

CHAPTER 5-1

PERIMETER AND AREA OF OTHER POLYGONS

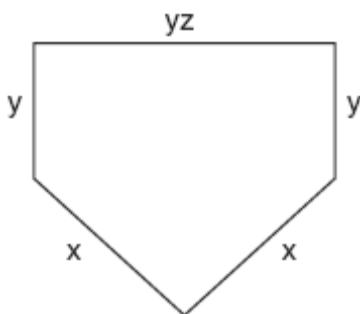
1. 089905a, P.I. A.G.1

The Pentagon building in Washington, D.C., is shaped like a regular pentagon. If the length of one side of the Pentagon is represented by $n + 2$, its perimeter would be represented by

- [A] $5n + 10$ [B] $5n + 2$
[C] $10n$ [D] $n + 10$

2. 010603a, P.I. A.G.1

The lengths of the sides of home plate in a baseball field are represented by the expressions in the accompanying figure.



Which expression represents the perimeter of the figure?

- [A] $2x + 3yz$ [B] $2x + 2y + yz$
[C] $x^2 + y^3z$ [D] $5xyz$

3. 080124a, P.I. A.G.1

An engineer measured the dimensions for a rectangular site by using a wooden pole of unknown length x . The length of the rectangular site is 2 pole measures increased by 3 feet, while the width is 1 pole measure decreased by 4 feet. Write an algebraic representation, in terms of x , for the perimeter of the site.

4. 060527a, P.I. A.G.1

The length of a side of a square window in Jessica's bedroom is represented by $2x - 1$. Which expression represents the area of the window?

- [A] $4x^2 + 4x - 1$ [B] $4x^2 + 1$
[C] $4x^2 - 4x + 1$ [D] $2x^2 + 1$

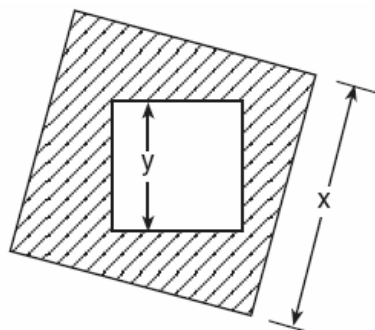
5. 010212a, P.I. A.G.1

What is the area of a square whose perimeter is represented by $12x$?

- [A] $6x\sqrt{2}$ [B] $144x^2$
[C] $12x^2$ [D] $9x^2$

6. 060302a, P.I. A.G.1

The accompanying diagram shows a square with side y inside a square with side x .

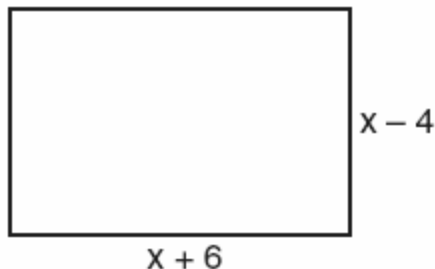


Which expression represents the area of the shaded region?

- [A] x^2 [B] y^2
[C] $x^2 - y^2$ [D] $y^2 - x^2$

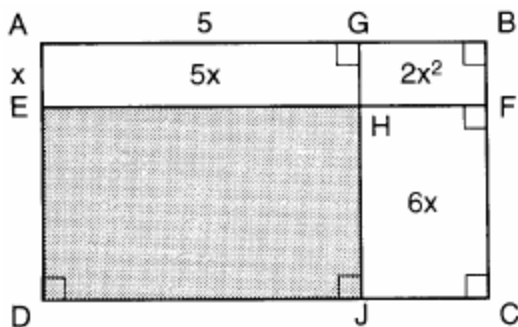
7. 060437a, P.I. A.G.1

Express both the perimeter and the area of the rectangle shown in the accompanying diagram as polynomials in simplest form.



8. 010028a, P.I. A.G.1

In the figure below, the large rectangle, $ABCD$, is divided into four smaller rectangles. The area of rectangle $AEHG = 5x$, the area of rectangle $GHFB = 2x^2$, the area of rectangle $HJCF = 6x$, segment $AG = 5$, and segment $AE = x$.



- a Find the area of the shaded region.
b Write an expression for the area of the rectangle $ABCD$ in terms of x .

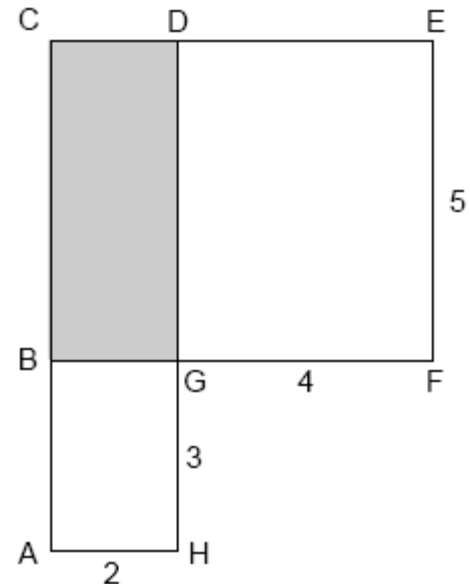
9. 080206a

If the area of a square garden is 48 square feet, what is the length, in feet, of one side of the garden?

- [A] $16\sqrt{3}$ [B] $4\sqrt{6}$
[C] $4\sqrt{3}$ [D] $12\sqrt{2}$

10. 069916a, P.I. A.G.1

In the accompanying figure, $ACDH$ and $BCEF$ are rectangles, $AH = 2$, $GH = 3$, $GF = 4$, and $FE = 5$.



What is the area of $BCDG$?

- [A] 6 [B] 20 [C] 10 [D] 8

11. 080031a, P.I. A.G.1

Mr. Santana wants to carpet exactly half of his rectangular living room. He knows that the perimeter of the room is 96 feet and that the length of the room is 6 feet longer than the width. How many square feet of carpeting does Mr. Santana need?

12. 080023a, P.I. A.G.1

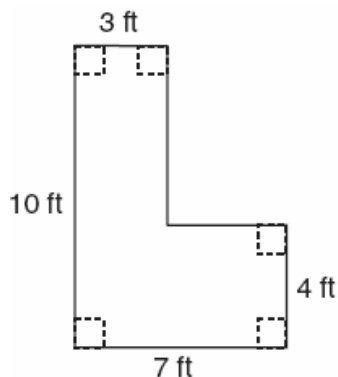
Kerry is planning a rectangular garden that has dimensions of 4 feet by 6 feet. Kerry wants one-half of the garden to have roses, and she says that the rose plot will have dimensions of 2 feet by 3 feet. Is she correct? Explain.

13. 060631a, P.I. A.G.1

Determine the area, in square feet, of the *smallest* square that can contain a circle with a radius of 8 feet.

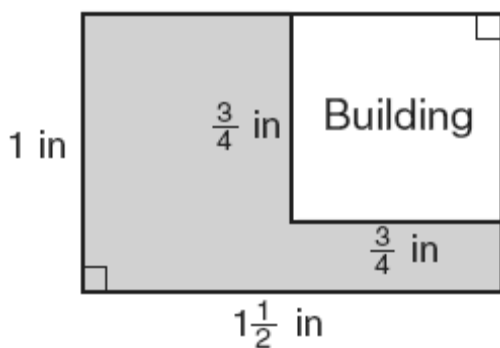
14. 060132a, P.I. A.G.1

Keesha wants to tile the floor shown in the accompanying diagram. If each tile measures 1 foot by 1 foot and costs \$2.99, what will be the total cost, including an 8% sales tax, for tiling the floor?



15. 080738a, P.I. A.G.1

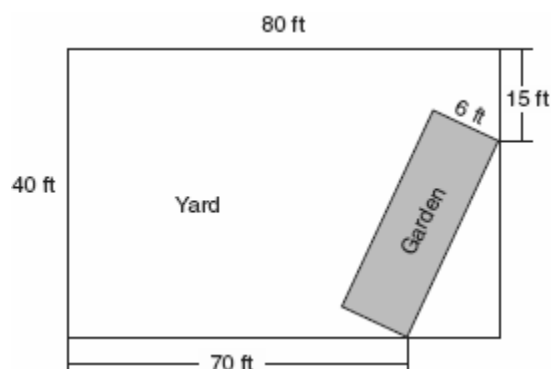
The accompanying diagram represents a scale drawing of the property where Brendan's business is located. He needs to purchase rock salt to melt the ice on the parking lot (shaded area) around his building. A bag of rock salt covers an area of 1,500 square feet. How many bags of rock salt does Brendan need to purchase to salt the entire parking lot?



Scale: $\frac{1}{4}$ in = 18 ft

16. 010330a, P.I. A.G.1

A rectangular garden is going to be planted in a person's rectangular backyard, as shown in the accompanying diagram. Some dimensions of the backyard and the width of the garden are given. Find the area of the garden to the nearest square foot.

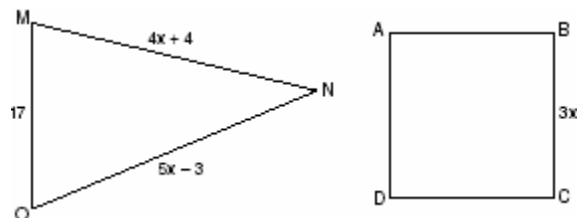


17. 060536a, P.I. A.A.8

Mr. James wanted to plant a garden that would be in the shape of a rectangle. He was given 80 feet of fencing to enclose his garden. He wants the length to be 10 feet more than twice the width. What are the dimensions, in feet, for a rectangular garden that will use exactly 80 feet of fencing?

18. 080537a

In the accompanying diagram, the perimeter of $\triangle MNO$ is equal to the perimeter of square ABCD. If the sides of the triangle are represented by $4x + 4$, $5x - 3$, and 17, and one side of the square is represented by $3x$, find the length of a side of the square.



19. 080639a

Manuel plans to install a fence around the perimeter of his yard. His yard is shaped like a square and has an area of 40,000 square feet. The company that he hires charges \$2.50 per foot for the fencing and \$50.00 for the installation fee. What will be the cost of the fence, in dollars?

20. 010202b, P.I. A.G.1

Chad had a garden that was in the shape of a rectangle. Its length was twice its width. He decided to make a new garden that was 2 feet longer and 2 feet wider than his first garden. If x represents the original width of the garden, which expression represents the difference between the area of his new garden and the area of the original garden?

- [A] 8 [B] $6x + 4$
[C] $2x^2$ [D] $x^2 + 3x + 2$

21. 080130b, P.I. A.G.1

A small, open-top packing box, similar to a shoebox without a lid, is three times as long as it is wide, and half as high as it is long. Each square inch of the bottom of the box costs \$0.008 to produce, while each square inch of any side costs \$0.003 to produce. Write a function for the cost of the box described above. Using this function, determine the dimensions of a box that would cost \$0.69 to produce.

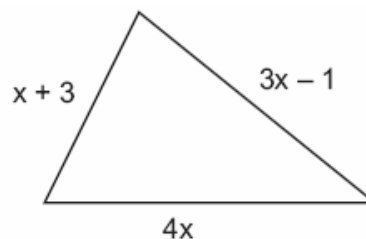
23. 060713a, P.I. A.G.1

If the base of a triangle is represented by $x + 4$ and the height is represented by $2x$, which expression represents the area of the triangle?

- [A] $(x + 4)(2x)$ [B] $\frac{1}{2}((x + 4) + (2x))$
[C] $\frac{1}{2}(x + 4)(2x)$ [D] $(x + 4) + (2x)$

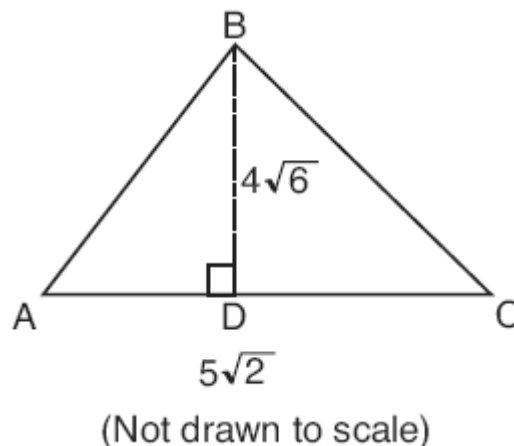
24. 060227a, P.I. G.G.33

The plot of land illustrated in the accompanying diagram has a perimeter of 34 yards. Find the length, in yards, of *each* side of the figure. Could these measures actually represent the measures of the sides of a triangle? Explain your answer.



25. 010833a, P.I. A.G.1

In the accompanying diagram of $\triangle ABC$, altitude $BD = 4\sqrt{6}$ and $AC = 5\sqrt{2}$. Find the area of the triangle to the *nearest tenth* of a square unit.



CHAPTER 5-2

PERIMETER AND AREA OF TRIANGLES

22. 060611a, P.I. A.G.1

The second side of a triangle is two more than the first side, and the third side is three less than the first side. Which expression represents the perimeter of the triangle?

- [A] $x + 5$ [B] $x^2 - x - 6$
[C] $3x - 1$ [D] $2x - 1$

26. 010517a, P.I. A.A.23

Sean knows the length of the base, b , and the area, A , of a triangular window in his bedroom. Which formula could he use to find the height, h , of this window?

[A] $h = 2A - b$ [B] $h = (2A)(b)$

[C] $h = \frac{A}{2b}$ [D] $h = \frac{2A}{b}$

27. 010521a, P.I. G.G.42

If the midpoints of the sides of a triangle are connected, the area of the triangle formed is what part of the area of the original triangle?

[A] $\frac{1}{3}$ [B] $\frac{3}{8}$ [C] $\frac{1}{4}$ [D] $\frac{1}{2}$

28. 010335a, P.I. A.G.1

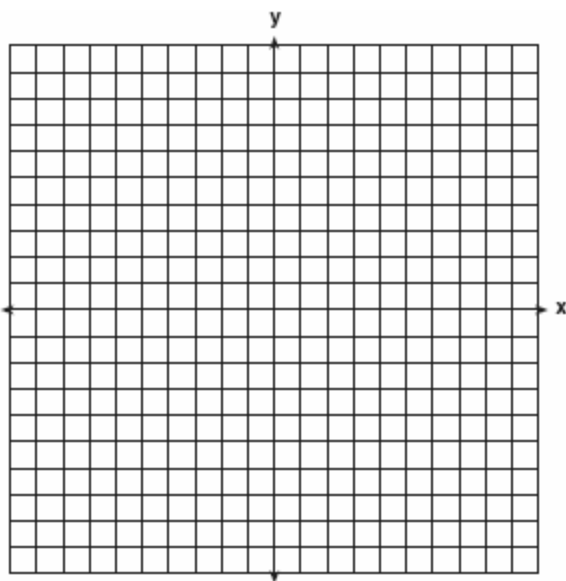
On the accompanying set of axes, graph and label the following lines:

$y = 5$

$x = -4$

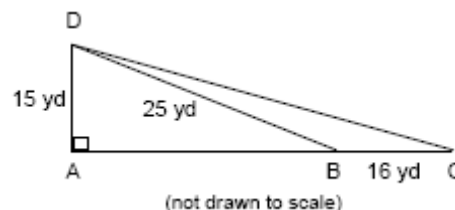
$y = \frac{5}{4}x + 5$

Calculate the area, in square units, of the triangle formed by the three points of intersection.



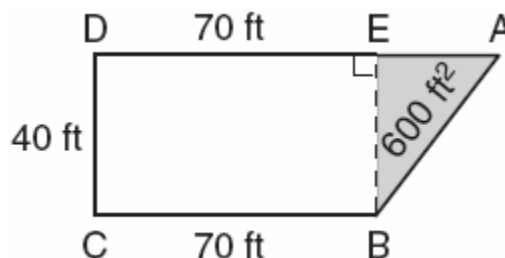
29. 089934a, P.I. A.G.1

Mr. Gonzalez owns a triangular plot of land BCD with $DB = 25$ yards and $BC = 16$ yards. He wishes to purchase the adjacent plot of land in the shape of right triangle ABD , as shown in the accompanying diagram, with $AD = 15$ yards. If the purchase is made, what will be the total number of square yards in the area of his plot of land, $\triangle ACD$?



30. 060134a, P.I. A.G.1

The plan of a parcel of land is represented by trapezoid $ABCD$ in the accompanying diagram. If the area of $\triangle ABE$ is 600 square feet, find the minimum number of feet of fence needed to completely enclose the entire parcel of land, $ABCD$.



HERO'S FORMULA

31. 010417b, P.I. A.G.1

A garden in the shape of an equilateral triangle has sides whose lengths are 10 meters. What is the area of the garden?

[A] 50 m^2 [B] $50\sqrt{3} \text{ m}^2$

[C] $25\sqrt{3} \text{ m}^2$ [D] 25 m^2

32. 060634b, P.I. A.G.1

A triangular plot of land has sides that measure 5 meters, 7 meters, and 10 meters. What is the area of this plot of land, to the nearest tenth of a square meter?

33. 080734b, P.I. A.G.1

A farmer has a triangular field with sides of 240 feet, 300 feet, and 360 feet. He wants to apply fertilizer to the field. If one 40-pound bag of fertilizer covers 6,000 square feet, how many bags must he buy to cover the field?

34. 060333b, P.I. A.G.1

A farmer has determined that a crop of strawberries yields a yearly profit of \$1.50 per square yard. If strawberries are planted on a triangular piece of land whose sides are 50 yards, 75 yards, and 100 yards, how much profit, to the *nearest hundred dollars*, would the farmer expect to make from this piece of land during the next harvest?

CHAPTER 5-4

PERIMETER AND AREA OF TRIANGLES

35. 089920a, P.I. A.G.1

What is the perimeter of an equilateral triangle whose height is $2\sqrt{3}$?

[A] $6\sqrt{3}$ [B] $12\sqrt{3}$ [C] 6 [D] 12

36. 060733a

The perimeter of an isosceles triangle is 71 centimeters. The measure of one of the sides is 22 centimeters. What are all the possible measures of the other two sides?

37. 080613b

If the perimeter of an equilateral triangle is 18, the length of the altitude of this triangle is

[A] $3\sqrt{3}$ [B] 6 [C] $6\sqrt{3}$ [D] 3

CHAPTER 5-5

PERIMETER AND AREA OF OTHER POLYGONS

38. 010608a, P.I. A.G.1

The equation $A = \frac{1}{2}(12)(3+7)$ is used to find

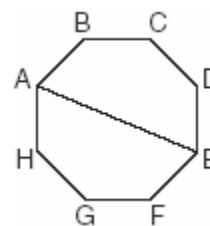
the area of a trapezoid. Which calculation would *not* result in the correct area?

[A] $\frac{12}{2} \times \frac{10}{2}$ [B] $\frac{12(3+7)}{2}$
[C] $6(3+7)$ [D] $0.5(12)(10)$

CHAPTER 5-6

39. 010330b

A picnic table in the shape of a regular octagon is shown in the accompanying diagram. If the length of \overline{AE} is 6 feet, find the length of one side of the table to the *nearest tenth of a foot*, and find the area of the table's surface to the *nearest tenth of a square foot*.



CHAPTER 5-7

CIRCUMFERENCE AND AREA

40. 080108a, P.I. A.G.1

What is the approximate circumference of a circle with radius 3?

[A] 28.27 [B] 7.07
[C] 9.42 [D] 18.85

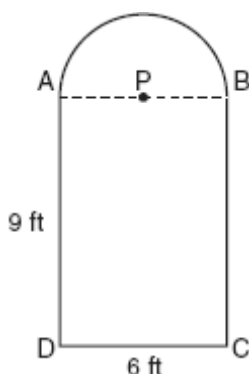
41. 069914a, P.I. 7.G.1

What is the diameter of a circle whose circumference is 5?

[A] $\frac{2.5}{\pi}$ [B] $\frac{5}{\pi^2}$ [C] $\frac{2.5}{\pi^2}$ [D] $\frac{5}{\pi}$

42. fall0733ia, P.I. A.G.1

Serena's garden is a rectangle joined with a semicircle, as shown in the diagram below. Line segment AB is the diameter of semicircle P . Serena wants to put a fence around her garden.



Calculate the length of fence Serena needs to the *nearest tenth of a foot*.

43. 010437a, P.I. A.G.1

A wheel has a radius of 5 feet. What is the minimum number of *complete* revolutions that the wheel must make to roll at least 1,000 feet?

44. 080027a, P.I. A.G.1

To measure the length of a hiking trail, a worker uses a device with a 2-foot-diameter wheel that counts the number of revolutions the wheel makes. If the device reads 1,100.5 revolutions at the end of the trail, how many miles long is the trail, to the *nearest tenth of a mile*?

45. 010215b, P.I. A.G.1

Every time the pedals go through a 360° rotation on a certain bicycle, the tires rotate three times. If the tires are 24 inches in diameter, what is the minimum number of complete rotations of the pedals needed for the bicycle to travel at least 1 mile?

[A] 5,280 [B] 12 [C] 281 [D] 561

CHAPTER 5-8

46. 010012a

If the circumference of a circle is 10π inches, what is the area, in square inches, of the circle?

[A] 100π [B] 50π
[C] 25π [D] 10π

47. 010831a

The circumference of a circle measures 22π units. Find the number of square units in the area of the circle. Express your answer in terms of π .

48. 010617a, P.I. A.G.1

A dog is tied with a rope to a stake in the ground. The length of the rope is 5 yards. What is the area, in square yards, in which the dog can roam?

[A] 25π [B] 10π [C] 20 [D] 25

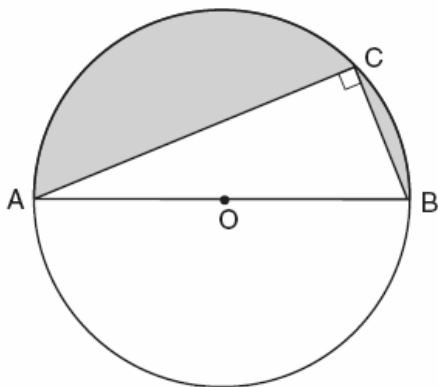
49. 010717a, P.I. A.G.1

A circular garden has a diameter of 12 feet. How many bags of topsoil must Linda buy to cover the garden if one bag covers an area of 3 square feet?

[A] 38 [B] 40 [C] 13 [D] 151

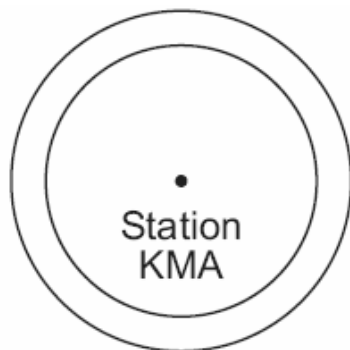
50. 080438a

In the accompanying diagram, right triangle ABC is inscribed in circle O , diameter $AB = 26$, and $CB = 10$. Find, to the *nearest square unit*, the area of the shaded region.



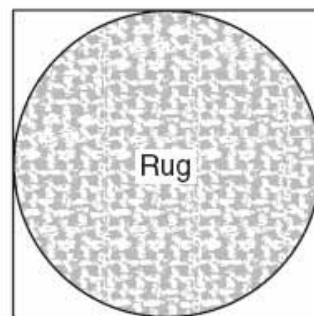
51. 060228a, P.I. A.G.1

As shown in the accompanying diagram, radio station KMA is increasing its radio listening radius from 40 miles to 50 miles. How many additional square miles of listening area, to the *nearest tenth*, will the radio station gain?



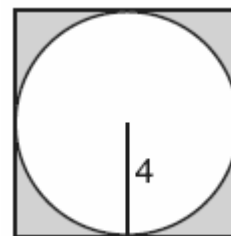
52. 060129a, P.I. A.G.1

Virginia has a circular rug on her square living room floor, as represented in the accompanying diagram. If her entire living room floor measures 100 square feet, what is the area of the part of the floor covered by the rug?



53. 080105a, P.I. A.G.1

In the accompanying diagram, a circle with radius 4 is inscribed in a square.

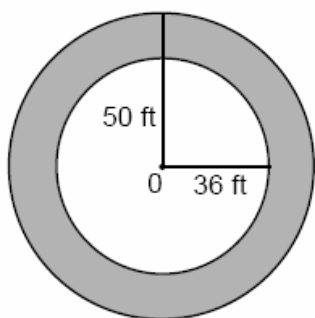


What is the area of the shaded region?

- [A] $64 - 16\pi$ [B] $16 - 16\pi$
[C] $64\pi - 8\pi$ [D] $16 - 8\pi$

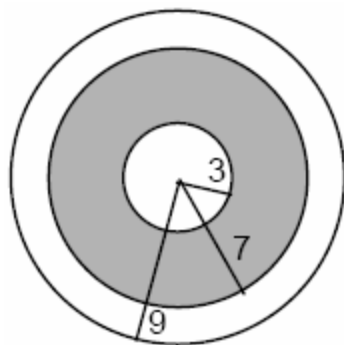
54. 089932a, P.I. A.G.1

If asphalt pavement costs \$0.78 per square foot, determine, to the *nearest cent*, the cost of paving the shaded circular road with center O , an outside radius of 50 feet, and an inner radius of 36 feet, as shown in the accompanying diagram.



55. 069931a, P.I. A.G.1

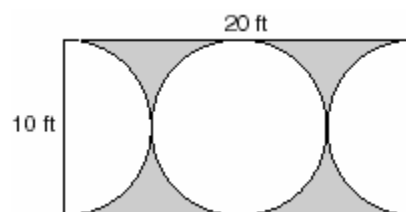
A target shown in the accompanying diagram consists of three circles with the same center. The radii of the circles have lengths of 3 inches, 7 inches, and 9 inches.



- a* What is the area of the shaded region to the *nearest tenth of a square inch*?
- b* To the *nearest percent*, what percent of the target is shaded?

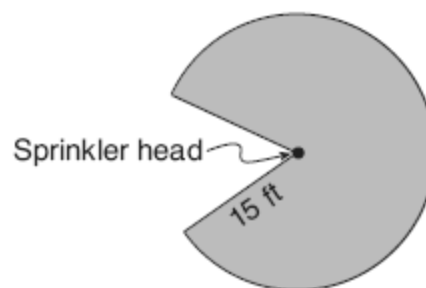
56. 080539a, P.I. A.G.1

Mr. Petri has a rectangular plot of land with length = 20 feet and width = 10 feet. He wants to design a flower garden in the shape of a circle with two semicircles at each end of the center circle, as shown in the accompanying diagram. He will fill in the shaded area with wood chips. If one bag of wood chips covers 5 square feet, how many bags must he buy?



57. 060716b, P.I. 6.G.8

Cerise waters her lawn with a sprinkler that sprays water in a circular pattern at a distance of 15 feet from the sprinkler. The sprinkler head rotates through an angle of 300° , as shown by the shaded area in the accompanying diagram.



What is the area of the lawn, to the *nearest square foot*, that receives water from this sprinkler?

- [A] 94 [B] 589 [C] 79 [D] 707

58. 060106b

The circumference of a circular plot of land is increased by 10%. What is the best estimate of the total percentage that the area of the plot increased?

- [A] 21% [B] 25% [C] 10% [D] 31%

[1] A

[2] B

[2] $6x - 2$ or an equivalent expression, and appropriate work is shown, such as
 $2(2x + 3) + 2(x - 4) = 6x - 2$.

[1] The length is represented correctly as $2x + 3$ and the width as $x - 4$, but the representation of the perimeter is determined incorrectly.

or [1] The length, the width, and the perimeter are represented appropriately, but by a variable other than x .

or [1] One or both dimensions are represented incorrectly, but the perimeter is represented appropriately.

[0] One or both dimensions are represented incorrectly, and the perimeter is not determined.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[3] obviously incorrect procedure.

[4] C

[5] D

[6] C

[3] Perimeter = $4x + 4$ or $4(x + 1)$ and area = $x^2 + 2x - 24$, and appropriate work is shown.

[2] $4x + 4$ and $x^2 + 2x - 24$, and appropriate work is shown, but the answers are not labeled or are labeled incorrectly.

or [2] Appropriate work is shown, but one computational error is made.

or [2] Area = $x^2 + 2x - 24$, and appropriate work is shown, but the perimeter is not found or is found incorrectly.

or [2] The area and perimeter are represented correctly, but only one of them is expressed in simplest form.

[1] Appropriate work is shown, but two or more computational errors are made.

or [1] Perimeter = $4x + 4$, and appropriate work is shown, but the area is not found or is found incorrectly.

or [1] The area and perimeter are represented correctly, but neither is expressed in simplest form.

or [1] Perimeter = $4x + 4$ or $4(x + 1)$ and area = $x^2 + 2x - 24$, but no work is shown.

[0] Perimeter = $4x + 4$ or area = $x^2 + 2x - 24$, but no work is shown.

or [0] $4x + 4$ and $x^2 + 2x - 24$, but no work is shown and the answers are not labeled or are labeled incorrectly.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[7] obviously incorrect procedure.

a [2] 15 and an appropriate method is shown, such as finding $GB = JC = 2x$ and $FC = ED = HJ = 3$.

[1] 15 and no work is shown.

or [1] At least one of the values is correct, as shown above, and the area is calculated based on the incorrect value.

b [1] Any form equivalent to $(2x+5)(x+3)$ is shown, such as $5x + 2x^2 + 6x + 15$.

or [1] Any correct total area based on the students incorrect answer in part a is found.

a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[8] obviously incorrect procedure.

[9] C _____

[10] C _____

[4] 283.5 or 284 and appropriate work or an explanation is shown, such as $4x + 12 = 96$, $\frac{21 \times 27}{2}$, or trial and error.

[3] Appropriate work is shown, but one computational error is made.

[2] Appropriate work is shown, but more than one computational error is made.

or [2] 283.5 or 284 and only a check is shown.

[1] Appropriate work is shown, but no answer is found.

or [1] 283.5 or 284 but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[11] incorrect procedure.

[2] Kerry is incorrect and an explanation is given that the original area is 24 ft^2 and the area of the rose plot is 6 ft^2 , which is not half of 24 ft^2 .

or [2] Kerry is incorrect and an explanation is given that since the original area is 24 ft^2 , the area of the rose plot should be 12 ft^2 , so the new dimensions should multiply to 12, such as 3×4 , 4×3 , 2×6 , 2×6 .

or [2] Kerry is incorrect and a diagram is used to show the original area is 24 ft^2 and the area of the rose plot is 6 ft^2 .

[1] Kerry is incorrect but the work or diagram shows one error.

or [1] Appropriate work is shown, but the incorrect conclusion is found.

[0] Kerry is incorrect or correct but no explanation is given.

or [0] Kerry is correct and $\frac{1}{2}(4) = 2$ or

$\frac{1}{2}(6) = 3$ is shown.

or [0] Kerry is correct and the student uses the perimeter.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[12] obviously incorrect procedure.

[2] 256, and appropriate work is shown, such as finding the side of the square and calculating the area.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown, but only the area of the circle is found.

or [1] An incorrect value for the side of the square is determined, but an appropriate area is found.

or [1] A correct value for the side of the square is determined, but the area is not found or is found incorrectly.

or [1] The area for the square inscribed in the circle is found, resulting in an answer of 128.

or [1] 256, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[13] incorrect procedure.

[4] \$148.54, and appropriate work is shown.

[3] The correct pre-tax amount of \$137.54 is found, but no tax or an incorrect tax is shown.

or [3] Appropriate work is shown, but one computational error is made.

[2] The correct area of 46 ft^2 is found, but no cost is shown.

or [2] Appropriate work is shown, but more than one computational error is made.

or [2] An incorrect area is determined, such as by adding or multiplying all sides, but then a final cost including tax is determined appropriately.

[1] An incorrect area is shown, and one computational error is made.

or [1] \$148.54, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[14] incorrect procedure.

[4] 4, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] Appropriate work is shown to find 4,860, the area of the parking lot, but no further correct work is shown.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect conversion.

or [2] The property has been divided into appropriate sections (e.g., 108×72 , the entire property, and 52×52 , the building) and correct areas are found, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] 4, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[15] incorrect procedure.

[3] 162, and appropriate work is shown.

[2] The Pythagorean theorem is used correctly to find the hypotenuse, but the result is not multiplied by 6.

or [2] Appropriate work is shown, but one computational or rounding error is made.

[1] Appropriate work is shown, but more than one computational or rounding error is made.

or [1] 162, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[16] incorrect procedure.

- [3] 10 and 30, and appropriate work is shown, such as $2x + 2(2x + 10) = 80$ or trial and error with at least three trials and appropriate checks.
- [2] Appropriate work is shown, but one computational error is made.
- or [2] Appropriate work is shown, but only one of the dimensions is found.
- or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.
- [1] Appropriate work is shown, but two or more computational errors are made.
- or [1] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.
- or [1] An incorrect equation of equal difficulty is solved appropriately.
- or [1] Appropriate solutions are found based on the incorrect use of the perimeter formula, such as $3x + 10 = 80$.
- or [1] 10 and 30, but no work or only one trial with an appropriate check is shown.
- [0] 10 or 30, but no work or only one trial with an appropriate check is shown.
- or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [17] _____

- [3] 18, and appropriate work is shown.
- [2] Appropriate work is shown, but one computational error is made.
- or [2] Appropriate work is shown, and the value of x is found, but no further correct work is shown.
- [1] Appropriate work is shown, but two or more computational errors are made.
- or [1] Appropriate work is shown, but one conceptual error is made.
- or [1] A correct expression is written for the perimeter of each figure, but no further correct work is shown.
- or [1] 18, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [18] _____
- [4] 2,050, and appropriate work is shown, such as finding the length of one side of the field, finding the perimeter, and calculating $(2.50 \cdot 800) + 50$.
- [3] Appropriate work is shown, but one computational error is made.
- or [3] Appropriate work is shown, but the installation fee is not added to the cost of the fencing.
- [2] Appropriate work is shown, but two or more computational errors are made.
- or [2] Appropriate work is shown, but one conceptual error is made.
- [1] Appropriate work is shown, but one conceptual error and one computational error are made.
- or [1] 2,050, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [19] _____
- [20] B _____

[4] $c(x) = 0.06x^2$ or an equivalent equation;
width = $\sqrt{11.5}$ inches or an equivalent, length
= $3\sqrt{11.5}$ inches or an equivalent, and height
= $\frac{3}{2}\sqrt{11.5}$ inches or an equivalent, and

appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] One or more dimensions are represented incorrectly, but all further work is appropriate.

or [3] The correct function is found and solved for x , but no further work is shown.

[2] The dimensions are represented correctly, but the equation is incorrect, but all further work is appropriate.

or [2] The dimensions are represented correctly, and the correct function is written, but further work is incomplete or is incorrect.

[1] The dimensions are represented correctly, but the function is written and solved incorrectly.

or [1] $\sqrt{11.5}$, $3\sqrt{11.5}$, and $\frac{3}{2}\sqrt{11.5}$, but no

work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[21] incorrect procedure.

[22] C

[23] C

[3] 7, 11, 16, and yes, and appropriate work is shown, and an appropriate explanation of the Triangle Inequality theorem is given.

[2] 7, 11, 16, and yes, and appropriate work is shown, but no explanation or an incorrect explanation of the Triangle Inequality theorem is given.

or [2] One computational error is made, but appropriate substitution is shown, and an appropriate explanation is given.

or [2] The correct equation is written but not solved, but the Triangle Inequality theorem is stated correctly.

[1] Appropriate work is shown, and $x = 4$ is determined, but no further work is shown.

or [1] The Triangle Inequality theorem is stated correctly but not evaluated for the sides, or the correct equation is written, but no further work is shown.

or [1] 7, 11, 16, and yes, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[24]

[2] 34.6, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as using an incorrect area formula.

or [1] Appropriate work is shown, but the answer is left in radical form.

or [1] 34.6, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[25] incorrect procedure.

[26] D

[27] C

- [4] All lines are graphed and labeled correctly and area = 10, and appropriate work is shown.
 [3] The lines are graphed and labeled correctly, but the area of the triangle is missing or is incorrect.
 or [3] One of the lines is graphed incorrectly, but the area for the given triangle is found appropriately.
 [2] One of the lines is graphed incorrectly, and the area of the triangle is missing or is incorrect.
 [1] Only one line is graphed and labeled correctly, and no further correct work is shown.
 or [1] All three lines are graphed incorrectly, but the area for the given triangle is found appropriately.
 or [1] Area = 10, but no work is shown.
 [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [28] _____
- [4] 270 and an appropriate method is shown, such as using the Pythagorean theorem or trigonometry to find base AC = 36.
 [3] An appropriate method is shown, but one computational mistake is made.
 [2] An inappropriate formula for the area of the triangle is used, but work is carried to a solution.
 or [2] The Pythagorean theorem is used correctly, but only the area of triangle ADB is found, as 150.
 or [2] The Pythagorean theorem is used incorrectly arriving at incorrect AB, but work is carried to its appropriate solution for triangle ADC.
 [1] Only the area of triangle DBC is found, as 120.
 or [1] The Pythagorean theorem is used incorrectly, and the area is not found.
 or [1] 270 and no work is shown.
 [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [29] _____

- [4] 260, and appropriate work is shown, such as applying the appropriate area formula,
 or $A = \frac{1}{2}bh$ or $A = \frac{1}{2}h(b_1 + b_2)$, to find the length of \overline{AE} and using the Pythagorean theorem or stating the Pythagorean triple to determine AB.
 [3] 300, because \overline{BE} is added to the perimeter.
 or [3] Appropriate work is shown, but one computational error is made.
 [2] Appropriate work is shown, but more than one computational error is made.
 or [2] Only AB and AE are determined correctly.
 [1] Only AB or AE is determined correctly.
 or [1] 260, but no work is shown.
 [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [30] _____
- [31] C _____

[6] 16.2, and appropriate work is shown, such as using the Law of Cosines to find one angle, and then using $K = \frac{1}{2}ab \sin C$ or Hero(n)'s

formula, $A = \sqrt{s(s-a)(s-b)(s-c)}$, to find the area.

[5] Appropriate work is shown, but one computational or rounding error is made.

[4] Appropriate work is shown, but two or more computational or rounding errors are made.

[3] Appropriate work is shown, but one conceptual error is made, but an appropriate area is found.

or [3] The Law of Cosines is used to find a correct measure for one of the angles of the triangle, but no further correct work is shown.

[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

[1] Correct substitution is made into the Law of Cosines, but no further correct work is shown.

or [1] 16.2, but no work is shown.

[0] Right triangle trigonometry is used inappropriately.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[32] obviously incorrect procedure.

[6] 6, and appropriate work is shown, such as determining the area of the field, using Heron's formula or using the Law of Cosines to determine one angle of the triangle,

followed by $A = \frac{1}{2}ab \sin C$, and then

$A \div 6000$.

[5] Appropriate work is shown, but one computational or rounding error is made.

[4] Appropriate work is shown, but two or more computational or rounding errors are made.

or [4] Appropriate work is shown to find the area of the triangle, but the number of bags of fertilizer is not found.

[3] Appropriate work is shown, but one conceptual error is made.

or [3] The Law of Cosines is used to find an angle, and substitution is made into the correct area equation, but no further correct work is shown.

[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [2] The Law of Cosines is used to find an angle, but no further correct work is shown.

[1] Correct substitution is made into the Law of Cosines, but no further correct work is shown.

or [1] 6, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[33] incorrect procedure.

[6] 2,700, and appropriate work is shown, such as using the Law of Cosines and finding the area of the triangle.

[5] Appropriate work is shown, but one computational or rounding error is made.

[4] Appropriate work is shown, but more than one computational or rounding error is made.

or [4] Appropriate work is shown, and the area of the triangle is determined correctly, but the dollar amount is not determined or is determined incorrectly.

or [4] The Law of Cosines is used correctly to determine an angle, but an incorrect procedure is used to find the area, but an appropriate dollar amount is found.

or [4] The Law of Cosines is used incorrectly to determine an angle, but a correct procedure is used to find the area, and an appropriate dollar amount is found.

[3] The Law of Cosines is used correctly to determine an angle, but an incorrect procedure is used to find the area, and the dollar amount is not determined or is determined incorrectly.

[2] The Law of Cosines is used correctly to determine an angle, but no further correct work is shown.

[1] A correct equation using the Law of Cosines is written, but no further correct work is shown.

or [1] 2,700, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[34] incorrect procedure.

[35] D

[2] 22, 27 and 24.5, 24.5, *or* 22, 27, and 24.5, and appropriate work is shown, such as a labeled diagram.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown, but only one of the two possible sets of numbers is found.

or [1] 22, 27 and 24.5, 24.5, *or* 22, 27, and 24.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[36] incorrect procedure.

[37] A

[38] A

[4] The side equals 2.3 and the area equals 25.5, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but one incorrect formula is used, such as using an incorrect trigonometric function, but appropriate answers are found.

or [2] Appropriate work is shown to find the correct side, but no further correct work is shown.

[1] The radius equals 3 and the central angle equals 45° , but no further correct work is shown.

or [1] The side equals 2.3 and the area equals 25.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[39] incorrect procedure.

[40] D

[41] D

- [2] 33.4, and appropriate work is shown.
 [1] Appropriate work is shown, but one computational or rounding error is made.
 or [1] Appropriate work is shown, but one conceptual error is made.
 or [1] 33.4, but no work is shown.
 [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [3] 32, and appropriate work is shown, such as finding the circumference to be 10π and dividing 1,000 by 10π .
 [2] Appropriate work is shown, but one computational or rounding error is made or the answer is expressed in terms of π .
 [1] An incorrect circumference formula is used, but an appropriate number of revolutions is found.
 or [1] The circumference of the wheel is found to be 10π or an equivalent decimal, but no further correct work is shown.
 or [1] 32, but no work is shown.
 [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

[3] 1.3 and appropriate work is shown, such as calculating the circumference of the wheel and the length of the trail in feet, and converting them to miles, such as

$$\frac{2 \cdot \pi \cdot 1100.5}{5280}.$$

- [2] The student correctly calculates the circumference and length in feet but does not convert them to miles.
 or [2] Correct calculations are shown, but the answer is rounded incorrectly or is not rounded.
 or [2] Appropriate work is shown, but one error is made.
 [1] The correct circumference is calculated.
 or [1] Appropriate work is shown, but more than one error is made.
 or [1] 1.3 but no work is shown.
 [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [44] C _____
- [45] C _____
- [46] C _____
- [2] 121π , and appropriate work is shown.
 [1] Appropriate work is shown, but one computational error is made.
 or [1] Appropriate work is shown, but one conceptual error is made.
 or [1] Appropriate work is shown, but the answer is expressed as a decimal.
 or [1] The radius of the circle is found, but no further correct work is shown.
 or [1] 121π , but no work is shown.
 [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [47] _____
- [48] A _____
- [49] A _____

[4] 145, and appropriate work is shown, such as $(\frac{1}{2}\pi 13^2) - (\frac{1}{2} \cdot 10 \cdot 24)$.

[3] Appropriate work is shown, but one computational or rounding error is made or the answer is expressed in terms of π .
or [3] Appropriate work is shown, but the area of the entire circle is used to calculate the area of the shaded region.

or [3] The areas of the semicircle and triangle are found correctly, but they are not subtracted to find the shaded area.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] An incorrect formula is used to find the area of the triangle or the semicircle, but an appropriate shaded area is found.

or [2] Only the area of the semicircle or the area of the triangle is found correctly, and no further correct work is shown.

[1] Both the areas of the semicircle and the triangle are found incorrectly, but they are subtracted to find an appropriate shaded area.

or [1] Only the length of \overline{AC} is found correctly.

or [1] 145, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[50] incorrect procedure.

[3] 2,827.4, and appropriate work is shown, such as $50^2\pi - 40^2\pi$.

[2] The areas of both circles are found correctly, but the two areas are not subtracted.

or [2] Appropriate work is shown, but one computational error is made.

[1] The correct area is found for only one of the circles.

or [1] The circumference formula is used, but the appropriate difference is shown, such as $100\pi - 80\pi = 20\pi$.

or [1] 2,827.4, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[51] incorrect procedure.

[3] 78.5 square feet or 25π or an equivalent answer, and appropriate work is shown.

[2] Appropriate work is shown, but one computational error is made.

or [2] Appropriate work is shown, but the measure of one side of the square is used as the radius of the circle.

or [2] Appropriate work is shown, but the perimeter is used to find a side of the square.

[1] The correct length of the side of the square is shown, but further work is missing or is incorrect.

or [1] The equation for the circumference of the circle instead of the equation for the area of the circle is solved appropriately.

or [1] Appropriate work is shown, but more than one error is made.

or [1] 78.5 square feet or 25π , but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[52] incorrect procedure.

[53] A

- [4] \$2,950.33 and a correct method is shown, such as area 1204π square feet multiplied by \$0.78.
or [4] Various correct values of π are used that lead to slightly different totals such as \$2,948.84 (if 3.14 is used).
[3] The shaded area is found, such as 1204π (or similar values based on π approximation).
or [3] The correct shaded area is found, but one computational mistake is made in the price, or the final cost is not rounded correctly.
[2] The two separate areas are found but not correctly used.
or [2] An inappropriate formula for areas is shown, but work is carried to an appropriate value.
or [2] Only one appropriate area is found and an appropriate cost is computed.
or [2] The area found is incorrect but calculated to an appropriate cost.
[1] Only one appropriate area is found, either 2500π or 1296π .
or [1] An inappropriate area is found, and one computational mistake is made in calculating the cost.
or [1] \$2,948.84 through \$2,950.33 and no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [54] _____

- a [2] 125.6 or 125.7 (correct for the value of π used) and appropriate work is shown.
[1] The area is left as 40π or the answer is not rounded correctly.
or [1] An appropriate method is shown, but one computational mistake is made.
or [1] The correct areas of both circles are found, but the two areas are not subtracted.
or [1] The circumference formula is used correctly for both circles and the circumferences are subtracted for an answer of 25.1.
or [1] 125.6 or 125.7 and no work is shown.
b [2] 49 and an appropriate explanation is given.
or [2] An appropriate percent for an incorrect part a is found and supported by area formulas.
[1] The answer is left as $\frac{40\pi}{81\pi}$.
or [1] An appropriate fraction for an incorrect part a is found but not given as a percent.
or [1] An appropriate percent for an incorrect part a is found and is supported by circumference formulas.
or [1] 49 and no work is shown.
[0] $\frac{4}{9}$ or 44% and no work is shown.
or [0] 4 is found by subtracting the radii.
or a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [55] _____

[4] 9, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] Appropriate work is shown, and the areas of the rectangle and one circle are found correctly, but the area of the circle is not doubled, but an appropriate number of bags is found.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect formula for the area of a circle, but an appropriate number of bags is found.

or [2] The areas of the rectangle and the circle are found correctly, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] 9, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[56] incorrect procedure.

[57] B _____

[58] A _____