INTRODUCTION

The **Algebra 1 Word Problems MathSet** is organized according to the following 13 units:

1. Writing Expressions
2. Solving Equations
3. Using Formulas
4. Integer Problems
5. Fractional Equations
6. Systems of Linear Equations
7. Direct and Indirect Relations
8. Polynomials
9. Quadratic Equations
10. Challenging Fractional Equations
11. Problems Involving Irrational Numbers
12. Challenging Quadratic Equations
13. Cumulative Review

Questions are provided at two levels of difficulty. Most units contain worksheets of problems at both levels, however Units 11 and 13 contain only Level A problems.

There are over 400 traditional word problems with numerous graphics. Detailed solutions for all questions are provided.

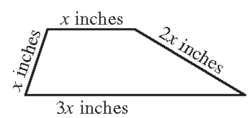
The questions in this MathSet are a subset of the questions available in the Algebra 1 Word Problems TestBank.

Name ______________________ Date ________

1 WRITING EXPRESSIONS Level A

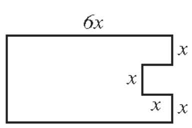
1. A boy is collecting rare nickels and dimes. If he has 15 coins altogether and there are n nickels, how many dimes are there? If there are more nickels than dimes in the collection, write the set of numbers of which n is a member.

2. Find a simple expression for the perimeter of this trapezoid.



3. A rectangular field is 3 times as long as it is wide. Express its perimeter in terms of the width w, in as simple a form as possible.

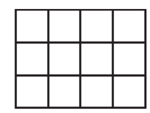
4. Write in simplest form the perimeter of the given figure in terms of x. All the angles are right angles.



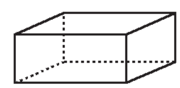
5. The length of a rectangle is $(5x - 2)$ feet, and the width of the rectangle is $(3x + 2)$ feet. Express the perimeter in its simplest form.

6. A rectangle is w feet wide, and its length is four times its width. Express its perimeter in feet.

7. Each mesh of a wire net is a square of side n inches. Find, in terms of n, the total length of wire in the net. (Consider the number of vertical strips and the number of horizontal strips.)



8. The three-dimensional rectangular wire frame shown in the diagram is $3x$ feet long, x feet wide, and $2x$ feet high. Express in terms of x the total length of wire in the frame.

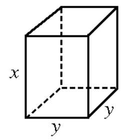


9. A boy has n dimes and n quarters. If he exchanges all the coins for nickels, how many should he receive?

10. The perimeter of a rectangle is $6x$ feet. If the width is 4 ft., write an expression for the length of the rectangle.

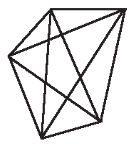
3 USING FORMULAS Level A

11. The volume of a prism with a square base is given by the formula $V = xy^2$. Find V if $x = 4$, $y = 2.5$.



12. The number (d) of diagonals of a figure of n sides is given by the formula $d = \frac{1}{2}n(n - 3)$. Find the number of diagonals if the figure has:

A. 4 sides;
B. 6 sides;
C. 12 sides;
D. 15 sides.



13. If n lines are drawn on a sheet of paper, the maximum possible number of points of intersection is $\frac{n(n-1)}{2}$. Find the largest number of points of intersection if:

A. 4 lines are drawn,
B. 8 lines.

14. Find a formula connecting speed when measured in feet per second with the same speed measured in miles per hour. Use the formula to complete the following table.

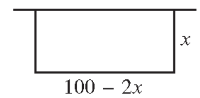
Speed in m.p.h.	5	15	20	25	30	50	60
Corresponding speed in f.p.s.							

15. The formula $A = lw$ shows that the area of a rectangle depends on the length and width of the rectangle. Suppose that w is fixed in value, say $w = 2$. Then $A = 21$. Thus A depends on l if w is constant.

A. Draw a group of rectangles each of which has a width of 2 in., but with varying lengths. Is A different for each rectangle?
B. Make a table showing how A changes when the width is 2 in. and the length changes 1 in. at a time from 1 to 10 in.

16. The area of the rectangular plot shown in the drawing is $x(100 - 2x)$. If we let y stand for any one of the possible values of this area, then we have the formula $y = x(100 - 2x)$. This formula shows us how the value of y depends on the value of x. Use the formula to complete the table below, then answer these questions:

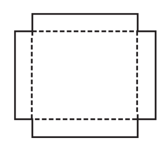
A. What happens to y as x increases?
B. Is there a value of x which makes y larger than it is for any other value of x? If so for what value of x does y have this maximum value?
C. If $x = 18$, what is the value of y?



x	0	5	10	15	20	25	30	35	40	45	50
y											

17. The amount of \$7,250 invested at 2¼% for a certain time is \$8,555. Find the time.

18. A rectangular piece of tin is 18 in. long and 15 in. wide. From each corner a square of side 2 in. is cut out. What is the area remaining? Find the volume of the box formed by bending up the sides on the dotted lines.



19. A rectangle is four times as long as it is wide. If it were 6 feet shorter and 6 feet wider, it would be a square. Find its dimensions.

20. If \$2000 earns \$350 simple interest in 5 years, what is the annual rate of interest?

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7 DIRECT AND INDIRECT RELATIONS Level A

1. A couple has 5 hr. to make a trip. They have two choices of routes. The first distance is 1½ times the second. Compare their rates if they take 5 hr. by either route.

2. If the lengths of the bases of a trapezoid are constant, does the area vary directly as the length of the altitude? Why?

3. The width of a rectangle is fixed at 10 in.

A. Does the area vary directly as the length?

B. If the length is multiplied by 2½, how is the area changed?

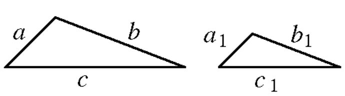
C. If $A = 75$, what is l?

4. One of the properties of similar triangles is that the ratio of any pair of corresponding sides is equal to the ratio of any other pair of corresponding sides. Thus, in the adjoining figures, $\frac{a}{a_1} = \frac{b}{b_1} = \frac{c}{c_1}$.

A. Is it correct to say that the relationship of the sides of one triangle to the sides of the other is one of direct variation?

B. If $a = 10$, $a_1 = 6$, $b = 12$, then $b_1 = ?$

C. If $\frac{a}{a_1} = 2$, find c_1 if $c = 18$?

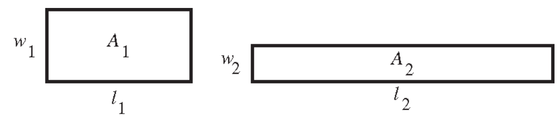


5. We may use the formula $T = nc$ to mean: the total cost of some articles is equal to the product of the number of articles by the cost per article.

A. If n is fixed and c is doubled, what happens to T?

B. If c is fixed and n is halved, what happens to T?

6. If A, l, and w are variables related by the rule $A = lw$, what happe*n*s to A if l is doubled and w is divided by 3?



7. The ratio of the circumference of circle A to the circumference of circle B is $\frac{4}{3}$. Show that the ratio of their radii is also $\frac{4}{3}$.

8. A garden is 30 ft. wide and 45 ft. long. Another garden is 40 ft. wide and 80 ft. long.

A. What is the ratio of their lengths?

B. What is the ratio of their widths?

C. If each garden is a rectangle, find their areas. What is the ratio of their areas?

D. How can the ratios in **A** and **B** be used to find the ratio of the areas?

9. If the base of a triangle is halved and the altitude is multiplied by 4½, what is the effect on the area?

10. The radii of two circles are 4 in. and 8 in. respectively.

A. Compare their radii.

B. Compare their areas. ($A = \pi r^2$)

C. Does the ratio of the radii equal the ratio of the areas? In two circles could the ratio of the radii ever equal the ratio of the areas?

D. If the radius of a circle is doubled, what is the effect on the area?

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8 POLYNOMIALS Level B

1. If two numbers are both increased by 10, their product is increased by 550. If twice the smaller number exceeds the larger number by 15, find the numbers.

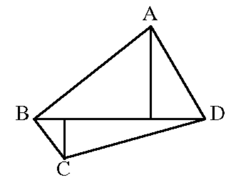
2. An airplane flying between two towns takes half an hour more than its usual time when its normal speed is reduced by 20 mph and 6 min. less than its usual time when its normal speed is increased by 5 mph. Find its normal speed and the distance between the towns.

3. A man who can do a job in 30 days works for 5 days and then is joined by another man who works twice as fast. How long will it take them to finish the job together?

4. One man rides north at x mph for $2t$ hours and another man starting from the same point rides south at y mph for $3t$ hours. Write a formula for their distance apart. Evaluate the formula when $x = 35$, $y = 50$, $t = 2\frac{1}{2}$.

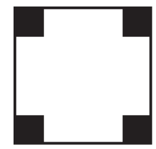
5. Two machines take 7 hr. to finish a job together. If the first runs 10½ hr. and the second runs 5½ hr., they also finish the job. How long would each machine take to do the job alone?

6. Find the area of the figure $ABCD$, in which $BD = 25.3$ in., and the altitudes of the triangles are 16.4 in. and 12.8 in. long.



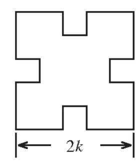
7. Squares of side y inches have been cut from the corners of a square of side x inches, as shown in the diagram. Write a formula for the area (A sq. in.) of the remainder, and complete the table below.

x	16	28	36	40
y	2	4	3	10
A				



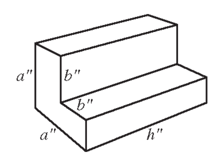
8. In the diagram, four square holes of side a inches have been punched out of a square of side $2k$ inches. Write a formula for the area (A sq. in.) of the remainder, and use it to complete the table below.

k	2	10	24	30
a	1	3	6	10
A				



9. Find the volume (V cu. in.) of the figure in the diagram, in which the length is h inches and the cross-section is an L−shaped figure with dimensions as shown. Complete the table below.

a	35	42	17	18
b	25	32	3	7
h	18	16	26	40
V				



10. Four circular holes each of radius a inches are punched out of a circular disk of radius b inches. Write a formula for the remaining area (A sq. in.), and find this area when $a = 3$, $b = 26$, $\pi = 3.14$.

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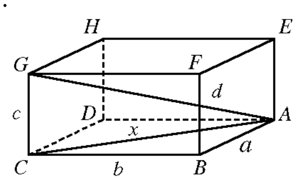
11 PROBLEMS INVOLVING IRRATIONAL NUMBERS Level A

11. The volume of a sphere whose radius is r is given by the formula $V = \frac{4}{3}\pi r^3$. The area of the surface of the sphere is given by the formula $S = 4\pi r^2$.

A. Show that the volume is ⅓ the area of the surface times the radius.

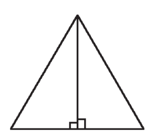
B. If $S = 100\pi$, find V. (Use $\pi = 3.14$.)

12. Show that if the dimensions of a rectangular box are a, b, and c units, the length, d units, of a diagonal drawn from one top corner to the opposite bottom corner is given by the formula $d = \sqrt{a^2 + b^2 + c^2}$.



13. Find the length of a diagonal of a rectangle of sides 4.6 in. and 9.2 in.

14. The sides of an equilateral triangle are 8 in. long. Find its altitude in simplest radical form. (The altitude of an equilateral triangle cuts the base into two equal parts.)



15. Find the diagonal of a cube of side 6 in.,

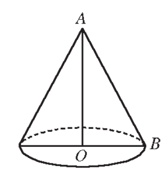
A. in simplest radical form,

B. correct to the nearest tenth of an inch.

16. The legs of a right triangle are in the ratio 3:4, and the hypotenuse is 60 ft. Find the area of the triangle.

17. Find the diagonal of a box of dimensions 12, 4, and 5 in.

18. Find the slant height of a cone of altitude 6 in. and radius of base 3 in. (AB is the slant height.)



19. The sides of an equilateral triangle are $2s$ units long. Find its altitude in simplest radical form.

20. Find to the nearest tenth the radius of a cylinder whose altitude is 14 in. and whose volume is 624 in. ($V = \pi r^2 h$, $\pi = \frac{22}{7}$).