

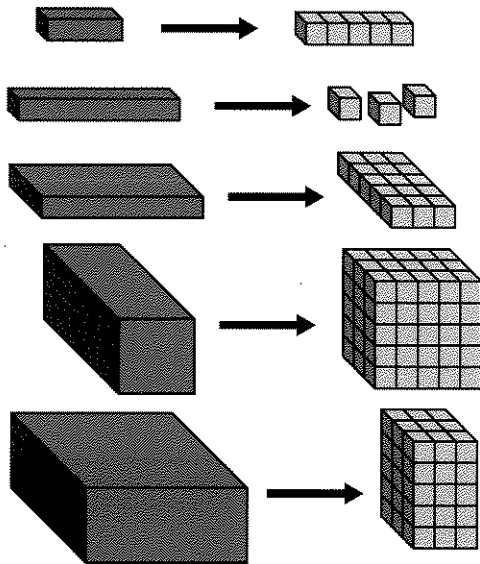


Essential Ideas

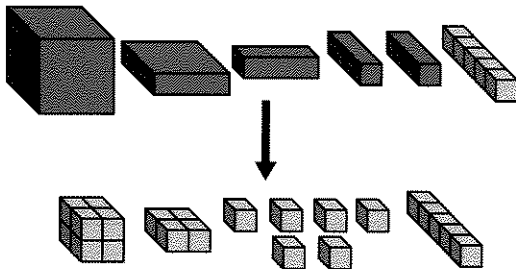
VARIABLES AND CONSTANTS

1. Explain, with examples, how to figure out the names of the other blue blocks by using 5-blocks, x -blocks, y -blocks, and the corner piece.

If $x = 5$ and $y = 3$, we can use the Lab Gear to think of xy , x^2y , xy^2 .



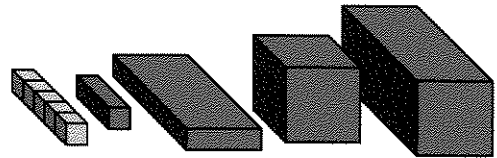
Here is $x^3 + x^2 + 3x + 5$, if $x = 2$.



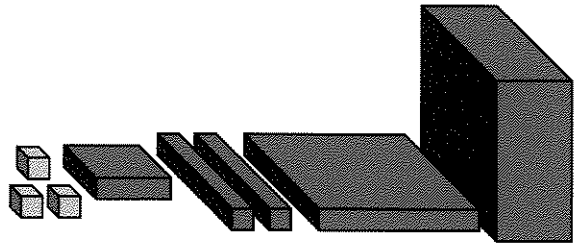
For each problem, write what the blocks show in terms of the variables x and y , then use substitution to evaluate them for:

- a. $x = 0$ and $y = 2$;
- b. $x = 5$ and $y = 1$;
- c. $x = 2$ and $y = 3$.

2.



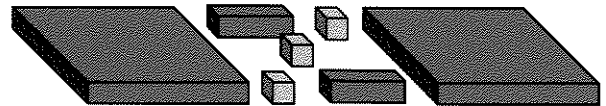
3.



LIKE TERMS

Combine like terms.

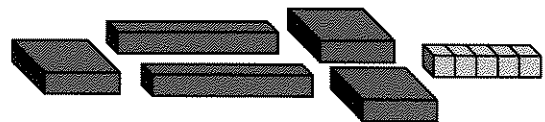
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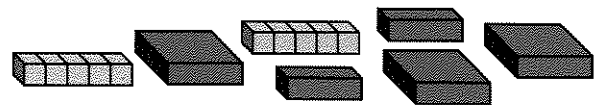
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6.



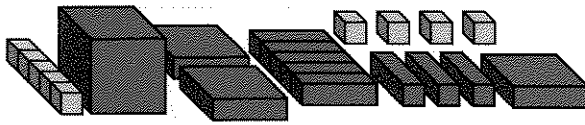
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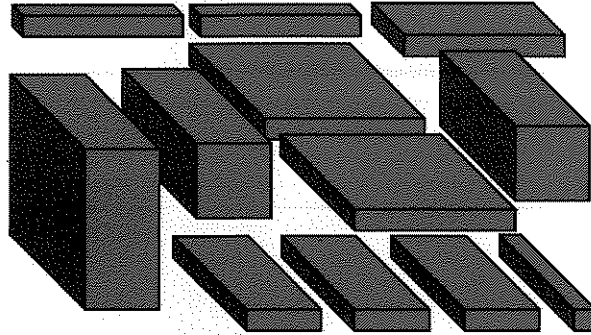
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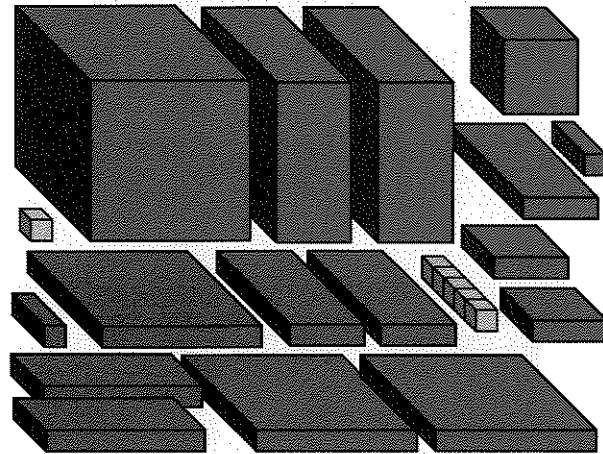
9.



10.



11.



UNLIKE TERMS

12. My student Al *doesn't* like terms. He missed every problem on the Algebra Quiz. Please help poor Al with his algebra. For each problem, give the correct answer and explain what Al did wrong. Use Lab Gear sketches when possible.

- $x^2 + x = x^3$
- $3x + x = 3x^2$
- $x^2 + x^2 + x^2 + x^2 = x^8$
- $y \cdot 6 = y^6$
- $2x + 3y = 5xy$

ADDING AND MULTIPLYING

13. Use the Lab Gear to show each expression. Sketch.
- $2 + x + y$
 - $2 + xy$
 - $2x + y$
 - $2xy$
14. a. Find values for x and y so that all four expressions in problem 13 have different values.
b. Find values for x and y so that as many as possible of the given expressions are equal to each other.
15. Use the Lab Gear to show each expression. Sketch. (Hint: Use the corner piece for the last one.)
- $x + y^2$
 - $x^2 + y$
 - $x^2 + y^2$
 - $(x + y)^2$
16. Find values for x and y so that all four expressions in problem 15 have different values.

ORDER OF OPERATIONS

17. Use the Lab Gear to show $2 + 5y$ and $(2 + 5)y$. Sketch each one.
18. a. Use trial and error to find a value of y such that $2 + 5y = (2 + 5)y$.
b. If $y = 0$, which is greater, $2 + 5y$ or $(2 + 5)y$?
c. If $y = 2$, which is greater, $2 + 5y$ or $(2 + 5)y$?

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AREA AND MULTIPLICATION

Use the corner piece for problems 19-21.

19. Find the area of a rectangle having the sides given below. For each problem write a multiplication of the form *length times width = area*.

- a. 3 and 5 b. 3 and x
 c. 3 and $x + 5$ d. x and $x + 5$

20. Find the sides of a rectangle having the following areas. Each problem has at least two solutions. Find as many of them as you can and write an equation for each.

- a. $4x$ b. $4x^2 + 8x$
 c. $3xy + 6x^2 + 9x$

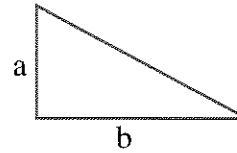
21. These equations are of the form *length times width = area*. Use the blocks to help you fill in the blanks.

- a. $x \cdot \underline{\hspace{2cm}} = x^2 + xy$
 b. $(y + 1) \cdot \underline{\hspace{2cm}} = 5y + 5$
 c. $(\underline{\hspace{2cm}} + 3) \cdot y = 2xy + 3y$
 d. $2x \cdot \underline{\hspace{2cm}} = 4x + 2xy + 6x^2$

22. Use the Lab Gear to build all the rectangles (or squares) you can find having the following perimeters. For each one, sketch your answer and write the length, width, and area.

- a. $8x$
 b. $6x + 2y$
 c. $4x + 4y$

23. What is the area of the triangle in the figure if



- a. $a = 7$ and $b = 9$?
 b. $a = 4x$ and $b = y$?