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

1. If $xy + 7y = 84$ and $x + 7 = 3$, what is the value of y?

   (A) -4
   (B) 4.9
   (C) 8.4
   (D) 12
   (E) 28

L1T1_1

2. When four given numbers are multiplied together, the product is negative. Which of the following could be true about the four numbers?

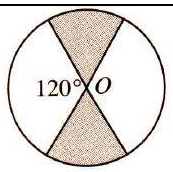
   (A) One is negative, two are positive, and one is zero.
   (B) Two are negative, one is positive, and one is zero.
   (C) Two are negative and two are positive.
   (D) Three are negative and one is positive.
   (E) Four are negative.

L1T1_2

3. If $x + y = 5$ and $x - y = 3$, then $x^2 - y^2 =$

(A) 9 (B) 15 (C) 16 (D) 25 (E) 34

L1T1_3



4. In the figure above, what fraction of the circular region with center O is shaded?

   (A) $\frac{1}{6}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{3}{5}$

L1T1_4

5. Which of the following is the graph of a linear function with both a negative slope and a negative y-intercept?

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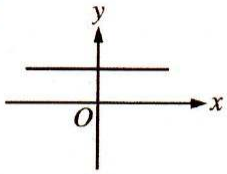
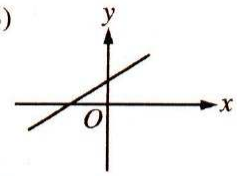


(B)


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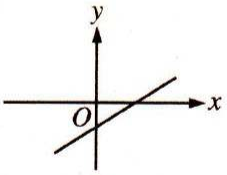

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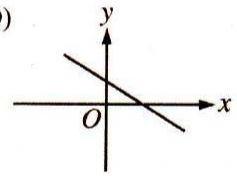

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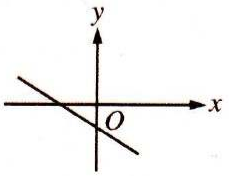


L1T1_5

6. If $k^2 - 4 = 4 - k^2$, what are all possible values of k?

   (A) 0 only
   (B) 2 only
   (C) 4 only
   (D) -2 and 2 only
   (E) -2, 0, and 2

L1T1_6

7. If $b^{2x+1} = b^{3x-1}$ for all values of b, what is the value of x?

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

L1T1_7

8. At North High School, the number of students taking French is decreasing by 20 students per year and the number of students taking Spanish is increasing by 10 students per year. This year 250 students are taking French, and 100 students are taking Spanish. Which of the following equations could be used to find the number of years n until the number of students is the same in both courses?

(A) $250 - 20n = 100 + 10n$
(B) $250 + 10n = 100 - 20n$
(C) $250 + 20n = 100 - 10n$
(D) $20n - 250 = 100 + 10n$
(E) $n(250 - 20) = n(100 + 10)$

L1T1_8

9. If $y = x^3 - 1.5$, for what value of x is $y = 2$?

(A) 0.79
(B) 1.14
(C) 1.52
(D) 1.87
(E) 6.50

L1T1_9

10. The length of a rectangle is four times its width. If the perimeter of the rectangle is 40 centimeters, what is its area?

(A) 4 cm^2
(B) 16 cm^2
(C) 20 cm^2
(D) 40 cm^2
(E) 64 cm^2

L1T1_10

11. The function g, where $g(t) = 0.066t + 0.96$, can be used to represent the relation between grade point average $g(t)$ and the number of hours t spent studying each week. Based on this function, a student with a grade point average of 3.5 studied how many hours per week?

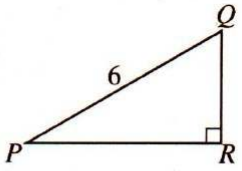
(A) 0.96
(B) 1.2
(C) 14.5
(D) 38.5
(E) 67.8

L1T1_11

12. $x^2 - 2x + 3 = x^3 + 2x + x^2$ is equivalent to

(A) 0
(B) $2x^2 - 4x = 0$
(C) $-x^3 + 4x - 3 = 0$
(D) $x^3 - 2x^2 - 3 = 0$
(E) $x^3 + 4x - 3 = 0$

L1T1_12



13. In right triangle PQR in the figure above, $\sin P = 0.5$. What is the length of side QR ?

(A) 2
(B) 3
(C) 5
(D) 6
(E) 12

L1T1_13

14. Which of the following numbers is a COUNTEREXAMPLE to the statement "All odd numbers greater than 2 are prime numbers" ?

(A) 2 (B) 3 (C) 5 (D) 7 (E) 9

L1T1_14

15. If $f(x) = \dfrac{2x-1}{x^2}$, what is the value of $f(-0.1)$?

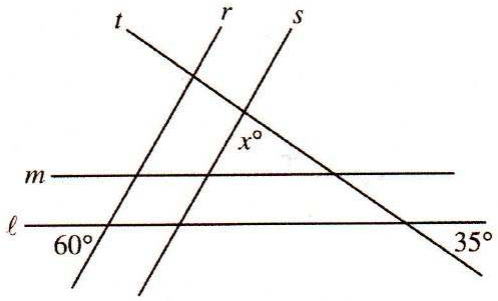
(A) −120
(B) −100
(C) 100
(D) 120
(E) 220

L1T1_15

16. On a blueprint, 0.4 inch represents 6 feet. If the actual distance between two buildings is 76 feet, what would be the distance between the corresponding buildings on the blueprint?

(A) 3.2 in
(B) 5.1 in
(C) 12.7 in
(D) 30.4 in
(E) 31.7 in

L1T1_16



17. In the figure above, if $\ell \parallel m$ and $r \parallel s$, what is the value of x ?

(A) 65
(B) 80
(C) 85
(D) 95
(E) 115

L1T1_17

18. For what value of x is $\frac{2x}{3x-1}$ undefined?

(A) $-\frac{1}{3}$ (B) 0 (C) $\frac{1}{3}$ (D) $\frac{1}{2}$ (E) 1

L1T1_18

19. A sales team sold an average (arithmetic mean) of 10.375 mobile phones per week during the first 8 weeks of the last quarter of the year. The members of the sales team will receive a bonus if they sell a total of 185 phones for the quarter. What must their average sales, in phones per week, be for the remaining 5 weeks of the quarter if they are to receive the bonus?

(A) 4.2
(B) 20.4
(C) 83
(D) 102
(E) 174.6

L1T1_19

20. What is the y-coordinate of the point at which the line whose equation is $3x - 2y - 7 = 0$ crosses the y-axis?

(A) $-\frac{7}{2}$

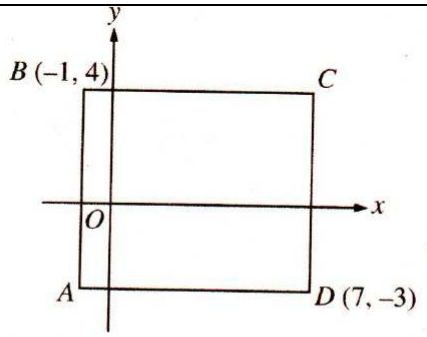
(B) $-\frac{7}{3}$

(C) $\frac{7}{3}$

(D) $\frac{7}{2}$

(E) 7

L1T1_20



21. In the figure above, the sides of rectangle $ABCD$ are parallel to the axes. What is the distance between point A and point C?

(A) 6.07
(B) 7
(C) 10.1
(D) 10.6
(E) 15

L1T1_21

22. Four signal flags — one red, one blue, one yellow, and one green — can be arranged from top to bottom on a signal pole. Every arrangement of the four flags is a different signal. How many different signals using all four flags have the red flag at the top?

(A) 3 (B) 4 (C) 6 (D) 16 (E) 24

L1T1_22

23. Triangle FGH is similar to triangle JKL. The length of side GH is 2.1 meters, the length of corresponding side KL is 1.4 meters, and the perimeter of $\triangle JKL$ is 3.6 meters. What is the perimeter of $\triangle FGH$?

(A) 2.4 m
(B) 3.3 m
(C) 4.3 m
(D) 5.1 m
(E) 5.4 m

L1T1_23

24. Which of the following is an equation of a line that is parallel to the line with equation $2x - y = 7$?

(A) $y = -2x - 7$

(B) $y = -2x + 7$

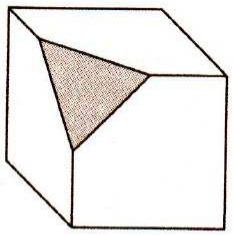
(C) $y = -\frac{1}{2}x - 7$

(D) $y = \frac{1}{2}x - 7$

(E) $y = 2x + 7$

L1T1_24

25.



A tetrahedron was cut from the corner of the cube shown above, with three of its vertices at the midpoints of three edges of the cube. If tetrahedrons of the same size are cut from the remaining seven corners of the cube, how many faces will the resulting solid have?

(A) 6 (B) 8 (C) 12 (D) 14 (E) 16

L1T1_25

26. The consecutive vertices of a certain parallelogram are A, B, C, and D. Which of the following are NOT necessarily congruent?

(A) $\angle A$ and $\angle C$
(B) $\angle B$ and $\angle D$
(C) $\overline{AC}$ and $\overline{BD}$
(D) $\overline{AB}$ and $\overline{CD}$
(E) $\overline{AD}$ and $\overline{BC}$

L1T1_26

27. A car traveled 200 miles at an average speed of 45 miles per hour. Of the following, which is the closest approximation to the amount of time that could be saved on this 200-mile trip if the average speed had increased 20 percent?

(A) 1 hour

(B) $\frac{3}{4}$ hour

(C) $\frac{1}{2}$ hour

(D) $\frac{1}{4}$ hour

(E) $\frac{1}{5}$ hour

L1T1_27

28. If c is a negative integer, for which of the following values of d is $|c - d|$ greatest?

(A) -10 (B) -4 (C) 0 (D) 4 (E) 10

L1T1_28

29. In $\triangle PQR$, $\angle Q$ is a right angle. Which of the following is equal to cos P ?

(A) $\frac{PQ}{PR}$

(B) $\frac{PR}{PQ}$

(C) $\frac{PR}{QR}$

(D) $\frac{QR}{PQ}$

(E) $\frac{QR}{PR}$

L1T1_29

30. The junior class is sponsoring a drama production to raise funds and plans to charge the same price for all admission tickets. The class has $700 in expenses for this production. If 300 tickets are sold, the class will make a profit of $1,100. What will be the profit for the class if 500 tickets are sold?

(A) $1,133
(B) $1,833
(C) $2,300
(D) $3,000
(E) $3,700

L1T1_30

31. In the xy-plane, the point (6, 3) is the midpoint of the line segment with endpoints $(x, 5)$ and $(9, y)$. What is the value of $x + y$?

(A) 4 (B) 9 (C) 14 (D) 18 (E) 32

L1T1_31

32. If $\frac{1}{2}$ is $\frac{3}{4}$ of $\frac{4}{5}$ of a certain number, what is that number?

(A) $\frac{3}{10}$

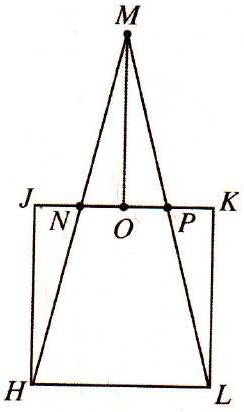
(B) $\frac{5}{6}$

(C) $\frac{11}{10}$

(D) $\frac{6}{5}$

(E) $\frac{10}{3}$

L1T1_32



33. In the figure above, $HJKL$ is a square and $JN = NO = OP = PK$. What is the ratio of the area of $\triangle MNP$ to the area of square $HJKL$?

(A) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{1}{3}$ (D) $\frac{3}{8}$ (E) $\frac{1}{2}$

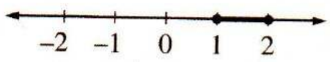
L1T1_33

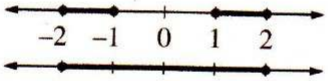
34. Which of the following numbers is NOT contained in the domain of the function f if $f(x) = \frac{x+2}{x+3} - \frac{1}{x}$?

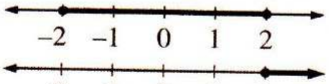
(A) -3 (B) -2 (C) 1 (D) $\sqrt{3}$ (E) 3

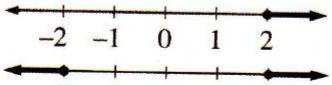
L1T1_34

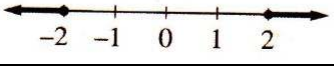
35. Which of the following is the graph of all values of x for which $1 \leq x^2 \leq 4$?

(A)


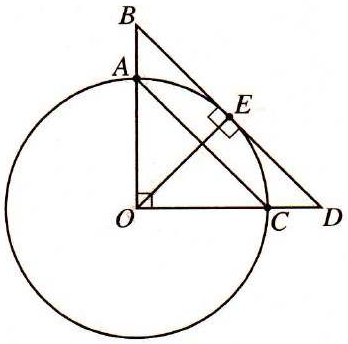
(B)


(C)


(D)


(E)


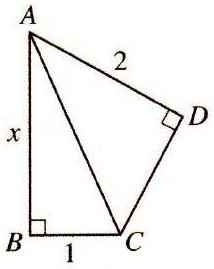
L1T1_35



36. The circle in the figure above has center O and radius r. If $OB = OD$, how many of the line segments shown (with labeled endpoints) have length r?

(A) Two
(B) Three
(C) Four
(D) Five
(E) Six

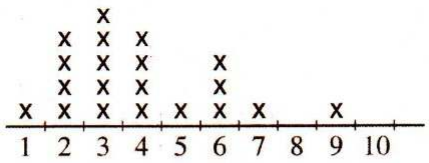
L1T1_36



37. In the figure above, if $\triangle ABC$ and $\triangle ADC$ are right triangles, then $CD =$

(A) $\sqrt{x^2 - 3}$
(B) $\sqrt{x^2 + 1}$
(C) $\sqrt{x^2 + 1} + 2$
(D) $\sqrt{x^2 + 3}$
(E) $x^2 + 5$

L1T1_37



Number of red candies in sample

38. Each of 20 students in a class took a sample of 10 candies from a large bag and counted the number of red candies in the sample. The distribution of red candies in their samples is shown above. If one of the students were chosen at random, what is the probability that the student's sample would have at least 5 red candies?

(A) $\frac{3}{5}$

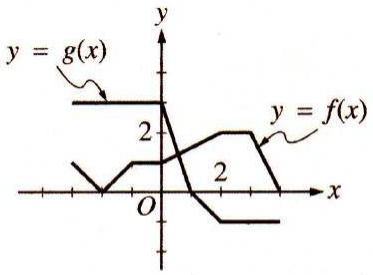
(B) $\frac{3}{10}$

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

(D) $\frac{3}{20}$

(E) $\frac{1}{20}$

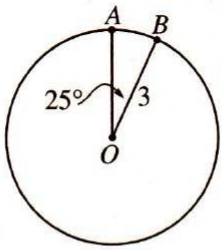
L1T1_38



39. The figure above shows the graphs of functions f and g. What is the value of $f(g(3))$?

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

L1T1_39



40. If O is the center of the circle in the figure above, what is the length of minor arc AB ?

(A) 0.65
(B) 1.27
(C) 1.31
(D) 1.40
(E) 1.96

L1T1_40

41. In the xy-plane, which of the following are the points of intersection of the circles whose equations are $x^2 + y^2 = 4$ and $(x - 2)^2 + y^2 = 4$?

(A) $(-1, \sqrt{3}), (-1, -\sqrt{3})$

(B) $(1, \sqrt{3}), (1, -\sqrt{3})$

(C) $(1, \sqrt{3}), (-1, \sqrt{3})$

(D) $(1, 1), (-1, 1)$

(E) $(1, 1), (1, -2)$

L1T1_41

42. The area of one face of a cube is x square meters. Which of the following gives an expression for the volume of this cube, in cubic meters?

(A) $x\sqrt{x}$

(B) $3\sqrt{x}$

(C) $x^2\sqrt{x}$

(D) x^3

(E) $3x^3$

L1T1_42

43. For which of the following equations is it true that the sum of the roots equals the product of the roots?

(A) $x^2 - 4 = 0$

(B) $x^2 - 2x + 1 = 0$

(C) $x^2 - 4x + 4 = 0$

(D) $x^2 - 5x + 6 = 0$

(E) $x^2 + 4x + 4 = 0$

L1T1_43

44. If the positive integers, starting with 1, are written consecutively, what will be the 90th digit written?

(A) 0 (B) 1 (C) 5 (D) 8 (E) 9

L1T1_44

45. The function f is defined by $f(x) = x^4 - 4x^2 + x + 1$ for $-5 \leq x \leq 5$. In which of the following intervals does the minimum value of f occur?

(A) $-5 < x < -3$

(B) $-3 < x < -1$

(C) $-1 < x < 1$

(D) $1 < x < 3$

(E) $3 < x < 5$

L1T1_45

46. In convex polygon P, the sum of the measures of the interior angles is 1,800°. How many sides does P have?

(A) 8 (B) 10 (C) 12 (D) 14 (E) 18

L1T1_46

47. What is the least integer value of k such that $x^2(3k + 1) - 6x + 2 = 0$ has no real roots?

(A) 5 (B) 2 (C) 1 (D) −1 (E) −2

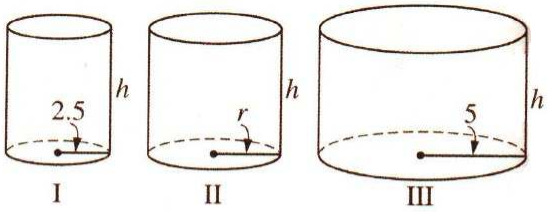
L1T1_47

48. If $\angle A$ is an acute angle and $\dfrac{\sin^2 A}{\cos^2 A} = 2.468$,

what is the value of $\tan A$?

(A) 1.234
(B) 1.571
(C) 2.468
(D) 4.936
(E) 6.091

L1T1_48



49. In the figure above, all of the right circular cylinders have height h. Cylinders I and III have a base radius of 2.5 and 5, respectively. If the volume of cylinder II is the mean of the volumes of cylinders I and III, what is the radius r of cylinder II?

(A) 1.98
(B) 3.75
(C) 3.95
(D) 4.00
(E) 15.63

L1T1_49

50. If f and g are functions, where

$f(x) = x^3 - 10x^2 + 27x - 18$ and

$g(x) = x^3 - x^2 - 6x$, which of the following gives a relationship between f and g ?

(A) $g(x) = 3f(x)$
(B) $g(x) = f(x) - 3$
(C) $g(x) = f(x) + 3$
(D) $g(x) = f(x - 3)$
(E) $g(x) = f(x + 3)$

L1T1_50

Test	Section	Item No.	Difficulty	Correct Answer
Level 1	Test 1	1	92	e
Level 1	Test 1	2	95	d
Level 1	Test 1	3	83	b
Level 1	Test 1	4	91	d
Level 1	Test 1	5	91	e
Level 1	Test 1	6	83	d
Level 1	Test 1	7	90	a
Level 1	Test 1	8	83	a
Level 1	Test 1	9	88	c
Level 1	Test 1	10	85	e
Level 1	Test 1	11	84	d
Level 1	Test 1	12	84	e
Level 1	Test 1	13	81	b
Level 1	Test 1	14	89	e
Level 1	Test 1	15	70	a
Level 1	Test 1	16	87	b
Level 1	Test 1	17	89	c
Level 1	Test 1	18	81	c
Level 1	Test 1	19	78	b
Level 1	Test 1	20	75	a
Level 1	Test 1	21	77	d
Level 1	Test 1	22	63	c
Level 1	Test 1	23	75	e
Level 1	Test 1	24	78	e
Level 1	Test 1	25	70	d
Level 1	Test 1	26	64	c
Level 1	Test 1	27	68	b
Level 1	Test 1	28	59	e
Level 1	Test 1	29	71	a
Level 1	Test 1	30	53	c
Level 1	Test 1	31	59	a
Level 1	Test 1	32	56	b
Level 1	Test 1	33	53	b
Level 1	Test 1	34	66	a
Level 1	Test 1	35	45	b
Level 1	Test 1	36	49	d
Level 1	Test 1	37	41	a
Level 1	Test 1	38	49	b
Level 1	Test 1	39	41	d
Level 1	Test 1	40	42	c
Level 1	Test 1	41	36	b
Level 1	Test 1	42	33	a
Level 1	Test 1	43	29	c
Level 1	Test 1	44	29	c
Level 1	Test 1	45	30	b
Level 1	Test 1	46	28	c
Level 1	Test 1	47	18	b
Level 1	Test 1	48	46	b
Level 1	Test 1	49	37	c
Level 1	Test 1	50	41	e