Assessment For The California Mathematics Standards Grade 7

Introduction: Summary of Goals

GRADE SEVEN

By the end of grade seven, students are adept at manipulating numbers and equations and understand the general principles at work. Students understand and use factoring of numerators and denominators and properties of exponents. They know the Pythagorean theorem and solve problems in which they compute the length of an unknown side. Students know how to compute the surface area and volume of basic three-dimensional objects and understand how area and volume change with a change in scale. Students make conversions between different units of measurement. They know and use different representations of fractional numbers (fractions, decimals, and percents) and are proficient at changing from one to another. They increase their facility with ratio and proportion, compute percents of increase and decrease, and compute simple and compound interest. They graph linear functions and understand the idea of slope and its relation to ratio.

Assessment For The California Mathematics Standards
Grade 7

Number Sense

NS 1.1

a. Write each number in scientific notation.

    1.   62,000 = _____

    2.   0.000000824 = _____

b. Rewrite the scientific notation numbers below in standard decimal notation.

    1. 4.385×10^{-3} = _____

    2. 1.8×10^{5} = _____

c. Circle the number that is larger.

    1. 5.63×10^{3} or 6.28×10^{2}

    2. 1.03×10^{-2} or 1.08×10^{-3}

d. Write each number in scientific notation, then round it to two decimal places.

    1.   0.09687 = _____

    2.   251,963 = _____

Assessment For The California Mathematics Standards
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Calculate and reduce to lowest terms when appropriate.

NS 1.2

a. $\dfrac{2}{3} + \dfrac{3}{5} =$

b. $\begin{array}{r} 0.075 \\ \times\ 3.2 \\ \hline \end{array}$

c. $2^3 =$

d. $-4 + (+2) =$

e. $\dfrac{3}{8} \div \dfrac{9}{2} =$

f. $-11 - (+3) =$

g. $3.54 - 0.954 =$

h. $-2\,(-5) =$

i. $\dfrac{-4}{-8}$

j. $\dfrac{3}{4} \times \dfrac{1}{4} =$

k. $\left(\dfrac{1}{3}\right)^5 =$

l. $(.3)^4 =$

NS 1.3

a. Complete the table

Fraction	Decimal	%
$\frac{1}{4}$		
$\frac{8}{100}$		
$\frac{3}{5}$		
$\frac{75}{100}$		

b. What is 30% of 60?

c. There are 25 children in the class; $\frac{3}{5}$ of the children in the class are boys. How many girls are in the class?

d. A mix weighs 38 pounds. The mix is 80% sand by weight. About how many pounds of sand are in the mix (give your answer to the nearest whole pound).

e. 15lbs of meat will be divided into portions of $\frac{1}{4}$ lb each. How many portions can be made?

NS 1.4 Circle each rational number.
Underline each irrational number.

$$\sqrt{2} \qquad 0.04 \qquad 1.\overline{3} \qquad \frac{14}{3} \qquad \frac{1}{9.215} \qquad 1.010010001...$$

NS 1.5 a. Write each fraction as a decimal.

1. $\frac{7}{8}$ 　　　　　　　2. $\frac{4}{3}$

b. Write each decimal as a fraction in lowest terms.

1. 0.75

2. 0.625

3. 0.80

NS 1.6

a   A dress originally cost $120. If it is now on sale for $100, what is the percent of the decrease in price?

b. Roger made a deposit of $1,200 in his bank account. His deposit grew by 7%. What is the value of his deposit now?

c. Madeleine had $200 to spend. After she did her shopping she had $80 left. By what percent did her spending money decrease?

NS 1.7

a. A jacket is on sale for 70% of the original price. If the discount saves $45, what was the original price of the jacket? What is the sale price?

b. Billy makes a 6% commission on all his sales. Last week he sold $8,200 worth of merchandise. How much money did he earn in commission?

c. A bookseller sells paperback books with a 45% markup. If the cost to the bookseller for a book is $14.00, how much does the bookseller charge?

d. I invest $800 at 5% interest compounded annually. Write, but do NOT evaluate, a numerical expression for the total value of my investment after 15 years.

e. Debbie borrows $1,000,000 for real estate development and makes annual interest only payments for three years at a rate of 7.5% per year. What is her total interest payment over the three year period?

NS 2.1

a. Write as a fraction.

1. 10^{-3} 2. 2^{-4}

b. Simplify:

1. $(2^5 \times 2^4) \, 2^{-3}$ 2. $\dfrac{5^3 \times 5^8}{5^{15}}$

3. $(3^3 \times 3^3 \times 3^3) \div (3^2 \times 3^2 \times 3^2)$

c. Write in exponential form:

1. $\dfrac{1}{6 \times 6 \times 6}$ 2. $\dfrac{1}{10 \times 10 \times 10 \times 10 \times 10 \times 10}$

NS 2.2 Use factorization to find the least common denominators. Show your work.

a. $\dfrac{3}{8} + \dfrac{7}{12} =$

b. $\dfrac{17}{9} + \dfrac{5}{3} =$

c. $\dfrac{9}{10} - \dfrac{5}{6} =$

NS 2.3 a. Rewrite using factors and exponents, then simplify.

1. $\dfrac{1000}{100}$

2. $\dfrac{9}{81}$

3. $\dfrac{4}{64}$

b. Work each item. Write the answer as a regular fraction.

1. $\dfrac{(3 \times 3)}{(6 \times 6 \times 6)} \times \dfrac{(6 \times 6)}{(3 \times 3 \times 3)}$

2. $\left(\dfrac{2^3}{2^5}\right) \div \left(\dfrac{2^0}{2^2}\right)$

NS 2.4

a. Find the positive square root:

1.　　144　　　　　　　2. $2^6 \cdot 3^4$　　　　　　3.　　196

b. Between which 2 whole numbers does the square root lie?
Do not use a calculator. Explain your answer.

1.　　60　　　　　　　2.　　12　　　　　　　3.　　115

NS 2.5

Write the absolute value of each number:

a. $|-15|$ = _____　　b. $|+8|$ = _____　　c. $|12|$ = _____　　d. $|-20|$ = _____

e.　Which of the four numbers above has the largest absolute value?

f.　Show the absolute value of (+4) as a distance on the number line below.

g.　Trace a line segment on the number line below to show the absolute value of (-7) as a distance.

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
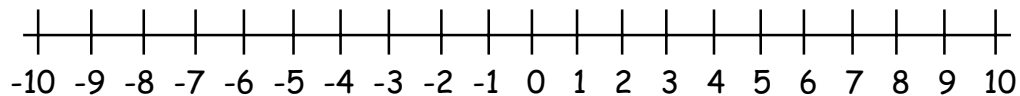
Algebra & Functions

AF 1.1

a. Write as a mathematical expression:

    1. 5 less than R

    2. One fourth as large as the area, where the area = A

    3. 25 more than Z

b. Write as a mathematical equation:

    1. Y is 3 more than twice the value of X

    2. Z is 6 less than two fifths the value of Q

    3. X is less than 7 times the value of $\frac{1}{3}$ the price, where the price = A

c. Express mathematically:

    1. D is $\frac{3}{4}$ the size of R

    2. R is twice the size of Q

    3. Write an equation to express D in terms of Q

AF 1.2

Let x = 3 and y = 2. Substitute to find the value of the expressions below:

a. $\dfrac{y\,(\,xy - 7\,)}{10}$

b. $\dfrac{[2\,(x + 5) - \frac{1}{2}\,(5x - 3)]^2}{10}$

AF 1.3

Justify each equation below with one of the following properties: additive identity, commutative property of addition, commutative property of multiplication, associative property of addition, associative property of multiplication, or the distributive property.

a) $xy\,(\,y + \text{-}y\,) = xy\,(0)$ _____

b) $y\,(\,a + b\,) = ya + yb$ _____

c) $y\,(\,a + b\,) = (\,a + b\,)\,y$ _____

d) $(\,2 + x\,) + y = 2 + (\,x + y\,)$ _____

e) $xy + y = y + xy$ _____

f) $y\,[(\,x + y\,)\,z] = [y\,(\,x + y\,)]\,z$ _____

AF 1.4

a. For the equation, $y = 2x + 5$

    1.   Name the variables. _____

    2.   What is the coefficient of x? _____

    3.   What is the constant? _____

b. How many terms? $3x^2 + 5x - 7$ _____

c. State whether each item is an expression, equation, or inequality

  1. $y > 2x + 1$ _____   2. $y = 5x^2 + 3x - 2$ _____

  3. $5(7x - 2) + 3$ _____   4. $x^2 - 1 \neq y$ _____

AF 1.5

a. The graph below shows the relationship of the cost price of items in a catalogue to the customer price, including a standard mailing charge of $5

Customer price (y-axis): $5, $10, $15, $20, $25, $30, $35

Cost price (x-axis): 0, $5, $10, $15, $20, $25
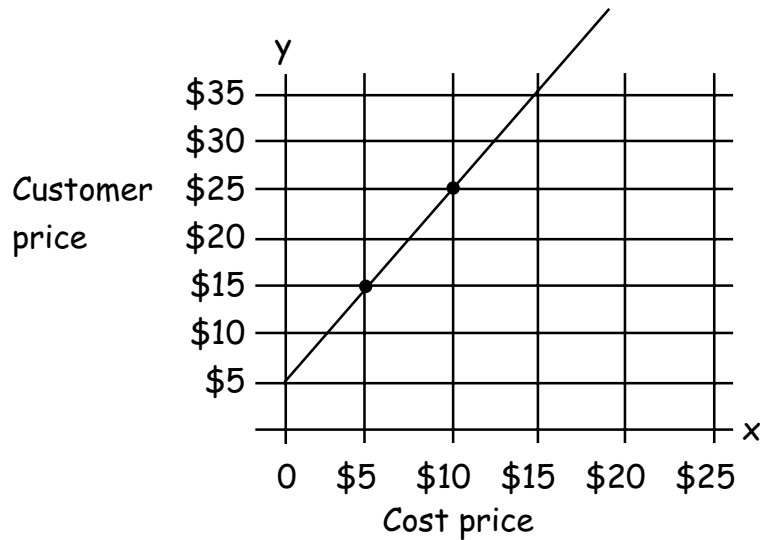
1. If the cost price is $10, how much is the customer price?

2. Why does the graph touch the y axis at the point for $5?

3. If the customer pays $15, what is the cost of the article bought?

[CONTINUED]

AF 1.5

b. Below is a chart showing the ratio of eggs to cups of apples in a recipe. Complete the chart, and represent the relationship on the graph below.

eggs	4		16	8	
apples	5	15			50
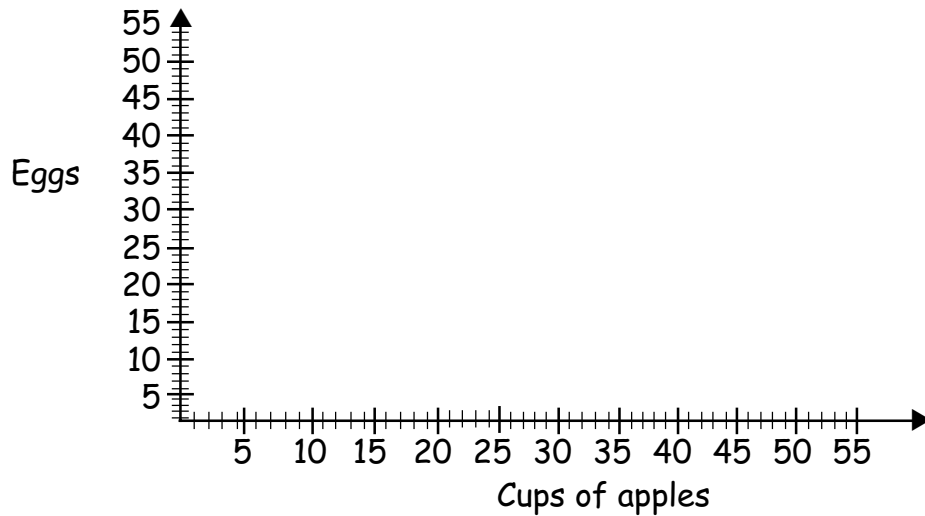
AF 2.1 Express each of the following in simplest form using exponents:

a. $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$

b. $\dfrac{1}{6 \cdot 6 \cdot 6}$

c. $10 \cdot 10 \cdot 10$

AF 2.2 a. Find the square root. Assume all variables are positive.

1. $\dfrac{4mrmr}{t9p^2t}$

2. $2x^2(2y^4)$

3. $\dfrac{2z(8z^3)}{4p(16p)}$

b. Simplify and square each expression.

1. $4x\,2y$

2. $\dfrac{3m^3}{9mx}$

AF 3.1

a. $y = 3x^2$ Plot the graph for the following values: $x = 0, x = 1, x = 2, x = -1,$ $x = -2, x = -3$
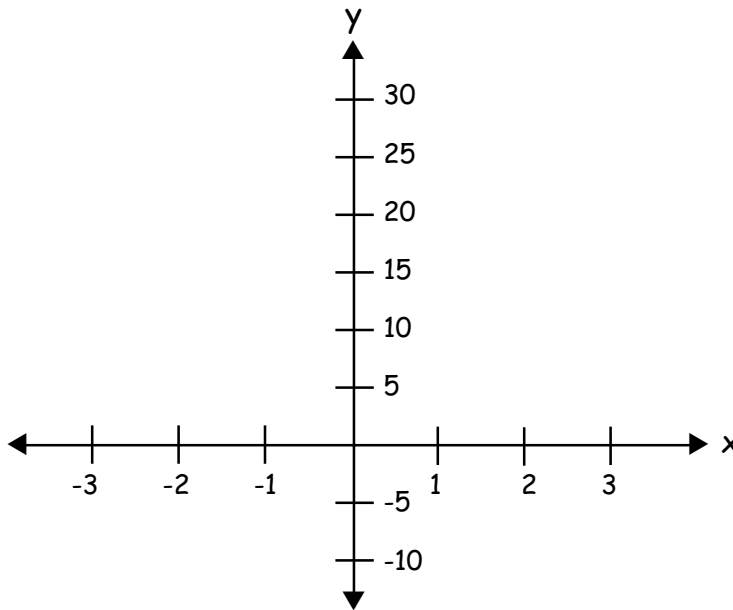
b. $y = 2x^3$ Plot the graph for the following values: $x = 0, x = 1, x = 2, x = -1, x = -2$
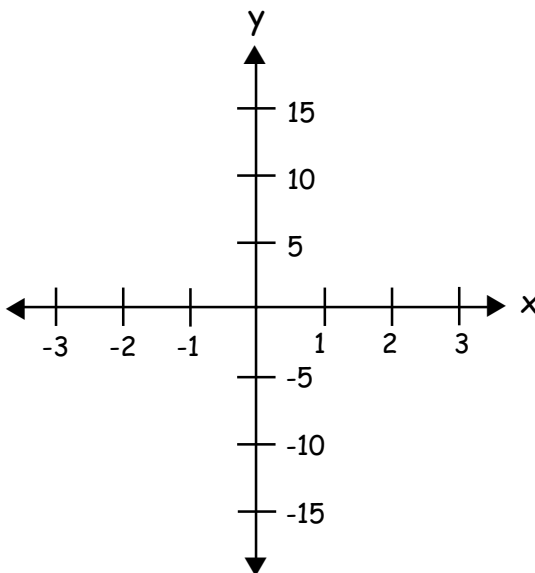
AF 3.2

a. Complete the following table for the volume V of a cube with side length S.

S	V
1	
2	
3	

b. Plot the points from your table on the graph below.
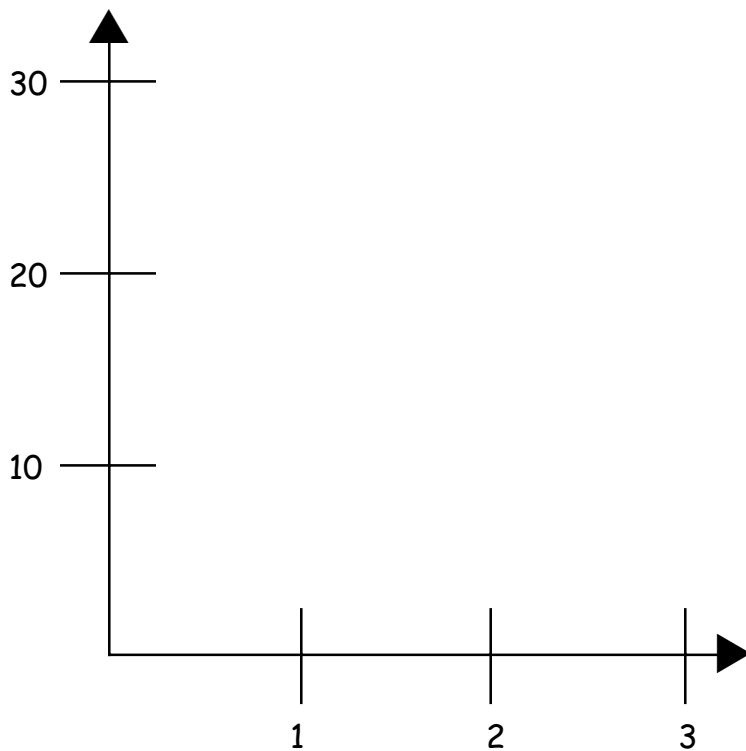
AF 3.3

a. $y = \frac{1}{2}x + 4$ Plot the points on the graph corresponding to $x = 0$, $x = 2$, $x = 4$, $x = -2$, $x = -4$. Also graph the function $y = \frac{1}{4} x + 4$.
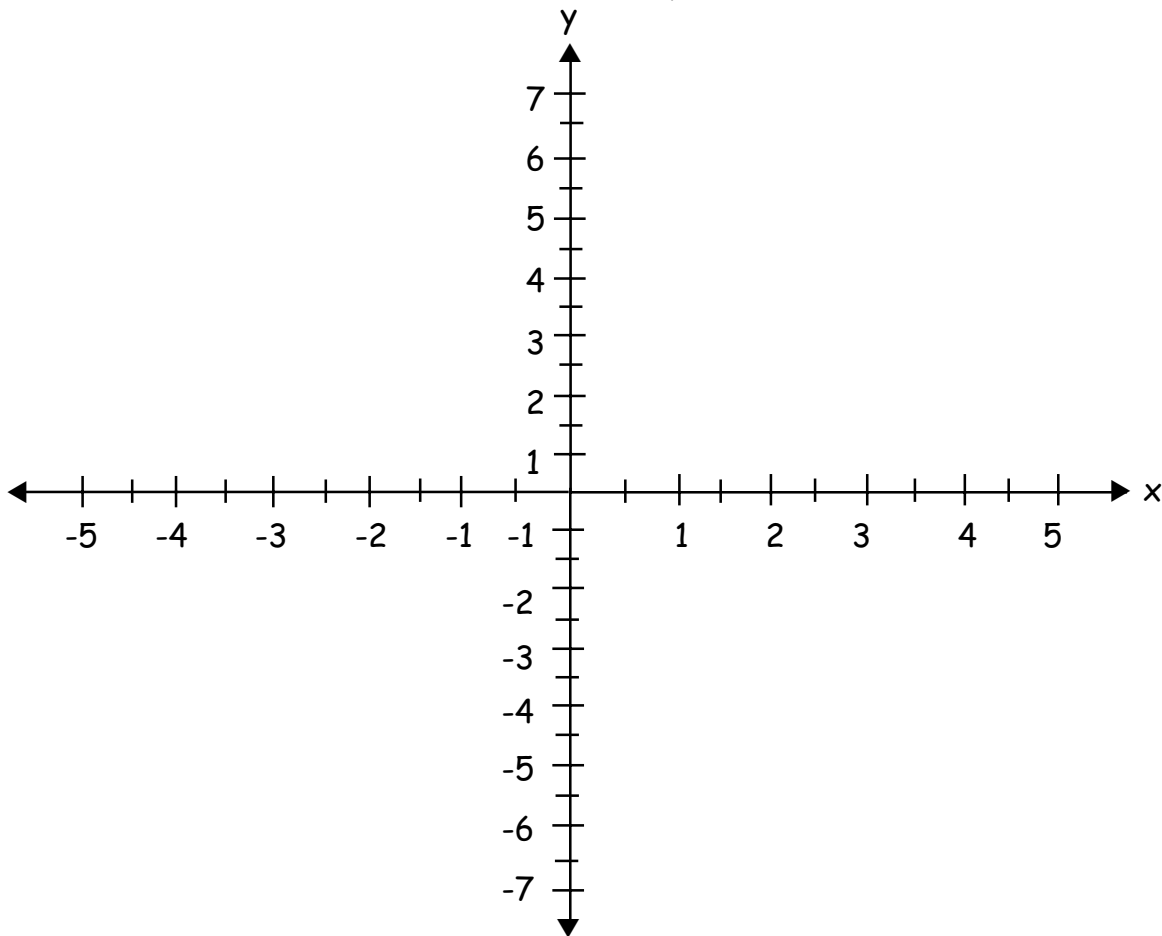
b. What is the slope of the graph you have plotted?

AF 3.4

a. Use the relationship between days and weeks to plot a graph showing the number of days for 1 week through 7 weeks.

Days

50
40
30
20
10
0

0   1   2   3   4   5   6   7

Weeks
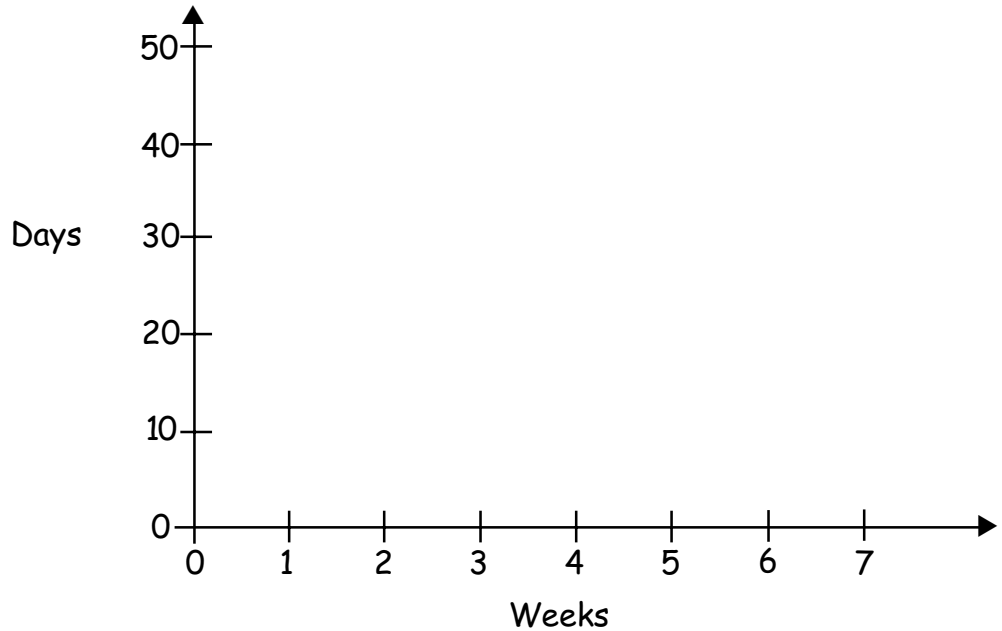
b. What does the slope of the graph represent?

AF 4.1

a. **y = 4x-5** If $y = -\frac{5}{2}$, what does x equal? Verify your answer by substitution.

b. **y ≤ 2.5 x - 2.5** If y = 5, what is the smallest x could be?

c. If you add 6 years to Johnny's age, then divide by 3, you find his brothers age. His brother is 12. How old is Johnny? Write an equation where B represents the brother's age and J represents Johnny's age.

AF 4.2

a. Johnny drove at 32 miles per hour for 30 minutes and at 48 miles per hour for 45 minutes. How far did he travel?

b. A machine produces pencils at the rate of 480 per hour. A newer model produces pencils at the rate of 14 per minute. At the end of 2 hours, how many pencils are produced if they both work together?

MG 1.1

A conveyer belt moves at a rate of 8 miles in 4 hours. How many feet per minute does the belt move? (1 mile = 5,280 feet).

MG 1.2 The graph shows a plan view of a single story building. Each division on the x and y axes represent a distance of 2 yards.

  a. What is the square yardage of the building?

  b. What is the square footage of the building?

Units of 2 Yards

Units of 2 Yards
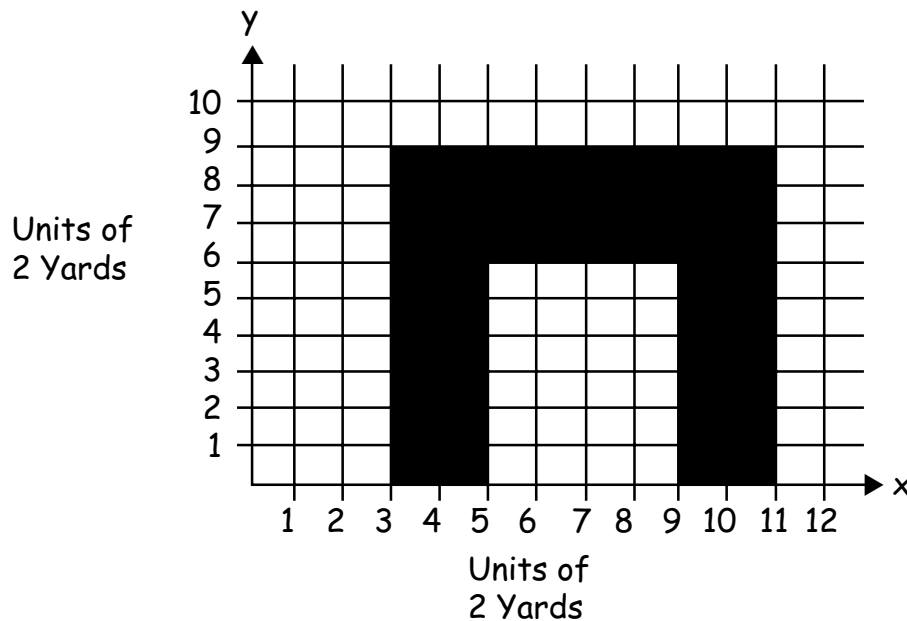
MG 1.3

a. A project will take a total of 480 person-days to complete.

1. How many days will it take to complete the project if 3 people work on the project?

2. If the project must be completed in 20 days, how many people must be employed?

b. The density of a solid bar is 15 lbs. per cubic ft.
What is the weight of the bar?

12 in

2 yd
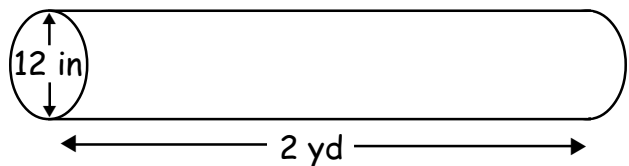
[CONTINUED]

MG 1.3

c. A car is traveling at an average speed of 44 mph. How long will
    it take the car to travel 99 miles?

d. What are the units of

$$\frac{2 \text{ feet}}{\text{second}} \times \frac{3 \text{ seconds}}{\text{hour}} \times \frac{4 \text{ hours}}{\text{day}} \times \frac{5 \text{ days}}{\text{year}} \ ?$$

MG 2.1

a. Examine the figures to the right.

    A. 4cm 16cm
    B. 5cm 14cm
    The base is a square

    1. Find the volume of figure A.

    2. Find the volume of figure B.

    3. Find the surface area of figure a.

    4. Find the surface area of figure b

MG 2.1

[CONTINUED]

11 cm

10 in

8 in

10 in

16 in
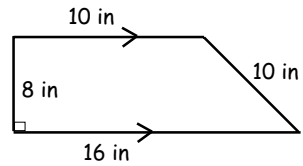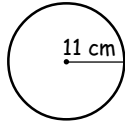
b.   What is the circumference of the circle?

c.   What is the area of the circle?

d.   What is the area of the trapezoid?
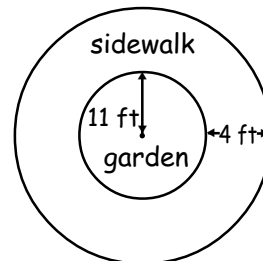
e.   What is the perimeter of the trapezoid?
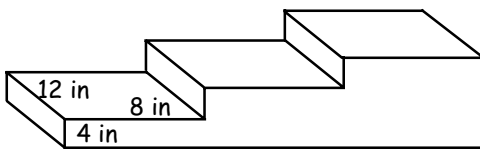
MG 2.2

2 ft

4 ft

3 ft

3 ft

2 ft

12 ft
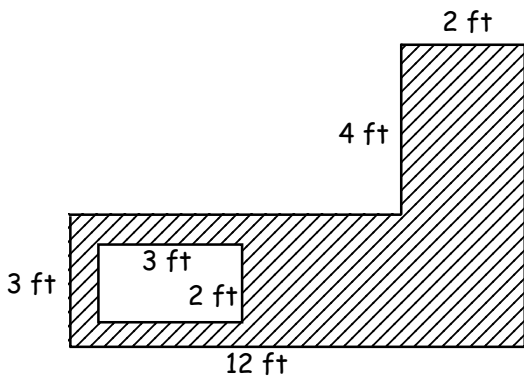
a. This diagram shows a kitchen counter with an area cut out for the sink. What is the area of the counter top?

b. This diagram shows a sidewalk around a circular garden. What is the area of the sidewalk?

sidewalk

11 ft

garden

4 ft

MG 2.3

Each step is 4 inches high,
8 inches deep and 12 inches wide.

a.   What is the volume of the entire unit?

b.   What is the surface area of the entire unit?

A model of the step unit will be built to scale. Each dimension will
be half the actual size.

c.   What fraction of the volume of the real staircase will the volume of
      the model be?

d.   What fraction of the surface area of the real staircase will the surface
      area of the model be?

MG 2.4

a) The volume of a box is $\dfrac{100}{(2.54)^2}$ cubic inches. Using the fact that

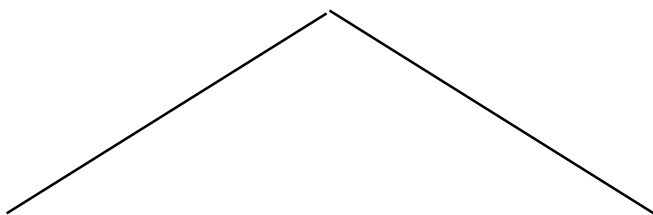1 inch = 2.54 centimeters, find the volume of the box in cubic centimeters.

b) The surface area of a ball is 288 square inches. How many square feet is

this?

MG 3.1   Use a compass and a straight edge to construct the following. Do not erase compass marks.

a.   bisect the angle

b.   Make a line perpendicular to the segment PQ that also bisects the segment.

P   Q

MG 3.2

Plot the points (1, 2) and (3, 4) on the graph below.

a. If the line segment with endpoints (1, 2) and (3, 4) is translated 3 units to the left, what are the coordinates of the end points of the resulting line segment? Graph the translated line segment.

b. If the line segment with endpoints (1, 2) and (3, 4) is reflected through the x-axis, what are the coordinates of the end points of the resulting line segment. Graph the reflected line segment.
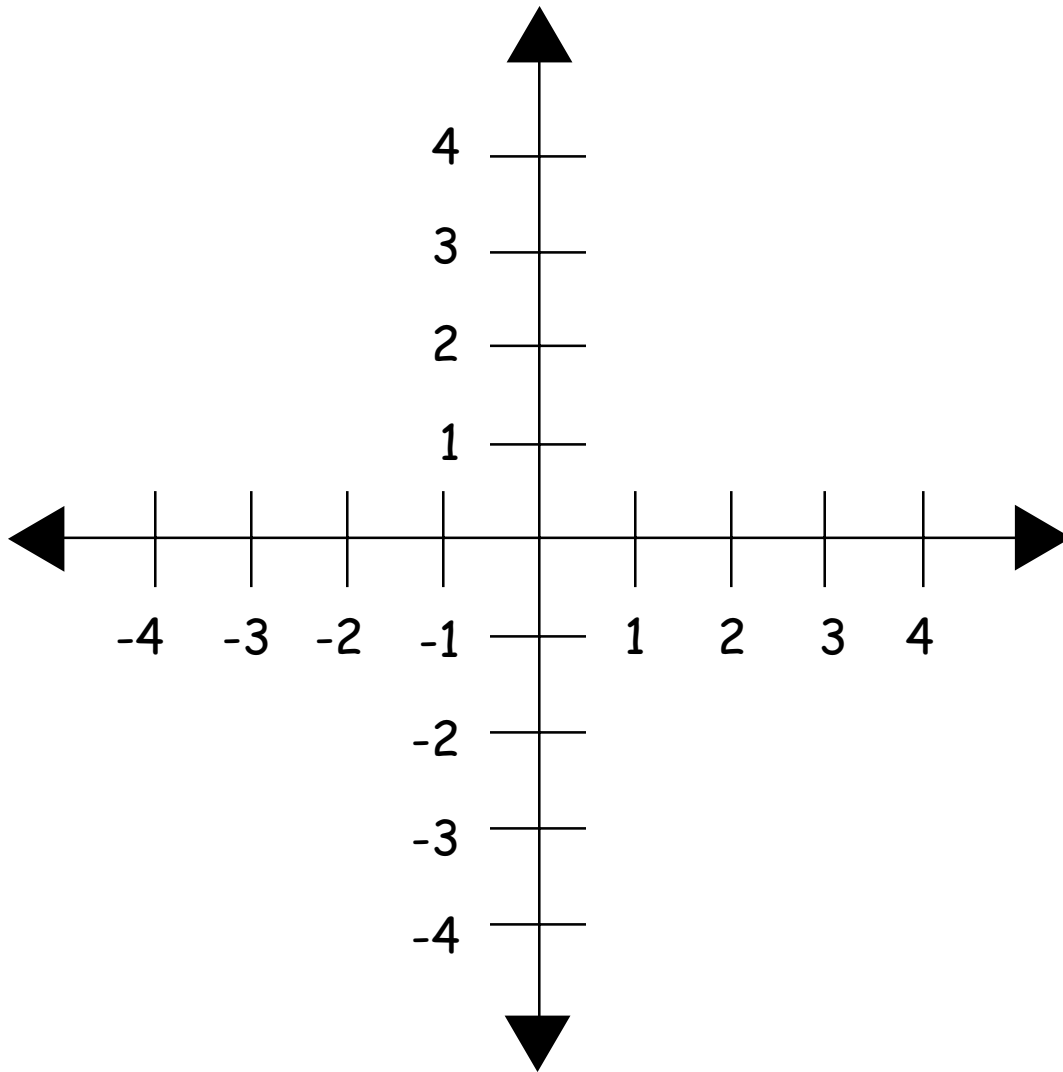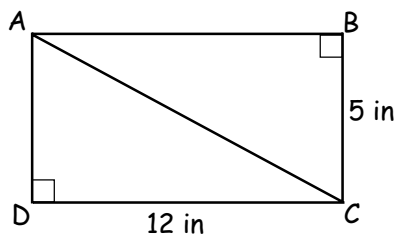
MG 3.3
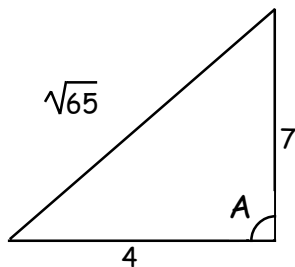
a. The triangle has sides of lengths 4, 7 and $\sqrt{65}$. What is the degree measure of angle A? Show your work.
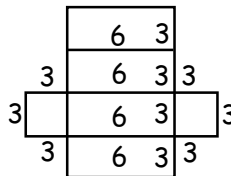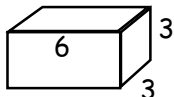

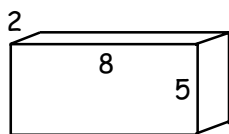b. Figure out the length of the diagonal AC.

MG 3.4

A triangle is congruent to a second triangle whose sides have lengths 4, 3 and 6. What is the perimeter of the first triangle?
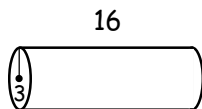
MG 3.5

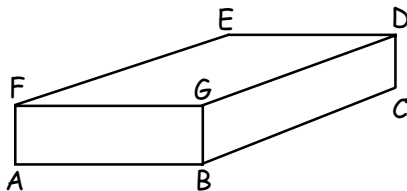By folding up the shape on the right, you can make the box on the left.

a. Draw a diagram which can be folded to make this box.

b. Draw a diagram which can be wrapped and joined to make this cylinder

MG 3.6
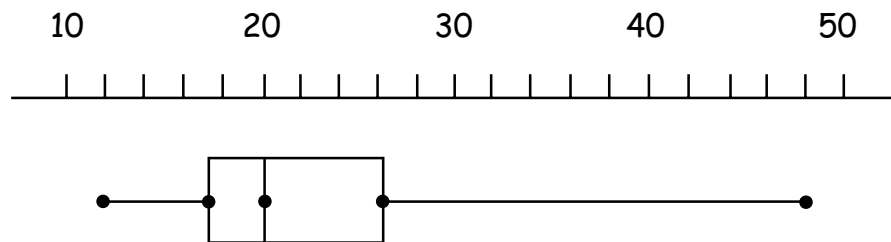
a. Draw a diagonal of this rectangular solid from point C and another diagonal from point B.

Statistics, Data, & Probability

SDP 1.1

The box and whisker plot below shows the dollar prices of twenty popcorn poppers as listed in *Consumer Reports Buying Guide,* 1991.
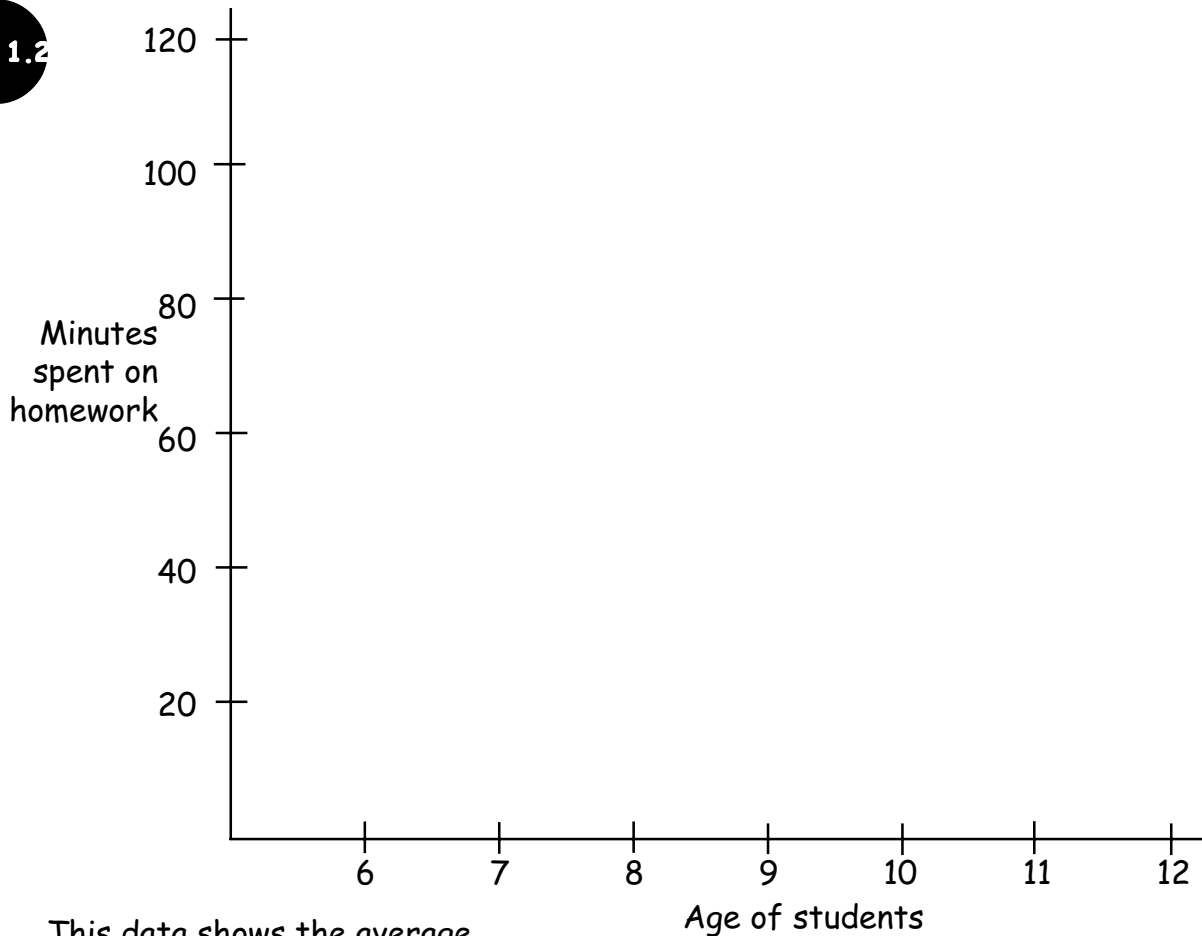
| 10 | 20 | 30 | 40 | 50 |

Source: *Consumer Reports Buying Guide,* 1991.

a. Approximately how much did the most expensive popcorn popper cost?

b. Approximately how much did the least expensive popcorn popper cost?

c. What was the median price for a popcorn popper?

SDP 1.2

120 –

100 –

Minutes 80 –
spent on
homework
60 –

40 –

20 –

6	7	8	9	10	11	12

Age of students

This data shows the average amount of time 20 children, aged between six and twelve years old, spent on homework last week.

a. Represent the data as a scatter plot on the graph provided.

	AGE	TIME		AGE	TIME
1.	6	8 min	11.	9	64 min
2.	6	20 min	12.	9	80 min
3.	6	38 min	13.	9	50 min
4.	7	20 min	14.	10	66 min
5.	7	25 min	15.	10	90 min
6.	7	40 min	16.	11	78 min
7.	8	50 min	17.	11	65 min
8.	8	60 min	18.	11	80 min
9.	8	52 min	19.	12	52 min
10.	9	30 min	20.	12	108 min

c. What is the range in time spent on homework? Look at the scores for

[CONTINUED]

SDP 1.2

b. Do you see a relationship between age and time spent on homework? Explain your answer

c. What is the range in time spent on homework? Look at the scores for 7-year-olds.

SDP 1.3

This data represents 12 scores on a math test:

4, 4, 7, 9, 12, 14, 18, 19, 20, 21, 22, 27

a. What is the median score?

b. What is the highest score?

c. What is the lowest score?

d. The cut off for the lower quartile lies between which two scores?

e. The cut off for the upper quartile lies between which two scores?