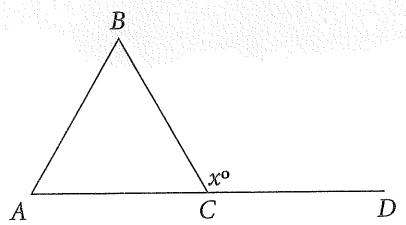
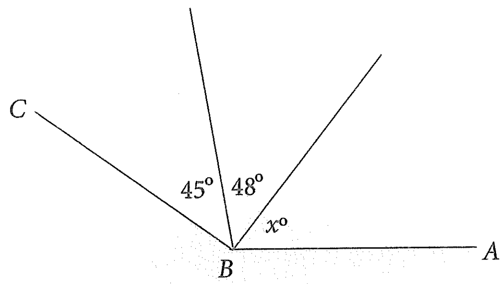
PRACTICE QUESTIONS



1. In the figure above, segments *AB*, *BC*, *CD*, and *AC* are all equal. What is the value of *x*?

   (A) 30
   (B) 45
   (C) 60
   (D) 90
   (E) 120



2. If the measure of angle *ABC* is 145°, what is the value of *x*?

   (A) 39
   (B) 45
   (C) 52
   (D) 55
   (E) 62

3. If the perimeter of a square is 32 meters, what is the area of the square, in square meters?

   (A) 16
   (B) 32
   (C) 48
   (D) 56
   (E) 64

4. In triangle *XYZ* the measure of angle *Y* is twice the measure of angle *X*, and the measure of *Z* is three times the measure of angle *X*. What is the degree measure of angle *Y*?

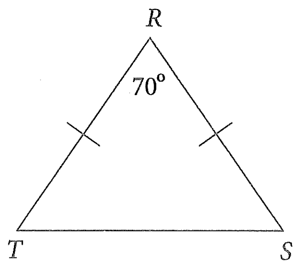
   (A) 15
   (B) 30
   (C) 45
   (D) 60
   (E) 90

5. The perimeter of triangle *ABC* is 24. If $AB = 9$ and $BC = 7$, then $AC =$

   (A) 6
   (B) 8
   (C) 10
   (D) 15
   (E) 17

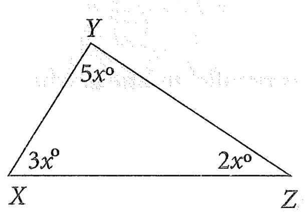
6. If the perimeter of an equilateral triangle is 150, what is the length of one of its sides?

(A) 35
(B) 40
(C) 50
(D) 75
(E) 100



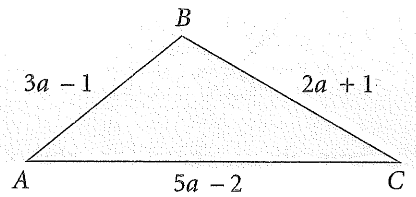
7. In triangle *RST*, if *RS* = *RT*, what is the degree measure of angle *S*?

(A) 40
(B) 55
(C) 70
(D) 110
(E) It cannot be determined from the information given.



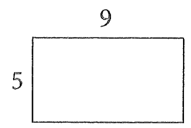
8. In triangle *XYZ*, what is the degree measure of angle *YXZ*?

(A) 18
(B) 36
(C) 54
(D) 72
(E) 90



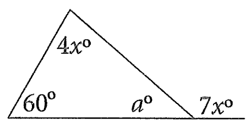
9. If the perimeter of triangle *ABC* is 18, what is the length of *AC*?

(A) 2
(B) 4
(C) 5
(D) 6
(E) 8



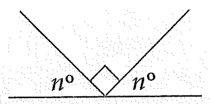
10. What is the area, in square units, of a square that has the same perimeter as the rectangle above?

(A) 25
(B) 36
(C) 49
(D) 64
(E) 81



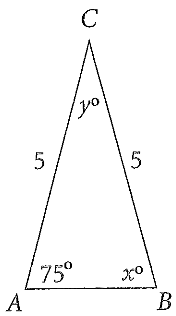
11. What is the value of *a* in the figure above?

(A) 20
(B) 40
(C) 60
(D) 80
(E) 140



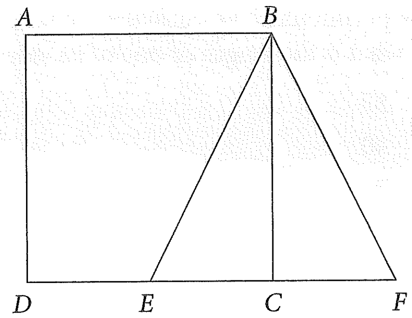
12. In the figure above, what is the value of n?

(A) 30
(B) 60
(C) 45
(D) 90
(E) 135



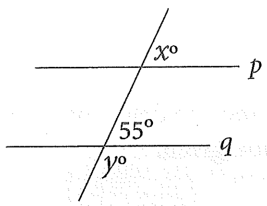
13. In the figure above, what is the value of $x - y$?

(A) 30
(B) 45
(C) 75
(D) 105
(E) 150



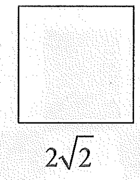
14. A square and a triangle are drawn together as shown above. The perimeter of the square is 64 and $DC = EF$. What is the area of triangle BEF?

(A) 32
(B) 64
(C) 128
(D) 256
(E) It cannot be determined from the information given.



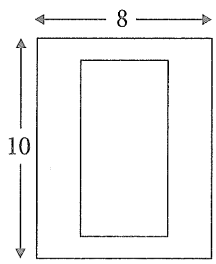
15. If line p is parallel to line q, what is the value of $x + y$?

(A) 90
(B) 110
(C) 125
(D) 180
(E) 250



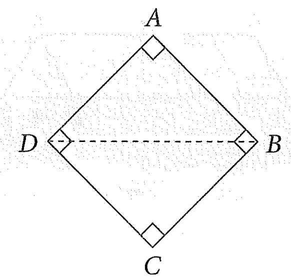
16. What is the area of the square above?

(A) 4
(B) $4\sqrt{2}$
(C) 8
(D) 16
(E) 24



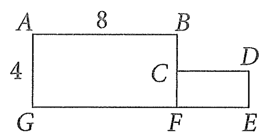
17. What is the area of the frame in the figure above if the inside picture has a length of 8 and a width of 4?

(A) 4
(B) 8
(C) 16
(D) 24
(E) 48



18. In the figure above, *ABCD* is a square, and the area of triangle *ABD* is 8. What is the area of square *ABCD*?

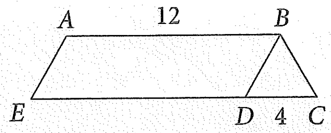
(A) 2
(B) 4
(C) 8
(D) 16
(E) 64



Note: Figure not drawn to scale.

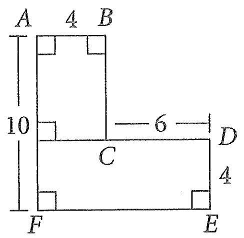
19. In the figure above, *ABFG* and *CDEF* are rectangles, *CD* bisects *BF*, and *EF* has a length of 2. What is the area of the entire figure?

(A) 4
(B) 16
(C) 32
(D) 36
(E) 72



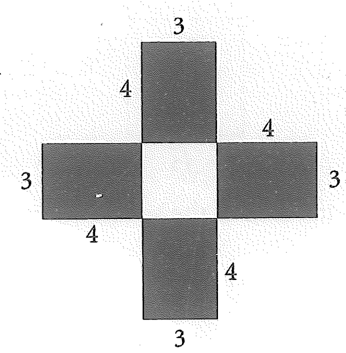
20. In the figure above, *ABDE* is a parallelogram, and *BCD* is an equilateral triangle. What is the perimeter of *ABCE*?

(A) 12
(B) 16
(C) 24
(D) 32
(E) 36



21. In the figure above, what is the perimeter of *ABCDEF*?

(A) 14
(B) 24
(C) 28
(D) 38
(E) 40



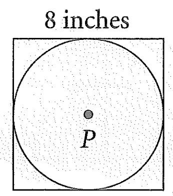
22. If the shaded regions are 4 rectangles, what is the area of the unshaded region?

(A) 9
(B) 12
(C) 16
(D) 19
(E) 20

Note: Figure not drawn to scale.

23. In the figure above, *AB* is twice the length of *BC*, *BC* = *CD*, and *DE* is triple the length of *CD*. If *AE* = 49, what is the length of *BD*?

(A) 14
(B) 21
(C) 28
(D) 30
(E) 35

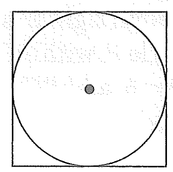


24. In the figure above, circle P is inscribed in a square with sides of 8 inches. What is the area of the circle?

    (A) 4π square inches
    (B) 16 square inches
    (C) 8π square inches
    (D) 16π square inches
    (E) 32π square inches

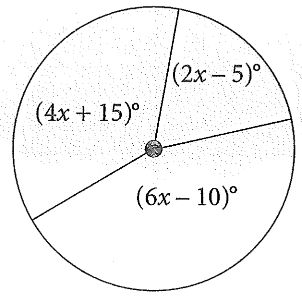
25. What is the radius of a circle whose circumference is 36π?

    (A) 3
    (B) 6
    (C) 8
    (D) 18
    (E) 36



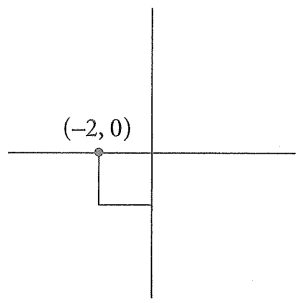
26. If the perimeter of the square is 36, what is the circumference of the circle?

    (A) 6π
    (B) 9π
    (C) 12π
    (D) 15π
    (E) 18π



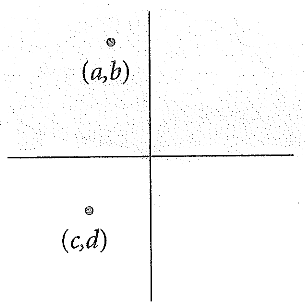
27. In the figure above, what is the value of x?

    (A) 15
    (B) 30
    (C) 55
    (D) 70
    (E) 135



28. In the figure above, a square is graphed on the coordinate plane. If the coordinates of one corner are $(-2, 0)$, what is the area of the square?

    (A) $\frac{1}{4}$
    (B) 1
    (C) 2
    (D) 4
    (E) 16

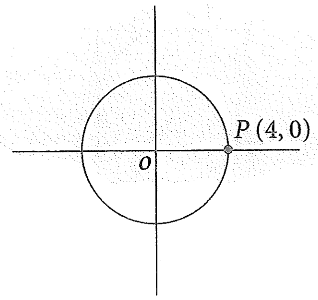


29. Points (a, b) and (c, d) are graphed in the coordinate plane as shown above. Which of the following statements MUST be true?

    (A) $bd > ac$
    (B) $c > ad$
    (C) $b > acd$
    (D) $bc > ad$
    (E) It cannot be determined from the information given.

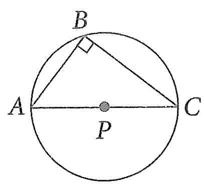
30. What is the distance from the point (0, 6) to the point (0, 8) in a standard coordinate plane?

    (A) 2
    (B) 7
    (C) 10
    (D) 12
    (E) 14



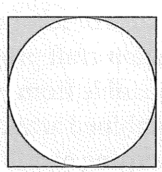
31. Circle O above has its center at the origin. If point P lies on circle O, what is the area of circle O?

    (A) 4π
    (B) 8π
    (C) 10π
    (D) 12π
    (E) 16π



32. In the figure above, right triangle ABC is inscribed in circle P, with AC passing through center P. If $AB = 6$, and $BC = 8$, what is the area of the circle?

    (A) 10π
    (B) 14π
    (C) 25π
    (D) 49π
    (E) 100π



33. In the figure above, a circle is inscribed within a square. If the area of the circle is 25π, what is the perimeter of the shaded region?

(A) $40 + 5\pi$

(B) $40 + 10\pi$

(C) $100 + 10\pi$

(D) $100 + 25\pi$

(E) $40 + 50\pi$

34. What is the slope of the line that contains points (3, –5) and (–1, 7)?

(A) -3

(B) $-\frac{1}{3}$

(C) $-\frac{1}{4}$

(D) $\frac{1}{3}$

(E) 3

35. If the circumference of a circle is 16π, what is its area?

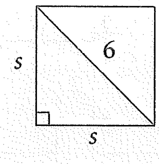
(A) 8π

(B) 16π

(C) 32π

(D) 64π

(E) 256π



36. What is the area of the square above with diagonals of length 6?

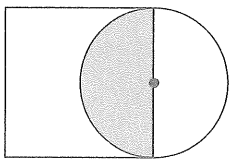
(A) 9

(B) 12

(C) $9\sqrt{2}$

(D) 15

(E) 18



37. A square and a circle are drawn as shown above. The area of the square is 64. What is the area of the shaded region?

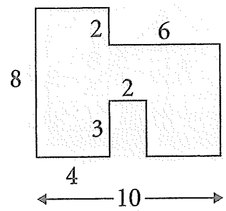
(A) 4π

(B) 8π

(C) 16π

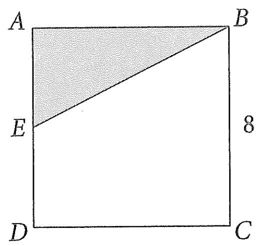
(D) 32π

(E) It cannot be determined from the information given.



38. What is the area of the polygon above if each corner of the polygon is a right angle?

(A) 40
(B) 62
(C) 68
(D) 74
(E) 80



39. *ABCD* is a square. If *E* is the midpoint of *AD*, what is the area of the shaded region?

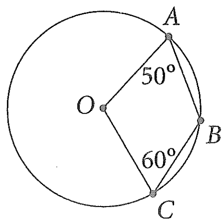
(A) 8
(B) 12
(C) 16
(D) 24
(E) 32

40. Circle *A* has radius $r + 1$. Circle *B* has radius $r + 2$. What is the positive difference between the circumference of circle *B* and the circumference of circle *A*?

(A) 1
(B) 2π
(C) $2\pi + 3$
(D) $2\pi r + 3$
(E) $2\pi(2r + 3)$

41. Erica has 8 squares of felt, each with an area of 16. For a certain craft project, she cuts the largest circle possible from each square of felt. What is the combined area of the excess felt left over after cutting out all the circles?

(A) $4(4 - \pi)$
(B) $8(4 - \pi)$
(C) $8(\pi - 2)$
(D) $32(4 - \pi)$
(E) $8(16 - \pi)$



42. In the figure above, points *A*, *B*, and *C* lie on the circumference of the circle centered at *O*. If $\angle OAB$ measures 50° and $\angle BCO$ measures 60°, what is the degree measure of $\angle AOC$?

(A) 110
(B) 125
(C) 140
(D) 250
(E) It cannot be determined from the information given.

PRACTICE QUESTION ANSWERS

1. E

Since $AB = BC = AC$, triangle ABC is equilateral. Therefore, all of its angles are 60°. Since angle BCD or x is supplementary to angle BCA, a 60° angle, the value of x is 180 – 60 or 120.

2. C

Since the degree measure of angle ABC is 145, $45 + 48 + x = 145$, $93 + x = 145$, and $x = 52$.

3. E

A square has four equal sides, so its perimeter is equal to $4s$, where s is the length of a side of the square. Its perimeter is 32, so its side length is $32 \div 4 = 8$. The area of a square is equal to s^2, so the area of the square is 8^2 or 64.

4. D

In any triangle, the measures of the three interior angles sum to 180°, so $X + Y + Z = 180$. Since the measure of angle Y is twice the measure of angle X, $Y = 2X$. Similarly, $Z = 3X$. So $X + 2X + 3X = 180$, $6X = 180$ and $X = 30$. Since $Y = 2X$, the degree measure of angle Y is $2 \times 30 = 60$.

5. B

The perimeter of a triangle is the sum of the lengths of its sides, in this case, $AB + BC + AC$. The perimeter of triangle ABC is 24, so plugging in the given values, $9 + 7 + AC = 24$, $16 + AC = 24$, and $AC = 8$.

6. C

In an equilateral triangle, all three sides have equal length. The perimeter of a triangle is equal to the sum of the lengths of its three sides. Since all three sides are equal, each side must be $\frac{1}{3}$ of 150, or 50.

7. B

Since RS and RT are equal, the angles opposite them must be equal. Therefore, angle T = angle S. Since the three angles of a triangle sum to 180, 70 + angle S + angle T = 180 and angle S + angle T = 110. Since the two angles, S and T, are equal, each must be half of 110, or 55.

8. C

The three interior angles of a triangle add up to 180 degrees, so $2x + 3x + 5x = 180$, $10x = 180$ degrees and $x = 18$. So angle YXZ has a degree measure of $3x = 3(18) = 54$.

9. E

The perimeter of triangle ABC is 18, so $AB + BC + AC = 18$. Plugging in the algebraic expressions given for the length of each side, you get:

$$\begin{aligned}(3a-1)+(2a+1)+(5a-2) &= 18\\ 10a-2 &= 18\\ 10a &= 20\\ a &= 2\end{aligned}$$

The length of AC is given as $5a - 2$, so $AC = 5(2) - 2 = 8$.

10. C

The perimeter of a rectangle is $2(\ell + w)$, where ℓ represents its length and w its width. The perimeter of this rectangle is $2(9 + 5) = 28$. A square has four equal sides, so a square with a perimeter of 28 has sides of length 7. The area of a square is equal to the length of a side squared, so the area of a square with a perimeter of 28 is 7^2 or 49.

11. B

An exterior angle of a triangle equals the sum of the two remote interior angles. So $7x = 4x + 60$, $3x = 60$, and $x = 20$. So the angle marked $7x°$ has a degree measure of $7(20) = 140$. The angle marked $a°$ is supplementary to this angle, so its measure is $180 - 140 = 40$.

12. C

We are given a right angle, so that is 90°. A straight angle contains 180°, so $2n + 90 = 180$, $2n = 90$, and $n = 45$.

13. B

Since $AC = CB$, the angles opposite these sides are equal as well. So angle CAB = angle CBA, and $x = 75$. The three interior angles of a triangle sum to 180 degrees, so $2(75) + y = 180$ and $y = 30$. The question asks for the value of $x - y$, or $75 - 30 = 45$.

14. C

The area of a triangle is equal to $\frac{1}{2}bh$. In triangle BEF, the height is BC and the base is EF. The square's perimeter is 64, so each of its sides is a fourth of 64, or 16. Therefore, $BC = 16$. The question also states that $DC = EF$, so $EF = 16$ as well. Plugging into the formula, the area of triangle BEF is $\frac{1}{2}(16 \times 16) = 128$.

15. D

When parallel lines are crossed by a transversal, all acute angles formed are equal, and all acute angles are supplementary to all obtuse angles. So in this diagram, the obtuse angle measuring $y°$ is supplementary to the acute angle measuring $x°$, so $x + y = 180$.

16. C

The area of a square is equal to the square of one of its sides. In this case, the square has a side length of $2\sqrt{2}$, so its area is $(2\sqrt{2})^2$ or $2 \times 2 \times \sqrt{2} \times \sqrt{2}$ or $4 \times 2 = 8$.

17. E

To find the area of the frame, find the area of the frame and picture combined (the outer rectangle) and subtract from it the area of the picture (the inner rectangle). The outer rectangle has area $10 \times 8 = 80$, the inner rectangle has area $8 \times 4 = 32$, so the area of the frame is $80 - 32 = 48$.

18. D

Diagonal BD divides square $ABCD$ into two identical triangles. If the area of triangle ABD is 8, the area of the square must be twice this, or 16.

19. D

The area of the entire figure is equal to the area of rectangle $ABFG$ plus the area of rectangle $CDEF$. The area of $ABFG$ is $8 \times 4 = 32$. So the area of the entire figure must be greater than 32, and at this point you can eliminate (A), (B), and (C). Since BF has length 4, and C bisects BF, CF has length 2. The question states that EF has length 2, so $CDEF$ is actually a square, and its area is 2^2 or 4. So the area of the entire figure is $32 + 4 = 36$, choice (D).

20. E

The perimeter of $ABCE$ is equal to $AB + BC + CD + DE + EA$. Since triangle BCD is equilateral, $BC = CD = BD = 4$. Because $ABDE$ is a parallelogram, $AB = DE = 12$ and $BD = EA = 4$. Therefore, the perimeter of $ABCE$ is $12 + 4 + 4 + 12 + 4 = 36$, choice (E).

21. E

Simply add the six sides of the L-shaped figure. Four of them are labeled, and you can use these to figure out the remaining two. The length of side *EF* must be equivalent to the sum of sides *AB* and *CD*, so $4 + 6 = 10$ and $EF = 10$. The length of side *BC* is equivalent to the difference between sides *AF* and *DE*, so $10 - 4 = 6$ and $BC = 6$. Therefore, the perimeter is $10 + 10 + 4 + 6 + 6 + 4 = 40$.

22. A

Each of the shaded rectangles has a side of length 3 opposite the side contributing to the interior unshaded region. So the interior region, a square, has an area of 3^2, or 9.

23. A

Let $BC = x$. *AB* has twice the length of *BC*, so it is $2x$. $BC = CD$, so $CD = x$. *DE* is three times the length of *CD*, or $3x$. Since $AE = 49$, $2x + x + x + 3x = 49$, $7x = 49$, and $x = 7$. *BD* is composed of segments *BC* and *CD*, so its length is $7 + 7 = 14$.

24. D

Since circle *P* is inscribed within the square, its diameter is equal in length to a side of the square. Since the circle's diameter is 8, its radius is half this, or 4. Area of a circle = πr^2, where r is the radius, so the area of circle *P* is $\pi(4)^2 = 16\pi$ square inches.

25. D

Circumference of a circle = $2\pi r$, where r is the radius of the circle. So a circle with a circumference of 36π has a radius of $\frac{36\neq}{2\neq} = 18$.

26. B

The perimeter of the square is 36, and since all four sides are equal, one side has length 9. Since the circle is inscribed in the square, its diameter is equal in length to a side of the square, or 9. Circumference is πd, where d represents the diameter, so the circumference of the circle is 9π.

27. B

A circle contains 360°, so:

$$\begin{aligned}(4x + 15) + (2x - 5) + (6x - 10) &= 360\\ 4x + 2x + 6x + 15 - 5 - 10 &= 360\\ 12x &= 360\\ x &= 30\end{aligned}$$

28. D

The area of a square is equal to the square of the length of one of its sides. Since one vertex (corner) of the square lies on the origin at (0, 0) and another vertex lies on the point (–2, 0), the length of a side of the square is the distance from the origin to the point (–2, 0). This can be found by calculating the absolute value of the difference between the x-coordinates of the points, namely $|-2 - 0| = |-2| = 2$. Therefore, the area of the square is $2^2 = 4$.

29. C

While there's no way to determine the numerical values of a, b, c, or d, from their positions on the coordinate plane, you do know that a is negative, b is positive, c is negative, and d is negative. Bearing in mind that a negative times a negative is a positive, consider each answer choice. (C) is indeed true: b, which is positive, is greater than the product acd, which is negative.

30. A

The points (0, 6) and (0, 8) have the same x-coordinate. That means that the segment that connects them is parallel to the y-axis. Therefore, all you have to do to figure out the distance is subtract the y-coordinate and find the absolute value of the difference. $|8 - 6| = 2$, so the distance between the points is 2.

31. E

OP is the radius of the circle. Since O has coordinates (0, 0), the length of OP is $|4 - 0| = |4| = 4$. The area of a circle is πr^2 where r is the radius, so the area of circle O is $\pi(4)^2 = 16\pi$.

32. C

Right triangle ABC has legs of 6 and 8, so the legs are in a ratio of 3:4 and the triangle is a multiple of the 3-4-5 right triangle. Since the $3 \times 2 = 6$ and $4 \times 2 = 8$, double the hypotenuse length of 5, and the hypotenuse of triangle ABC equals 10. Notice that the hypotenuse is also the diameter of the circle. To find the area of the circle, we need its radius. Radius is half the diameter, so the radius of circle P is 5. The area of a circle is πr^2 where r is the radius, so the area of circle P is $\pi(5)^2 = 25\pi$.

33. B

The area of a circle is πr^2 where r is the radius, and since the area of the circle is 25π, its radius is 5. Circumference is equal to $2\pi r$, or $2\pi(5) = 10\pi$. Only (B) and (C) contain 10π, so you can eliminate (A), (D), and (E). Since the circle is inscribed within the square, its diameter is equal to a side of the square. The diameter of the circle is $2r$ or 10, so a side of the square is 10 and its perimeter is $4(10) = 40$. Therefore, the perimeter of the shaded region is $40 + 10\pi$, choice (B).

34. A

Slope of a line is defined by the formula $\frac{y_2 - y_1}{x_2 - x_1}$, where (x_1, y_1) and (x_2, y_2) represent two points on the line. Substitute the given coordinates into the formula (it doesn't matter which you designate as point 1 or point 2; just be consistent):

$$\begin{aligned} \text{slope} &= \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-(-5)}{-1-3} \\ &= \frac{12}{-4} \\ &= -3 \end{aligned}$$

35. D

The circumference of a circle is $2\pi r$, where r is the radius, so a circle whose circumference is 16π has a radius of $\frac{16\cancel{\pi}}{2\cancel{\pi}} = 8$. The area of a circle is πr^2, so in this case the area is $\pi(8)^2 = 64\pi$, (D).

36. E

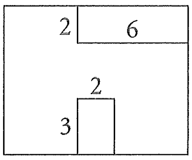
Since all sides of a square are equal, notice that the diagonal of the square is also the hypotenuse of an isosceles right triangle. Use this information to determine the length of a side of the square, marked s in the figure. The ratio of the sides in such a triangle is $x:x:x\sqrt{2}$. Since $x\sqrt{2}$ represents the hypotenuse, which is equal to 6, solve the equation $x\sqrt{2} = 6$. Divide by $\sqrt{2}$ to get $x = \frac{6}{\sqrt{2}}$. So the length of a side of the square is $\frac{6}{\sqrt{2}}$. The area of a square is therefore $\left(\frac{6}{\sqrt{2}}\right)^2 = \frac{36}{2} = 18$.

37. B

The shaded region represents one-half the area of the circle. Find the length of the radius to determine this area. Notice that the diameter of the circle is equal to a side of the square. Since the area of the square is 64, it has a side length of 8 (because $8^2 = 64$). So the diameter of the circle is 8, and its radius is 4. The area of the circle is πr^2, or $\pi(4)^2 = 16\pi$. This isn't the answer though; the shaded region is only half the circle, so its area is 8π.

38. B

Think of the figure as a rectangle with two rectangular bites taken out of it. Sketch in lines to make one large rectangle (see diagram below):



Now find the area of the large rectangle, and subtract the areas of the two rectangular pieces that weren't in the original figure. The area of a rectangle is length times width. Since the length of the large rectangle is 10, and its width is 8, its area is $10 \times 8 = 80$. The rectangular bite taken out of the top right corner has dimensions 6 and 2, so its area is 6×2 or 12. The bite taken out of the bottom has dimensions 2 and 3, so its area is $2 \times 3 = 6$. To find the area of the polygon, subtract the areas of the two bites from the area of the large rectangle: $80 - (12 + 6) = 80 - 18 = 62$, (B).

39. C

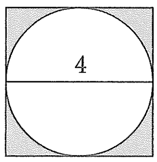
Since *ABCD* is a square, all four sides have the same length, and the corners meet at right angles. The area you're looking for is that of a triangle, and since all corners of the square are right angles, angle *EAB* is a right angle, which makes triangle *EAB* a right triangle. The area of a right triangle is $\frac{1}{2}(\text{leg}_1)(\text{leg}_2)$. The diagram shows that *BC* has length 8, so $AB = AD = 8$. Point *E* is the midpoint of *AD*, so *AE* is 4. Now that you have the lengths of both legs, you can substitute into the formula: $\frac{1}{2}(AB)(AE) = \frac{1}{2}(8)(4) = 16$, (C).

40. B

The circumference of a circle is equal to $2\pi r$, where r is the radius. The circumference of circle *A* is $2\pi(r + 1) = 2\pi r + 2\pi$. The circumference of circle *B* is $2\pi(r + 2) = 2\pi r + 4\pi$. So the positive difference between the two circumferences is simply 2π.

41. D

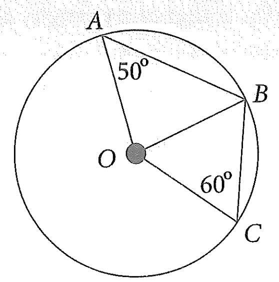
A square with area 16 has sides of length 4. Therefore, the largest circle that could possibly be cut from such a square would have a diameter of 4.



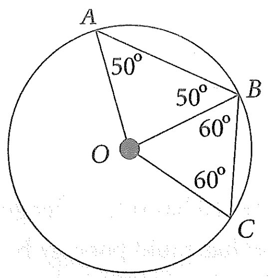
Such a circle would have a radius of 2, making its area $\pi(2)^2 = 4\pi$. So the amount of felt left after cutting such a circle from one of the squares of felt would be $16 - 4\pi$, or $4(4 - \pi)$. There are 8 such squares, so the total area of the leftover felt is $8 \times 4(4 - \pi) = 32(4 - \pi)$, (D).

42. C

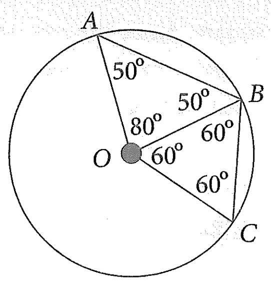
The key to solving this problem is to draw in *OB*:



Because *OA*, *OB*, and *OC* are all radii of the same circle, triangle *AOB* and triangle *BOC* are both isosceles triangles, each therefore having equal base angles:



Using the fact that the three interior angles of a triangle add up to 180°, you can figure out that the vertex angles measure 80° and 60° as shown:



Angle *AOC* measures 80 + 60 = 140, (C).