



CALIFORNIA MATHEMATICS REVIEW

Supports Content
Standards 6-Algebra I

COLLEEN PINTOZZI

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Preface

THE CALIFORNIA MATHEMATICS REVIEW (Content Standards 6 - Algebra I) will help you review and learn important concepts and skills related to middle and high school mathematics. Some of this material will be a review of skills you have already learned, while other sections will present you with new applications in Arithmetic, Data Analysis/Statistics, Pre-Algebra, Algebra, and Geometry. To help identify which areas are of greater challenge for you, begin by taking the Diagnostic Test at the beginning of this book. Once you have taken the test, complete the evaluation chart with your instructor in order to help you identify the chapters which require your careful attention. When you have finished your review of all of the material your teacher assigns, take the progress tests to evaluate your understanding of the California Math Content Standards 6 - Algebra I. **The materials in this book are based on the standards and content descriptions for mathematics published by the California Department of Education**

This book contains several sections. These sections are as follows: 1) A Diagnostic Test; 2) Chapters that teach the concepts and skills for Content Standards 6 - Algebra I; 3) Two Progress Tests. Answers to the tests and exercises are in a separate manual.

The diagnostic and progress tests are divided into the following topics:

<u>Topic and Grade Level</u>	<u>Number of Questions</u>
Statistics, Data Analysis, and Probability - 6th grade level	6 questions
Number Sense - 7th grade level	14 questions
Algebra and Functions - 7th grade level	17 questions
Measurement and Geometry - 7th grade level	17 questions
Statistics, Data Analysis, and Probability - 7th grade level	6 questions
Mathematical Reasoning - 7th grade level	8 questions
Algebra I - 8th - 9th grade level.	12 questions
Total	80 questions



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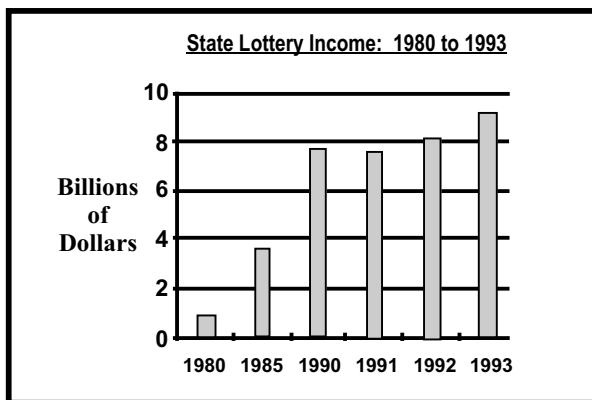
California Math Review

Diagnostic Test

1. Find the mean of 36, 54, 66, 45, 36, 36, and 63.

A. 36
 B. 45
 C. 48
 D. 63

2.



“People spent more money in 1986 than any other year.” According to the graph above, this statement is

- A. true based on the data.
 B. not supported by the data.
 C. false based on the data.
 D. None of the above
3. One light year is equal to about 9,461,000,000,000 kilometers. How would you express this in scientific notation?
- A. 9461×10^9
 B. 946.1×10^{10}
 C. 9.461×10^9
 D. 9.461×10^{12}

4. Sarah deposits 50¢ into Miss Clucky, a machine that makes chicken squawks and gives Sarah one plastic egg with a toy surprise. In the machine, 30 eggs contain a rubber frog, 43 eggs contain a plastic ring, 23 eggs contain a necklace, and 18 eggs contain a plastic car. What is the probability that Miss Clucky will give Sarah a necklace in her egg?

A. $\frac{1}{114}$
 B. $\frac{23}{114}$
 C. $\frac{23}{91}$
 D. $\frac{1}{23}$

5. The probability of flipping a coin 8 times and coming up with heads each time is $\frac{1}{256}$. What is the probability against flipping heads 8 times in a row?

A. $\frac{256}{1}$
 B. $\frac{255}{256}$
 C. $\frac{8}{256}$
 D. $\frac{1}{8}$

6. In problem 5, each time you flip the coin is a(n)

A. independent event.
 B. dependent event.
 C. pattern.
 D. probability.

75. Compute the x -intercept and y -intercept for the equation $x + 2y = 6$.

- A. x -intercept = (0, 6)
 y -intercept = (3, 0)
- B. x -intercept = (4, 1)
 y -intercept = (2, 2)
- C. x -intercept = (0, 6)
 y -intercept = (0, 3)
- D. x -intercept = (6, 0)
 y -intercept = (0, 3)

76. What is the equation of the line that includes the point (4, 3) and has a slope of 2?

- A. $y = 2x - 5$
- B. $y = 2x - 2$
- C. $y = 2x + 5$
- D. $y = 2x - 5$

77. Which of the following lines is parallel to $y = 4x + 6$?

- A. $y = 2x + 6$
- B. $y = 4x + 2$
- C. $y = 4x + 6$
- D. $y = 2x + 6$

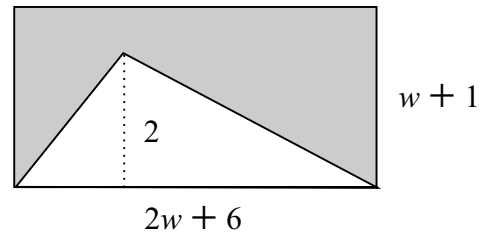
78. What is the intercept of the following linear equations?

$$y = 3x - 1$$

$$y = 4x + 2$$

- A. (3, 10)
- B. (-3, 10)
- C. (10, 3)
- D. (3, 10)

79. The triangle and rectangle have dimensions as shown. Which of the following expressions represents the area of the shaded region?



- A. $2w + 6$
- B. $3w + 6$
- C. $2w^2 + 6w$
- D. $3w^2 + 6w$

80. A farmer has some cream which is 20% butterfat and some which is 15% butterfat. How many gallons of each must be mixed to produce 50 gallons of cream which is 18% butterfat?

- A. 15 gallons of 15% butterfat and 35 gallons of 20% butterfat
- B. 15 gallons of 20% butterfat and 35 gallons of 15% butterfat
- C. 20 gallons of 15% butterfat and 30 gallons of 20% butterfat
- D. 20 gallons of 20% butterfat and 30 gallons of 15% butterfat

CHAPTER 6 REVIEW

Simplify the following expressions. Reduce to simplest form. Make all exponents positive.

- | | | | |
|---------------------|---------------------------------|----------------------|---------------------------|
| 1. $5^2 \times 5^3$ | 6. $(b^3)^4$ | 11. $3^3 \times 3^2$ | 16. $(5^9 \cdot 5^7)^2$ |
| 2. $(4^4)^5$ | 7. $\frac{4^6}{4^4}$ | 12. $(2^4)^2$ | 17. $\frac{(2^3)^2}{2^4}$ |
| 3. $(4y^3)^3$ | 8. $\left(\frac{3}{5}\right)^2$ | 13. $5^7 \times 5^4$ | 18. $\frac{y^2}{3y^4}$ |
| 4. $6x^3$ | 9. $\frac{(3a^2)^3}{a^3}$ | 14. $x^3 \cdot x^7$ | 19. $\frac{(2^3)^2}{2^4}$ |
| 5. $(3a^2)^2$ | 10. $(2x)^4$ | 15. $(4^2)^2$ | 20. $(4d^5)^3$ |

Simplify the following square root expressions.

- | | | | |
|-----------------|-----------------|------------------|-----------------|
| 21. $\sqrt{50}$ | 24. $\sqrt{18}$ | 27. $\sqrt{75}$ | 30. $\sqrt{20}$ |
| 22. $\sqrt{44}$ | 25. $\sqrt{8}$ | 28. $\sqrt{200}$ | 31. $\sqrt{63}$ |
| 23. $\sqrt{12}$ | 26. $\sqrt{48}$ | 29. $\sqrt{32}$ | 32. $\sqrt{80}$ |

Estimate the following square root solutions.

- | | |
|---|---|
| 33. Is $\sqrt{5}$ closer to 2 or 3? | 37. Is $\sqrt{79}$ closer to 8 or 9? |
| 34. Is $\sqrt{52}$ closer to 7 or 8? | 38. Is $\sqrt{106}$ closer to 10 or 11? |
| 35. Is $\sqrt{130}$ closer to 11 or 12? | 39. Is $\sqrt{160}$ closer to 12 or 13? |
| 36. Is $\sqrt{619}$ closer to 24 or 25? | 40. Is $\sqrt{29}$ closer to 5 or 6? |

Simplify the following square root problems.

- | | | |
|-------------------------------|------------------------------------|------------------------------------|
| 41. $5\sqrt{27} + 7\sqrt{3}$ | 46. $\sqrt{63} \times \sqrt{28}$ | 51. $2\sqrt{48} - \sqrt{12}$ |
| 42. $\sqrt{40} - \sqrt{10}$ | 47. $\frac{\sqrt{56}}{35}$ | 52. $\frac{2\sqrt{5}}{30}$ |
| 43. $\sqrt{64} + \sqrt{81}$ | 48. $\sqrt{8} \times \sqrt{50}$ | 53. $\frac{3\sqrt{22}}{2\sqrt{3}}$ |
| 44. $8\sqrt{50} - 3\sqrt{32}$ | 49. $\frac{\sqrt{20}}{45}$ | 54. $\sqrt{72} \times 3\sqrt{27}$ |
| 45. $14\sqrt{5} + 8\sqrt{80}$ | 50. $5\sqrt{40} \times 3\sqrt{20}$ | 55. $4\sqrt{5} + 8\sqrt{45}$ |

CHANGING ALGEBRA WORD PROBLEMS TO ALGEBRAIC EQUATIONS

EXAMPLE: There are 3 people who have a total weight of 595 pounds. Sally weighs 20 pounds less than Jessie. Rafael weighs 15 pounds more than Jessie. How much does Jessie weigh?

Step 1: Notice everyone's weight is given in terms of Jessie. Sally weighs 20 pounds less than Jessie. Rafael weighs 15 pounds more than Jessie. First, we write everyone's weight in terms of Jessie, j .

$$\begin{aligned} \text{Jessie} &= j \\ \text{Sally} &= j - 20 \\ \text{Rafael} &= j + 15 \end{aligned}$$

Step 2: We know that all three together weigh 595 pounds. We write the sum of everyone's weight equal to 595.

$$j + j - 20 + j + 15 = 595$$

We will learn to solve these problems in the next chapter.

Change the following word problems to algebraic equations.

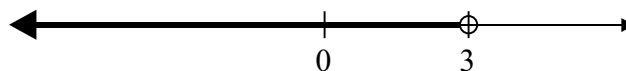
1. Fluffy, Spot, and Shampy have a combined age in dog years of 91. Spot is 14 years younger than Fluffy. Shampy is 6 years older than Fluffy. What is Fluffy's age, f , in dog years?
2. Jerry Marcosi puts 5% of the amount he makes per week into a retirement account, r . He is paid \$11.00 per hour and works 40 hours per week for a certain number of weeks, w . Write an equation to help him find out how much he puts into his retirement account.
3. A furniture store advertises a 40% off liquidation sale on all items. What would the sale price (p) be on a \$2530 dining room set?
4. Kyle Thornton buys an item which normally sells for a certain price, x . Today the item is selling for 25% off the regular price. A sales tax of 6% is added to the equation to find the final price, f .
5. Tamika Francois runs a floral shop. On Tuesday, Tamika sold a total of \$600 worth of flowers. The flowers cost her \$100, and she paid an employee to work 8 hours for a given wage, w . Write an equation to help Tamika find her profit, p , on Tuesday.
6. Sharice is a waitress at a local restaurant. She makes an hourly wage, \$3.50, plus she receives tips. On Monday, she worked 6 hours and received tip money, t . Write an equation showing what Sharice made on Monday, y .
7. Jenelle buys x shares of stock in a company at \$34.50 per share. She later sells the shares at \$40.50 per share. Write an equation to show how much money, m , Jenelle has made.

GRAPHING INEQUALITIES

An inequality is a sentence that contains a $<$, $>$, \leq , or \geq sign. Look at the following graphs of inequalities on a number line.

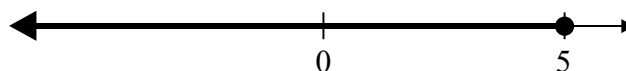
NUMBER LINE

$x < 3$ is read “ x is less than 3.”



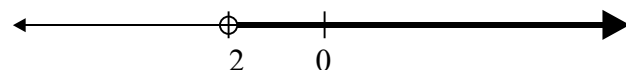
There is no line under the $<$ sign, so the graph uses an **open** endpoint to show x is less than 3 but does not include 3.

$x \leq 5$ is read “ x is less than or equal to 5.”

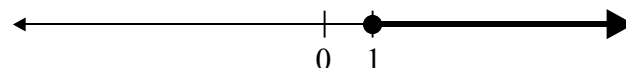


If you see a line under $<$ or $>$ (\leq or \geq), the endpoint is filled in. The graph uses a **closed** circle because the number 5 is included in the graph.

$x > 2$ is read “ x is greater than 2.”

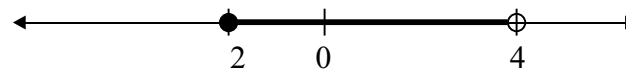


$x \geq 1$ is read “ x is greater than or equal to 1.”

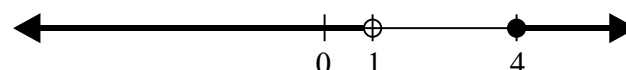


There can be more than one inequality sign. For example:

$2 \leq x < 4$ is read “2 is less than or equal to x , and x is less than 4.”



$x < 1$ or $x \geq 4$ is read “ x is less than 1, or x is greater than or equal to 4.”



Graph the solution sets of the following inequalities.

- | | |
|----------------|---------------------------|
| 1. $x < 8$ | 6. $x \geq 2$ and $x < 1$ |
| 2. $x < 5$ | 7. $x < 10$ |
| 3. $5 < x < 1$ | 8. $x < 4$ |
| 4. $x < 7$ | 9. $x < 3$ and $x < 5$ |
| 5. $1 < x < 4$ | 10. $x < 1$ and $x < 1$ |

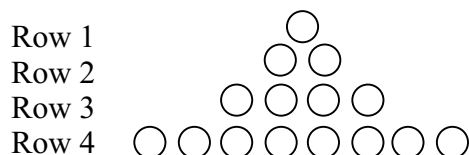
Give the inequality represented by each of the following number lines.

- | | |
|-----|-----|
| 11. | 16. |
| 12. | 17. |
| 13. | 18. |
| 14. | 19. |
| 15. | 20. |

INDUCTIVE REASONING AND PATTERNS

Humans have always observed what happened in the past and used these observations to predict what would happen in the future. This is called **inductive reasoning**. Although mathematics is referred to as the “deductive science,” it benefits from inductive reasoning. We observe patterns in the mathematical behavior of a phenomenon, then find a rule or formula for describing and predicting its future mathematical behavior. There are lots of different kinds of predictions that may be of interest.

EXAMPLE 1: Nancy is watching her nephew, Drew, arrange his marbles in rows on the kitchen floor. The figure below shows the progression of his arrangement.



QUESTION 1: Assuming this pattern continues, how many marbles would Drew place in a fifth row?

ANSWER 1: It appears that Drew doubles the number of marbles in each successive row. In the 4th row he had 8 marbles, so in the 5th row we can predict 16 marbles.

QUESTION 2: How many marbles will Drew place in the n th row?

ANSWER 2: To find a rule for the number of marbles in the n th row, we look at the pattern suggested by the table below.

Which row	1st	2nd	3rd	4th	5th
Number of marbles	1	2	4	8	16

Observing closely, you will notice that the n th row contains 2^{n-1} marbles.

QUESTION 3: Suppose Nancy tells you that Drew now has 6 rows of marbles on the floor. What is the total number of marbles in his arrangement?

ANSWER 3: Again, organizing the data in a table could be helpful.

Number of rows	1	2	3	4	5
Total number of marbles	1	3	7	15	31

With careful observation, one will notice that the total number of marbles is always 1 less than a power of 2; indeed, for n rows there are $2^n - 1$ marbles total.

CHAPTER 20 REVIEW

Fill in the blanks below with the appropriate unit of measurement.

1. A box of assorted chocolates might weigh about 1 _____ (English).
2. A compact disc is about 7 _____ (English) across.
3. In Europe, gasoline is sold in _____ (metric).
4. A vitamin C tablet has a mass of 500 _____ .

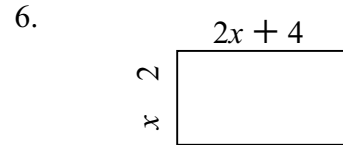
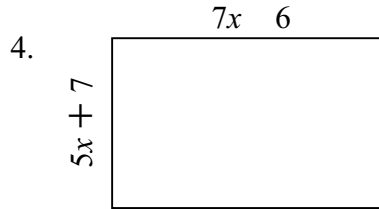
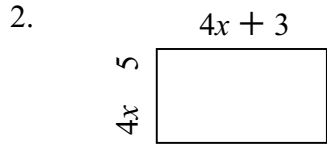
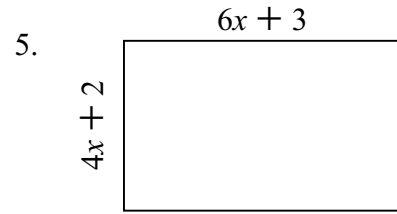
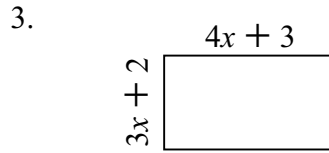
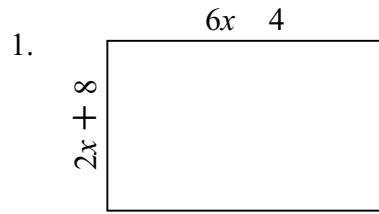
Fill in the blanks below with the appropriate English or metric conversions.

5. Two gallons equals _____ cups.
6. 4.2 L equals _____ mL.
7. $3\frac{1}{2}$ yards equals _____ inches.
8. 6,800 m equals _____ kilometers.
9. 36 oz. equals _____ pounds.
10. 730 mg equals _____ kg.

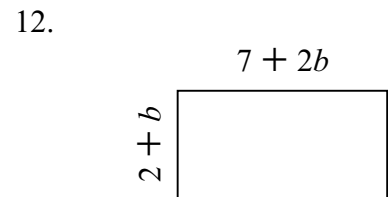
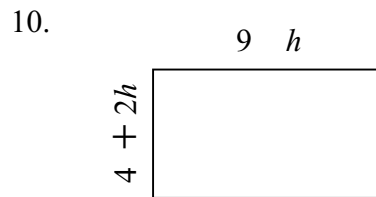
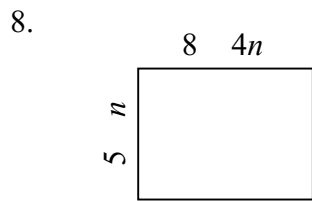
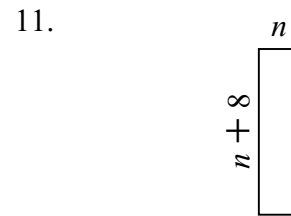
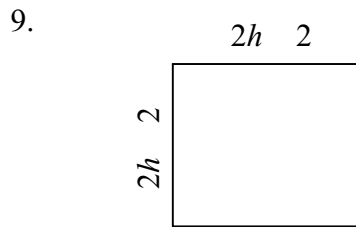
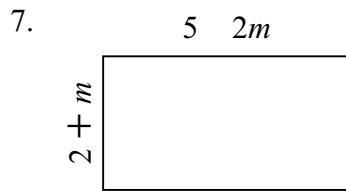
Use dimensional analysis to make the following conversions.

11. Convert 30 miles per hour to feet per second.
12. An outlet pipe releases 450 gallons of water per hour. How many cups of water are released per second?
13. If Janet can type 36 words per minute, how many words can she type in 10 seconds?
14. A bicyclist travels 22 feet per second. How many miles per hour is the bicyclist traveling?
15. How many square inches are in a floor tile that measures 2 square feet?
16. A water bottle holds 500 cm^3 . How many cubic inches does the water bottle hold? Use the conversion factor of 1 inch = 2.5 cm.
17. An airplane travels at 540 miles per hour. How many feet per second does it travel?
18. Jose's bathroom measures 10 feet by 10 feet. How many square centimeters does his bathroom measure? Use the conversion factor of 1 foot = 30 centimeters.
19. Paulo's faucet drips 2 cubic inches per day. How many cubic centimeters does it drip? Use the conversion factor of 1 inch = 2.5 cm.
20. Yulisa has 681 grams of candy. How many pounds of candy does she have if 1 pound = 454 grams?

Find the perimeter for each of the following rectangles.



Find the area of each of the following rectangles.



Find the area of the shaded portion of each figure below.

