**Perimeter-Area-Volume**

**April 2017**

21. Laura plans to paint the 8-foot-high rectangular walls of her room, and before she buys paint she needs to know the area of the wall surface to be painted. Two walls are 10 feet wide, and the other 2 walls are 15 feet wide. The combined area of the 1 window and the 1 door in her room is 60 square feet. What is the area, in square feet, of the wall surface Laura plans to paint?

1. 200
2. 340
3. 360
4. 390
5. 400

22. The length of a rectangle is 5 inches longer than the width. The perimeter of the rectangle is 40 inches. What is the width of the rectangle, in inches?

1. 7.5
2. 8
3. 15
4. 16
5. 17.5

32. Mikea, an intern with the Parks and Recreation Department, is developing a proposal for the new trapezoidal Springdale Park. The figure below shows her scale drawing of the proposed park with 3 side lengths and the radius of the merry-go-round given in inches. In Mikea’s sale drawing, 1 inch represents 1.5 feet. What is the area, in square inches, of the scale drawing of the park?

1. 448
2. 544
3. 640
4. 672
5. 1,088

33. Mikea, an intern with the Parks and Recreation Department, is developing a proposal for the new trapezoidal Springdale Park. The figure below shows her scale drawing of the proposed park with 3 side lengths and the radius of the merry-go-round given in inches. In Mikea’s sale drawing, 1 inch represents 1.5 feet. Mikea’s proposal includes installing a fence on the perimeter of the park. What is the perimeter, in *feet*, of the park?

1. 84
2. 88
3. 104
4. 126
5. 156

35. The Smith family is planning to build a 3-room cabin which consists of 2 bedrooms (BR) and 1 living room (LR). Shown below are the rectangular floor plan (left-figure) and a side view of the cabin (right-figure). In the side view, the roof forms an isosceles triangle (triangleABC), the walls are perpendicular to the level floor (line)ED, (line)AC parallel (line)ED, F is the midpoint of (line) AC, and (line)BF perpendicular (line)AC. During the week the Smiths plan to roof the cabin, there is a 20% chance of rain each day. Mr. Smith plans to build a 3-foot-wide walkway around the outside of the cabin, as shown in the floor plan. What will be the area, in square feet, of the top surface of the walkway?

1. 171
2. 324
3. 360
4. 396
5. 720

45. Toby wants to find the volume of a solid toy soldier. He fills a rectangular container 8 cm long, 6 cm wide, and 10 cm high with water to a depth of 4 cm. Toby totally submerged the toy soldier in the water. The height of the water with the submerged toy soldier is 6.6 cm. Which of the following is closest to the volume, in cubic centimeters, of the toy soldier?

1. 125
2. 156
3. 192
4. 208
5. 317

46. A box in the shape of a cube has an interior side length of 18 inches and is used to ship a right circular cylinder with a radius of 6 inches and a height of 12 inches. The interior of the box not occupied by the cylinder is filled with packing material. Which of the following numerical expressions gives the number of cubic inches of the box filled with packing material?

1. 6(18)2 - 2π(6)(12) - 2π(6)2
2. 6(18)2 - 2π(6)(12)
3. 183 - π(6)(12)2
4. 183 - π(6)2(12)
5. 183 - π(12)3

47. A room has a rectangular floor that is 15 feet by 21 feet. What is the area of the floor in square *yards*?

A. 24

B. 35

C. 36

D. 105

E. 144

49. The graph of a function y = f(x) consists of 3 line segments. The graph and the coordinates of the endpoints of the 3 line segments are shown in the standard (x,y) coordinate plane below. What is the area, in square coordinate units, of the region bounded by the graph of y = f(x), the positive y-axis, and the positive x-axis?

1. 10
2. 13
3. 14
4. 15
5. 20

**June 2017**

1. The top surface of a rectangular table has an area of 100 square feet and a width of 5 feet. What is the length, in feet, of the surface?

1. 10
2. 15
3. 20
4. 95
5. 500

5. A formula for the volume of a right circular cone is V = ⅓ πr2h, where r is the radius of the base and h is the height of the cone. Using 22/7 as an approximate value for π, which of the following values is closest to the volume, in cubic inches, of a cone with height 28 inches and radius 6 inches?

1. 264
2. 352
3. 1,056
4. 4,224
5. 4,928

18. The rectangle shown in the figure below is partitioned into 3 triangles, 2 of which are shaded. What is the total area, in square inches, of the 2 shaded regions?

1. 20
2. 24
3. 32
4. 40
5. 80

24. A parallelogram has a perimeter of 84 inches, and 1 of its sides measures 16 inches If it can be determined, what are the lengths, in inches, of the other 3 sides?

1. 16, 16, 36
2. 16, 18, 18
3. 16, 26, 26
4. 16, 34, 34
5. Cannot be determined from the given information

25. In the figure below, all of the small squares are equal in area, and the area of rectangle *ABCD* is 1 square unit. Which of the following expressions represents the area, in square units, of the shaded region?

1. ⅙ \* ¼
2. ⅙ \* ¾
3. ⅙ \* ⅚
4. ⅚ \* ¼
5. ⅚ \* ¾

29. Parallelogram *ABCD* is graphed in the standard (x,y) coordinate plane below. Sides (line) AB and (line)CD are each rad 10 coordinate units long. Sides (line)AD and (line)BC are each 5 coordinate unites long. The distance between (line)AD and (line)BC is 3 coordinate units. What is the area, in square coordinate units, of *ABCD*?

1. 5
2. 7.5
3. 10
4. 15
5. 20

43. A 3-inch-tall rectangular box with a square base is constructed to hold a circular pie that has a diameter of 8 inches. Both are shown below. What is the volume, in cubic inches, of the smallest such box that can hold this pie?

\*\*\*\*picture\*\*\*\*\*

1. 24
2. 64
3. 72
4. 192
5. 512

**April 2016**

2. The length of a rectangle is 12 feet. The width of the rectangle is ½ the length. What is the perimeter of the rectangle, in feet?

1. 18
2. 24
3. 30
4. 26
5. 72

12. The dimensions of the rectangle shown below are given in inches. Which of the following expressions gives the area, in square inches, of the rectangle?

\*\*\*\*picture\*\*\*

1. 6x + 2
2. X2 + 3x - 2
3. 2x2 -2
4. 2x2 + 3x - 2
5. 2x2 + 5x + 2

17. In the figure below, all of the small squares are equal in area, and the area of rectangle ABCD is 1 square unit. Which of the following expressions represents the area, in square units, of the shaded region?

\*\*\*\*\*\*\*picture\*\*\*\*

1. 1/10 \* ⅛
2. 1/10 \* ⅞
3. 1/10 \*9/10
4. 9/10 \* ⅛
5. 9/10 \*7/8

31. In the figure shown below, trapezoid *ABCD* is formed by (triangle)*ABC* and (triangle)*ACD*. The lengths are given in inches. What is the area of (triangle)*ABC*, in square inches?

1. 64
2. 66
3. 90
4. 132
5. 150

35. The figure below shows 12 congruent line segments, each determined by a pair of adjacent points. The sum of the lengths of the 12 line segments is 36 centimeters. Each intersection of 4 of the line segments forms 4 right angles. What is the area, in square centimeters, of the shaded region?

\*\*\*\*\*\*picture\*\*\*\*\*\*\*\*

1. 4
2. 6
3. 9
4. 12
5. 16

42. Two concentric circles are shown below. The radius of the larger circle is 10 feet and the radius of the smaller circle is 6 feet. What is the area, in square feet, of the shaded region bounded by the circles?

\*\*\*\*\*\*\*\*\*\*picture\*\*\*\*\*\*

1. 8π
2. 16π
3. 36π
4. 64π
5. 100π

51. The volume of a right circular cone with radius *r* and height *h* is (⅓)πr2h, where *r* and *h* have the same unit of measure. Cones A and B are both right circular cones. The radius of Cone B is 2 times the radius of Cone A. Cone B’s height is ½ Cone A’s height. Compared to the volume of Cone A, the volume of Cone B is:

1. The same
2. ½ as great.
3. ⅔ as great.
4. 2 times as great.
5. 4 times as great.

**June 2016**

5. The total surface area, *T,* of any right circular cone with a radius *r* and a slant height *s*, such as the cone shown below, can be determined by using the formula T = πr2 + πrs. If a cone has a 3-inch radius and a 5-inch slant height, what is its total surface area, in square inches?

\*\*\*\*\*\*picture\*\*\*\*\*

1. 18π
2. 24π
3. 40π
4. 75π
5. 135π

12. A rectangular box that is 1/9 foot deep, 1 foot wide, and 1 foot long has a volume of how many cubic feet?

1. 1/9
2. 1
3. 2 1/9
4. 9
5. 81

23. What is the area, in square coordinate units, of parallelogram *ABCD* shown in the standard (x,y) coordinate plane below?

\*\*\*\*\*picture\*\*\*\*\*\*\*\*

1. 14
2. 16
3. 28
4. 40
5. 45

36. Square *ABCD*, shown below, has side length 5 meters. The square is divided into 25 nonoverlapping congruent squares. Point *P* is the center of *ABCD*. The perimeter of 1 of the 25 congruent squares is how many meters?

a. 1

b. 4

c. 5

d. 20

e. 25

50. What fraction of a 6-inch-diameter pizza contains the same amount of pizza as 1 slice of a 12-inch-diameter pizza of the same thickness cut into 12 equal slices?

1. ¼
2. ⅓
3. ½
4. ⅔
5. 1

**December 2016**

15. In the figure below, all of the small squares are equal in area, and the area of rectangle ABCD is 1 square unit. Which of the following expressions represents the area, in square units of the shaded region?

\*\*\*\*\*picture\*\*\*\*\*\*

1. ⅛ \* ⅙
2. ⅛ \* ⅚
3. ⅛ \* ⅞
4. ⅞ \* ⅙
5. ⅞ \* ⅚

19. A scale drawing of Corinne’s bedroom floor is shown below. All given dimensions are in feet, and all intersecting line segments shown are perpendicular. Corinne wants to completely cover the floor with square hardwood tiles. Each tile has a side length of 1 foot, and no tiles will be cut. How many tiles will Corinne need to cover the floor?

\*\*\*\*\*picture\*\*\*\*\*

1. 63
2. 69
3. 74
4. 79
5. 84

25. Matt purchased a 60-foot-long roll of chain-link fence. He used the entire roll of fence to construct a rectangular pen for his dog. Given that the pen is 12 feet wide, what is its length, in feet?

1. 5
2. 18
3. 24
4. 36
5. 48

27. A rectangle is 3rad5 meters wide and 5rad5 meters long. What is the area, in square meters, of the rectangle?

1. 75
2. 16rad5
3. 15rad5
4. 8rad10
5. 8rad5

36. Erika is landscaping her front yard. The yard, which is level, has the shape of a rectangle that is 60 feet wide by 80 feet long. To cover the yard with a layer of topsoil having a uniform depth of 4 inches (⅓ foot). Erika needs to use how many cubic feet of topsoil?

1. 1,600
2. 1,920
3. 4,800
4. 14,400
5. 19,200

39. The figure below shows the top view of the Santana family’s house and yard. The Santana’s rectangular house is 40 feet wide and 30 feet long, and their rectangular yard is 75 feet wide and 100 feet long. The Santanas have a rectangular garden in the back corner of their yard that is 30 feet wide and 25 feet long. The garden currently contains 48 flower bulbs: 10 tulip bulbs, 18 daffodil bulbs, and 20 crocus bulbs. The yard will be enclosed by a fence and the back side of the house. The fence will begin at one back corner of the house and will end at the other. What is the minimum number of feet of fencing needed to enclose the yard?

1. 215
2. 275
3. 310
4. 315
5. 350

49. In the figure below, ABCD is a trapezoid with (line)AE perpendicular to (line)AB; (line) AE is 10 units long; and (line) DC is 28 units long. IF the area of right triangle (triangle)EBA is 60 square units, what is the area, in square units, of trapezoid ABCD?

\*\*\*\*\*picture\*\*\*\*\*\*

1. 140
2. 170
3. 180
4. 200
5. 240

**April 2015**

28. The rectangular deck on Sachi’s house has a width of 4 yards and a length of 6 years. Sachi remodels the deck by increasing both the length and width by the same amount. The area of her new deck is twice the area of her original deck. What is the length, in yards, of Sachi’s new deck?

1. 2
2. 6
3. 8
4. 12
5. 18

48. The figure shown below is composed of a rectangle and a semicircle. Points A and B are endpoints of both a side of the rectangle and a diameter of the semicircle. What is the perimeter, in feet, of the figure?

\*\*\*\*\*picture \*\*\*

1. 3π + 20
2. 3π + 22
3. 6π + 14
4. 6π + 28
5. 9π + 48

49. What is the area, in square inches, of the parallelogram shown below?

\*\*\*picture\*\*\*

1. 42
2. 50
3. 55
4. 60
5. 75

52. A can of soda pop has the shape of a right circular cylinder with an inside height of 6 inches and an inside diameter of 2 inches. When you pour the soda pop from the full can into a cylindrical glass with an inside diameter of 3 inches, about how many inches high is the soda pop in the glass? (Note: The volume of a right circular cylinder is πr2rh.)

1. 2 ⅔
2. 4
3. 5
4. 6 ⅔
5. 8

55. A storage facility is currently offering a special rate to customers who sign contracts for 6 months or more. According to this special rate, the first month’s rent is $1, and for each month after the first month, customer pay the regular monthly rental rate. The table below shows the storage unit sizes available, the floor dimensions, and the regular monthly rental rate. All the units have the same height. Size 5 units can be subdivided to form other sizes of units. What is the greatest number of Size 1 units that can be formed from a single Size 5 unit?

A. 2

B. 4

C. 8

D. 10

E. 16

**June 2015**

17. A company ships notepads in rectangular boxes that each have inside dimensions measuring 9 inches long, 9 inches wide, and 12 inches tall. Each notepad is in the shape of a cube with an edge length of 3 inches. What is the maximum number of notepads that will fit in 1 closed box?

A. 10

B. 11

C. 12

D. 22

E. 36

20. The floor plan of Helena’s kitchen is shown in the figure below; the given dimensions are in feet. Helena will install baseboard along the bottom of each wall (shown by solid lines in the floor plan). According to the floor plan, which of the following distances is closest to the perimeter, in feet, of Helena’s kitchen?

\*\*\*\*picture\*\*\*\*

1. 40
2. 50
3. 60
4. 100
5. 120

21. A 5-inch-by-7-inch photograph was cut to fit exactly into a 4-inch-by-6-inch-frame. What is the area, in square inches, of the part of the photograph that was cut off?

1. 2
2. 10
3. 11
4. 12
5. 24

32. For (triangle)ABC shown below, base (line)AC has a length of 16 inches and altitude (line)BD has a length of 8 inches. The area of a certain square is equal to the area of (triangle)ABC. What is the length, in inches, of a side of the square?

\*\*\*picture\*\*

1. 6
2. 8
3. 12
4. 16
5. 32

40. A sphere with radius x inches has a volume of 12 cubic inches. What is the value of x? (Note: The volume of a sphere with radius r is (4/3)πr3.)

1. 1/π
2. 3/π
3. cuberoot(9/π)
4. cuberoot(16/π)
5. cuberoot(9π)

**December 2015**

12. In the Coaltown High School cafeteria, the student council is laying a triangular carpet in a corner that is designated to be a lounge. The carpet is a right triangle with the 2 shorter sides having lengths of 12 feet and 8 feet, as shown in the figure below. What is the area, in square feet, of the carpet?

\*\*\*\*\*picture\*\*\*\*\*

1. 10
2. 20
3. 40
4. 48
5. 96

16. The perimeter of a parallelogram is 80 inches, and the length of 1 side is 16 inches. If it can be determined, what are the lengths, in inches, of the other 3 sides?

1. 16, 16, 16
2. 16, 16, 32
3. 16, 24, 24
4. 16, 32, 32
5. Cannot be determined from the given information

23) The length of a rectangle is 12 feet longer than the rectangle’s width. The area of the rectangle is 140 square feet. The width of the rectangle, *w* feet, is the positive solution to which of the following equations?

1. *w*2= 140
2. *w*(*w* + 12) = 140
3. *w*(*w* - 12) = 140
4. 2*w* + 2(*w* + 12) = 140
5. 2*w* + 2(*w*- 12) = 140

30. Javier will have a pool installed in his backyard. The interior of the pool is a right circular cylinder with a uniform depth of 5 feet and a radius of 8 feet. The maximum volume of water that can be in the pool is 75% of the volume of the pool. Which of the following values is closest to the maximum number of cubic feet of water that can be in the pool?

1. 0.75π(82)(5)
2. 0.75π(52)(8)
3. 0.75[5(8)]2
4. (82)(5)π-75
5. (52)(8)π-75

45. A cube has a total surface area of 216 square centimeters. Which of the following expressions gives the area, in square centimeters, of a single face of the cube?

1. Rad216
2. Cuberoot216
3. (216/6) \* (216/6)
4. 216/6
5. 216/4

49. In trapezoid *ABCD* illustrated below, (line)AB is 8 units long, (line)CD is 12 units long, and (line)EF is 6 units long. Also, (angle)AEF and (angle)DFE are right angles. What is the area of *ABCD*, in square units?

\*\*\*\*\*\*\*picture\*\*\*\*\*\*\*

1. 60
2. 72
3. 84
4. 120
5. 288

54. The dimensions shown below are in feet. What is the area, in square feet, of the shaded rectangle?

\*\*\*\*\*\*picture\*\*\*\*\*\*

1. 2x2
2. 2x2-48x+216
3. 2x2-42x+216
4. 216 - 2x2
5. 216 - 3x