

Math Subject Test – Level 1 (easier) ~ Example 2

1. If $2t + 3t = 4t + 6t - 10$, then $t =$

- (A) -1 (B) 0 (C) $\frac{1}{2}$ (D) 1 (E) 2

L1T2_1

2. For all $x \neq 0$, $\frac{1}{\left(\frac{2}{x^2}\right)} =$

- (A) $\frac{x^2}{2}$ (B) $\frac{x^2}{4}$ (C) $\frac{2}{x^2}$ (D) $\frac{1}{2x^2}$ (E) $2x^2$

L1T2_2

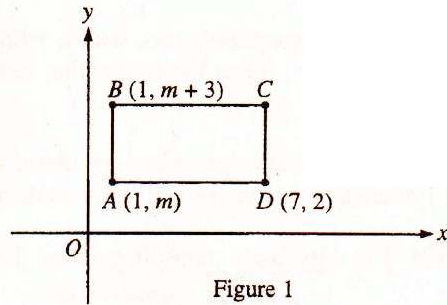
3. If $x = 1$, then $(x - 5)(x + 2) =$

- (A) -12 (B) -3 (C) -1 (D) 3 (E) 12

L1T2_3

4. In rectangle $ABCD$ in Figure 1, what are the coordinates of vertex C ?

- (A) $(1, 4)$
 (B) $(1, 5)$
 (C) $(5, 7)$
 (D) $(7, 4)$
 (E) $(7, 5)$



L1T2_4

5. $(a + b + 2)(a + b + 2) =$

- (A) $(a + b)^2 + 4$
 (B) $(a + b)^2 + 4(a + b)$
 (C) $(a + b)^2 + 4(a + b) + 4$
 (D) $a^2 + b^2 + 4$
 (E) $a^2 + b^2 + 4ab$

L1T2_5

6. At what point does the graph of $2x + 3y = 12$ intersect the y -axis?

- (A) $(0, -6)$
 (B) $(0, -2)$
 (C) $(0, 3)$
 (D) $(0, 4)$
 (E) $(0, 12)$

L1T2_6

7. If $12x^2 = 7$, then $7(12x^2)^2 =$

- (A) 49
 (B) 84
 (C) 98
 (D) 144
 (E) 343

L1T2_7

8. If lines ℓ and m are parallel and are intersected by line t , what is the sum of the measures of the interior angles on the same side of line t ?

- (A) 90° (B) 180° (C) 270° (D) 360° (E) 540°

L1T2_8

9. If $x + y = 5$ and $x - y = 3$, then $x =$

- (A) 4 (B) 2 (C) 1 (D) 0 (E) -1

L1T2_9

10. If the cube root of the square root of a number is 2, what is the number?

- (A) 16
- (B) 32
- (C) 36
- (D) 64
- (E) 256

L1T2_10

11. Each face of the cube in Figure 2 consists of nine small squares. The shading on three of the faces is shown, and the shading on the other three faces is such that on opposite faces the reverse squares are shaded. For example, if one face has only the center square shaded, its opposite face will have eight of the nine squares shaded (the center square will not be shaded). What is the total number of shaded squares on all six faces of the cube?

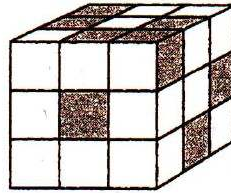


Figure 2

L1T2_11

- (A) 12
- (B) 16
- (C) 18
- (D) 27
- (E) 54

12. For three bins, A , B , and C , the volume of A is one-half that of B and the volume of B is two-thirds that of C . If A has a volume of 210 cubic meters, what is the volume of C , in cubic meters?

- (A) 630
- (B) 315
- (C) 280
- (D) 140
- (E) 70

L1T2_12

13. In Figure 3, when ray OA is rotated clockwise 7 degrees about point O , ray OA will be perpendicular to ray OB . What is the measure of $\angle AOB$ before this rotation?

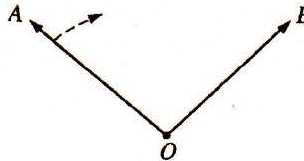


Figure 3

L1T2_13

- (A) 97°
- (B) 90°
- (C) 87°
- (D) 83°
- (E) 80°

14. If $x + x + x = y$, then $x - y =$

- (A) $-3x$
- (B) $-2x$
- (C) $-\frac{x}{2}$
- (D) $\frac{2}{3}x$
- (E) $2x$

L1T2_14

15. If $f(x) = \frac{1}{x}$ for $x > 0$, then $f(1.5) =$

- (A) $\frac{3}{4}$
- (B) $\frac{2}{3}$
- (C) $\frac{1}{2}$
- (D) $\frac{1}{3}$
- (E) $\frac{1}{4}$

L1T2_15

16. If $15^m = 3^4 \cdot 5^4$, what is the value of m ?

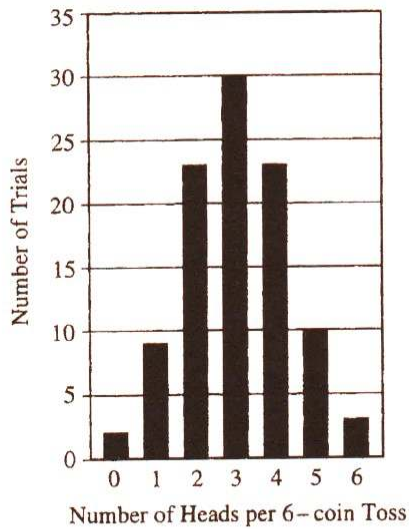
- (A) 4
- (B) 8
- (C) 16
- (D) 32
- (E) 128

L1T2_16

17. What are all values of x for which $|x - 2| < 3$?

- (A) $x < -1$ or $x > 5$
- (B) $x < -1$
- (C) $x > 5$
- (D) $-5 < x < 1$
- (E) $-1 < x < 5$

L1T2_17



18. An algebra class conducted a coin-tossing experiment. Each trial of the experiment consisted of tossing 6 coins and counting the number of heads that resulted. The results for 100 trials are pictured in the graph above. In approximately what percent of the trials were there 3 or more heads?

- (A) 32% (B) 36% (C) 50% (D) 60% (E) 66%

L1T2_18

19. The circle in Figure 4 has center J and radius 6. What is the length of chord GH ?

- (A) 6 (B) 8.49 (C) 10.39 (D) 12 (E) 16.97

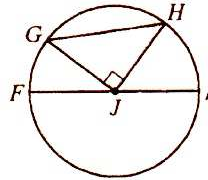
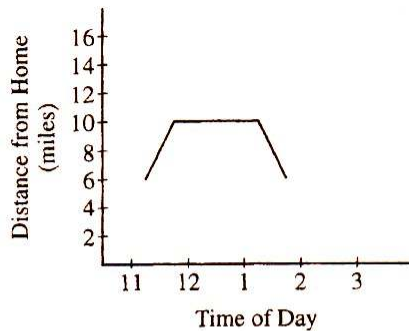


Figure 4

L1T2_19



20. The graph above shows the distance of Janet's car from her home over a period of time on a given day. Which of the following situations best fits the information?

- (A) Janet leaves her workplace, drives to a restaurant for lunch, and then returns to her workplace.
 (B) Janet leaves her workplace, drives home, and stays at home.
 (C) Janet leaves home, drives to a friend's house, and stays at the friend's house.
 (D) Janet drives from home to the grocery store and then returns home.
 (E) Janet is at the grocery store, takes the groceries home, and then drives back to the grocery store.

L1T2_20

$$X = \{2, 3, 4, 5, 6, 7, 8, 9\}$$

$$Y = \{0, 1\}$$

$$Z = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

21. Before 1990, telephone area codes in the United States were three-digit numbers of the form xyz . Shown above are sets X , Y , and Z from which the digits x , y , and z , respectively, were chosen. How many possible area codes were there?

(A) 919 (B) 160 (C) 144 (D) 126 (E) 20

L1T2_21

22. In Figure 5, $\triangle ABC$ is equilateral and $EF \parallel DG \parallel AC$. What is the perimeter of the shaded region?

(A) 4 (B) 6 (C) 8 (D) 9 (E) 10

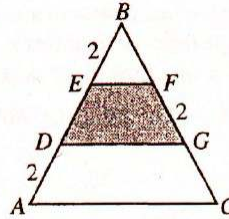


Figure 5

L1T2_22

23. In Figure 6, two congruent circles are tangent to the number line at points 5 and 10, respectively, and tangent to rays from points 0 and 8, respectively. The circle at 10 is to be moved to the right along the number line, and the ray from point 8 is to be rotated so that it is tangent to the circle at its new position and $\tan x^\circ = \tan y^\circ$. How many units to the right must the circle be moved?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

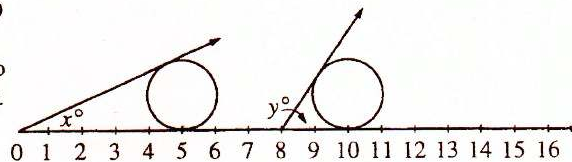


Figure 6

L1T2_23

24. A beacon that rotates in a complete circle at a constant rate throws a single beam of light that is seen every 9 seconds at a point four miles away. How many degrees does the beacon turn in 1 second?

(A) 6° (B) 20° (C) 40° (D) 54° (E) 60°

L1T2_24

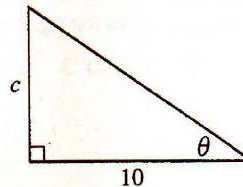
25. If $i^2 = -1$ and if $\left((i^2)^3\right)^k = 1$, then the least positive integer value of k is

(A) 1 (B) 2 (C) 4 (D) 6 (E) 8

L1T2_25

26. In Figure 7, if $\theta = 44^\circ$, what is the value of c ?

(A) 6.94 (B) 7.19 (C) 9.66 (D) 10.36 (E) 13.90



Note: Figure not drawn to scale.

Figure 7

L1T2_26

27. The thickness of concrete that lines a swimming pool is a function of the depth of the pool. If d represents the depth, in feet, of the pool and $t(d)$ represents the thickness, in inches, of the concrete, then $t(d) = \frac{1}{12}(d^2 - 2d + 6)$.

Of the following, which is the closest approximation to the thickness, in inches, of the concrete at a depth of 10 feet?

(A) 0.5 (B) 1.5 (C) 6.2 (D) 7.2 (E) 10.5

L1T2_27

28. Of the following, which has the greatest value?

- (A) 10^{100}
- (B) 100^{10}
- (C) $(10 \cdot 10^{10})^{10}$
- (D) $(100 \cdot 10)^{10}$
- (E) 10,000,000,000

L1T2_28

29. In the xy -plane, the points $O(0, 0)$, $P(-6, 0)$, $R(-7, 5)$, and $S(-1, 1)$ can be connected to form line segments. Which two segments have the same length?

- (A) OP and OR
- (B) OP and OS
- (C) OR and RS
- (D) OS and PR
- (E) PR and PS

L1T2_29

30. A total of 9 students took a test and their average (arithmetic mean) score was 86. If the average score for 4 of the students was 81, what was the average score for the remaining 5 students?

- (A) 87 (B) 88 (C) 89 (D) 90 (E) 91

L1T2_30

31. Line ℓ has a positive slope and a negative y -intercept. Line m is parallel to ℓ and has a positive y -intercept. The x -intercept of m must be

- (A) negative and greater than the x -intercept of ℓ
- (B) negative and less than the x -intercept of ℓ
- (C) zero
- (D) positive and greater than the x -intercept of ℓ
- (E) positive and less than the x -intercept of ℓ

L1T2_31

32. Figure 8 is a right rectangular prism. Which of the given points is located in the plane determined by the vertices G , H , and B ?

- (A) A (B) C (C) D (D) E (E) F

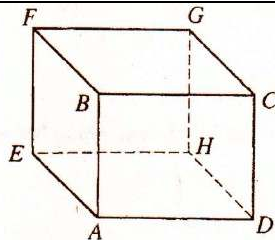


Figure 8

L1T2_32

33. The sum of the two roots of a quadratic equation is 5 and their product is -6 . Which of the following could be the equation?

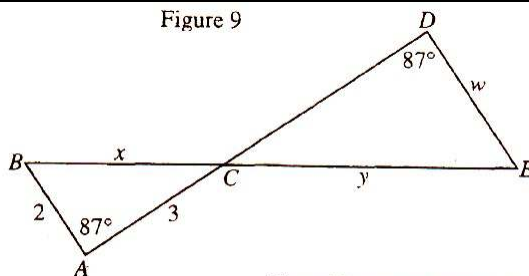
- (A) $x^2 - 6x + 5 = 0$
- (B) $x^2 - 5x - 6 = 0$
- (C) $x^2 - 5x + 6 = 0$
- (D) $x^2 + 5x - 6 = 0$
- (E) $x^2 + 6x + 5 = 0$

L1T2_33

34. In Figure 9, triangles ABC and DEC are similar and $w = 5$.

What is the value of $\frac{x}{y}$?

- (A) $\frac{2}{5}$ (B) $\frac{3}{5}$ (C) $\frac{2}{3}$ (D) $\frac{3}{2}$ (E) $\frac{5}{2}$



Note: Figure not drawn to scale. L1T2_34

35. $(\sin^2 \theta + \cos^2 \theta - 3)^4 =$

- (A) 256 (B) 81 (C) 64 (D) 32 (E) 16

L1T2_35

36. In Figure 10, if $\triangle ABC$ is reflected across line ℓ , what will be the coordinates of the reflection of point A ?

- (A) (5, 1) (B) (8, 1) (C) (9, 1) (D) (11, 1) (E) (13, 1)

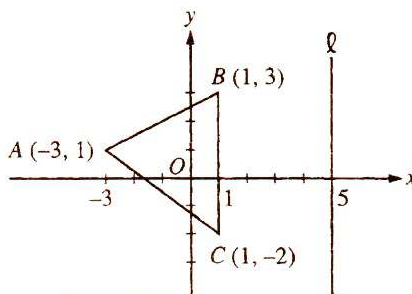


Figure 10

L1T2_36

37. In Figure 11, the cube has edge of length 2. What is the distance from vertex A to the midpoint C of edge BD ?

- (A) $\sqrt{7}$
 (B) $2\sqrt{2}$
 (C) 3
 (D) 5
 (E) $\sqrt{29}$

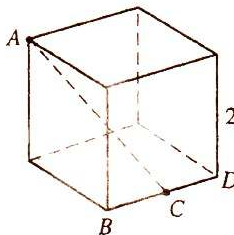


Figure 11

L1T2_37

38. The line with equation $y = 7$ is graphed on the same xy -plane as the circle with center $(4, 5)$ and radius 3. What are the x -coordinates of the points of intersection of the line and the circle?

- (A) -5 and 5
 (B) -1 and 1
 (C) 1.35 and 6.65
 (D) 1.76 and 6.24
 (E) 2 and 6

L1T2_38

39. In Figure 12, if $60 < q + s < 160$, which of the following describes all possible values of $t + r$?

- (A) $0 < t + r < 60$
 (B) $60 < t + r < 120$
 (C) $120 < t + r < 200$
 (D) $200 < t + r < 300$
 (E) $420 < t + r < 520$

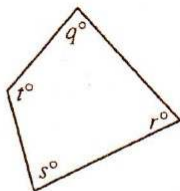


Figure 12

L1T2_39

40. At the end of 1990, the population of a certain town was 6,250. If the population increases at the rate of 3.5 percent each year, what will the population of the town be at the end of 2005?

- (A) 9,530
 (B) 9,740
 (C) 9,950
 (D) 10,260
 (E) 10,470

L1T2_40

41. If points R , S , and T lie on a circle and if the center of the circle lies on segment RT , then $\triangle RST$ must be

- (A) acute
 (B) obtuse
 (C) right
 (D) isosceles
 (E) equilateral

L1T2_41

42. The function f , where $f(x) = (1 + x)^2$, is defined for $-2 \leq x \leq 2$. What is the range of f ?

- (A) $0 \leq f(x) \leq 4$
- (B) $0 \leq f(x) \leq 9$
- (C) $1 \leq f(x) \leq 4$
- (D) $1 \leq f(x) \leq 5$
- (E) $1 \leq f(x) \leq 9$

L1T2 42

43. In the right circular cylinder shown in Figure 13, P and O are the centers of the bases and segment AB is a diameter of one of the bases. What is the perimeter of $\triangle ABO$ if the height of the cylinder is 5 and the radius of the base is 3?

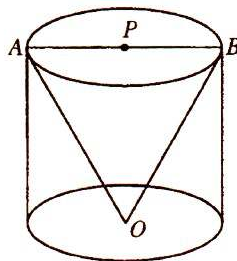


Figure 13

L1T2 43

44. Sequential arrangements of squares are formed according to a pattern. Each arrangement after the first one is generated by adding a row of squares to the bottom of the previous arrangement, as shown in Figure 14. If this pattern continues, which of the following gives the number of squares in the n th arrangement?

- (A) $2n^2$
- (B) $2(2n - 1)$
- (C) $n(n - 1)$
- (D) $\frac{1}{2}n(n + 1)$
- (E) $n(n + 1)$

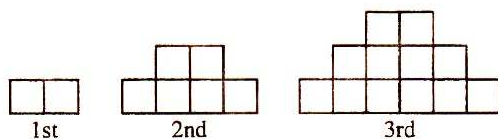


Figure 14

L1T2 44

45. If $f(x) = x^3 + 1$ and if f^{-1} is the inverse function of f , what is $f^{-1}(4)$?

- (A) 0.02
- (B) 1.44
- (C) 1.71
- (D) 27
- (E) 65

L1T2 45

46. Two positive integers j and k satisfy the relation jRk if and only if $j = k^2 + 1$. If m , n , and p satisfy the relations mRn and nRp , what is the value of m in terms of p ?

- (A) $p^2 + 1$
- (B) $p^2 + 2$
- (C) $(p^2 + 1)^2$
- (D) $(p^2 + 1)^2 + 1$
- (E) $(p^2 + 2)^2$

L1T2 46

47. The area of parallelogram $ABCD$ in Figure 15 is

- (A) 12
- (B) $6\sqrt{3}$
- (C) 20
- (D) $12\sqrt{3}$
- (E) 24

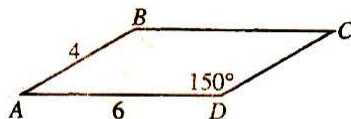


Figure 15

L1T2 47

48. In Figure 16, the area of the shaded region bounded by the graph of the parabola $y = f(x)$ and the x -axis is 3. What is the area of the region bounded by the graph of $y = f(x - 2)$ and the x -axis?

- (A) 1
- (B) $\frac{3}{2}$
- (C) 2
- (D) 3
- (E) 6

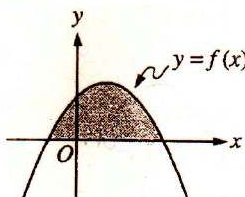


Figure 16

L1T2 48

49. Marigolds are to be planted inside a circular flower garden so that there are 4 marigolds per square foot. The circumference of the garden is 20 feet. If marigolds are available only in packs of 6, how many packs of 6 flowers are needed?

- (A) 6 (B) 13 (C) 14 (D) 20 (E) 22

L1T2_49

50. A solution is made by mixing concentrate with water. How many liters of concentrate should be mixed with 2 liters of water so that 32 percent of the solution is concentrate?

- (A) 0.63
 (B) 0.64
 (C) 0.68
 (D) 0.94
 (E) 1.06

L1T2_50

Test	Section	Item No.	Difficulty	Correct Answer
Level 1	Test 2	1	92	e
Level 1	Test 2	2	76	a
Level 1	Test 2	3	93	a
Level 1	Test 2	4	91	e
Level 1	Test 2	5	65	c
Level 1	Test 2	6	77	d
Level 1	Test 2	7	86	e
Level 1	Test 2	8	77	b
Level 1	Test 2	9	88	a
Level 1	Test 2	10	80	d
Level 1	Test 2	11	78	d
Level 1	Test 2	12	75	a
Level 1	Test 2	13	80	a
Level 1	Test 2	14	75	b
Level 1	Test 2	15	86	b
Level 1	Test 2	16	71	a
Level 1	Test 2	17	71	e
Level 1	Test 2	18	65	e
Level 1	Test 2	19	80	b
Level 1	Test 2	20	72	a
Level 1	Test 2	21	68	b
Level 1	Test 2	22	66	e
Level 1	Test 2	23	60	c
Level 1	Test 2	24	72	c
Level 1	Test 2	25	63	b
Level 1	Test 2	26	68	c
Level 1	Test 2	27	72	d
Level 1	Test 2	28	52	c
Level 1	Test 2	29	57	e
Level 1	Test 2	30	53	d
Level 1	Test 2	31	58	b
Level 1	Test 2	32	51	a
Level 1	Test 2	33	24	b
Level 1	Test 2	34	51	a
Level 1	Test 2	35	49	e
Level 1	Test 2	36	38	e
Level 1	Test 2	37	34	c
Level 1	Test 2	38	25	d
Level 1	Test 2	39	37	d
Level 1	Test 2	40	25	e
Level 1	Test 2	41	25	c
Level 1	Test 2	42	14	b
Level 1	Test 2	43	51	e
Level 1	Test 2	44	42	e
Level 1	Test 2	45	28	b
Level 1	Test 2	46	32	d
Level 1	Test 2	47	19	a
Level 1	Test 2	48	19	d
Level 1	Test 2	49	22	e
Level 1	Test 2	50	27	d