

LESSON 2

Estimating and Eliminating

Lesson 2: Estimating and Eliminating

Rationale

Some problems on the CAHSEE will require students to make calculations using numbers in the problem. While all students should be familiar with using algorithms, they can estimate the final answer and make an educated guess using the answer choices. In addition, students can use their estimates to eliminate any answer choices that seem incorrect.

In this lesson, students will learn how to use the answer choices in multiple-choice problems to find quick and accurate solutions.

Standards Alignment

In this lesson, students will solve problems aligned to these standards:

Number Sense

7.NS.1.3: Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.

7.NS.1.6: Calculate the percentage of increases and decreases of a quantity.

7.NS.1.7: Solve problems that involve discounts, markups, commissions, and profit, and compute simple and compound interest.

Measurement and Geometry

7.MG.1.3: Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems; check the units of the solutions; and use dimensional analysis to check the reasonableness of the answer.

7.MG.2.1: Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders.

7.MG.2.2: Estimate and compute the area of more complex or irregular two- and three-dimensional figures by breaking the figures down into more basic geometric objects.

7.MG.2.4: Relate the changes in measurement with a change of scale to the units used (e.g., square inches, cubic feet) and to conversions between units ($1 \text{ square foot} = 144 \text{ square inches}$ or $[1 \text{ ft}^2] = [144 \text{ in}^2]$, 1 cubic inch is approximately $16.38 \text{ cubic centimeters}$ or $[1 \text{ in}^3] = [16.38 \text{ cm}^3]$).

7.MG.3.3: Know and understand the Pythagorean theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean theorem by direct measurement.

Statistics, Data Analysis, and Probability

7.SDAP.1.1: Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.

Instruction

 approx. 6 min.

Delivery

Explain to students that they can save time by being strategic on Test Day.

Read the introductory text with students.

- Emphasize that many questions on the CAHSEE will involve calculations with numbers given in the problem. Since students cannot use a calculator on the CAHSEE, they should practice performing these calculations mentally instead.
- Remind students that estimating is only useful when you are given numbers, but eliminating can be used on any question on the CAHSEE.

Introduce the strategy: Estimating and Eliminating.

Read through the steps of the strategy with students.

- Explain that the strategy allows students to take advantage of the fact that the solution must be one of the four choices presented. Students can eliminate any answers that seem unreasonable, increasing their chances of choosing the correct answer.
- Remind students that if they round up the numbers in the question, their estimate will often be larger than the correct answer. Also, if they round down the numbers in the question, their answer will often be smaller than the correct answer.

Guide students through the Try It Out exercise.

Work through the problem together as a class.

- Have students use rounded numbers that are easy for making mental calculations. Remind them that the more they round a number, the further their estimate will be from the correct answer.
- Tell students to avoid rounding \$52,000 to \$50,000. Explain that if students round \$61,500 to \$62,000, the mental math will be simple, and the difference between the estimate and the correct answer will be relatively small.
- Remind students to eliminate answer choices using their estimates to increase their chances of selecting the correct answer.



Instruction

Work Smarter, Not Harder

You can save yourself a lot of time on the CAHSEE by approximating numerical answers for multiple-choice questions. This allows you to eliminate unreasonable answer choices.

Estimating and Eliminating

- Round the numbers in the problem.
- Estimate the answer.
- Eliminate answer choices that are unreasonable.

Inside the Test!

All numerical answer choices on the CAHSEE will be in ascending or descending order. If you have an idea of what your answer should be, you can eliminate any answers that are less than or greater than your estimate.

TRY IT OUT ➔ Estimate and eliminate to solve the problem below.

1. An art collector bought an ancient statue for \$52,000. The statue increases in value linearly. After 5 years it is worth \$61,500. By what amount does the value of the statue increase per year?

- A \$960
- B \$1,900
- C \$9,500
- D \$12,300

Which number can be rounded to make calculations easier? 61,500

What is the number after rounding? 62,000

Use this number to calculate an approximate answer to the problem in the space below.

$$\begin{aligned} \$62,000 - \$52,000 &= \$10,000 \\ \frac{\$10,000}{5 \text{ yrs}} &= \$2,000/\text{yr} \end{aligned}$$

Based on your estimate, which of the answer choices can you eliminate and why?

I can eliminate (C) and (D) because they are both a lot larger than \$2,000. I can eliminate (A) because it is much less than \$2,000.

STRATEGY TIP

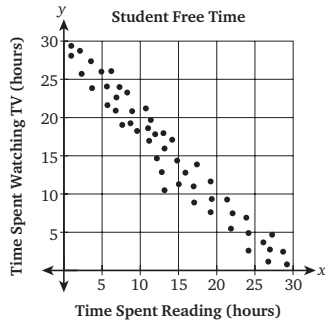
- Don't round single-digit numbers. Instead, round the larger numbers and then use the single-digit numbers as they are.

Other Ways to Eliminate

You can also eliminate answer choices that are obviously not correct, even when the problem does not involve estimation. Read all answer choices and cross out the incorrect ones.

TRY IT OUT Estimate and eliminate to solve the problem below.

2. Each of Ms. Okonko's students recorded the time they spent reading and the time they spent watching TV over a period of two weeks. The scatterplot below displays this data.



Which of the following cannot be concluded from analyzing this scatterplot?

- A Fifty students participated in this project.
- B No student spent more than 30 total hours watching TV.
- C In general, the more Ms. Okonko's students read, the less they watched TV.
- D** Students that read more earned better grades.

In this case, the incorrect answer choices are the ones that *can* be concluded from analyzing the scatterplot. Can you conclude that 50 students have participated in this project? If so, how?

Yes. I can conclude this because the 50 data points represent 50 participants.

Are there any data points that correspond to more than 30 hours of television watching?

No. The greatest amount of time spent watching TV is about 30 hours or less.

Inside the Test!

You may be able to eliminate some answer choices for statistics questions just by using common sense. Read each answer choice and determine whether there are any that do not make sense.

STRATEGY TIP

- If you get to an answer choice that you think is true, read all the remaining choices anyway. This will help you make sure your answer is correct.

LESSON 2
ESTIMATING AND ELIMINATING

15

Instruction

approx. 6 min.

Delivery

Discuss how to use eliminating for other types of questions.

Read the introductory text with students.

- Remind students that not all questions on the CAHSEE will require computations. For these questions, students can use common sense to eliminate incorrect answers.
- Remind students to read all the answer choices before eliminating any. That way, they can ensure that they understand the question and won't jump to any conclusions.

Guide students through the Try It Out exercise.

Have students complete the exercise independently or in pairs. Then review, focusing on the following points.

- Discuss which answer choices students think they can eliminate and why. Ask them to use information from the graph to support their argument.
- Circulate around the room to ensure that all students understand how to eliminate answer choices using the information given in the question and in the graph.

Teacher's Note

Emphasize that even if students can only eliminate one or two answer choices, they will increase their chances of guessing correctly by a significant amount. Explain that students who can eliminate one answer choice have a 33% chance of guessing correctly, while students who eliminate two answer choices have a 50% chance of guessing correctly.

Independent Practice

approx. 20 min.

Delivery

Have students complete the Independent Practice.

As students work, observe and assist when necessary. Redirect students as needed by asking them questions about their work. Effective questions include the following:

- Which numbers in the problem can you round?
- Will your estimated answer be larger or smaller than the correct answer?
- Which answer choices can you eliminate and why?

Answers

1 C

Students should know that 20% is equal to $\frac{1}{5}$. Students should eliminate (A) as it is too small to represent $\frac{1}{5}$ of 500 and (D) since it is more than half the total number of students. To determine the correct answer, students can multiply 500 by 0.20.

Related Content Standard: 7.SDAP.1.1

2 B

Students may recognize that 10% of 1500 is 150 and, therefore, they can eliminate (D) because this value is much larger than 150. Students can multiply 1500 by 0.04, then multiply the product by 2.

Related Content Standard: 7.NS.1.7

3 D

Students may eliminate (A) because 40 is less than the length of one side. Students should divide 2400 by 60 to find the width, and then add all the sides of the rectangular border to find the perimeter.

Related Content Standard: 7.MG.2.1

4 D

Students may eliminate (A) because that price is not reasonable. If students estimate the sale price by rounding the numbers, they should identify (D) as the correct answer

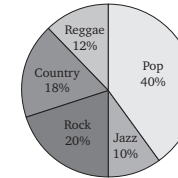
Related Content Standard: 7.NS.1.7



Independent Practice

1. A survey asked 500 students to identify their favorite type of music. The graph below shows the results.

Votes for Favorite Music Type



How many students chose Rock as their favorite music type?

- A 20
- B 50
- C 100
- D 300

2. Laura put \$1500 in a savings account. Each year the account earns 4% simple interest. How much interest will be earned in two years?

- A \$60
- B \$120
- C \$180
- D \$600

3. A contractor is hired to build a concrete border around a rectangular parking lot. The parking lot has an area of 2400 square feet. If the length of the parking lot is 60 feet, what is the perimeter of the concrete border?

- A 40 feet
- B 100 feet
- C 140 feet
- D 200 feet

4. Michael is buying a new dishwasher that regularly sells for \$1140. It is on sale for 20% off. What is the sale price of the dishwasher?

- A \$228.00
- B \$684.00
- C \$730.00
- D \$912.00

Answers

5 C

By estimating, students may eliminate (A) and (D) since (A) represents the perimeter and (D) represents the area of the larger rectangle including the missing smaller rectangle. Have students determine the measures of the missing sides, then divide the figure into two rectangles. They can find the sum of the areas of these rectangles to determine the area of the whole figure.

Related Content Standard: 7.MG.2.2



Students who chose (A) have found the perimeter of the object. Remind them that they need to break the object into separate shapes and find the sum of the areas of each shape.

6 B

Students may eliminate (D) because the container is only partially filled and the volume of the entire container is 120 cubic inches. Students should calculate $2.5 \times 4 \times 5$ to find the answer, 50 cubic inches.

Related Content Standard: 7.MG.2.1

7 B

Students may divide 72 by the product of 3 and 8. One mechanic working an 8-hour shift could finish the job in 9 days, so students may eliminate (C) and (D) because there are too many days.

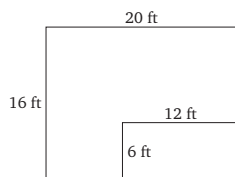
Related Content Standard: 7.MG.1.3

8 B

Students can eliminate (C) and (D) because 50% of 5 is greater than two. Students may divide 2 by 5 then multiply by 100 to calculate the percent of people Brandon observed buying clothes in the mall. Alternatively, students can use equivalent fractions: $\frac{2}{5} = \frac{40}{100}$.

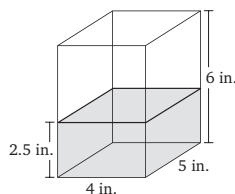
Related Content Standard: 7.NS.1.3

5. A diagram of Holly's patio is shown below.



What is the area of Holly's patio?

- A 72 square feet
 B 200 square feet
 C 248 square feet
 D 320 square feet
6. Lynn is using the container below to store leftover soup.



She pours soup into the container to a height of 2.5 inches. What is the volume of the soup in the container?

- A 20 cubic inches
 B 50 cubic inches
 C 70 cubic inches
 D 120 cubic inches

7. An auto shop estimates that rebuilding an engine will take 1 mechanic 72 hours. If 3 mechanics rebuild the engine and they each work 8-hour days, how many days are needed to rebuild the engine?

- A 2
 B 3
 C 9
 D 24

8. Brandon observed the shopping patterns of customers at a mall in San Diego. He recorded that 2 of the 5 people he observed bought clothes while in the mall. What percent of the people Brandon observed bought clothes in the mall?

- A 25%
 B 40%
 C 50%
 D 60%

Answers

9 C

Students may eliminate (A) because it is the amount of the discount only. Students should multiply \$55 by 0.80 and then add the sales tax by multiplying the product by 1.06. After making these calculations, students will see (B) is the discounted price, so (C) is the correct answer.

Related Content Standard: 7.NS.1.7

! Students who chose (A) have calculated the discount, but not the actual sale price. Remind students to highlight or underline the question so they are focused on answering the correct question.

10 B

By estimating, students may eliminate (C) and (D) because 50% of the original is about \$10,000. Students may subtract the value after 5 years from the purchase price and then divide the difference by the purchase price.

Related Content Standard: 7.NS.1.6

11 C

Students may eliminate (A) because the hypotenuse must be the largest side, and (D) because any one side of a triangle must not be larger than or equal to the sum of the other two sides. Students may use the Pythagorean theorem to find the measure of the missing side.

Related Content Standard: 7.MG.3.3

12 D

Students may eliminate (A) because this value does not include converting the length of 1 foot to 12 inches before finding the area. The area can be found by multiplying 12 in. \times 8 in., which equals 96 square inches.

Related Content Standard: 7.MG.2.4

! Students who chose (A) did not take the units into account. Remind students that the units must be the same before calculating the area of a figure.

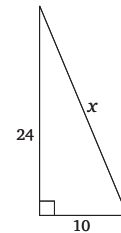
9. Ciara bought a dress on sale for 20% off the regular price of \$55. After the price reduction, a 6% sales tax was added. What was the price Ciara paid for the dress?

A \$11.00
B \$44.00
C \$46.64
D \$58.30

10. Karla bought a boat for \$19,500. The value decreased to \$11,700 after 5 years. What was the percent of decrease in the price of the boat?

A 33%
B 40%
C 60%
D 67%

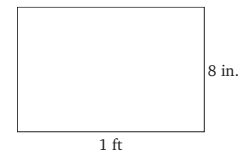
11.



What is the value of x in the triangle above?

A 14
B 25
C 26
D 34

12. The width of the rectangle shown below is 8 inches (in.). The length is 1 foot (ft).



What is the area of the rectangle in square inches?

A 8
B 48
C 80
D 96