

GEOMETRY

SUMMER PACKET

CONWELL-EGAN CATHOLIC HIGH SCHOOL

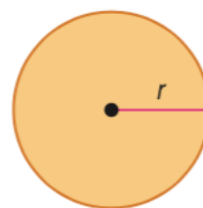


This summer assignment is a review and exploration of key skills that are necessary for success in your mathematics course as well as future high school mathematics courses.

All summer packets are due on the Friday of the first full week of school.

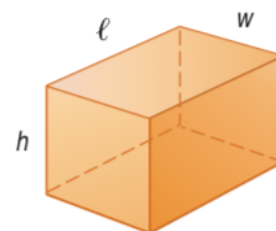
A DIGITAL COPY OF THIS PACKET WITH EXAMPLES CAN BE FOUND ON THE SCHOOL'S WEBSITE UNDER THE ACADEMIC'S TAB.

20. **GEOMETRY** The area of a circle can be found by multiplying the number π by the square of the radius. If the radius of a circle is r , write an expression that represents the area of the circle.



44. **GEOMETRY** The surface area of a rectangular prism is the sum of:

- the product of twice the length ℓ and the width w ,
- the product of twice the length and the height h , and
- the product of twice the width and the height.



Write an expression that represents the surface area of a prism.

46. **CRITICAL THINKING** In the square, the variable a represents a positive whole number. Find the value of a such that the area and the perimeter of the square are the same.

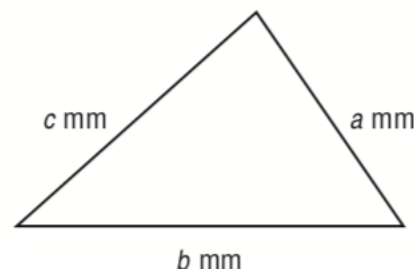


29. **GEOMETRY** Find the area of the rectangle when $n = 4$ centimeters.



46. Find the perimeter of the triangle using the formula $P = a + b + c$ if $a = 10$, $b = 12$, and $c = 17$.

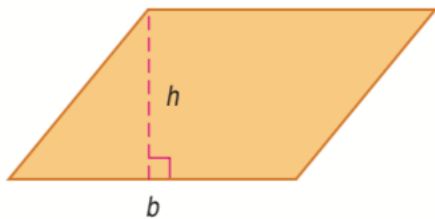
- Ⓐ 39 mm Ⓑ 19.5 mm
Ⓒ 60 mm Ⓓ 78 mm



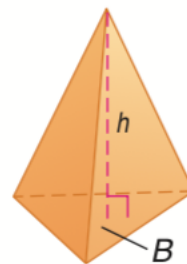
- Ⓓ 39

Translate each sentence into a formula.

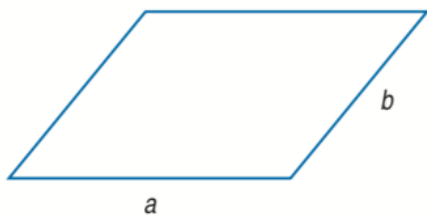
23. The area A of a parallelogram is the base b times the height h .



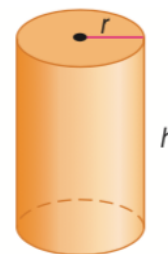
24. The volume V of a pyramid is one-third times the product of the area of the base B and its height h .



25. The perimeter P of a parallelogram is twice the sum of the lengths of the two adjacent sides, a and b .

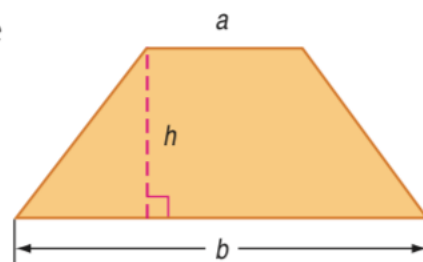


26. The volume V of a cylinder equals the product of π , the square of the radius r of the base, and the height.

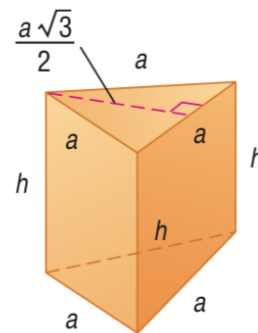


27. In a right triangle, the square of the measure of the hypotenuse c is equal to the sum of the squares of the measures of the legs, a and b .

37. **GEOMETRY** If a and b represent the lengths of the bases of a trapezoid and h represents its height, then the formula for the area A of the trapezoid is $A = \frac{1}{2}h(a + b)$. Write the formula in words.



52. **CRITICAL THINKING** The surface area of a prism is the sum of the areas of the faces of the prism. Write a formula for the surface area of the triangular prism at the right.



GEOMETRY For Exercises 41 and 42, use the following information.

The volume V of a cone equals one-third times the product of π , the square of the radius r of the base, and the height h .

41. Write the formula for the volume of a cone.
42. Find the volume of a cone if r is 10 centimeters and h is 30 centimeters.

GEOMETRY For Exercises 43 and 44, use the following information.

The volume V of a sphere is four-thirds times π times the radius r of the sphere cubed.

43. Write a formula for the volume of a sphere.
44. Find the volume of a sphere if r is 4 inches.

4. Justify each step. $\frac{4 - 2d}{5} + 3 = 9$

$$\frac{4 - 2d}{5} + 3 - 3 = 9 - 3$$

$$\frac{4 - 2d}{5} = 6$$

$$\frac{4 - 2d}{5}(5) = 6(5)$$

$$4 - 2d = 30$$

$$4 - 2d - 4 = 30 - 4$$

$$-2d = 26$$

$$\frac{-2d}{-2} = \frac{26}{-2}$$

$$d = -13$$

a. $\underline{\quad ? \quad}$

b. $\underline{\quad ? \quad}$

c. $\underline{\quad ? \quad}$

d. $\underline{\quad ? \quad}$

e. $\underline{\quad ? \quad}$

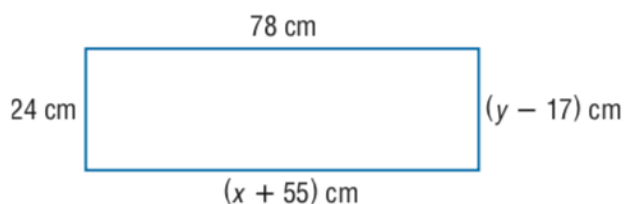
f. $\underline{\quad ? \quad}$

g. $\underline{\quad ? \quad}$

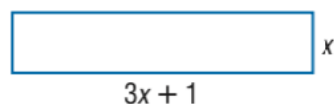
h. $\underline{\quad ? \quad}$

GEOMETRY For Exercises 41 and 42, use the rectangle at the right.

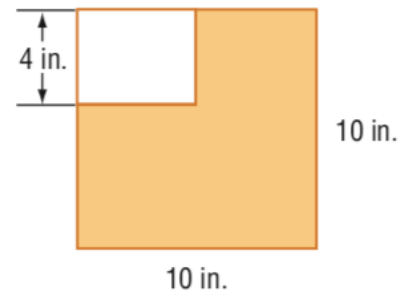
41. Write an equation you could use to solve for x and then solve for x .
42. Write an equation you could use to solve for y and then solve for y .



47. **GEOMETRY** The rectangle and square shown below have the same perimeter. Find the dimensions of each figure.



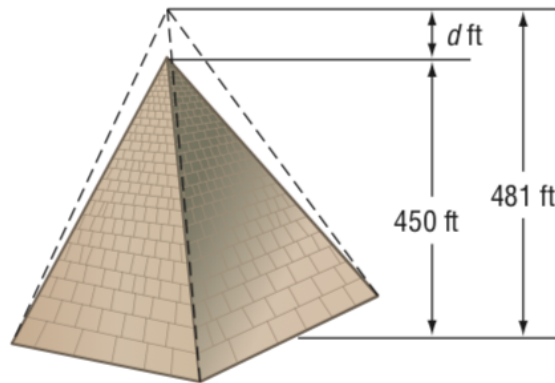
54. **GEOMETRY** A rectangle is cut from the corner of a 10-inch by 10-inch of paper. The area of the remaining piece of paper is $\frac{4}{5}$ of the area of the original piece of paper. If the width of the rectangle removed from the paper is 4 inches, what is the length of the rectangle?



HISTORY For Exercises 56 and 57, use the following information.

Over the years, the height of the Great Pyramid at Giza, Egypt, has decreased.

56. Write an addition equation to represent the situation.
57. What was the decrease in the height of the pyramid?



Source: World Book Encyclopedia

Solve each proportion.

1. $\frac{x}{5} = \frac{3}{4}$

2. $\frac{x}{9} = \frac{0.24}{3}$

3. $\frac{1}{y-3} = \frac{3}{y-5}$

4. $\frac{6p-2}{7} = \frac{5p+7}{8}$

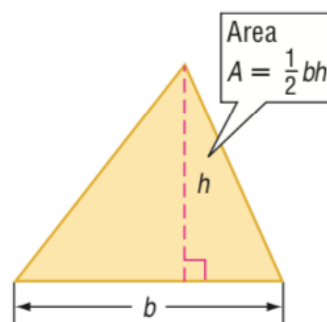
5. $\frac{w-5}{4} = \frac{w+3}{3}$

6. $\frac{4n+5}{5} = \frac{2n+7}{7}$

31. **WORK** Seth earns \$152 in 4 days. At that rate, how many days will it take him to earn \$532?
32. **DRIVING** Lanette drove 248 miles in 4 hours. At that rate, how long will it take her to drive an additional 93 miles?
33. **BLUEPRINTS** A blueprint for a house states that 2.5 inches equals 10 feet. If the length of a wall is 12 feet, how long is the wall in the blueprint?
34. **MODELS** A collector's model racecar is scaled so that 1 inch on the model equals $6\frac{1}{4}$ feet on the actual car. If the model is $\frac{2}{3}$ inch high, how high is the actual car?
35. **PETS** A research study shows that three out of every twenty pet owners got their pet from a breeder. Of the 122 animals cared for by a veterinarian, how many would you expect to have been bought from a breeder?

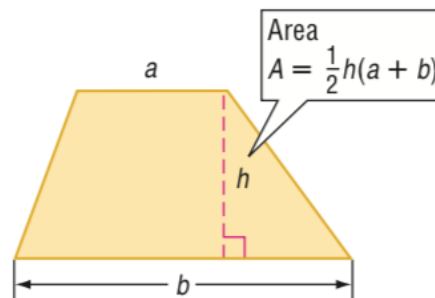
GEOMETRY For Exercises 10–12, use the formula for the area of a triangle.

10. Find the area of a triangle with a base of 18 feet and a height of 7 feet.
11. Solve the formula for h .
12. What is the height of a triangle with area of 28 square feet and base of 8 feet?



GEOMETRY For Exercises 34 and 35, use the formula for the area of a trapezoid.

34. Solve the formula for h .
35. What is the height of a trapezoid with an area of 60 square meters and bases of 8 meters and 12 meters?



WORK For Exercises 36 and 37, use the following information.

The formula $s = \frac{w - 10e}{m}$ is often used by placement services to find keyboarding speeds. In the formula, s represents the speed in words per minute, w represents the number of words typed, e represents the number of errors, and m represents the number of minutes typed.

36. Solve the formula for e .
37. If Miguel typed 410 words in 5 minutes and received a keyboard speed of 76 words per minute, how many errors did he make?

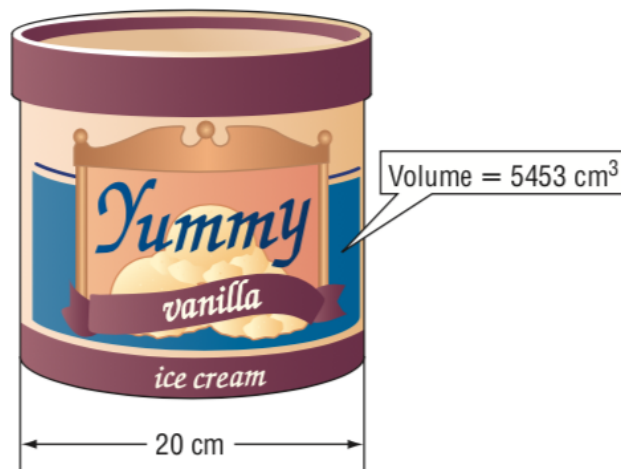
FLOORING For Exercises 38 and 39, use the following information.

The formula $P = \frac{1.2W}{H^2}$ represents the amount of pressure exerted on the floor by the heel of a shoe. In this formula, P represents the pressure in pounds per square inch, W represents the weight of a person wearing the shoe in pounds, and H is the width of the heel of the shoe in inches.

38. Solve the formula for W .
39. Find the weight of the person if the heel is 3 inches wide and the pressure exerted is 30 pounds per square inch.

40. **ROCKETRY** In the book *October Sky*, high school students were experimenting with different rocket designs. One formula they used was $R = \frac{S + F + P}{S + P}$, which relates the mass ratio R of a rocket to the mass of the structure S , the mass of the fuel F , and the mass of the payload P . The students needed to determine how much fuel to load in the rocket. How much fuel should be loaded in a rocket whose basic structure and payload each have a mass of 900 grams, if the mass ratio is to be 6?

41. **PACKAGING** The Yummy Ice Cream Company wants to package ice cream in cylindrical containers that have a volume of 5453 cubic centimeters. The marketing department decides the diameter of the base of the containers should be 20 centimeters. How tall should the containers be?
(Hint: $V = \pi r^2 h$)



Justify each indicated step.

11. $\frac{2}{5}w + 7 \leq -9$

$$\frac{2}{5}w + 7 - 7 \leq -9 - 7 \quad \text{a. } \underline{\quad? \quad}$$

$$\frac{2}{5}w \leq -16$$

$$\left(\frac{5}{2}\right)\frac{2}{5}w \leq \left(\frac{5}{2}\right)(-16) \quad \text{b. } \underline{\quad? \quad}$$

$$w \leq -40$$

12. $m > \frac{15 - 2m}{-3}$

$$(-3)m < (-3)\frac{15 - 2m}{-3} \quad \text{a. } \underline{\quad? \quad}$$

$$-3m < 15 - 2m$$

$$-3m + 2m < 15 - 2m + 2m \quad \text{b. } \underline{\quad? \quad}$$

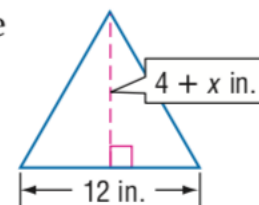
$$-m < 15$$

$$(-1)(-m) > (-1)15 \quad \text{c. } \underline{\quad? \quad}$$

$$m > -15$$

45. **GEOMETRY** The area of a rectangle is less than 85 square feet. The length of the rectangle is 20 feet. What is the width of the rectangle?
49. **LANDSCAPING** Matthew is planning a circular flower garden with a low fence around the border. If he can use up to 38 feet of fence, what radius can he use for the garden? (Hint: $C = 2\pi r$)

50. **GEOMETRY** The length of the base of the triangle at the right is less than the height of the triangle. What are the possible values of x ?



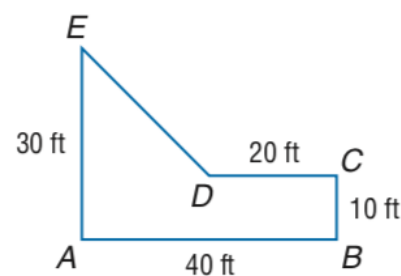
GEOMETRY For Exercises 39 and 40, use the following information.

By definition, the measure of any acute angle is less than 90 degrees. Suppose the measure of an acute angle is $3a - 15$.

39. Write an inequality to represent the situation.

40. Solve the inequality.

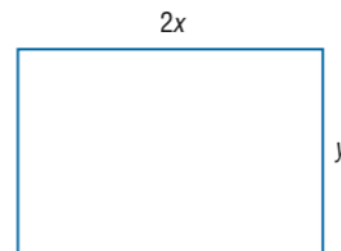
12. **ARCHITECTURE** Chun Wei has sketched the southern view of a building. If A is located on a coordinate system at $(-40, 10)$, locate the coordinates of the other vertices.



GEOMETRY For Exercises 46–48, refer to the figure.

The perimeter P of a rectangle is given by $2\ell + 2w = P$, where ℓ is the length of the rectangle and w is the width.

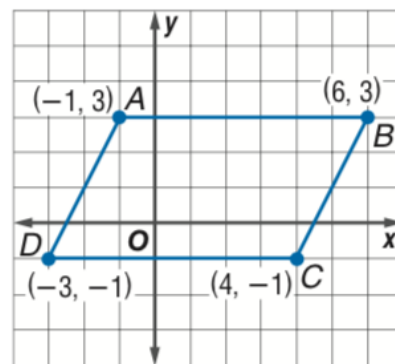
46. If the perimeter of the rectangle is 30 inches, write an equation for the perimeter in standard form.
47. What are the x - and y -intercepts of the graph of the equation?
48. Graph the equation.



GEOMETRY For Exercises 13 and 14, use parallelogram $ABCD$.

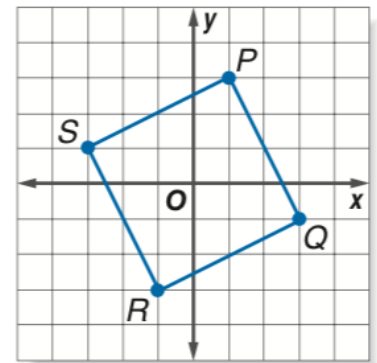
A parallelogram has opposite sides parallel.

13. Write the point-slope form of the line containing $\overline{AD}$.
14. Write the standard form of the line containing $\overline{AD}$.



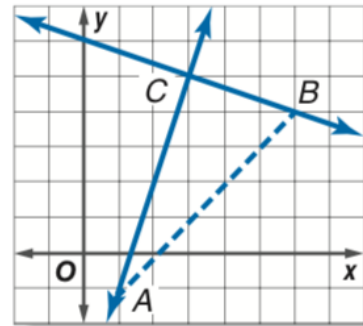
GEOMETRY For Exercises 61–63, use square $PQRS$.

61. Write a point-slope equation of the line containing each side.
62. Write the slope-intercept form of each equation.
63. Write the standard form of each equation.

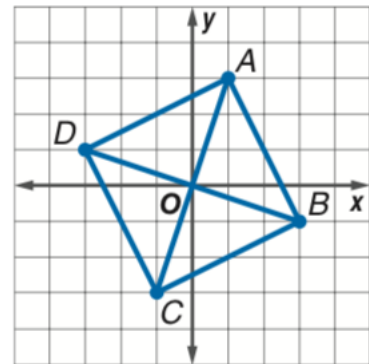


8. **GEOMETRY** Quadrilateral $ABCD$ has vertices $A(-2, 1)$, $B(3, 3)$, $C(5, 7)$, and $D(0, 5)$. Determine whether $\overline{AC}$ is perpendicular to $\overline{BD}$.

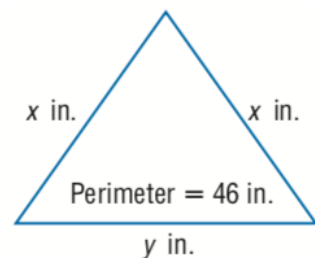
12. **GEOMETRY** The line with equation $y = 3x - 4$ contains side $\overline{AC}$ of right triangle ABC . If the vertex of the right angle C is at $(3, 5)$, what is an equation of the line that contains side $\overline{BC}$?



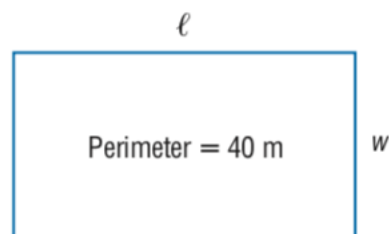
45. **GEOMETRY** The diagonals of a square are segments that connect the opposite vertices. Determine the relationship between the diagonals $\overline{AC}$ and $\overline{BD}$ of square $ABCD$.



29. **GEOMETRY** The base of the triangle is 4 inches longer than the length of one of the other sides. Use a system of equations to find the length of each side of the triangle.



41. **GEOMETRY** The length of the rectangle at the right is 1 meter less than twice its width. What are the dimensions of the rectangle?



GEOMETRY For Exercises 42 and 43, use the graphs of $y = 2x + 6$, $3x + 2y = 19$, and $y = 2$, which contain the sides of a triangle.

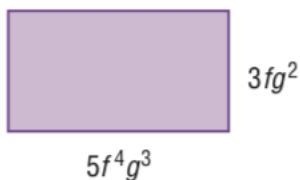
42. Find the coordinates of the vertices of the triangle.

43. Find the area of the triangle.

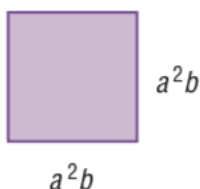
32. **GEOMETRY** Supplementary angles are two angles whose measures have the sum of 180 degrees. Angles X and Y are supplementary, and the measure of angle X is 24 degrees greater than the measure of angle Y. Find the measures of angles X and Y.

GEOMETRY Express the area of each figure as a monomial.

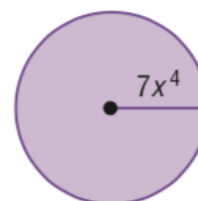
43.



44.

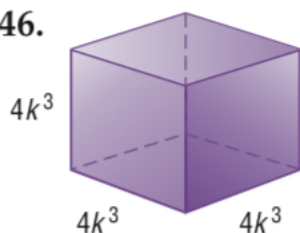


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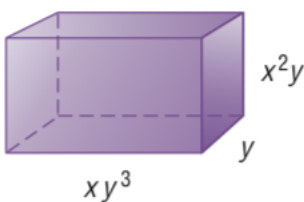


GEOMETRY Express the volume of each solid as a monomial.

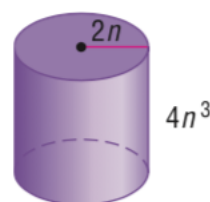
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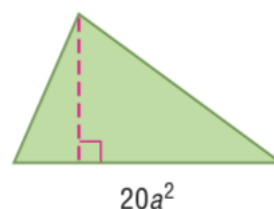
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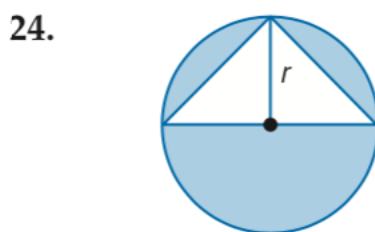
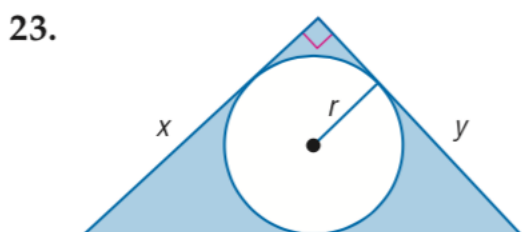
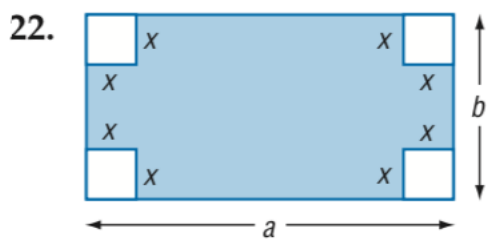
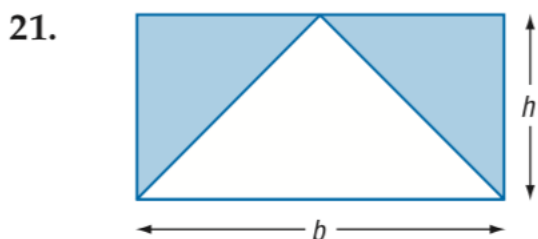
38. The area of the rectangle is $24x^5y^3$ square units. Find the length of the rectangle.



39. The area of the triangle is $100a^3b$ square units. Find the height of the triangle.



GEOMETRY Write a polynomial to represent the area of each shaded region.

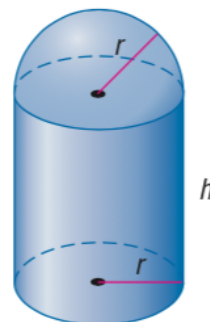


PACKAGING For Exercises 55 and 56, use the following information.

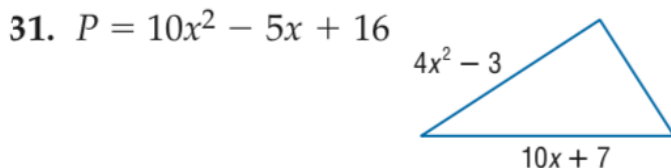
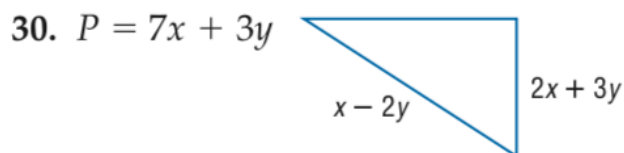
A convenience store sells milkshakes in cups with semispherical lids. The volume of a cylinder is the product of π , the square of the radius r , and the height h . The volume of a sphere is the product of $\frac{4}{3}$, π , and the cube of the radius.

55. Write a polynomial that represents the volume of the container.

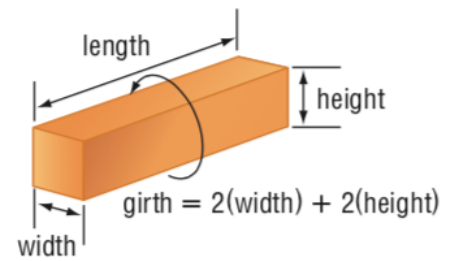
56. If the height of the container is 6 inches and the radius is 2 inches, find the volume of the container.



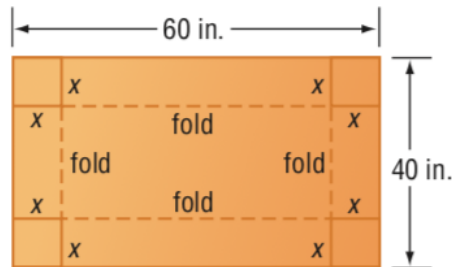
GEOMETRY The measures of two sides of a triangle are given. If P is the perimeter, find the measure of the third side.



POSTAL SERVICE For Exercises 36–40, use the information below and in the figure at the right. The U.S. Postal Service restricts the sizes of boxes shipped by parcel post. The sum of the length and the girth of the box must not exceed 108 inches.



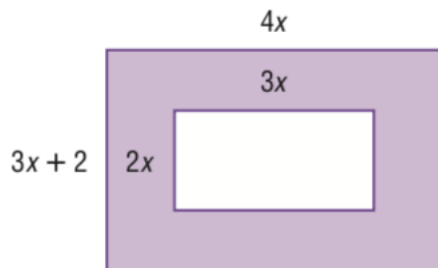
Suppose you want to make an open box using a 60-by-40 inch piece of cardboard by cutting squares out of each corner and folding up the flaps. The lid will be made from another piece of cardboard. You do not know how big the squares should be, so for now call the length of the side of each square x .



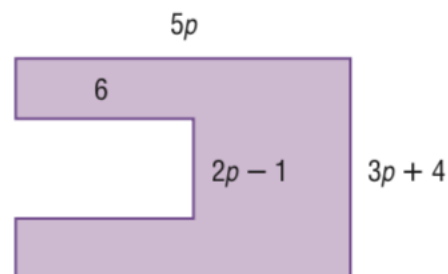
36. Write a polynomial to represent the length of the box formed.
37. Write a polynomial to represent the width of the box formed.
38. Write a polynomial to represent the girth of the box formed.
39. Write and solve an inequality to find the least possible value of x you could use in designing this box so it meets postal regulations.
40. What is the greatest integral value of x you could use to design this box if it does not have to meet regulations?

GEOMETRY Find the area of each shaded region in simplest form.

37.

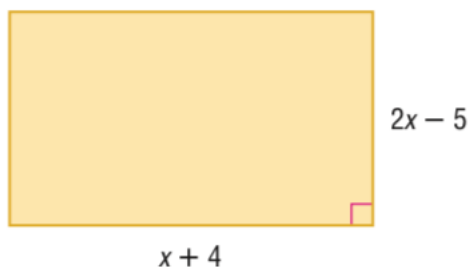


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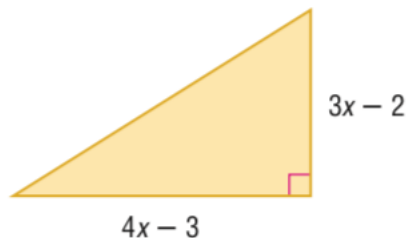


GEOMETRY Write an expression to represent the area of each figure.

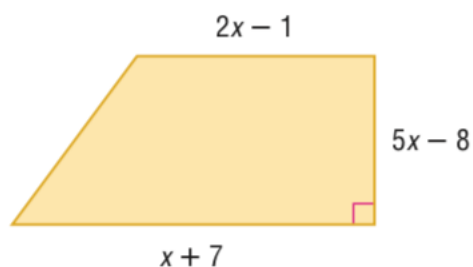
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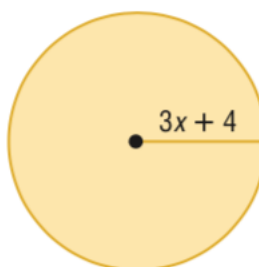
40.



41.

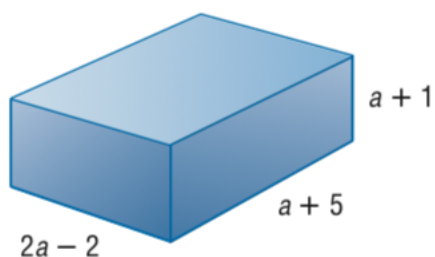


42.

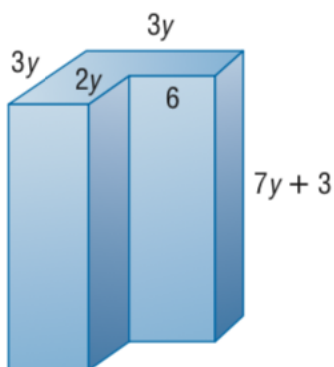


GEOMETRY The volume V of a prism equals the area of the base B times the height h . Write an expression to represent the volume of each prism.

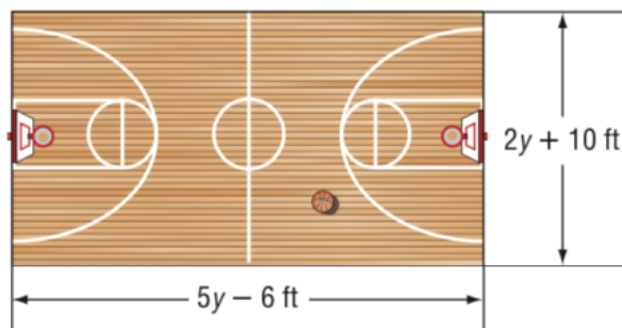
43.



44.



48. **BASKETBALL** The dimensions of a professional basketball court are represented by a width of $2y + 10$ feet and a length of $5y - 6$ feet. Find an expression for the area of the court.

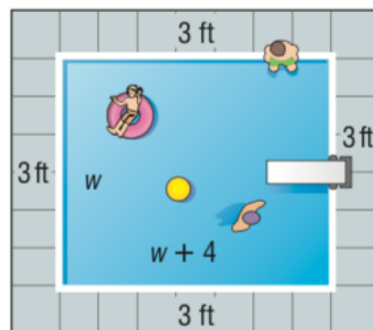


OFFICE SPACE For Exercises 49–51, use the following information.

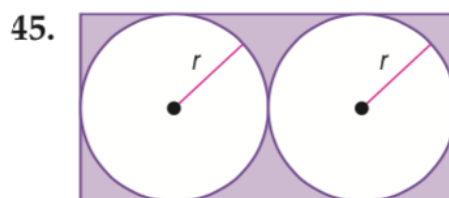
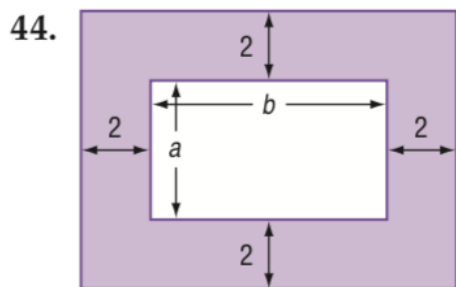
Latanya's modular office is square. Her office in the company's new building will be 2 feet shorter in one direction and 4 feet longer in the other.

49. Write expressions for the dimensions of Latanya's new office.
50. Write a polynomial expression for the area of her new office.
51. Suppose her office is presently 9 feet by 9 feet. Will her new office be bigger or smaller than her old office and by how much?

53. **POOL CONSTRUCTION** A homeowner is installing a swimming pool in his backyard. He wants its length to be 4 feet longer than its width. Then he wants to surround it with a concrete walkway 3 feet wide. If he can only afford 300 square feet of concrete for the walkway, what should the dimensions of the pool be?



GEOMETRY Write an expression in factored form for the area of each shaded region.



GEOMETRY Find an expression for the area of a square with the given perimeter.

46. $P = 12x + 20y$ in.

47. $P = 36a - 16b$ cm