Name _____ Date _____

Pre-Course Diagnostic Test

Multiple Choice **Choose the letter of the correct answer.**

1. What is the value of $5^2 + 8[(3 - 1)^2]$?

Ⓐ 50 Ⓑ 57 Ⓒ 132 Ⓓ 264

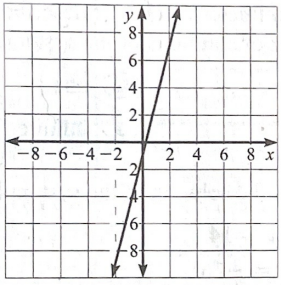
2. What is the value of $4r^2 - 8$ when $r = 3$?

Ⓕ 16 Ⓖ 28 Ⓗ 36 Ⓙ 40

3. What is the solution of $3a + 6 < 21$?

Ⓐ $a < 3$ Ⓑ $a < 5$ Ⓒ $a < 6$ Ⓓ $a < 9$

4. Which function does this graph represent?



Ⓕ $y = x - 4$ Ⓖ $y = -x + 4$

Ⓗ $y = 4x - 1$ Ⓙ $y = -4x + 1$

5. Four customers buy cheese at a deli. Kim buys $1\frac{4}{5}$ pounds, Jay buys $2\frac{3}{5}$ pounds, Lena buys 1.5 pounds, and Li buys 2.05 pounds. Which customer bought the *least*?

Ⓐ Kim Ⓑ Jay Ⓒ Lena Ⓓ Li

6. At noon, the temperature is −5°F. By evening, the temperature has dropped 7°F. What is the evening temperature?

Ⓕ 2°F Ⓖ −2°F

Ⓗ 12°F Ⓙ −12°F

7. Which is equivalent to $-\frac{3}{4}b \cdot (-20)$?

Ⓐ $-15b$ Ⓑ $-\frac{3}{5}b$ Ⓒ $\frac{3}{5}b$ Ⓓ $15b$

8. Which is the best estimate of $\sqrt{65}$ to the nearest whole number?

Ⓕ 8 Ⓖ 9 Ⓗ 32 Ⓙ 33

9. What is the solution of $-3x + 4 = 28$?

Ⓐ $x = -27$ Ⓑ $x = -8$

Ⓒ $x = 4$ Ⓓ $x = 32$

10. What is the solution of $-2c + 18 = c - 42$?

Ⓕ $c = 8$ Ⓖ $c = 12$

Ⓗ $c = 20$ Ⓙ $c = 60$

11. A farmer knows that 5 sheep produce about 25 pounds of wool. Which is the best estimate of how much wool the farmer can expect to get from her flock of 68 sheep?

Ⓐ 88 pounds Ⓑ 125 pounds

Ⓒ 340 pounds Ⓓ 1700 pounds

12. The perimeter P of a rectangle is given by the formula $P = 2\ell + 2w$, where ℓ is the length of the rectangle and w is its width. Which is the perimeter formula solved for w?

Ⓕ $w = P - 2\ell$ Ⓖ $w = 2(P - \ell)$

Ⓗ $w = \frac{P}{2} + 1$ Ⓙ $w = \frac{P}{2} - \ell$

13. What is the slope m and the y-intercept b of the graph of $8x - 3y = 10$?

Ⓐ $m = -10, b = 8$ Ⓑ $m = -\frac{10}{3}, b = \frac{8}{3}$

Ⓒ $m = \frac{8}{3}, b = -\frac{10}{3}$ Ⓓ $m = 8, b = -10$

Name _____ Date _____

Pre-Course Diagnostic Test *continued*

14. What is the slope of the line that passes through $(12, -7)$ and $(5, 14)$?

Ⓕ -3 Ⓖ $-\frac{19}{9}$ Ⓗ $-\frac{1}{3}$ Ⓙ 1

15. What is the value of $f(x) = -x + 4$ when $x = -2$?

Ⓐ -4 Ⓑ -2 Ⓒ 2 Ⓓ 6

16. Which is an equation of the line that passes through $(12, 18)$ and $(-18, -7)$?

Ⓕ $y = \frac{5}{6}x + 8$ Ⓖ $y = \frac{6}{5}x + \frac{5}{4}$

Ⓗ $y = \frac{7}{5}x + \frac{5}{6}$ Ⓙ $y = \frac{5}{4}x + \frac{6}{5}$

17. Which is a linear equation in standard form of a line with slope $-\frac{4}{9}$ that passes through $(3, 1)$?

Ⓐ $4x + y = 7$

Ⓑ $4x + 9y = 21$

Ⓒ $-13x + y = 24$

Ⓓ $-13x + 27y = -12$

18. What is the slope of a line perpendicular to the graph of $y = \frac{5}{3}x - 8$?

Ⓕ $-\frac{5}{3}$ Ⓖ $-\frac{3}{5}$ Ⓗ $\frac{3}{5}$ Ⓙ $\frac{5}{3}$

19. Carla can spend at most $550 on a couch. She pays $100 up front and makes 6 equal payments p. Which best describes p?

Ⓐ $p \leq 75$ Ⓑ $p \leq 91.67$

Ⓒ $p \geq 91.67$ Ⓓ $p \geq 75$

20. A water heater is guaranteed to heat water to within 1.25°F of the selected temperature. Mr. Jones sets his water heater to 130°F. What is the coolest temperature the water could be?

Ⓕ 128.75°F Ⓖ 129.75°F

Ⓗ 130.25°F Ⓙ 131.25°F

21. What is the solution of $-9 < 2x + 5 \leq 3$?

Ⓐ $-7 < x \geq -1$ Ⓑ $-7 > x \leq -1$

Ⓒ $-7 < x \leq -1$ Ⓓ $-7 > x \geq -1$

22. The graph of a certain linear system is two parallel lines. Which best describes the number of solutions of the system?

Ⓕ none Ⓖ one

Ⓗ two Ⓙ infinite

23. What is the solution of the system below?

$3x + 2y = 14$

$y - 4x = -26$

Ⓐ $x = 2, y = 4$ Ⓑ $x = 5, y = -6$

Ⓒ $x = 6, y = -2$ Ⓓ $x = 10, y = 8$

24. One estimate of the U.S. national debt shows it growing by $\$1.05 \times 10^4$ per second. There are about 3.15×10^7 seconds in a year. At this rate, about how much is added to the debt in a year?

Ⓕ $\$3.00 \times 10^3$ Ⓖ $\$3.31 \times 10^{11}$

Ⓗ $\$3.31 \times 10^{28}$ Ⓙ $\$4.20 \times 10^{11}$

Name _____ Date _____

Pre-Course Diagnostic Test *continued*

25. Which is equivalent to $r^5(t^2 \cdot rt^3)^{-4}$?

Ⓐ r^2t Ⓑ $r^{-15}t^2$

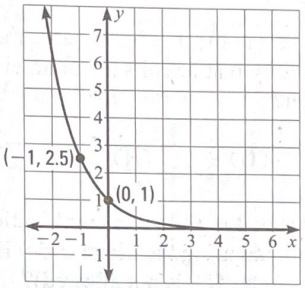
Ⓒ rt^{-20} Ⓓ $r^{-20}t^{-24}$

26. Which is an exponential function?

Ⓕ $y = x^5$ Ⓖ $y = 5^x$

Ⓗ $y = \frac{x}{5}$ Ⓙ $y = \frac{5}{x}$

27. Which function is graphed below?



Ⓐ $y = (0.4)^x$ Ⓑ $y = x^{0.4}$

Ⓒ $y = x^{-0.4}$ Ⓓ $y = -0.4^x$

28. What are the solutions of $-5a^2 + 31a = 6$?

Ⓕ $a = 1, a = 5$ Ⓖ $a = -1, a = -5$

Ⓗ $a = \frac{1}{5}, a = 6$ Ⓙ $a = -\frac{1}{5}, a = -6$

29. What are the factors of $36h^2 - k^2$?

Ⓐ $(6h - k)(6h - k)$

Ⓑ $(6h + k)(6h - k)$

Ⓒ $(6)(h - k)(h - k)$

Ⓓ $(6)(h + k)(h - k)$

30. A rectangle has width $(2v + 3)$ and length $(v + 1)$. If the area is 36 square inches, what is the width of the rectangle?

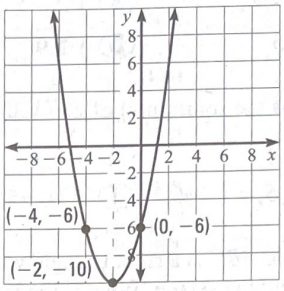
Ⓕ 3 inches Ⓖ 4 inches

Ⓗ 6 inches Ⓙ 9 inches

31. Maria's age is M. Pat's age is $M + 3$. Five years ago, the product of their ages was 70. How old is Maria now?

Ⓐ 7 Ⓑ 10 Ⓒ 12 Ⓓ 15

32. Which function is graphed below?



Ⓕ $y = x^2 + 4x - 6$

Ⓖ $y = x^2 - 2x - 10$

Ⓗ $y = x^2 - 10x - 2$

Ⓙ $y = x^2 - 4x + 6$

33. What is the value of the discriminant of $y = 6n^2 - 9n - 1$?

Ⓐ -324 Ⓑ -10

Ⓒ 6 Ⓓ 105

34. What is the solution of $x^2 - 8x = 1$?

Ⓕ $x = 4 \pm \sqrt{17}$ Ⓖ $x = 0, x = 8$

Ⓗ $x = 1, x = 7$ Ⓙ $x = \pm\sqrt{17}$

35. Which best describes the number of solutions of $7d^2 + d + 4 = 0$?

Ⓐ none Ⓑ one

Ⓒ two Ⓓ infinite

Name _____ Date _____

Pre-Course Diagnostic Test *continued*

36. Which is equivalent to $\sqrt{12}(6\sqrt{3} + 8)$?

Ⓕ $28\sqrt{3}$ Ⓖ $10\sqrt{6}$

Ⓗ $2(3\sqrt{15} + 16\sqrt{3})$ Ⓙ $4(9 + 4\sqrt{3})$

37. What is the range of $y = \sqrt{x - 9} + 5$?

Ⓐ $y \geq -9$ Ⓑ $y \geq -5$

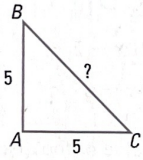
Ⓒ $y \geq 5$ Ⓓ $y \geq 9$

38. What is the solution(s) of $x = \sqrt{30 - x}$?

Ⓕ $x = 5$ Ⓖ $x = 6$

Ⓗ $x = 5, x = -6$ Ⓙ $x = -5, x = 6$

39. Triangle ABC is a right triangle with the side lengths shown. What is the length of side BC?



Ⓐ $2\sqrt{5}$ Ⓑ $5\sqrt{2}$ Ⓒ 10 Ⓓ 25

40. For which value(s) of x is the expression $\frac{1}{x - 5}$ undefined?

Ⓕ $x = 5$ Ⓖ $x \neq 5$ Ⓗ $x = \frac{1}{5}$ Ⓙ $x \neq \frac{1}{5}$

41. What is the quotient of $(-3x^2 - 10x + 8) \div (x + 4)$?

Ⓐ $-3x + 2$

Ⓑ $3x - 2$

Ⓒ $-3x^2 - 11x + 4$

Ⓓ $-3x^3 - 10x^2 + 8x$

42. Which is equivalent to $\frac{2g^2 + 7g - 4}{2g^2 + 5g - 3}$?

Ⓕ $2g - 1$ Ⓖ $\frac{g + 4}{g + 3}$

Ⓗ $\frac{7g - 4}{5g - 3}$ Ⓙ $4g^2 + 12g - 7$

43. What is $\frac{m^2 - 16}{2m + 5}$ divided by $\frac{m + 4}{4m^2 - 25}$?

Ⓐ $2m^2 - 13m + 20$ Ⓑ $\frac{m^2 - 8m + 16}{4m^2 - 20m + 25}$

Ⓒ $2m^2 + 13m + 20$ Ⓓ $\frac{m^2 + 8m + 16}{4m^2 + 20m + 25}$

44. Jim rolls a number cube. What is the probability that he rolls a 5 or an even number?

Ⓕ $\frac{1}{6}$ Ⓖ $\frac{1}{2}$ Ⓗ $\frac{2}{3}$ Ⓙ $\frac{5}{6}$

45. How many 4-digit locker combinations are possible using the digits 0–5 with no repeats (e.g., 588 is not allowed)?

Ⓐ 15 Ⓑ 24 Ⓒ 360 Ⓓ 720

46. For which data set are the mean, median, and mode each equal to 3?

Ⓕ 0, 2, 3, 4, 6 Ⓖ 1, 3, 3, 3, 5

Ⓗ 2, 2, 3, 3, 3 Ⓙ 3, 4, 5, 6, 7

Name _____ Date _____

Pre-Course Diagnostic Test *continued*

Short Response

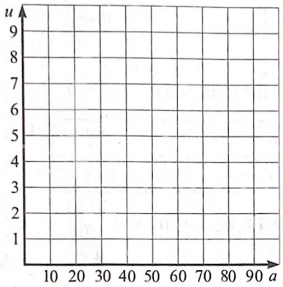
47. Bob earns \$8 per hour plus a \$40 bonus. Ellen earns \$8.50 per hour. Write an expression for Bob and Ellen's combined earnings.

48. A hat sold in Australia that is size 52 is the same size as a hat sold in the United States that is size $6\frac{1}{2}$. The table shows some other equivalent hat sizes.

United States Hat Size (u)	$6\frac{1}{2}$	$6\frac{5}{8}$	$6\frac{3}{4}$	$6\frac{7}{8}$	7
Australian Hat Size (a)	52	53	54	55	56

a. Write a rule for U.S. hat size u in terms of Australian hat size a.

b. Graph the function.



c. Bruce wears a hat that is Australian size 58. What is his U.S. hat size?

49. Deb competes in a 400-meter swim race. She swims the first 300 meters at m meters per minute. She swims the last 100 meters of the race at a pace 2.5 meters per minute faster.

a. Write an equation for Deb's total time t in terms of m.

b. If she swims 60 meters per minute for the first 300 meters, how long does Deb take to swim the whole race? Round to the nearest second.

50. The base of Mount Tirzah is 552 feet above sea level. Luke climbs from the base and gains 5448 feet of altitude. Then, he explores a trail and loses 168 feet of altitude. Finally, he climbs again, rising 354 feet in altitude, and makes camp. What is the elevation of Luke's camp?

51. A washing machine can wash 3 loads of laundry in 144 minutes. How long will the machine take to wash 5 loads?

52. 97.2 is what percent of 180?

53. D'Andre has 6 class periods, 1 lunch period, and 10 minutes between periods. Each period is 55 minutes long. How long is his school day from the start of the first class until the end of the last class?

Answers

47. _____

48a. _____

48b. See graph.

48c. _____

49a. _____

49b. _____

50. _____

51. _____

52. _____

53. _____

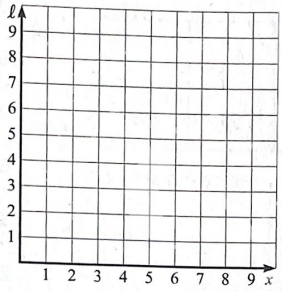
Name _____ Date _____

Pre-Course Diagnostic Test *continued*

54. Don is knitting a scarf. When he started today, it was 5 inches long.

a. Don knits for 18 minutes at a constant speed of x inches per minute and adds 4.5 inches to the scarf. Write an equation to model the total length ℓ of the scarf in terms of x.

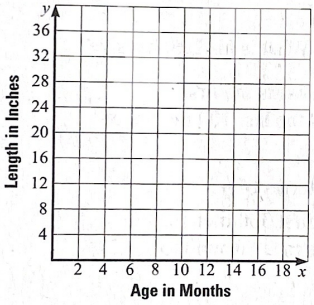
b. Graph the equation on the grid below. At this rate, how long will Don need to knit a 60-inch long scarf?



55. The table shows a baby's length, measured every three months.

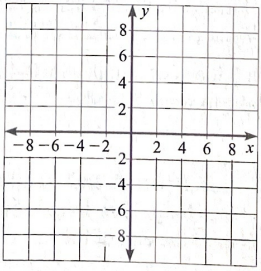
Age (months) x	0	3	6	9	12
Length (inches) y	19	24	26	30	32

a. Plot the data on the grid below, draw a line of fit, and write the equation of the line.



b. Estimate the baby's length at 7 months.

56. Graph $y - 2x < -6$. Is $(4, -1)$ a solution of the inequality? Explain.



Answers

54a. _____

54b. See graph.

55a. See graph.

55b. _____

56. See graph.

_____

_____

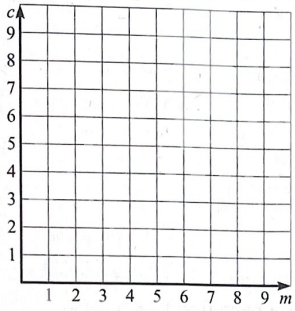
_____

Name _____ Date _____

Pre-Course Diagnostic Test *continued*

57. Beth can spend up to \$45 on 2.5 pounds of meat and 5 pounds of cheese to make sandwiches for a party. The cost per pound m of the meat can be no more than 2 times the cost per pound c of the cheese.

a. Write and graph a system of linear inequalities for c in terms of m.



b. If Beth spends \$5 per pound on cheese, will she still be able to buy 2.5 pounds of meat?

58. Solve the system, $2x = 5y - 23$ and $3y - x = 13$.

59. Vince invests \$75 at 4.2% interest, compounded annually.

a. At the end of 10 years, what is the value of Vince's investment?

b. Next, Vince takes all the money and buys stock. The stock depreciates at an annual rate of 5.1% for 2 years. What is the value of Vince's investment at the end of 2 years?

60. Does $8x^2 + 3x = -9$ have any solutions? If yes, solve for x. If no, explain.

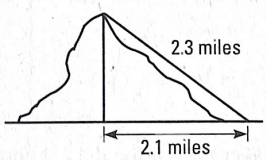
61. A ski jumper takes off from the end of a ramp 20 meters off the ground with an initial vertical velocity of 36 meters per second. The table shows the height h in meters of a ski jumper at time t seconds.

Time t	0	1	2	3	4	5
Height h	20	51.1	72.4	83.9	85.6	77.5

a. Is the function linear, exponential, or quadratic? Write the equation of the function for h in terms of t.

b. How long does the ski jumper take to reach the ground? Round to the nearest tenth of a second.

62. A cable car travels along a 2.3 mile long cable, from the base of a mountain to the summit, as shown. What is the height of the mountain from base to summit?



Answers

57a. See graph.

57b. _____

58. _____

59a. _____

59b. _____

60. _____

_____

_____

61a. _____

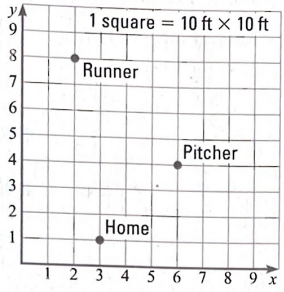
61b. _____

62. _____

Name _____ Date _____

Pre-Course Diagnostic Test *continued*

63. A baseball player is running from third base to home. The pitcher has the ball and is trying to tag the runner out.



a. If the runner runs at 440 feet per minute and the pitcher runs at 300 feet per minute, which player gets to home base first?

b. Explain.

64. Solve $\frac{b+3}{b-5} + 2b = 3$.

65. Does the table below represent an inverse variation? If so, write the equation. If not, explain.

Input, *p*	−5	−3	4	6
Output, *q*	−0.96	−1.6	1.2	0.8

66. Benita shoots 10 arrows at a target. The distance in inches of each arrow from the bull's-eye is 2, 0, 6, 3, 0, 6, 2, 1, 6, and 0.

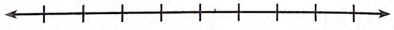
a. What are the mean, median, and mode(s) of the data?

b. Which measure best describes Benita's shooting? Explain.

67. Mr. Williams' students have visited different numbers of states: 2, 3, 6, 15, 18, 20, 35, 32, 12, 4, 7, 30, 26, 21, 20, 8, 4, 2, 3, and 9.

a. Make a stem-and-leaf plot of the data. What is the median?

b. Make a box-and-whisker plot of the data. About what percent of the students have visited at least 10 states?



Answers

63a. _____

63b. _____

_____

64. _____

65. _____

_____

_____

66a. _____

66b. _____

_____

_____

67a. See plot.

_____

67b. See plot.

_____