to feminism—and everyone offers opinions about her from her fashions to her feminism.

Nearly all of the select have felt this glare of  
40 extraordinariness, even in their more earthly pursuits. Nearly all of them have sighed, at some moment, as Ride did, “It may be too bad that our society isn’t further along and that this is such a big deal.”

But most First Women share something else: a  
45 special conflict. There is the desire to be accepted as a self-made woman, a person who was and is judged on individual merit. There is the realization that each carries a load of other women’s frustrations and hopes.

Ride has borne the disappointments of women such  
50 as those would-be astronauts of 1961, the dozen whose space futures were canceled out because “the times” were not ripe. She has also taken on the hopes of a generation of young girls in search of heroines. When it all gets to be too much, she flips “the switch marked  
55 ‘oblivious.’” Maybe First Women wear that switch like a sorority pin.

In any case, Ride is now initiated. She’s learned the rules. Being a full-fledged First Woman means carrying  
60 your self as a second job. Being a First Woman means taking every step for womankind. It’s not easy, but the company is fine.

## Guiding Questions for Reading Workshop Activity

- How would you classify this passage: literary narrative or informational passage?
- Using the passage descriptions at the bottom of the Reading College Readiness Standards table, what do you think is the difficulty level of the passage: uncomplicated, more challenging, or complex?
- What skills does a student need to successfully respond to the test question?
- Which strand focuses on the skills you listed?
- Which standard within that strand (and score range) best describes the skills you listed?
- Think of one classroom activity that you've used successfully that either requires students to use the skill you've identified or that helps students learn the skill you've identified. Please informally describe that activity to your fellow teachers.

### Worksheet

Passage classification: \_\_\_\_\_

Sample Test Question	Strand(s) College Readiness Standards
<p><b>Score Range 20–23</b></p> <p>4. The passage indicates that Ride is luckier than many other First Women because:</p> <ul style="list-style-type: none"> <li>F. she got to travel in space.</li> <li>G. her future was not canceled out.</li> <li>H. the initiation rites were familiar.</li> <li>*J. people were on her side.</li> </ul> <p><b>Skills:</b></p>	
<p><b>Score Range 20–23</b></p> <p>5. Throughout the passage, being a First Woman is compared to being:</p> <ul style="list-style-type: none"> <li>*A. in a sorority.</li> <li>B. on a ride into space.</li> <li>C. married to the President.</li> <li>D. in search of heroines.</li> </ul> <p><b>Skills:</b></p>	
<p><b>Score Range 28–32</b></p> <p>7. As it is used in line 15, the phrase <i>to wit</i> most nearly means:</p> <ul style="list-style-type: none"> <li>A. stereotypically.</li> <li>B. nevertheless.</li> <li>*C. that is.</li> <li>D. therefore.</li> </ul> <p><b>Skills:</b></p>	

# PLAN Science Test

The Interpretation of Data strand describes the skills used to read and analyze information presented in tables, graphs, diagrams, or text. These skills include selecting data points from graphs, comparing 2 or more data points or sets of data, interpolation of data, and extrapolation from data.

The Scientific Investigation strand focuses on the skills needed to understand and analyze an experiment. These skills include determining the control in an experiment, determining the hypothesis that an experiment is designed to test, and

determining the purpose behind an experimental design or procedure.

The Evaluation of Models, Inferences, and Experimental Results strand contains the skills needed to understand and analyze diverse scientific models. These skills include determining the hypothesis or conclusion that is supported by a given set of data, experiment, or model; finding the areas of agreement and disagreement in different models; and identifying the strengths, weaknesses, key issues, and assumptions in various models.

## Data Representation Passage from the Abbreviated PLAN Test

### Passage I

The *heating rate* is defined as the amount of heat absorbed by a material in a given time period. When a material absorbs heat, its temperature may rise.

For 50 g each of various liquids, initially at 20°C, Table 1 lists the temperature change when each liquid absorbs heat for 10 sec at a heating rate of 60 watts (W).

Liquid	Mass (g)	Heating rate (W)	Time (sec)	Temperature change (°C)
Benzene	50	60	10	6.9
Ethylene glycol	50	60	10	5.0
Methanol	50	60	10	4.7
Mercury	50	60	10	86.3

For 50 g or 100 g of water, initially at 20°C, Figure 1 shows the temperature changes that occur when the water is heated for 10 sec at various heating rates, and Figure 2 shows the temperature changes that result for water at a heating rate of 60 W for various amounts of time.

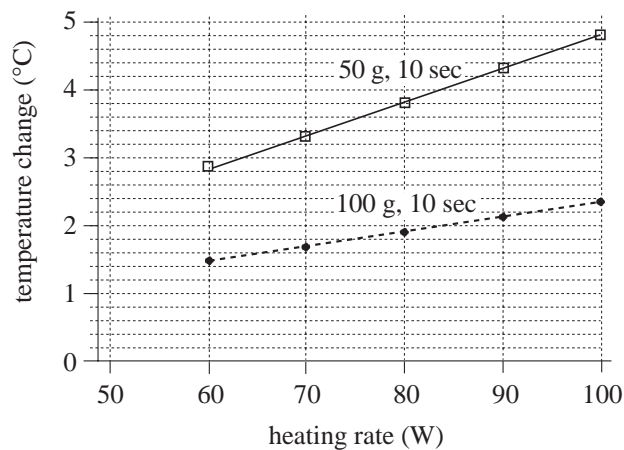


Figure 1

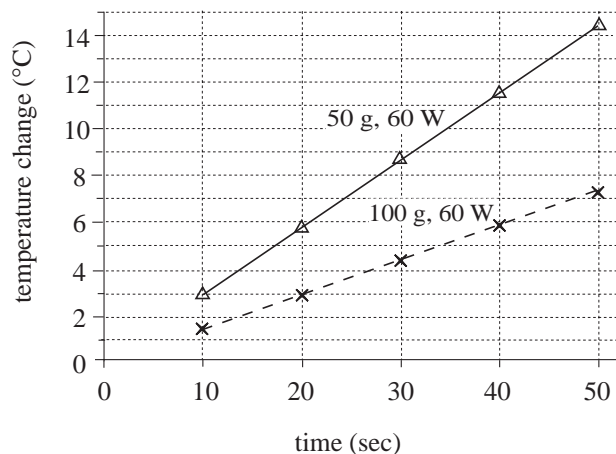


Figure 2

## Guiding Questions for Science Workshop Activity

1. What science process skills must students use to answer the test question correctly?
2. Which strand focuses on the skills you chose?
3. Which standard within that strand (and score range) best describes the skills you listed?
4. Think of one classroom activity that you've used successfully that either requires students to use the skill you've identified or that helps students learn the skill you've identified. Please informally describe that activity to your fellow teachers.

### Worksheet

Sample Test Question	Strand(s) College Readiness Standards
<p><b>Score Range 20–23</b></p> <p>2. According to Table 1, how much benzene was being heated?</p> <p>F. 6.9 g            G. 10 g            *H. 50 g            J. 60 g</p> <p><b>Science Process Skills:</b></p>	
<p><b>Score Range 24–27</b></p> <p>4. According to the data in Table 1, which of the following lists ranks the 4 liquids in order of <i>decreasing</i> temperature change?</p> <p>F. Benzene, ethylene glycol, methanol, mercury            G. Ethylene glycol, benzene, mercury, methanol            H. Methanol, ethylene glycol, benzene, mercury            *J. Mercury, benzene, ethylene glycol, methanol</p> <p><b>Science Process Skills:</b></p>	
<p><b>Score Range 28–32</b></p> <p>5. According to the data in Figure 1, if 25 g of water were heated at a rate of 60 W for 10 sec, the temperature change of the water would be closest to which of the following values?</p> <p>A. 0.7°C            B. 1.5°C            C. 2.2°C            *D. 5.7°C</p> <p><b>Science Process Skills:</b></p>	

## Research Summaries Passage

from the Abbreviated PLAN Test

### Passage II

*Herbicides* are chemicals that kill plants. A study was conducted to examine the effects of 2 herbicides (Herbicides A and B) on both crop and weed plant species.

Ten identical 10 m × 10 m plots were established in a field. One row of seeds of each of 5 crop species and 5 weed species was planted in each plot. One herbicide at 1 of 2 concentrations was then added to each plot (see Table 1). Plants were observed 2 weeks after application of the herbicides. Plots 1–5 were used in Experiment 1 and Plots 6–10 were used in Experiment 2.

Table 1		
Plot	Herbicide	Concentration
1 and 6	A	low
2 and 7	A	high
3 and 8	B	low
4 and 9	B	high
5 and 10	None	—

#### Experiment 1

Herbicides were applied to the plots immediately after the seeds were planted (*pre-emergence application*). The results are shown in Table 2.

(Note: [X] indicates that the plants died and [–] indicates that plants were not affected.)

Table 2					
	Plot				
	1	2	3	4	5
<b>Crops</b>					
corn	–	X	–	–	–
cucumber	–	X	X	X	–
oats	X	X	–	–	–
tomato	–	–	X	X	–
wheat	X	X	–	–	–
<b>Weeds</b>					
crabgrass	X	X	–	–	–
quackgrass	X	X	–	–	–
foxtail	–	–	–	–	–
ragweed	X	X	X	X	–
velvetleaf	–	–	X	X	–

#### Experiment 2

The herbicides were applied to the plots only after the plants had emerged from the soil and were 6–12 cm tall (*post-emergence application*). Table 3 presents the results.

(Note: [I] indicates that the plants were injured by the herbicide.)

Table 3					
	Plot				
	6	7	8	9	10
<b>Crops</b>					
corn	–	X	–	–	–
cucumber	I	X	–	I	–
oats	X	X	–	–	–
tomato	I	I	–	I	–
wheat	X	X	–	–	–
<b>Weeds</b>					
crabgrass	X	X	–	–	–
quackgrass	X	X	–	–	–
foxtail	–	–	X	X	–
ragweed	I	X	I	X	–
velvetleaf	I	X	–	–	–

At the end of the experiments, all plots were seeded with bluegrass in order to prevent soil erosion.

## Guiding Questions for Science Workshop Activity

1. What science process skills must students use to answer the test question correctly?
2. Which strand focuses on the skills you chose?
3. Which standard within that strand (and score range) best describes the skills you listed?
4. Think of one classroom activity that you've used successfully that either requires students to use the skill you've identified or that helps students learn the skill you've identified. Please informally describe that activity to your fellow teachers.

### Worksheet

Sample Test Question	Strand(s) College Readiness Standards
<p><b>Score Range 20–23</b></p> <p>7. Which of the plots served as the control in Experiment 2 ?</p> <ul style="list-style-type: none"> <li>A. Plot 7</li> <li>B. Plot 8</li> <li>C. Plot 9</li> <li>*D. Plot 10</li> </ul> <p><b>Science Process Skills:</b></p>	
<p><b>Score Range 20–23</b></p> <p>8. In which of the following ways were the procedures of Experiments 1 and 2 different?</p> <ul style="list-style-type: none"> <li>F. Herbicide concentrations</li> <li>G. Size of the plots</li> <li>H. Plant species tested</li> <li>*J. Timing of herbicide application</li> </ul> <p><b>Science Process Skills:</b></p>	
<p><b>Score Range 20–23</b></p> <p>9. Based on the results of Experiment 1, one can conclude that Herbicide A has no effect on which of the following crop species after pre-emergence application?</p> <ul style="list-style-type: none"> <li>A. Cucumber</li> <li>B. Oats</li> <li>*C. Tomato</li> <li>D. Wheat</li> </ul> <p><b>Science Process Skills:</b></p>	