

Entry Level Mathematics

ELM

Problem Book

Numbers and Data

Algebra

Geometry

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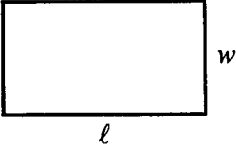
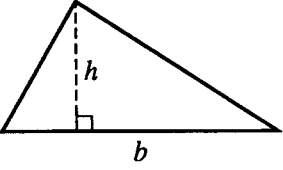
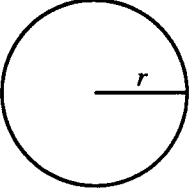
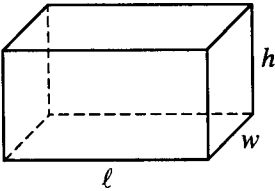
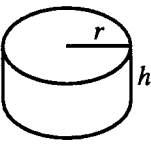
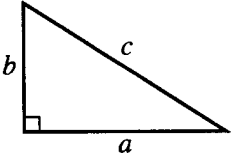
2002 Edition

An Aid to Preparation for
The California State University
Entry Level Mathematics (ELM) Examination

Table of Contents

Introduction	1
The Entry Level Mathematics Requirement	1
Description of the Modified ELM Placement Test	2
Content.....	2
Timing.....	2
Calculators Not Allowed	2
Table 1: CSU ELM Topics	3
Scores on the ELM Placement Test	4
Subscores	4
How the ELM Placement Test is Used.....	4
Sample Problems.....	6
Table 2: Geometry Reference Formulas	7
Number Sense	8
Data Analysis.....	13
Algebra I	17
Algebra II.....	23
Measurement Geometry.....	27
Plane Geometry	32
Coordinate Geometry and Graphing.....	36
Answers to Questions.....	41

Table 2: Geometry Reference Formulas

<p>Rectangle</p>  <p>A diagram of a rectangle with a horizontal base labeled l and a vertical right side labeled w.</p>	<p>Area = ℓw Perimeter = $2\ell + 2w$</p>
<p>Triangle</p>  <p>A diagram of a triangle with a horizontal base labeled b. A dashed vertical line from the top vertex to the base represents the height, labeled h, with a right-angle symbol at the base.</p>	<p>Area = $\frac{1}{2}bh$</p>
<p>Circle</p>  <p>A diagram of a circle with a horizontal radius line from the center to the right edge, labeled r.</p>	<p>Area = πr^2 Circumference = $2\pi r$</p>
<p>Rectangular Solid</p>  <p>A 3D diagram of a rectangular solid. The front horizontal edge is labeled l, the depth edge is labeled w, and the vertical edge is labeled h. Hidden edges are shown as dashed lines.</p>	<p>Volume = ℓwh</p>
<p>Right Circular Cylinder</p>  <p>A diagram of a right circular cylinder. The radius of the top circular face is labeled r, and the height of the cylinder is labeled h.</p>	<p>Volume = $\pi r^2 h$</p>
<p>Pythagorean Theorem</p>  <p>A diagram of a right-angled triangle with a right-angle symbol at the bottom-left corner. The vertical leg is labeled b, the horizontal leg is labeled a, and the hypotenuse is labeled c.</p>	<p>$c^2 = a^2 + b^2$</p>

Number Sense

1. A theater has 25 rows, each with 12 seats. At a certain performance there were, on average, 3 empty seats per row. What was the attendance at that performance?

(A) 225 (B) 264 (C) 297 (D) 300 (E) 375



-
2. There are 45 people coming to a picnic at which hot dogs will be served. Hot dogs come in packages of 8 that cost \$2.50 each, and hot dog rolls come in packages of 10 that cost \$2.00 each. If enough hot dogs and hot dog rolls will be purchased so that each person can have at least one hot dog in a roll, what is the minimum that can be spent on hot dogs and hot dog rolls?

(A) \$20.50 (B) \$22.50 (C) \$25.00 (D) \$27.00 (E) \$29.50



-
3. A P-model car costs 15 percent more than a V-model car. If the V-model costs \$7,000, what is the cost of the P-model?

(A) \$5,950 (B) \$7,105 (C) \$8,005 (D) \$8,050 (E) \$8,500

-
4. The sale price of a photography book is 20 percent off the list price. If the sale price of the book is \$10, what is the list price?

(A) \$7.50 (B) \$8.00 (C) \$12.00 (D) \$12.50 (E) \$14.00



-
5. The operating budget of the Western Robotics Company was \$300 million last year. If the operating budget this year is 12 percent less than last year, what is this year's operating budget, in millions of dollars?

(A) 36 (B) 264 (C) 274 (D) 288 (E) 336



6. The sale price of Kathy's new briefcase was reduced 30% from the original price of \$80. What was the sale price of the briefcase?

(A) \$30 (B) \$40 (C) \$50 (D) \$56 (E) \$104



7. Which of the following numbers is between 3.74 and $3\frac{4}{5}$?

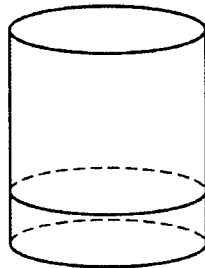
(A) $3\frac{9}{10}$ (B) 3.72 (C) 3.82 (D) $3\frac{1}{2}$ (E) $3\frac{3}{4}$



0.12 0.018 0.04 0.004

8. In which of the following are the four decimals above listed in order from greatest to least?

(A) 0.12 0.018 0.04 0.004
(B) 0.12 0.04 0.018 0.004
(C) 0.018 0.12 0.004 0.04
(D) 0.018 0.004 0.12 0.04
(E) 0.04 0.004 0.12 0.018



9. The figure above shows a right circular cylindrical vessel that is exactly one-quarter full. If 7 liters of liquid are added, the vessel will be exactly three-fifths full. What is the total capacity of the vessel, in liters?

(A) 14 (B) 20 (C) 21 (D) $\frac{9\pi}{20}$ (E) 21π



10. Marshall is making corn bread. His recipe calls for $3\frac{1}{2}$ cups of cornmeal, but he wants to make only half the amount given in the recipe. How many cups of cornmeal should he use?

(A) $1\frac{1}{4}$ (B) $1\frac{1}{2}$ (C) $1\frac{3}{4}$ (D) 5 (E) 7



-
11. Maria worked in a library. She was paid at the rate of \$6.00 per hour. If she worked from 10:30 A.M. to 4:45 P.M. on Tuesday, how much money did she earn?

(A) \$30.00 (B) \$33.00 (C) \$34.50 (D) \$36.00 (E) \$37.50



-
12. A certain medicine is prescribed in an amount proportional to a patient's body weight. If a patient weighing 70 kilograms requires 210 milligrams of this medicine, then the amount of medicine required for a patient weighing 80 kilograms is

(A) 220 mg (B) 230 mg (C) 240 mg (D) 250 mg (E) 290 mg



-
13. Joel mixed 3 tablespoons of plant fertilizer with 2 liters of water. In order to obtain the same ratio of fertilizer to water, how many tablespoons of fertilizer must he mix with 5 liters of water?

(A) $3\frac{1}{3}$ (B) 6 (C) 7 (D) $7\frac{1}{2}$ (E) 8



-
14. How many dollars will x pens cost if 5 such pens cost y dollars?

(A) $\frac{xy}{5}$ (B) $\frac{5}{xy}$ (C) $5xy$ (D) $\frac{y}{5x}$ (E) $\frac{x}{5y}$



ENROLLMENT AT CENTRAL COLLEGE

Freshmen	1,816
Sophomores	1,473
Juniors	1,431
Seniors	1,298

15. According to the table above, which of the following best approximates the total enrollment at Central College?

- (A) $1,800 + 1,400 + 1,400 + 1,200$
 (B) $1,800 + 1,400 + 1,400 + 1,300$
 (C) $1,800 + 1,500 + 1,400 + 1,300$
 (D) $1,900 + 1,500 + 1,400 + 1,300$
 (E) $1,900 + 1,500 + 1,500 + 1,300$



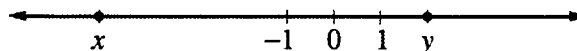
16. In a music class of 30 students, there are 6 more females than males. How many females are in the class?

- (A) 6 (B) 12 (C) 18 (D) 24 (E) 36



17. A roast is to be cooked 20 minutes for each pound of weight. If a roast weighing 7 pounds needs to be ready for dinner at 6:00 P.M., which of the following would be the best time to put the roast into the oven?

- (A) 2:30 P.M. (B) 3:00 P.M. (C) 3:30 P.M. (D) 4:00 P.M. (E) 4:30 P.M.

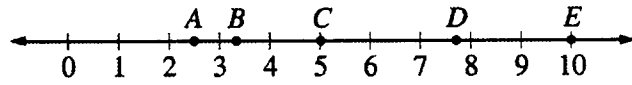



18. Which of the following must be true about the numbers x and y graphed on the number line above?

- I. $x + y > 0$
 II. $y - x > 0$
 III. $xy > 0$




- (A) I only (B) II only (C) III only (D) II and III only (E) I, II, and III



19. Which point on the number line above could represent $\sqrt{10}$? 

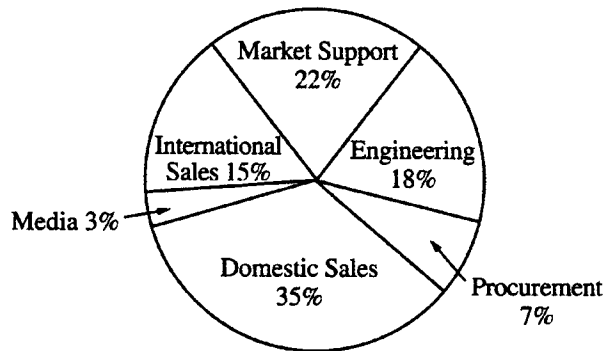
- (A) *A* (B) *B* (C) *C* (D) *D* (E) *E*
-


20. $\sqrt{24}$ is a number between 

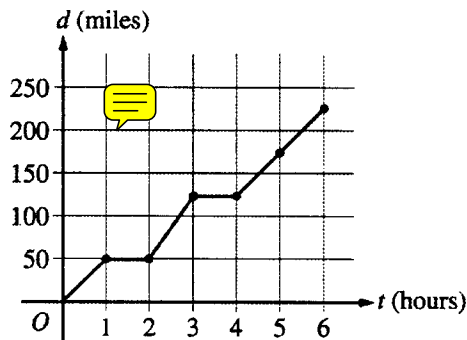
- (A) 0 and 1 (B) 1 and 2 (C) 2 and 3 (D) 3 and 4 (E) 4 and 5
-

Data Analysis

ANNUAL BUDGET BY DEPARTMENT

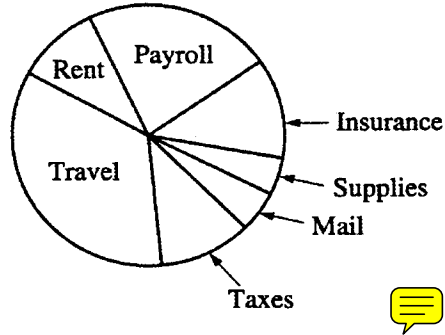


21. The circle graph above shows the annual budget for the Heavy Equipment Company. If the total budget is \$50,000,000, what amount is budgeted for the market support and engineering departments combined?
- (A) \$11 million (B) \$18 million (C) \$20 million 
(D) \$22 million (E) \$25 million



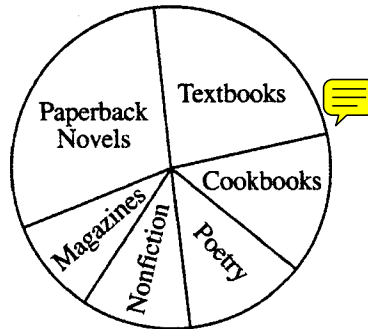
22. In the graph above, d represents the distance, in miles, that a motorist has traveled after t hours on the road. How many hours did it take the motorist to travel 200 miles?
- (A) 4.0 (B) 4.5 (C) 5.0 (D) 5.5 (E) 6.0

MONTHLY EXPENSES
OF COMPANY X



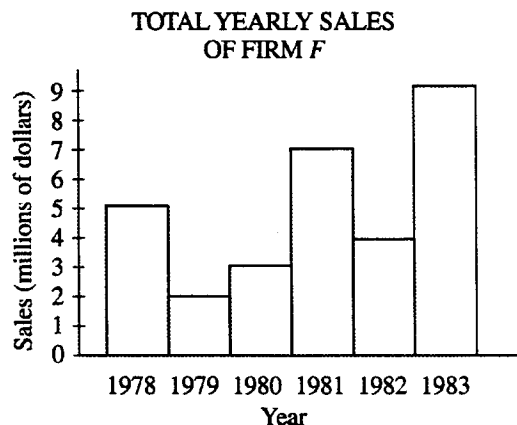
23. Which of the categories shown in the graph above accounts for approximately one-third of Company X's expenses?

- (A) Insurance (B) Payroll (C) Rent (D) Travel (E) Taxes
-



24. The circle graph above represents the percent of total revenue a publisher receives from various types of publications. Approximately what percent of total revenue is derived from textbooks and cookbooks?

- (A) 10% (B) 25% (C) 35% (D) 50% (E) 65%
-



25. The graph above shows the yearly sales for Firm *F*. What is the average (arithmetic mean) of the yearly sales of Firm *F* for the three-year period from 1979 through 1981, in millions of dollars?

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

26. The recorded high temperatures on four successive days were 94° , 85° , 77° , and 86° . What must the recorded high temperature be on the fifth day in order to have an average (arithmetic mean) high temperature of 85° for the five days?



(A) 76° (B) 80° (C) 83° (D) 86° (E) 88°

HISTORY TEST SCORES

Test 1	82
Test 2	71
Test 3	93
Test 4	88
Test 5	86



27. Danielle's scores on 5 history tests are given in the table above. What is the median of Danielle's scores?

(A) 82 (B) 84 (C) 86 (D) 88 (E) 93

ANNUAL COST OF WATER PER HOUSEHOLD IN 5 COMMUNITIES


Ashville	\$696
Buckview	\$557
Centerville	\$268
Deerfield	\$156
Elmwood	\$434




28. What is the median annual cost of water per household in the 5 communities listed in the table above?

- (A) \$156 (B) \$268 (C) \$434 (D) \$557 (E) \$696
-

29. An investment company advertised that last year its clients, on average, made a profit of 9%. Which of the following claims can legitimately be made, based on that information?

- (A) All of their clients made a profit of at least 9% last year. 
- (B) At least one of their clients made a profit of at least 9% last year.
- (C) Some of their clients will make a profit of at least 9% this year.
- (D) All of their clients will make a profit of at least 9% this year.
- (E) If a person becomes one of their clients, that person will make a profit of at least 9% each year.
-

30. In a study of pain relievers, 50 people were given product *A* and all but 3 experienced relief. In the same study, 25 people were given product *B* and all but 2 experienced relief. Which of the following claims is most reasonable based on the data?

- (A) Product *B* is better, because only 2 failed to get relief. 
- (B) Product *B* is better, because only 8% failed to get relief.
- (C) Product *B* is better, because only 2% failed to get relief.
- (D) Product *A* is better, because only 6% failed to get relief.
- (E) Product *A* is better, because only 3% failed to get relief.
-

Algebra I

31. If $x = -1$ and $y = 6$, then $x^2 + 3xy =$

- (A) 19 (B) 17 (C) 16 (D) -16 (E) -17



32. If $t = -2$, then $3t^2 - 5t - 6 =$

- (A) -28 (B) -8 (C) -4 (D) 8 (E) 16



33. If $b = 6$ and $h = 10$, then $\frac{1}{2}bh =$

- (A) 8 (B) 15 (C) 16 (D) 30 (E) 60



34. $\frac{4r^3s^5}{10r^8s^6} =$

- (A) $\frac{2r^5s}{5}$ (B) $\frac{2r^{11}s^{11}}{5}$ (C) $\frac{2s}{5r^5}$ (D) $\frac{2}{5r^5s}$ (E) $\frac{1}{6r^5s}$



35. $(a^2c^3)(ab^2c) =$

- (A) ab^2c^2 (B) $a^2b^2c^3$ (C) $a^3b^2c^4$ (D) $a^3b^3c^4$ (E) $a^4b^2c^5$



36. $(27a^{12}b^6)^{\frac{1}{3}} =$



- (A) $3a^4b^2$ (B) $9a^4b^2$ (C) $9a^{12}b^6$ (D) $81a^{12}b^6$ (E) $81a^{36}b^{18}$
-

37. $16^{-\frac{1}{2}} =$



- (A) -8 (B) -4 (C) $\frac{1}{8}$ (D) $\frac{1}{4}$ (E) 256
-

38. A thermostat is set at a temperature T that is neither less than 68° nor greater than 78° . Which of the following inequalities describes all values of T ?

- (A) $68^\circ \leq T$
(B) $68^\circ < T < 78^\circ$
(C) $68^\circ \leq T < 78^\circ$
(D) $68^\circ < T \leq 78^\circ$
(E) $68^\circ \leq T \leq 78^\circ$



39. This year José earned 3 times as much money as he earned last year. If José earned T dollars this year and he earned L dollars last year, which of the following equations represents the relationship between T and L ?





- (A) $3L = T$ (B) $\frac{L}{3} = T$ (C) $T \times L = 3$ (D) $\frac{L}{3} = \frac{T}{3}$ (E) $\frac{L}{3} = \frac{3}{T}$
-


40. $(y^2 - 3y + 6) - (3y^2 + 4y - 5) =$





- (A) $-2y^2 + y - 11$ (B) $-2y^2 + y + 1$ (C) $-2y^2 + y + 11$
(D) $-2y^2 - 7y + 1$ (E) $-2y^2 - 7y + 11$
-


41. $-2r(3r^2 - 2rs) =$ 
- (A) $6r^3 + 4rs$ (B) $6r^3 - 4r^2s$ (C) $-6r^3 + 2rs$
(D) $-6r^3 + 4r^2s$ (E) $-6r^3 - 4r^2s$
-

42. $(x - 6)(3x - 4) =$ 
- (A) $3x^2 - 22x + 24$ (B) $3x^2 - 22x - 24$ (C) $3x^2 - 18x + 24$
(D) $3x^2 - 14x - 24$ (E) $3x^2 - 14x + 24$
-

43. One factor of $x^2 + 2x - 8$ is 
- (A) $x - 1$ (B) $x - 2$ (C) $x - 4$ (D) $x - 6$ (E) $x - 8$
-

44. $(3x^3y)(-2x^2y^3) =$ 
- (A) $-6x^5y^4$ (B) $-6x^6y^3$ (C) xy^{-2} (D) x^6y^3 (E) $6x^5y^3$
-

45. $\frac{4 + 8x}{2} =$ 
- (A) $4x$ (B) $6x$ (C) $2 + 4x$ (D) $2 + 8x$ (E) $4 + 4x$
-

46. $x^{-2} =$ 
- (A) $\frac{1}{x^2}$ (B) \sqrt{x} (C) $-x^2$ (D) $x^{\frac{1}{2}}$ (E) $x^{-\frac{1}{2}}$
-

47. If $2az - 5z = 2$, then $z =$



- (A) $-\frac{2}{3a}$ (B) $\frac{2+5a}{2a}$ (C) $\frac{1}{a-5}$ (D) $\frac{2}{2a-5}$ (E) $7-2a$
-

48. If $4x - 1 = 5x + 3$, then $x =$



- (A) -4 (B) $-\frac{4}{9}$ (C) $\frac{2}{9}$ (D) $\frac{4}{9}$ (E) 2
-

49. If $3x - d = c$, then $x =$



- (A) $c + d - 3$ (B) $d + \frac{c}{3}$ (C) $\frac{d-c}{3}$ (D) $\frac{c-d}{3}$ (E) $\frac{c+d}{3}$
-

50. Ma-li can paint a certain room in about 5 hours, and Alicia can paint the same room in about 4 hours. Approximately how many hours would it take Ma-li and Alicia to paint that room if they worked together?



- (A) 1 (B) 2 (C) 4 (D) 5 (E) 9
-

51. Mario paddled his canoe upstream for 3 hours. When he turned around and paddled back to his starting point, it took him only 1 hour. If the river flows at a speed of 3 miles per hour, how fast could Mario paddle his canoe in still water?



- (A) 1 mile per hour (B) 2 miles per hour (C) 3 miles per hour
(D) 6 miles per hour (E) 9 miles per hour
-

52. What is the slope of the line through the points $(2, 2)$ and $(4, 3)$?



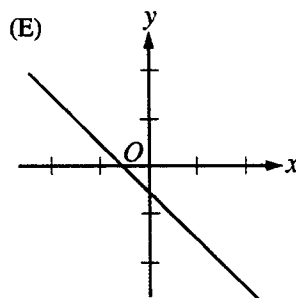
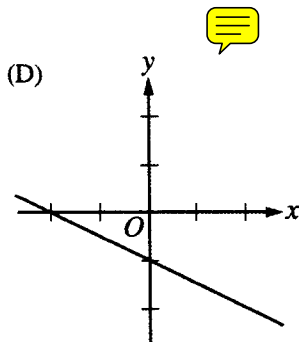
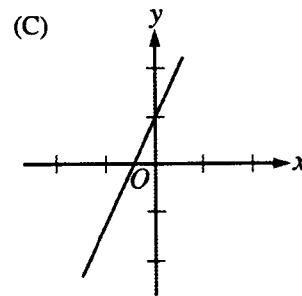
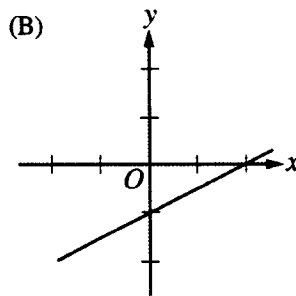
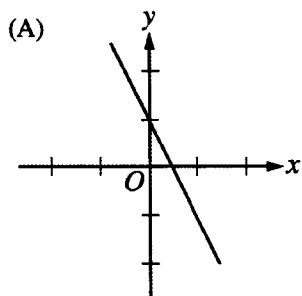
- (A) $-\frac{1}{2}$ (B) $-\frac{1}{4}$ (C) $\frac{1}{2}$ (D) $\frac{3}{4}$ (E) 2
-

53. Which of the following lines is parallel to the line with equation $2y + 4x = 3$?

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



54. Which of the following is the graph of a line with a slope of $-\frac{1}{2}$?



55. If the point $(2, 4)$ is on the line $y = 6x + b$, then $b =$

- (A) -22 (B) -8 (C) 12 (D) 16 (E) 26



56. $-3x < 5$ is equivalent to



- (A) $x < -15$ (B) $x < -\frac{5}{3}$ (C) $x > -15$ (D) $x > -\frac{5}{3}$ (E) $x > -\frac{3}{5}$
-

57. $1 - 2x \leq 2 + x$ is equivalent to



- (A) $x \geq -\frac{1}{3}$ (B) $x \geq 1$ (C) $x \leq -\frac{1}{3}$ (D) $x \leq \frac{1}{3}$ (E) $x \leq 1$
-

58. A car travels 80 miles on 3 gallons of gas. At the same rate (in miles per gallon), how many miles will the car be expected to travel on 5 gallons of gas?



- (A) 48 (B) 130 (C) $130\frac{2}{3}$ (D) $133\frac{1}{3}$ (E) 160
-

WEATHER BALLOON TEMPERATURES


Height	Temperature
1,000 feet	23°
2,000 feet	20°
3,000 feet	17°





59. A weather balloon is released and as it rises in the air it records the temperature, in degrees Celsius, as shown in the table above. If the temperature continues to decrease at a constant rate, the temperature at 5,500 feet will be


- (A) 12.5° (B) 11° (C) 9.5° (D) 8° (E) 6.5°
-


Algebra II

60. If $a = -2$, then $|5 - a| - |a - 8| =$ 
- (A) -13 (B) -3 (C) 7 (D) 13 (E) 17
-


61. For $x > 0$, $\sqrt{4x^2} + \sqrt{9x^2} =$ 
- (A) $\sqrt{13}x$ (B) $5x$ (C) $13x$ (D) $5x^2$ (E) $13x^2$
-


62. $\sqrt{100x^{36}} =$ 
- (A) $100x^{18}$ (B) $50x^{18}$ (C) $10x^{18}$ (D) $50x^6$ (E) $10x^6$
-


63. If $f(x) = 3x^2 - 4x + 1$, then $f(-2) =$ 
- (A) -19 (B) -5 (C) -3 (D) 5 (E) 21
-


64. A factor of $4a^2 - 9b^2$ is 
- (A) $4a + 9b$ (B) $4a - 9b$ (C) $3a + 2b$ (D) $2a + 3b$ (E) $a - b$
-

65. One factor of $18x^2 - 32$ is 
- (A) $9x - 32$ (B) $9x - 16$ (C) $3x - 2$ (D) $3x + 4$ (E) $9x + 4$
-

66. $\frac{2}{3x} - \frac{1}{x} =$ 
- (A) $\frac{1}{3}$ (B) $\frac{1}{2x}$ (C) $\frac{1}{3x}$ (D) $-\frac{1}{3x}$ (E) $-\frac{2}{3x^2}$
-

67. $\left(1 + \frac{1}{a}\right)\left(\frac{a}{a^2 - 1}\right) =$ 
- (A) 1 (B) $\frac{1}{a-1}$ (C) $\frac{a+1}{a-1}$ (D) $\frac{2}{a^2-1}$ (E) $\frac{a^2}{a^2-1}$
-

68. $\frac{t^2 - t}{3} + \frac{1}{3t} =$ 
- (A) $\frac{t-1}{9}$ (B) $\frac{t^3 - t^2}{9}$ (C) $\frac{9}{t-1}$ (D) $t-1$ (E) $t^3 - t^2$
-

69. If $\frac{4}{2x-2} = \frac{1}{x+1}$, then $x =$ 
- (A) 1 (B) $\frac{1}{3}$ (C) -1 (D) $-\frac{3}{2}$ (E) -3
-

70. One solution of the equation $(2x - 9)(5x + 2) = 0$ is

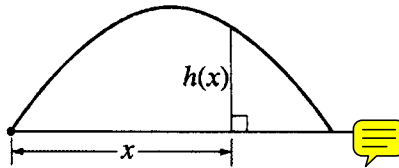
- (A) $-\frac{9}{2}$ (B) $-\frac{5}{2}$ (C) $\frac{2}{9}$ (D) $\frac{2}{5}$ (E) $\frac{9}{2}$

71. If $\sqrt{x-1} = 4$, then $x =$

- (A) 3 (B) 9 (C) 15 (D) 17 (E) 25

72. An apple falling from a tree is h feet above the ground t seconds after it begins to fall, where $h = 64 - 16t^2$. After how many seconds will the apple hit the ground ($h = 0$)?

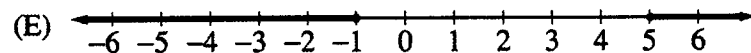
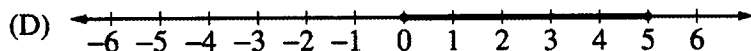
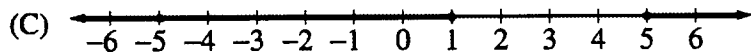
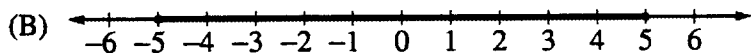
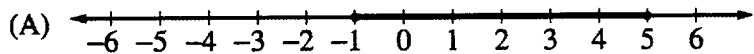
- (A) 1 (B) 2 (C) 4 (D) 8 (E) 48



73. A golf ball is hit so that when it is directly above a point that is x feet from the golfer, it is $h(x) = 30x - \frac{1}{10}x^2$ feet above the ground. How far from the golfer will the ball hit the ground?

- (A) 100 feet (B) 150 feet (C) 200 feet (D) 250 feet (E) 300 feet

74. Which of the following graphs represents all values of x such that $|x - 2| \leq 3$?



75. What are all values of x for which $|2x - 3| = 5$?



- (A) $x = -5$ and $x = 5$ (B) $x = -2$ and $x = 8$ (C) $x = -1$ and $x = 4$
(D) $x = 1$ and $x = -4$ (E) $x = 2$ and $x = 4$

76. If $3x + 5y = 4$ and $x = 3 - 2y$, then $y =$

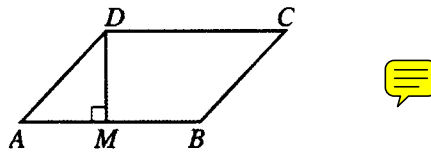


- (A) -13 (B) -5 (C) $-\frac{5}{3}$ (D) $\frac{13}{3}$ (E) 5

77. If $\begin{cases} 4x - 3y = 17 \\ 2x + 5y = -11 \end{cases}$, then $y =$

- (A) -3 (B) -2 (C) $\frac{7}{5}$ (D) 3 (E) $\frac{13}{3}$
-

Measurement Geometry



78. In parallelogram $ABCD$ above, $AM = MB$, $BC = \sqrt{2}$, and $DC = 2$. What is the area of $ABCD$?

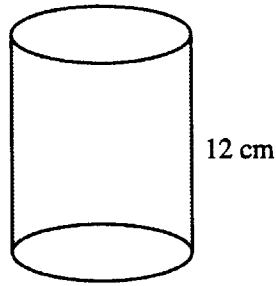
(A) 2 (B) 4 (C) $\sqrt{2}$ (D) $2\sqrt{2}$ (E) $4 + 2\sqrt{2}$

79. What is the area of a circle whose circumference is 10π ?

(A) 5 (B) 25 (C) 5π (D) 25π (E) 100π

80. The base of a rectangular solid is a square with side of length 3 feet. If the height of the rectangular solid is 5 feet, what is the volume of the solid, in cubic feet?

(A) 15 (B) 30 (C) 45 (D) 60 (E) 135



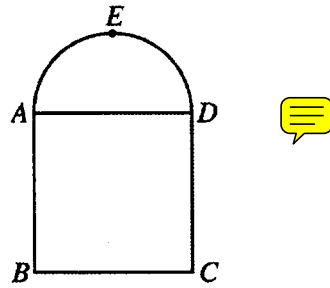
81. The cylinder shown above has a base area of 25π square centimeters and a height of 12 centimeters. What is its volume, in cubic centimeters?
- (A) $\frac{25\pi}{12}$ (B) $25\pi - 12$ (C) $25\pi + 12$ (D) 250π (E) 300π
-

82. If each edge of a cube is doubled in length, then the volume of the cube is multiplied by a factor of
- (A) 2 (B) 3 (C) 4 (D) 6 (E) 8
-

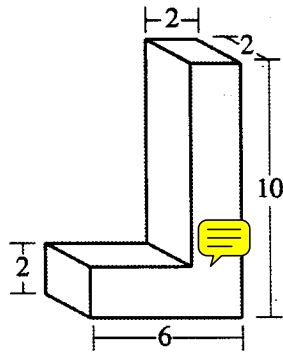
83. An automatic ice-cream scoop serves spherical helpings of ice cream. The scoop can be adjusted to serve helpings from 1 inch in diameter to 2 inches in diameter. If Tim orders a scoop with a 2-inch diameter, and if Paul wants only half as much ice cream as Tim, what should be the diameter of the scoop for Paul's helping?
- (Hint: The volume of a sphere is $V = \frac{4}{3}\pi r^3$ where r is the radius of the sphere.)



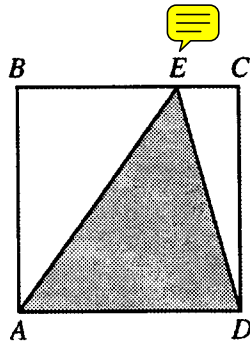
- (A) $\sqrt[3]{\frac{1}{2}}$ (B) 1 (C) $\frac{1}{2}$ (D) $2\left(\sqrt[3]{\frac{1}{2}}\right)$ (E) 2
-



84. The figure above consists of semicircle AED and square $ABCD$. If the length of a side of the square is 12 feet, what is the number of square feet enclosed by the semicircle?
- (A) 6π (B) 12π (C) 18π (D) 36π (E) 72π
-



85. In the figure above, two rectangular solids meet to form the L-shaped solid. What is the volume of the solid?
- (A) 48 (B) 56 (C) 64 (D) 120 (E) 480
-

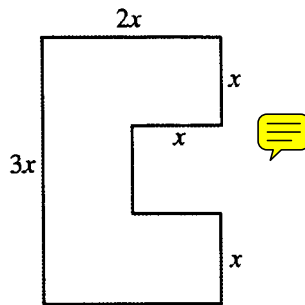


86. The area of square $ABCD$ in the figure above is 64. What is the area of the shaded triangle AED ?

- (A) 16 (B) 24 (C) 28 (D) 30 (E) 32
-

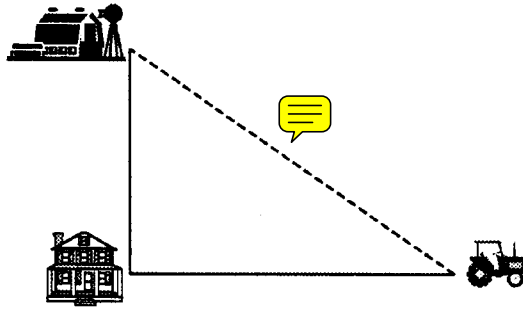
87. A stack of three cubes of the same size has a volume of 24 cubic inches. What is the length, in inches, of an edge of one of the cubes?

- (A) 2 (B) $\frac{8}{3}$ (C) 3 (D) 8 (E) $2\sqrt{2}$
-



88. What is the perimeter of the figure above, if all intersecting line segments meet at right angles?

- (A) $6x$ (B) $8x$ (C) $10x$ (D) $11x$ (E) $12x$
-



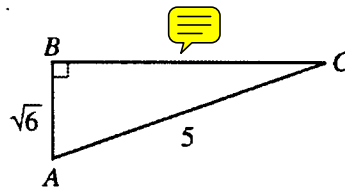
89. In the figure above, John's barn is 200 yards due north of his house and his tractor is 300 yards due east of his house. How many yards must he walk to go directly from his tractor to his barn if he walks in a straight line?

(A) $10\sqrt{13}$ (B) $\sqrt{500}$ (C) $100\sqrt{13}$ (D) 400 (E) 500



90. The lengths of the two longer sides of a right triangle are 7 and 9, respectively. What is the length of the shortest side?

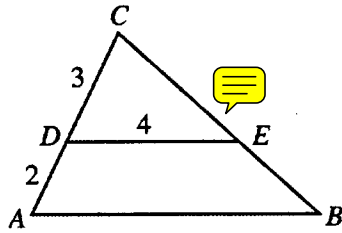
(A) 2 (B) $4\sqrt{2}$ (C) $\sqrt{130}$ (D) 16 (E) 32



91. In right triangle ABC above, $BC =$

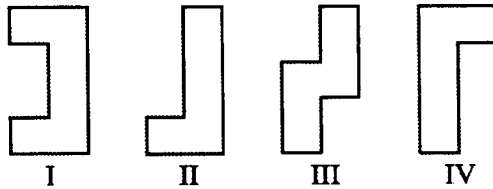
(A) $5 - \sqrt{6}$ (B) $\sqrt{19}$ (C) $\sqrt{31}$ (D) $5 + \sqrt{6}$ (E) 4

Plane Geometry



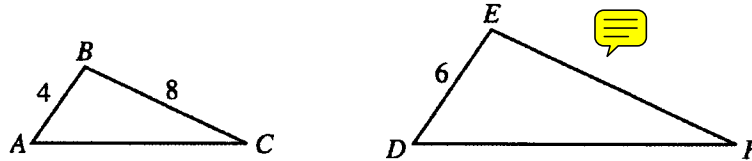
92. In the figure above, if $DE \parallel AB$, what is the length of AB ?

- (A) $\frac{3}{20}$ (B) $\frac{8}{3}$ (C) $\frac{15}{4}$ (D) 6 (E) $\frac{20}{3}$



93. Which two of the figures above are congruent?

- (A) I and II (B) I and III (C) I and IV (D) II and III (E) II and IV



94. Triangles ABC and DEF in the figure above are similar. What is the length of EF ?

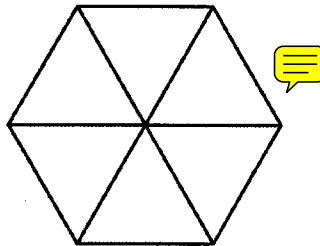
- (A) 4 (B) 6 (C) 8 (D) 12 (E) 16
-

95. A rectangular garden has a perimeter of 28 yards. The width of the garden is 6 yards less than its length. What is the area of the garden, in square yards? 🗨️

- (A) 132 (B) 48 (C) 40 (D) 36 (E) 12
-

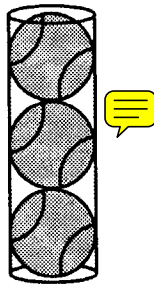
96. If the circumference of circle A is twice the circumference of circle B and the radius of circle A is 4, what is the radius of circle B ? 🗨️

- (A) 1 (B) 2 (C) $2\sqrt{2}$ (D) 2π (E) 8
-

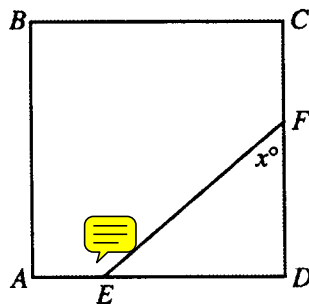


97. A regular hexagon is formed from 6 equilateral triangles, as shown in the figure above. If each triangle has perimeter 4, then the perimeter of the hexagon is

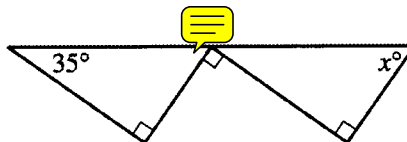
- (A) 8 (B) 16 (C) 24 (D) $\frac{4\sqrt{3}}{3}$ (E) $8\sqrt{3}$
-



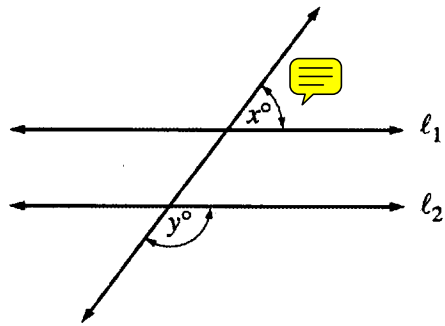
98. Three spherical balls, each 2 inches in diameter, fit snugly inside the cylindrical can shown above. The volume of the can is
- (A) 3π (B) 4π (C) 6π (D) 12π (E) 24π
-



99. In square $ABCD$ above, the measure of $\angle AEF = 140^\circ$. What is the value of x ?
- (A) 30 (B) 40 (C) 45 (D) 50 (E) 60
-

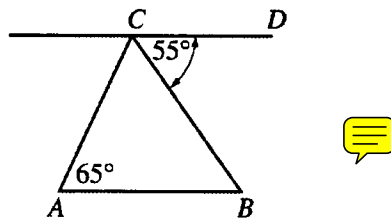


100. In the figure above, what is the value of x ?
- (A) 25 (B) 35 (C) 45 (D) 55 (E) 65
-



101. In the figure above, l_1 is parallel to l_2 and $y = 127$. What is the value of x ?

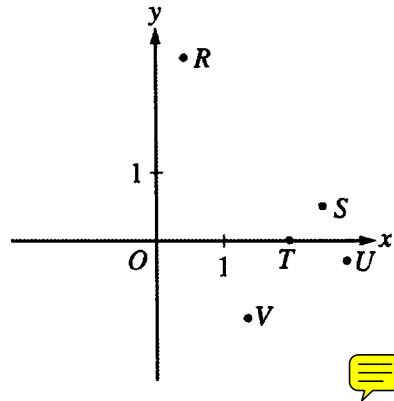
- (A) 37 (B) 45 (C) 53 (D) 60 (E) 63
-



102. In the figure above, CD is parallel to AB . What is the measure of $\angle ACB$?

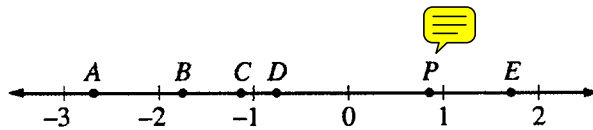
- (A) 25° (B) 35° (C) 60° (D) 120° (E) 125°
-

Coordinate Geometry and Graphing



103. If $a < b$, which point in the figure above could have coordinates (a, b) ?

- (A) R (B) S (C) T (D) U (E) V



104. If x is the coordinate of point P shown on the number line above, which of the following points has coordinate $-2x$?

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



105. Which of the following represents all values of x in the interval graphed on the number line above?

- (A) $x \leq -3$ and $x \leq 7$
- (B) $x \geq -3$ and $x \geq 7$
- (C) $x \leq -3$ or $x \geq 7$
- (D) $-3 \leq x \leq 7$
- (E) $7 \leq x \leq -3$



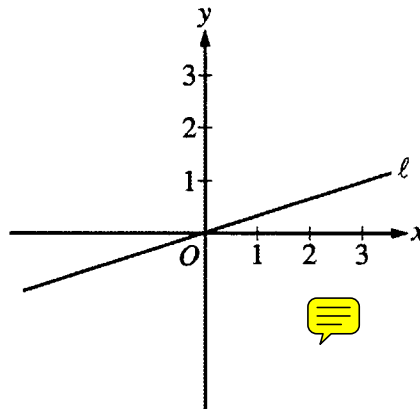
106. Which of the following points is NOT on the graph of $y = x^2 + 7$?

- (A) $(0, -7)$
- (B) $(0, 7)$
- (C) $(-1, 8)$
- (D) $(1, 8)$
- (E) $(2, 11)$



107. If a and b are the two solutions to $x^2 - x - 2 = 0$, then $a + b =$

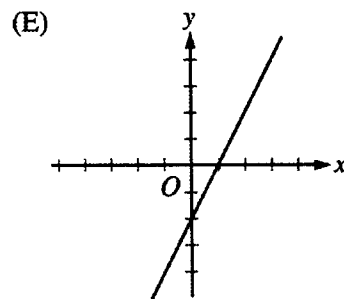
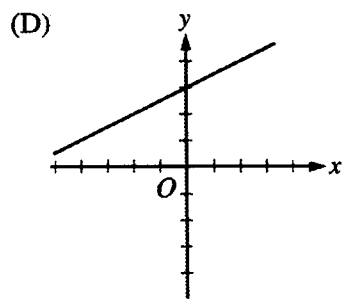
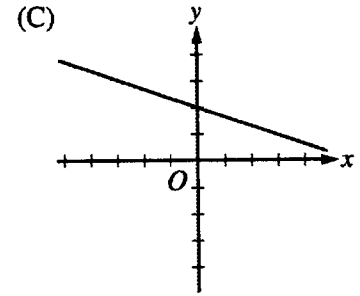
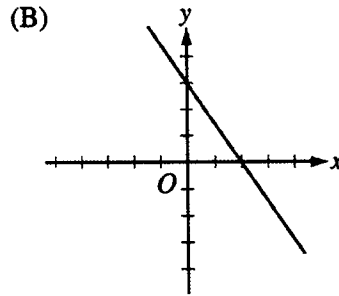
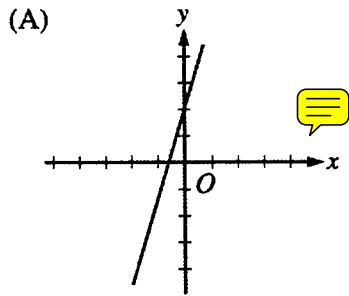
- (A) -1
- (B) 0
- (C) 1
- (D) 3
- (E) 5



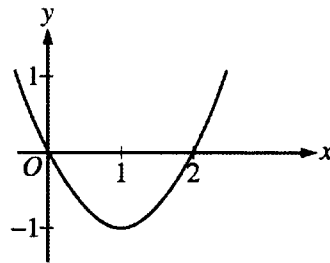
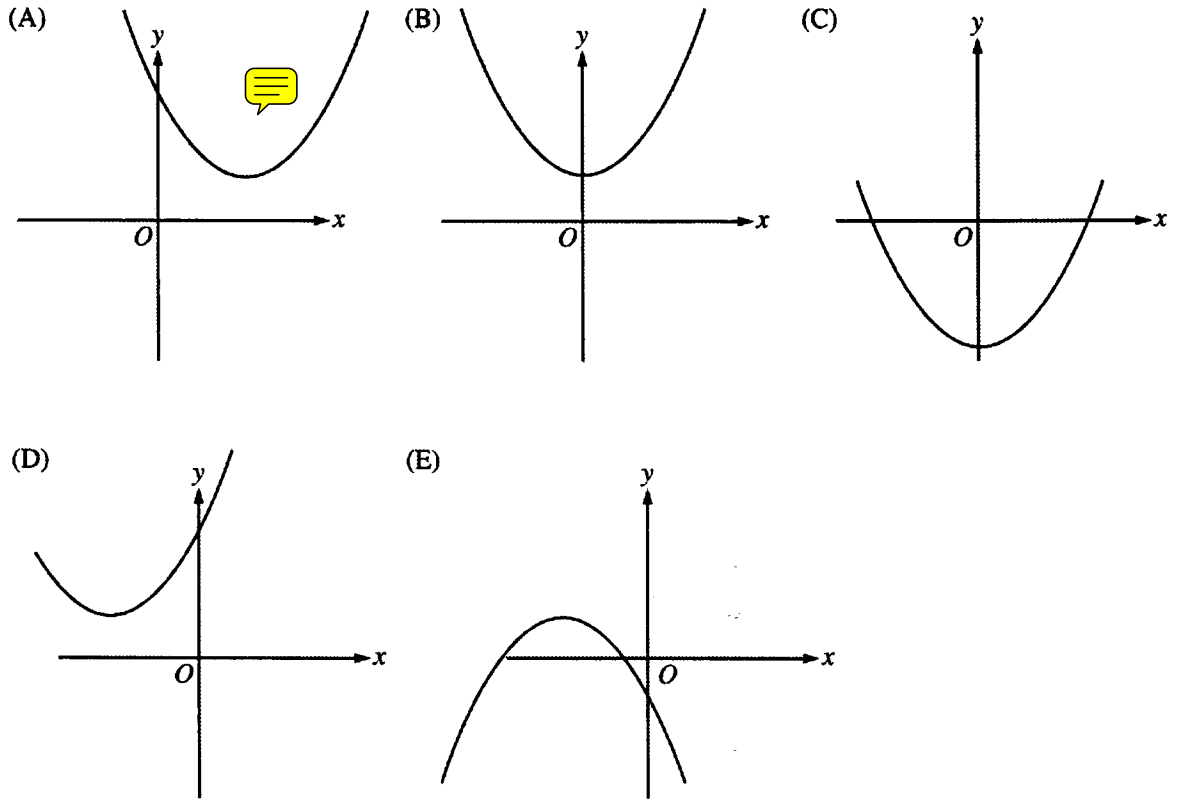
108. Which of the following is an equation of line ℓ in the figure above?

- (A) $y = \frac{1}{3}$
- (B) $y = \frac{1}{3}x$
- (C) $y = 3x$
- (D) $y = -\frac{1}{3}x$
- (E) $y = -3x$

109. Which of the following could be the graph of $y = 3x + 2$?



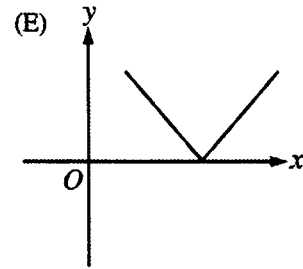
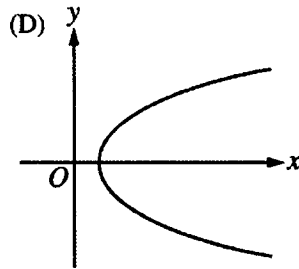
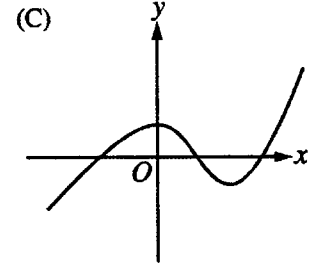
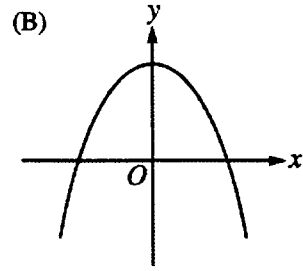
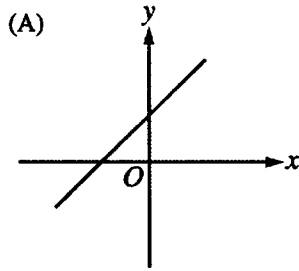
110. Which of the following could be the graph of $y = (x - 2)^2 + 1$?



111. The figure above shows the graph of $y = f(x)$. What are all values of x for which $f(x) > 0$?

- (A) $x < 0$ (B) $x > 1$ (C) $x > 2$ (D) $0 < x < 2$ (E) $x < 0$ or $x > 2$

112. Which of the following is the graph of a linear function?



113. If the distance between the points $(x, 11)$ and $(1, -1)$ is 13, then which of the following could be a value of x ?



- (A) 2 (B) 4 (C) 5 (D) 6 (E) 12



114. In the coordinate plane, which of the following is the midpoint of the line segment with endpoints $(2, 5)$ and $(6, 1)$?



- (A) $(8, 6)$ (B) $(4, 3)$ (C) $(4, 4)$ (D) $\left(\frac{7}{2}, \frac{7}{2}\right)$ (E) $\left(\frac{3}{2}, \frac{5}{2}\right)$



Answers to Questions

- | | | | |
|-------|-------|-------|--------|
| 1. A | 30. D | 59. C | 88. E |
| 2. C | 31. E | 60. B | 89. C |
| 3. D | 32. E | 61. B | 90. B |
| 4. D | 33. D | 62. C | 91. B |
| 5. B | 34. D | 63. E | 92. E |
| 6. D | 35. C | 64. D | 93. E |
| 7. E | 36. A | 65. D | 94. D |
| 8. B | 37. D | 66. D | 95. C |
| 9. B | 38. E | 67. B | 96. B |
| 10. C | 39. A | 68. E | 97. A |
| 11. E | 40. E | 69. E | 98. C |
| 12. C | 41. D | 70. E | 99. D |
| 13. D | 42. A | 71. D | 100. D |
| 14. A | 43. B | 72. B | 101. C |
| 15. C | 44. A | 73. E | 102. C |
| 16. C | 45. C | 74. A | 103. A |
| 17. C | 46. A | 75. C | 104. B |
| 18. B | 47. D | 76. E | 105. D |
| 19. B | 48. A | 77. A | 106. A |
| 20. E | 49. E | 78. A | 107. C |
| 21. C | 50. B | 79. D | 108. B |
| 22. D | 51. D | 80. C | 109. A |
| 23. D | 52. C | 81. E | 110. A |
| 24. C | 53. A | 82. E | 111. E |
| 25. B | 54. D | 83. D | 112. A |
| 26. C | 55. B | 84. C | 113. D |
| 27. C | 56. D | 85. B | 114. B |
| 28. C | 57. A | 86. E | |
| 29. B | 58. D | 87. A | |