ACT Math Homework
Math 2
60 Minutes — 60 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problem you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

DO YOUR FIGURING HERE.

1. There exists a line of the form $2y = 10x + 8$; another line parallel to this line would have a slope equal to what?

   A. -10
   B. $-1/5$
   C. 5
   D. 10
   E. 20

2. The width of a square is increased by 2 inches and the length by 3 to give a rectangle. If each side of the original square was n inches long, what is the area of the rectangle in terms of n?

   F. $6n$
   G. $2n + 3n$
   H. $6n^2$
   J. $n^2 + 5n + 6$
   K. $n^2 + 6n + 5$

3. A circle has its center at the origin with radius of $3\sqrt{2}$. If a line traces the circumference of the circle from the point $(3\sqrt{2}, 0)$ to the point $(-3, 3)$, how many degrees has the line traced over?

   A. 135°
   B. 120°
   C. 105°
   D. 90°
   E. 45°

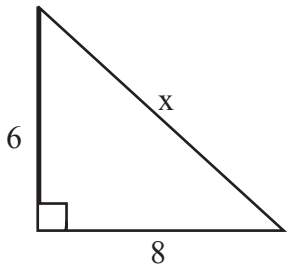
DO YOUR FIGURING HERE.

4. Two similar triangles have angle measures 30°, 60°, 90°. If the side opposite the 60° angle is $2\sqrt{3}$ in the first triangle and $\sqrt{3}$ in the second triangle, how many times larger is the area of the first than the second?

   F. 1
   G. $\sqrt{3}$
   H. 2
   J. 3
   K. 4

5. In the triangle below, side x is equal to what value?

   A. 7
   B. 8
   C. 10
   D. 12
   E. 13

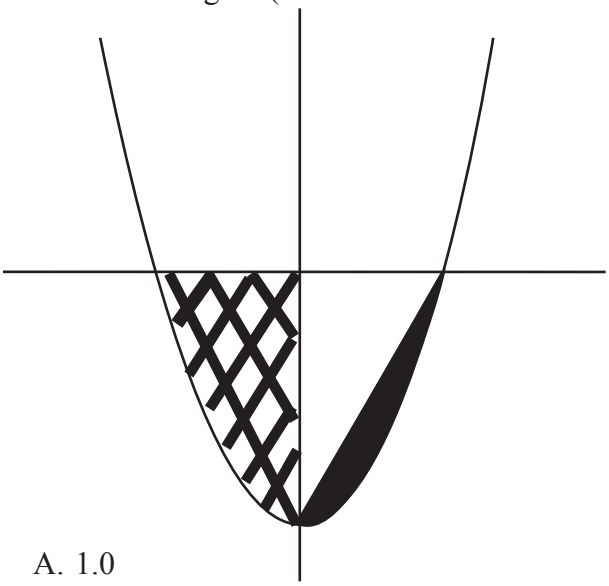


6. Given $\sin\theta = 0.5$ and $\cos\theta = \frac{(\sqrt{3})}{2}$, what does $\tan\theta$ equal?

   F. $\frac{\sqrt{3}}{3}$
   G. $\frac{\sqrt{2}}{2}$
   H. $\sqrt{3}$
   J. $2\sqrt{3}$
   K. $4\sqrt{3}$

7. If the equation of the parabola is $y = \left(\frac{x^2}{2}\right) - 4$ and the area of the lined region is 7.5 units^2, what is the area of the shaded region (rounded to the nearest tenth)?

DO YOUR FIGURING HERE.



A. 1.0
B. 1.8
C. 2.8
D. 4.2
E. 5.7

8. In the x-y plane, point P has coordinates (-5, y). If the length of the line segment from the origin to point P is 13 units, what is the value of y, given that $y > 0$?

F. 144
G. 15
H. 13
J. 12
K. 11

9. An isosceles right triangle is inscribed in a circle with sides a, a, and b. Which of the following must be true?

A. $a > b$
B. $b > 2a$
C. $b < 0$
D. $b > a$
E. $a^2 + b^2 = a^2$

10. A circle has circumference equal to 10π. What is the area of the circle?

DO YOUR FIGURING HERE.

F. 5π
G. 10π
H. 25π
J. 50π
K. 100π

11. The midpoint of the line with endpoints at α (-1, 2) and β (3, 2) is equal to which value?

A. (1, -2)
B. (2, 1)
C. (2, 2)
D. (1, 2)
E. (0, 0)

12. A lamp sitting on a desktop illuminates a circular area on the surface of the desk equal to 25π in^2. The light is projected from the bulb as a cone where the sine of the angle of spread is equal to $\frac{(\sqrt{3})}{2}$. If the bulb is recessed 1 in. from the bottom rim of the shade, how far above the desk is the lamp (rounded to the nearest tenth)?

F. 7.7 in
G. 8.7 in
H. 10.0 in
J. 11.0 in
K. 11.5 in

13. A cylindrical tank has radius of 10cm, height 100cm and empties at a rate of 10π cm^3/min. If there is initially 9000π cm^3 of liquid, what percentage of the tank is empty after 5 hours?

A. 80%
B. 70%
C. 60%
D. 55%
E. 40%

14. If the volume of a rectangular solid is 90 in^3, and the length and height are 5 in and 3 in respectively, what is the width of this solid?

DO YOUR FIGURING HERE.

F. 6 in
G. 5 in
H. 4 in
J. 3 in
K. 2 in

15. A circle has its center at the origin. A point P on the circumference of the circle has coordinates (0, 7). If P travels 270° from its original position, what are the new coordinates of P?

A. (7, 0)
B. (0, 7)
C. (0, -7)
D. (7, 7)
E. (-7, -7)

16. If the sinx = 4/5 and the cosx = 3/5, than the tanx = ?

F. 5/15
G. 6/15
H. 2/3
J. 3/5
K. 4/3

17. A 150 ft ladder is laying against a building with the cosine of the angle of elevation equal to 0.94. If the base of the ladder is pushed in 10 ft, how much higher does the ladder reach on the building (to the nearest whole number)?

    A. 3
    B. 9
    C. 17
    D. 21
    E. 22

18. A rectangle has an area of 35 in^2, if the width is 5 in what is the length?

    F. 30
    G. 10
    H. 7
    J. 5
    K. 4

19. In the x-y plane there exists a line y = 5- 3x. What could be a point of intersection with a line perpendicular to this line?

    A. (-2, -1)
    B. (3, 6)
    C. (3, -4)
    D. (2, 1)
    E. (2, -2)

20. In the x-y plane there exists two points X (-2, -5) and Y (5, 1), what are the coordinates of the midpoint of line segment XY?

    F. (-2, 3/2)
    G. (-7/2, -3)
    H. (3/2, -2)
    J. (7/2, -2)
    K. (-3/2, 2)

DO YOUR FIGURING HERE.

21. Half of a circle is inscribed in a rectangle. If the area of the whole circle is approximately 7.1 square units, what is the approximate area of the shaded region?

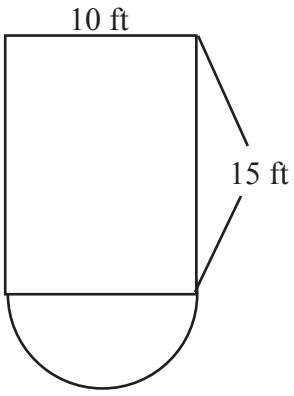
DO YOUR FIGURING HERE.

A. 7.5
B. 8.5
C. 11
D. 12
E. 19

22. If $2\theta = 60$, the expression $\cos^2\theta \sec^2\theta \sin^2 3\theta$ will be equivalent to what value?

F. -1
G. -½
H. ¼
J. 1
K. 2

23. The "painted" area beneath a basketball hoop (see diagram below) needs to be repainted. Approximately what area needs to be painted?



A. 228 ft^2
B. 210 ft^2
C. 196 ft^2
D. 189 ft^2
E. 154 ft^2

DO YOUR FIGURING HERE.

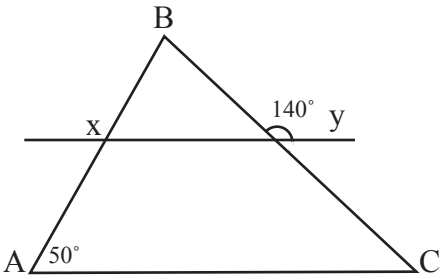
24. A line in the x-y plane has the form $3x + 12y = 5$. A line perpendicular to this may have the form of which of the following?

F. $y = \frac{x + 8}{4}$
G. $y = -4x - 2$
H. $y = \frac{-x + 9}{3}$
J. $y = 4x + 2$
K. $y = 3x + ½$

25. A rectangular soccer field that measures 120yd by 75yd needs to be covered with a tarp prior to inclement weather. In order to cover the entire field, what would the area of the tarp have to be?

A. 9000 yd^2
B. 7500 yd^2
C. 5000 yd^2
D. 195 yd^2
E. 45 yd^2

26. In the figure below, line segment XY passes through line segment AB and BC, and is parallel to AC. What is the measure of angle ABC?



F. 140
G. 135
H. 110
J. 100
K. 90

DO YOUR FIGURING HERE.

27. What is the sine of 105º?
[Note: $\sin(\alpha + \beta) = \sin\alpha\cos\beta + \sin\beta\cos\alpha$]

A. $\sqrt{3}$
B. $\frac{\sqrt{3} + \sqrt{2}}{2}$
C. $\frac{\sqrt{6} + \sqrt{2}}{4}$
D. $\frac{\sqrt{3}}{2}$
E. 1/2

28. If a line has a slope of -5 and contains the point (-2, 3), what is the equation of that line?

F. $y = -5x + 13$
G. $y = -5x + 7$
H. $y = 5x - 7$
J. $y = -5x - 7$
K. $y = 5x + 7$

29. Triangle ABC is formed in a circle with center sharing vertex B. Vertex C sweeps out 45 degrees along the circumference of the circle from vertex A. Which of the following conditions about triangle ABC is true?

A. AB < BC
B. Angle BAC > Angle ACB
C. AB > BC
D. Angle BAC > 90°
E. Angle BAC = Angle ACB

30. The area of a rectangular floor is 72 ft^2. The length of the floor is 1 ft more than 3 times the width. How wide is the floor (rounded to the nearest whole number)?

F. 4
G. 5
H. 7
J. 8
K. 9

31. In the x-y plane there exists a line y = -2x +1. Another line runs perpendicular with a y-intercept of 5. What is the x-coordinate of intersection?

DO YOUR FIGURING HERE.

A. $5/8$
B. $-8/5$
C. $8/5$
D. $-8/3$
E. $8/3$

32. The solution set for the system of linear equations below is a single line. What must the value of k be to satisfy the solution set?

$$20x - 5y = 50$$
$$8x + ky = 20$$

F. 6
G. 5
H. 4
J. -2
K. 0

33. Point A has coordinates (3, 0), point B has coordinates (3, 4), and point C is at the origin. What is the distance between point B and the origin?

A. 2
B. 3
C. 4
D. 5
E. 6

34. For the area of a circle to increase by a factor of 2, the radius must be the product of itself and what number?

F. $\sqrt{2}$
G. 2
H. $\sqrt{10}$
J. 4
K. 8

35. The area of a square is 4 times its perimeter. What is the length of a side of this square?

DO YOUR FIGURING HERE.

A. 24
B. 16
C. 8
D. 2
E. 1

36. Two congruent right isosceles triangles overlap so that they share one leg (see diagram). If the length of one leg is 6, what is the area of the shaded region?

F. $4\sqrt{2}$
G. 9
H. 18
J. $18\sqrt{2}$
K. 27

37. What would the volume of a cylinder be that has a height of 10 ft and a diameter of 4 ft?

A. 160π ft^3
B. 90π ft^3
C. 40π ft^3
D. 16π ft^3
E. 4π ft^3

38. A certain line fits the data given in the table below. The equation for this line is what?

DO YOUR FIGURING HERE.

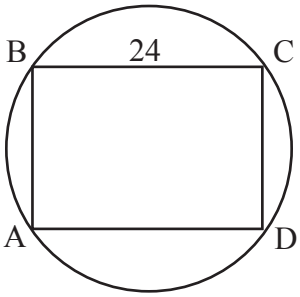
x	F(x)
0	3
2	6
4	9

F. $y = 3/2x + 3$
G. $y = 2x + 6$
H. $y = 3x + 3$
J. $y = x + 3$
K. $y = 3/2x - 6$

39. A cube has volume of 216 in^3, if the area of a face of this cube is decreased by 11 in^2 what is the new volume?

A. 25
B. 125
C. 150
D. 205
E. 211

40. In the figure below rectangle ABCD is inscribed in a circle, if side BC = 24 and the area of the rectangle is 240, what is the area of the circle?



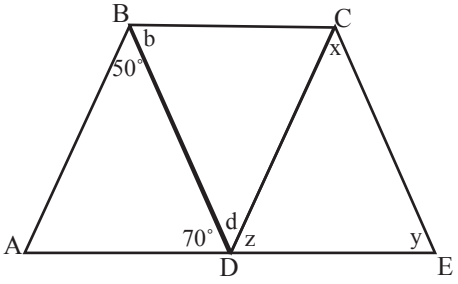
F. 169π
G. $196\ \pi$
H. $200\ \pi$
J. $250\ \pi$
K. $676\ \pi$

41. If $f(x) = x^2 + 3x$, and $g(x) = x + 1$, what is the value of $f(g(x))$?

DO YOUR FIGURING HERE.

A. $x^2 + 5x + 4$
B. $x^2 + 3x + 4$
C. $x^2 + x + 4$
D. $x^2 + 5x + 2$
E. $x^2 + 4x + 3$

42. Trapezoid ABCE is made of three adjoining triangles as shown below (with BC parallel to AE). ABCD forms a parallelogram. What is the value of $b + z$ if $x + y = 120$?



F. 110
G. 115
H. 120
J. 125
K. 130

43. The line $y = 2x + 6$ and a line perpendicular to that with a y-intercept of -4 would have a point of intersection at which of the following?

A. (-4, 14)
B. (4, 12)
C. (4, -2)
D. (-4, 2)
E. (-4, -2)

44. A rectangle has a perimeter of 30 with one of its sides equal to 10, what is the length of the diagonal?

F. $10\sqrt{5}$
G. $10\sqrt{10}$
H. $5\sqrt{5}$
J. 7
K. 10

45. In triangle ABC angle BCA = x, angle BAC = 2x, and angle ABC = 3x. If side AC = 10, what is the perimeter of the triangle?

DO YOUR FIGURING HERE.

A. $15 + 5\sqrt{3}$
B. $10 + 5\sqrt{3}$
C. $30\sqrt{2}$
D. $15 + 10\sqrt{3}$
E. 20

46. In the standard x-y plane, how many times does the graph

$$y = \frac{[(2x^2 - 18)(2x + 8)(2x - 4)(2x + 8)]}{(x - 3)}$$

intersect the x-axis?

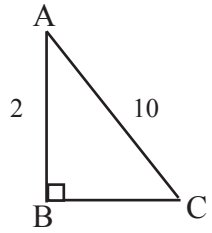
F. 0
G. 1
H. 2
J. 3
K. 4

47. In the standard x-y plane there exists a rectangle having vertices of ordered pairs, two of which are (4, 2) and (8, 0). If the width of the rectangle is 2 units what is the length of the diagonal?

A. $2\sqrt{10}$
B. 5
C. $2\sqrt{5}$
D. 12
E. 7

48. In triangle ABC below, what is the degree measure of angle A rounded to the nearest whole number?

F. 78°
G. 72°
H. 64°
J. 28°
K. 12°



49. What is the volume of a cylinder with diameter of 4 and diagonal of 5?

DO YOUR FIGURING HERE.

A. π
B. 3π
C. 12π
D. 20π
E. 80π

50. What is the surface area of a rectangular solid with width of 4, length of 6, and height of 3?

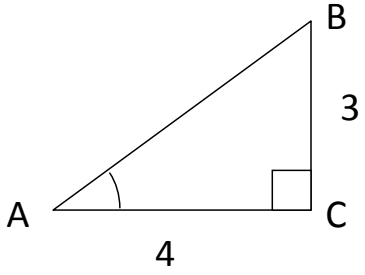
F. 72
G. 96
H. 108
J. 144
K. 156

51. What is the x-intercept of a line with y-intercept of 2 that is perpendicular to a line segment that has at least two points (2, 5) and (3, 8)?

A. 8
B. 6
C. 3
D. -4
E. -6

52. In triangle ABC below, what is the cosine of angle BAC?

F. $\frac{\sqrt{2}}{4}$
G. $\frac{3}{5}$
H. $\frac{3}{4}$
J. $\frac{4}{5}$
K. $\frac{5}{4}$



DO YOUR FIGURING HERE.

53. In the x-y plane there exists a line whose x-coordinate of each point is 3 less than 4 times its y-coordinate. What is the sum of the slope and y-intercept of this line?

A. 1
B. $^1/_2$
C. 0
D. $-^1/_2$
E. -1

54. What is the perimeter of a rectangle in terms of x, if the length is twice its width?

F. 2x
G. 3x
H. 4x
J. 5x
K. 6x

55. The length of a rectangle is (x + 3), and its height is (x + 2). If a square with sides of (x + 2) is removed from the rectangle, what would the remaining area be ?

A. $x^2 + 2x$
B. $x^3 + 2x + 1$
C. 9x + 10
D. 9x + 2
E. x + 2

56. In the x-y plane, a circle has its center at the origin. If the diameter of the circle is 8, what are the coordinates of the circle's x and y intercepts?

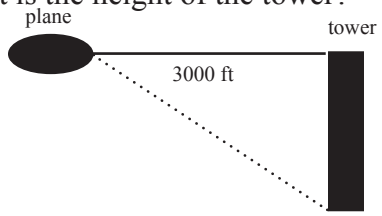
F. x-intercepts: (8,0) & (-8,0), y-intercepts: (0,8) & (0,-8)
G. x-intercepts: (4,0) & (-4,0), y-intercepts: (0,4) & (0,-4)
H. x-intercepts: (6,0) & (-6,0), y-intercepts: (0,6) & (0,-6)
J. x-intercepts: (2,0) & (-2,0), y-intercepts: (0,2) & (0,-2)
K. x-intercepts: (10,0) & (-10,0), y-intercepts: (0,10) & (0,-10)

DO YOUR FIGURING HERE.

57. Any line parallel to $y = \left[\frac{2x^2 - 9x + 10}{x^2 - 25}\right]\left[\frac{x^2 + 7x + 10}{x^2 - 4}\right]\left[\frac{x - 5}{1}\right]$ has a slope of what value?

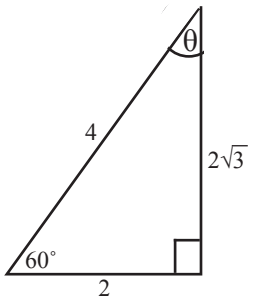
A. 5
B. 4
C. 2
D. $-\frac{1}{2}$
E. -2

58. A plane transmits a radar signal in mid flight to a radio tower 3000ft away. If the tangent of the angle formed by the plane and the line between the plane and the base of the tower is 1, what is the height of the tower?



F. 1,000 ft
G. 1,500 ft
H. 3,000 ft
J. 15,000 ft
K. 30,000 ft

59. In the diagram below, tan θ = ?



A. $\sqrt{3}$
B. 2
C. $\frac{2\sqrt{3}}{3}$
D. $\frac{\sqrt{3}}{3}$
E. $\frac{1}{2}$

60. A parallelogram is given such that one side is 5 and the other is 10. If the height is 4, what is the area?

F. 20
G. 30
H. 40
J. 60
K. 55