

Student Guide

Adding and Subtracting in Space

Questions 1–13 (SG pp. 147–150)

1. A. Mark A for 143 is between 100 and 200, slightly closer to 100
 B. 143 is closer to 100
 C. 100
2. A. Mark B for 188 is between 100 and 200, closer to 200
 B. Closer to 200
 C. 200
3. Round 143 to 150 using the first number line; 140 using the second number line.
4. A. 190
 B. 180 and 190
5. A.* $300 = 100 + 200$
 B.* $330 = 140 + 190$
 C.* Both are correct, since estimating does not mean finding an exact answer. Lee Yah's answer is closer to the exact answer.
6. Answers may vary, depending how students round. One possible solution involves rounding each number to the nearest hundred:
 $4300 - 2800 = 1500$

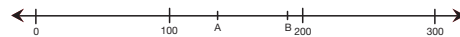
7. A.

	Benchmark #1	Benchmark #2	Rounded Number of Satellites
Nearest 1000	4000	5000	5000
Nearest 100	4500	4600	4600
Nearest 10	4580	4590	4580

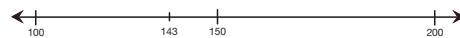
B. The number rounded to the nearest ten, or 4580, is closest to the exact number.



To help make her estimate, Grace decided to round the numbers from the table using a number line.



1. A. India has 143 satellites in orbit. Grace estimated where 143 would be on the number line. She knew it would be between 100 and 200, so she chose these two numbers as her benchmarks. Locate the mark Grace made on the number line showing 143. How did you decide?
 B. Is 143 closer to 100 or 200?
 C. Round 143 to the nearest 100.
2. A. Japan has 188 satellites in orbit. Using the same two benchmarks, Grace estimated where 188 is on the number line. Find the mark Grace made for 188 on the number line. How did you decide?
 B. Is it closer to 100 or 200?
 C. Round 188 to the nearest 100.
3. Lee Yah did not round 143 to the nearest hundred. She rounded 143 in two other ways. She used the marks on these two number lines as benchmarks to do the rounding.



Using these two number lines, give two ways to round 143.

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4. A. Use the second number line in Question 3 to round 188 to the nearest 10.
 B. What benchmarks did you use?
5. Grace estimated 300 for the total number of orbiting satellites launched by India and Japan. Lee Yah's estimate was 330 satellites.
 A. Write a number sentence to show how Grace found her estimate.
 B. Write a number sentence to show how Lee Yah found her estimate.
 C. Which student is correct?
6. Use rounded numbers to estimate how many more orbiting satellites were launched by the United States than China.



7. A. Use the number lines below to round the number of satellites launched by Russia to the nearest thousand, hundred, and ten. Write the rounded numbers in the table below, and include the two benchmarks you used each time you rounded.



	Benchmark #1	Benchmark #2	Rounded Number of Satellites
Nearest 1000			
Nearest 100			
Nearest 10			

- B. Compare the rounded numbers in the table in the last column. Which one is closest to the exact number?

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*Answers and/or discussion are included in the lesson.

8. **A.** Lee Yah estimated that the three countries with the most satellites have about 12,000 satellites in orbit altogether. Lee Yah wrote this number sentence showing the convenient numbers she chose:
 $12,000 = 3000 + 5000 + 4000$
 Explain how Lee Yah arrived at her estimate.
B. Find another estimate for the number of satellites launched by these three countries. Explain your thinking.
9. Estimate the total number of artificial satellites orbiting the earth. Show or tell how you arrived at your estimate.

When Do We Estimate?

While Grace was solving problems about satellites, she asked Mrs. Dewey, "When should I estimate an answer and when should I find it exactly?"

"Good question," replied Mrs. Dewey. "Let's think about that with your classmates."

Mrs. Dewey's class made a chart to show when it makes sense to estimate.

When Do We Estimate?

When...	For example...
...we want to check if an answer is reasonable	...after we use a calculator to find an answer (did we punch the buttons correctly?)
...we want to find a quick answer in our heads	...when we are estimating the cost of 20 cans of pet food at the store
...we don't need an exact answer	...the amount a school spends on electricity in a year to budget for the next year
...it is difficult or impossible to find an exact answer	...the number of leaves in a forest
...numbers don't stay exactly the same	...the value of five rare stamps (the value might change from one day to the next)

10. **A.** Write a second example for each of these situations.
B. Can you think of another situation when you might want to estimate rather than find an exact answer?

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Solving Problems with Sums and Differences

11. Mrs. Dewey is thinking about buying a telescope for the school. One telescope costs \$129.99. Another more expensive model costs \$254.09. Estimate the difference between the prices.
12. Mrs. Dewey's class wants to buy the telescope that costs \$254.09. To raise enough money for it, they hold a bake sale. Each day they make the amount of money shown in the table.

Sales from Class Bake Sale

Day	Sales
Monday	\$ 39.50
Tuesday	\$ 24.75
Wednesday	\$ 38.00
Thursday	\$ 51.25
Friday	\$ 78.00

- A.** Show or tell how to estimate the amount of money the class raised.
B. Does the class have enough money to buy the telescope?
C. If not, estimate how much more money they need to raise.
13. Based on the sales from the first five days, how many more days should the class plan to have the bake sale? Explain.

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*Answers and/or discussion are included in the lesson.

8. **A.** Lee Yah rounded each number of satellites to the nearest 1000, then added them together.
B. Answers will vary. Students may estimate to the nearest hundred before adding: $2800 + 4600 + 4300 = 11,700$.
9. Estimates will vary depending on students' methods. One possible solution would involve rounding numbers to the nearest thousand and then adding: $3000 + 0 + 0 + 5000 + 4000 + 1000 = 13,000$ satellites.
10. **A.** Answers will vary.
B. Answers will vary.
11. Estimates may vary. One possible solution is: $\$250 - \$130 = \$120$.
12. **A.*** Methods may vary. A conservative estimate might be made by rounding each amount down to the nearest five dollars.
B.* Answers will vary. By the method explained for Question 14A: $\$35 + \$20 + \$35 + \$50 + \$75 = \215 . The class does not have enough money yet.
C.* Answers will vary. Using the estimate from Part B, they will need about \$40 more since $\$255 - \$215 = \$40$.
13. Answers will vary depending on the method used to estimate. Using the estimate used in Question 12, the bake sale should probably run at least 1 more day. To guarantee they have enough money, the class could run it 2 more days.


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Homework


Questions 1–3 (SG p. 151)

1. **A.** 737 kilometers
B. Estimates will vary. One possible strategy would be to choose 250 as a convenient number for all three numbers: $250 + 250 + 250 = 750$ kilometers.
2. **A.** Estimates will vary. Students may estimate as $4300 - 3200 = 1100$ satellites.
B. Students may have chosen to estimate since the question asked, “About how many...”
3. **A.** 72 meteors
B. 126 meteors
C. Monday to Friday
C. 18 more meteors during the week



1. Some satellites circle the earth at the same speed all the time. Others speed up and slow down as they orbit the earth. A scientist watched a satellite through a telescope for three minutes. She saw that it traveled 232 kilometers in the first minute, 246 kilometers in the second minute, and 259 kilometers in the third minute.
 - A.** What is the total distance traveled by the satellite over the three minutes?
 - B.** Now estimate the distance. Was your answer for Question 1A reasonable?
2. **A.** Out of the 4284 orbiting satellites launched by the United States, 3231 are no longer being used. About how many satellites does the United States have in orbit that are still in use?
B. Did you estimate your answer for Question 2A or find an exact answer? Explain why.
3. On Monday, Jacob spotted 9 meteors. On Tuesday, he spotted 13. He counted 21 on Wednesday, 12 on Thursday, 17 on Friday, and 54 over the weekend.
 - A.** How many meteors did Jacob see from Monday to Friday?
 - B.** How many did he see all week?
 - C.** Did Jacob see more meteors from Monday to Friday or over the weekend?
 - D.** How many more meteors did he see during the week than over the weekend?





Meteors, or “shooting stars,” are objects (usually very small ones) that burn up brightly as they fall to the earth from outer space. During meteor showers, many of these can be seen streaking across the sky on a clear night. On a camping trip over the summer, Jacob counted the number of meteors he could spot crossing the night sky during a meteor shower.

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