Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Pre-Calculus Prerequisite Skills

Multiple Choice
Identify the choice that best completes the statement or answers the question.

Use set notation to denote the elements, subsets, and complements of the following given sets.

____ 1. N is the set of odd natural numbers greater than 11 and less than 21. Use set notation to write the elements of N.

a. $N = \{13, 15, 17, 19\}$

b. $N = (12, 14, 16, 18, 20\}$

c. $N = \{11, 12, 14, 16, 18, 20, 21\}$

d. $N = \{11, 13, 15, 17, 19, 21\}$

____ 2. Let $U = \{7, 8, 9, 10, 11, 12\}$ and $A = \{9, 11\}$. Determine whether the statement $A \subset U$ is true or false and find A'.

a. false; $A' = \{9, 10, 11, 12\}$

b. true; $A' = \{7, 8, 10, 12\}$

c. true; $A' = \{7, 8, 9, 10, 12\}$

d. false; $A' = \{7, 10, 12\}$

Find intersections and unions of the following given sets.

____ 3. Let $U = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18\}$, $A = \{6, 12, 13, 15, 16\}$, and $B = \{7, 11, 13, 16\}$. Find $A \cup B$ and $A \cap B$.

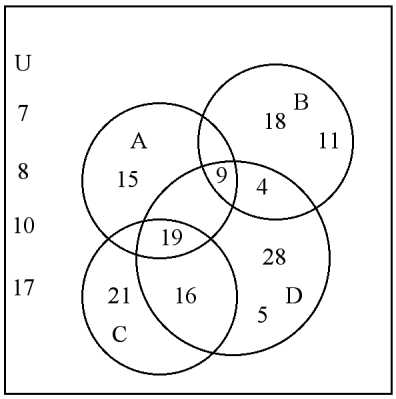
a. $A \cup B = \{6, 12, 13, 15, 16\}$;
$A \cap B = \{13, 16\}$

b. $A \cup B = \{6, 7, 11, 12, 13, 15, 16\}$;
$A \cap B = \{13, 16\}$

c. $A \cup B = \{6, 11, 12, 13, 15, 16\}$;
$A \cap B = \{11, 15, 16\}$

d. $A \cup B = \{6, 7, 11, 12, 13, 15, 16\}$;
$A \cap B = \{11, 15, 16\}$

____ 4. Use the Venn diagram to find $A \cup B$, $C \cap D$, and $(A \cup C) \cup D$.



a. $A \cup B = \{4, 9, 11, 15, 18, 19\}$;

$C \cap D = \{9, 11, 18, 19, 21, 28\}$;

$(A \cup C) \cup D = \{4, 5, 9, 15, 16, 19, 21, 28\}$

b. $A \cup B = \{4, 5, 15, 18, 19\}$;

$C \cap D = \{16, 19\}$;

$(A \cup C) \cup D = \{4, 5, 11, 13, 15, 18, 19, 21\}$

c. $A \cup B = \{4, 5, 15, 18, 19\}$;

$C \cap D = \{9, 11, 18, 19, 21, 28\}$;

$(A \cup C) \cup D = \{4, 5, 11, 13, 15, 18, 19, 21\}$

d. $A \cup B = \{4, 9, 11, 15, 18, 19\}$;

$C \cap D = \{16, 19\}$;

$(A \cup C) \cup D = \{4, 5, 9, 15, 16, 19, 21, 28\}$

____ 5. Simplify the expression $(3 - 5i)^3$ by performing operations with pure imaginary numbers and complex numbers.

a. $-123 + 10i$
b. $-198 - 10i$
c. $-123 + 550i$
d. $-198 + 550i$

____ 6. i^7

a. $-i$
b. 1
c. i
d. -1

____ 7. $(11 + i) + (3 - 15i)$

a. $14 - 14i$
b. $-4 + 4i$
c. $12 - 12i$
d. $14 + 16i$

____ 8. $(11 - 12i) + (21 - 8i)$

a. $9 + 19i$
b. $32 - 20i$
c. $32 - 4i$
d. $29i - i$

____ 9. $(8 + 10i)(5 - 8i)$

a. $40 - 14i + 80$
b. $120 - 14i$
c. $40 - 14i - 80i^2$
d. $88 + 50i$

____ 10. $(-4 + 4i)(-3 - 3i)$

a. $16 + 12i$
b. $12 + 0i - 12i^2$
c. $24 + 0i$
d. $12 + 0i + 12$

____ 11. Simplify the expression $\dfrac{3 - 9i\sqrt{5}}{3 + 2i\sqrt{5}}$ by using complex conjugates to write quotients of complex numbers in standard form.

a. $-\dfrac{9}{19} + \dfrac{33}{29}i\sqrt{5}$
b. $-\dfrac{81}{29} - \dfrac{33}{29}i\sqrt{5}$
c. $-\dfrac{9}{19} + \dfrac{60}{19}i\sqrt{5}$
d. $-\dfrac{81}{29} - \dfrac{60}{19}i\sqrt{5}$

____ 12. Simplify the expression $(4+4i) \div (4-3i)$ by using complex conjugates to write quotients of complex numbers in standard form.

a. $\frac{4}{19} - \frac{28}{25}i$

b. $\frac{4}{25} + \frac{28}{25}i$

c. $\frac{4}{19} + \frac{28}{19}i$

d. $\frac{4}{25} - \frac{28}{19}i$

____ 13. $\frac{3}{6+7i}$

a. $\frac{18}{85} + \frac{21}{85}i$

b. $\frac{6}{85} - \frac{7}{85}i$

c. $\frac{18}{13} + \frac{21}{13}i$

d. $\frac{18}{85} - \frac{21}{85}i$

____ 14. $\frac{6-3i}{8-11i}$

a. $\frac{81}{185} + \frac{42}{185}i$

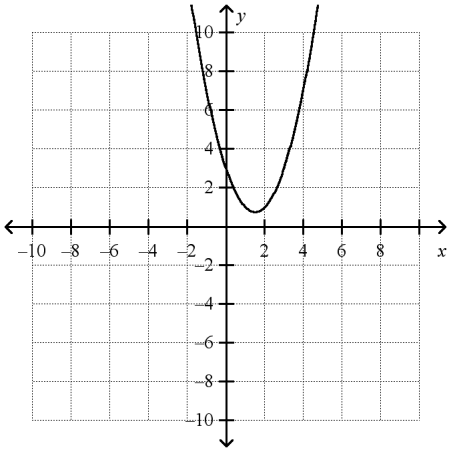
b. $\frac{15}{57} + \frac{42}{57}i$

c. $\frac{6}{185} - \frac{3}{185}i$

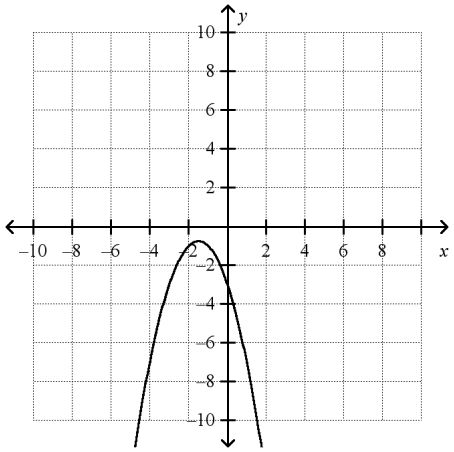
d. $\frac{81}{185} - \frac{42}{185}i$

____ 15. Graph $f(x) = x^2 + 3x + 3$ by making a table of values.

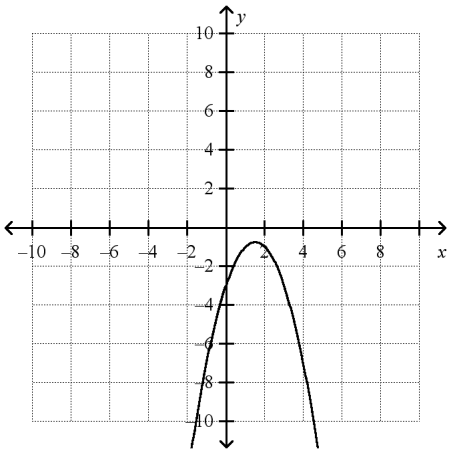
a.



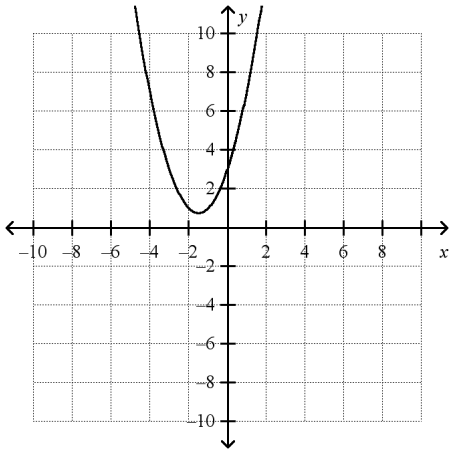
c.



b.



d.



____ 16. Consider $f(x) = 2x^2 + 8x + 3$. Determine whether the function has a maximum or minimum value. Then find the value of the maximum or minimum.

a. maximum; -2
b. minimum; -5
c. minimum; -2
d. maximum; -5

____ 17. Solve the equation $x^2 - 9x + 20 = 0$.

a. $4, -5$
b. $4, 5$
c. $-4, 5$
d. $-4, 5$

____ 18. Solve $x^2 + 2x = 15$ by completing the square.

a. $3, -5$
b. $6, -2$
c. $5, -15$
d. $4, -15$

____ 19. Solve $x^2 - 4x - 32 = 0$ by completing the square.

a. –4, 8
c. –8, 4
b. –8, 16
d. –8, 8

____ 20. Solve $-2x^2 + 5x = 0$ by completing the square.

a. 2.5, 0
c. 0
b. 0, – 2.5
d. 5, 0

____ 21. Find the exact solution of $x^2 - 3x = 40$ by using the Quadratic Formula.

a. –5, 8
c. –10, 16
b. –8, 5
d. 40, 43

____ 22. Find the exact solution of $-x^2 + 3x + 7 = 0$ by using the Quadratic Formula.

a. $\frac{3 - \sqrt{37}}{-2}, \frac{3 + \sqrt{37}}{-2}$
c. $\frac{-3 - \sqrt{-19}}{-2}, \frac{-3 + \sqrt{-19}}{-2}$
b. $\frac{-3 - \sqrt{12}}{-2}, \frac{-3 + \sqrt{12}}{-2}$
d. $\frac{-3 - \sqrt{37}}{-2}, \frac{-3 + \sqrt{37}}{-2}$

____ 23. Simplify the expression: $\sqrt{16a^{10}}$

a. $16a^{10}$
c. $4a^{10}$
b. $16a^5$
d. $4a^5$

____ 24. Simplify $\sqrt{25x^{20}y^{14}}$.

a. $5x^{10}y^7$
c. $5x^{20}y^{14}$
b. $12.5x^{20}y^{14}$
d. $12.5x^{10}y^7$

____ 25. Simplify $\sqrt[4]{81a^{32}b^{20}}$.

a. $20.25a^{32}b^{20}$
c. $3a^8b^5$
b. $3a^{32}b^{20}$
d. $20.25a^8b^5$

____ 26. Simplify $\sqrt{72x^5y^{12}}$.

a. $6y^6\sqrt{2x^5}$
c. $6x^2y^6\sqrt{x}$
b. $6\sqrt{2x^5y^{12}}$
d. $6x^2y^6\sqrt{2x}$

____ 27. Simplify $\sqrt{1331x^{13}y^{12}}$.

a. $11y^6\sqrt{11x^{13}}$
c. $11\sqrt{11x^{13}y^{12}}$
b. $11x^6y^6\sqrt{x}$
d. $11x^6y^6\sqrt{11x}$

____ 28. Simplify the expression. $\dfrac{x^{\frac{4}{7}} \cdot x^{\frac{3}{7}}}{x^{\frac{1}{7}}}$

a. $x^{\frac{7}{8}}$
b. $x^{\frac{6}{7}}$
c. $x^{\frac{7}{6}}$
d. $x^{\frac{8}{7}}$

____ 29. Solve the following system of equations. State whether the system is *consistent and independent*, *consistent and dependent*, or *inconsistent*.

$-5x + 3y = 15$

$5x - 3y = 20$

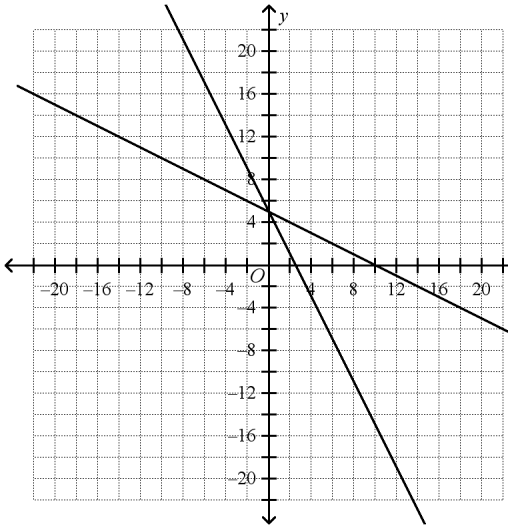
a. *inconsistent*
b. *consistent and dependent*
c. *consistent and independent*

____ 30. Solve the system of equations by graphing.

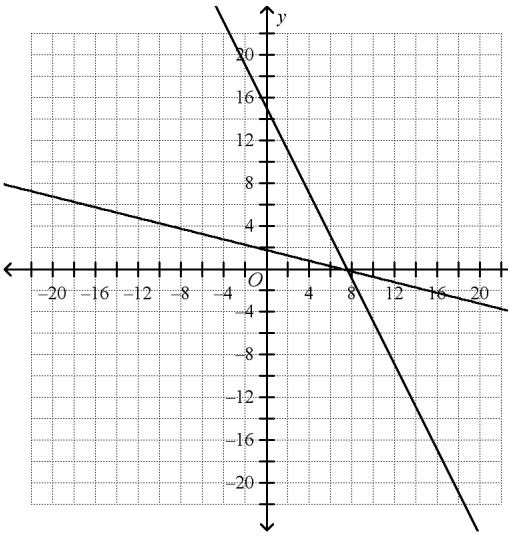
$x + y = -8$

$3x + y = -20$

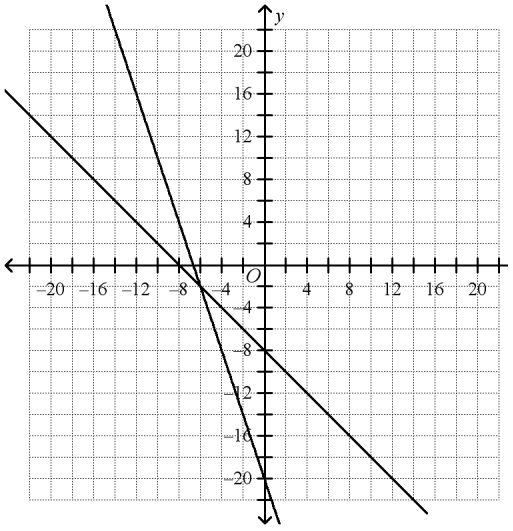
a.



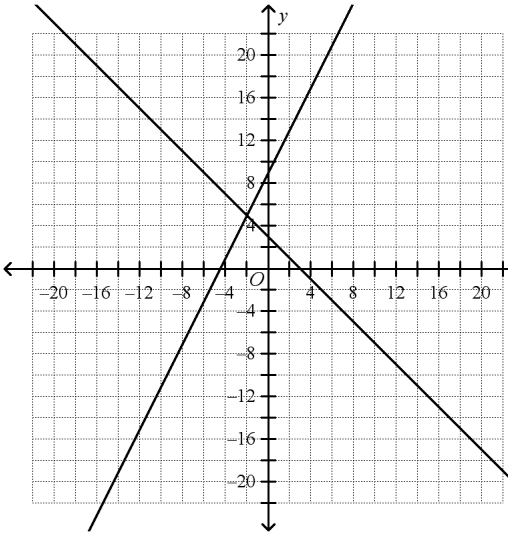
c.



b.



d.



____ 31. Solve the system of equations algebraically.

$4x - 3y = 3$

$6x - 6y = 6$

a. many solutions
b. $\{(-1, 0)\}$
c. $\{(0, -1)\}$
d. no solution

____ 32. Solve the system of equations.

$2x + 4y + 3z = 6$

$3x + 5y + 6z = 3$

$2x + 3y + 4z = 8$

a. $\{x = 63, y = -18, z = -16\}$
b. $\{x = 65, y = -20, z = -14\}$
c. $\{x = 62, y = -17, z = -15\}$
d. $\{x = 64, y = -19, z = -17\}$

____ 33. Solve the system of equations by graphing.

$y = 11x - 6$
$y = -6x + 11$

a. $(-1, 5)$
b. $(1, 7)$
c. $(5, 1)$
d. $(1, 5)$

____ 34. Solve the system of equations by graphing.

$2y + 8x = 58$
$y - 5x = 11$

a. $(2, 21)$
b. $(21, 2)$
c. $(4, 20)$
d. $(1, 21)$

____ 35. State whether the system of equations is *consistent and independent*, *inconsistent*, *consistitent and dependent*, or *none of these*.

$5x - 8y = 6$
$6x - 6y = 6$

a. inconsistent
b. consistent and independent
c. consistent and dependent
d. none of these

____ 36. Solve the system of equations by using substitution.

$8x + 7y = 18$
$3x - 5y = 22$

a. $(-2, 4)$
b. $(3, -2)$
c. $(4, -2)$
d. $(4, 0)$

____ 37. Solve the system of equations by using substitution.

$3r + 3s = 9$
$3r - 6s = 18$

a. $(4, -0.5)$
b. $(5.5, 3)$
c. $(4, -1)$
d. $(2, -1)$

____ 38. Solve the system of equations by using elimination.

$3p + 9q = 6$
$5p - 5q = 30$

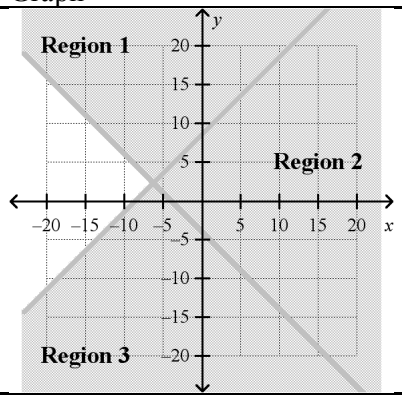
a. $(6, -1)$
b. $(3.75, 2)$
c. $(5, 0.5)$
d. $(5, -1)$

____ 39. Solve the system of equations by using elimination.

$7a + 9b = 14$
$6a - 4b = 12$

a. $(2, 0.25)$
b. $(2, 0)$
c. $(1, 0)$
d. $(3, -0.5)$

____ 40. Which region in the graph below is the solution of the system of inequalities given below?

System of inequalities:	Graph
$y \le x + 9$ $y \ge -x - 4$	

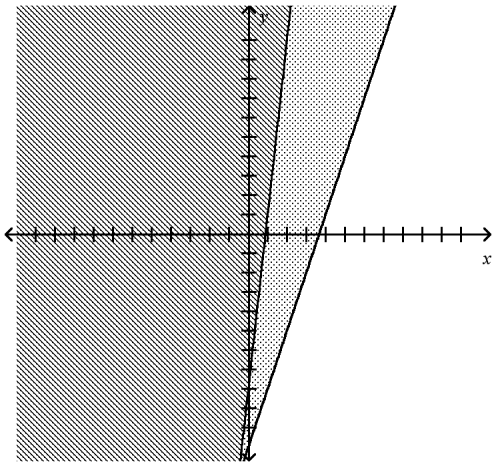
a. Region 3
b. Region 2
c. Region 1
d. Regions 1 and 2

____ 41. Solve the system of inequalities by graphing.

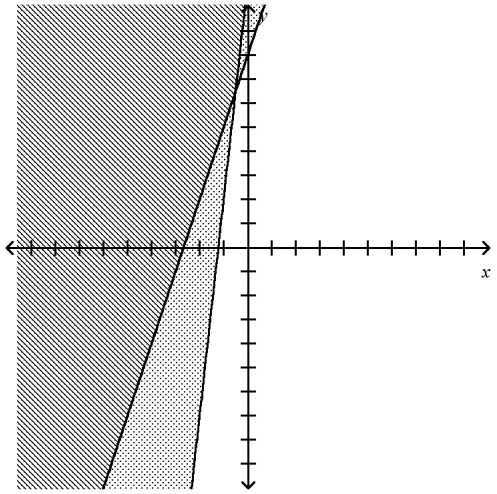
$y \leq -3x + 9$

$y \geq 9x + 8$

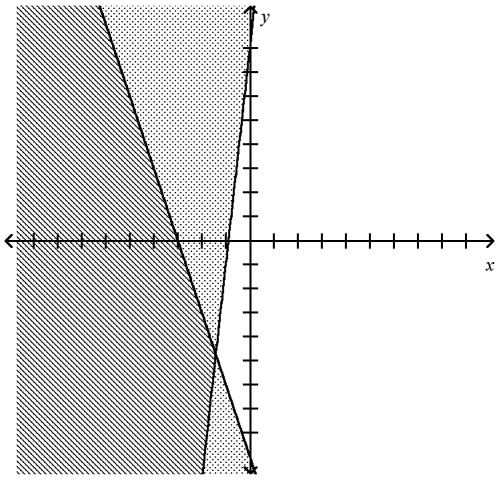
a.



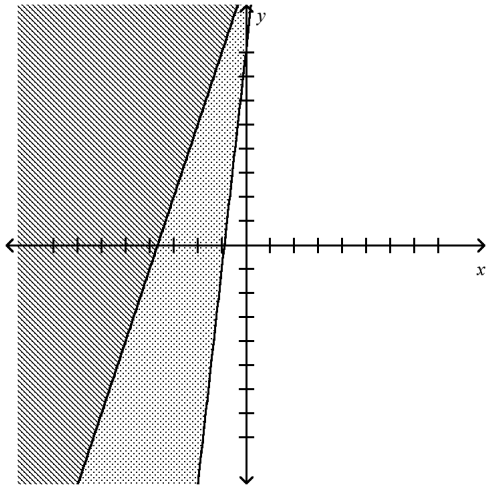
c.



b.



d.



Use characteristics to describe the following matrix.

____ 42. Use $A = \begin{bmatrix} 10 & 4 & 11 & 12 \\ 6 & 3 & 2 & 8 \end{bmatrix}$ to find the value of A_{21}.

a. 6
b. 10
c. 3
d. 4

Perform the following operations for the given matrices.

____ 43. Find each of the following for $A = \begin{bmatrix} 7 & 5 & 4 \\ 2 & 8 & 12 \end{bmatrix}$ and $B = \begin{bmatrix} 11 & 2 & 9 \\ 12 & 8 & 4 \end{bmatrix}$.

a. $A + B$
b. $5A - B$

a. $A + B = \begin{bmatrix} 18 & 7 & 13 \\ 14 & 16 & 16 \end{bmatrix}$;
$5A - B = \begin{bmatrix} 24 & 23 & 11 \\ -2 & 32 & 56 \end{bmatrix}$

b. $A + B = \begin{bmatrix} 21 & 7 & 17 \\ 14 & 8 & 16 \end{bmatrix}$;
$5A - B = \begin{bmatrix} 48 & 5 & 41 \\ 58 & 32 & 8 \end{bmatrix}$

c. $A + C = \begin{bmatrix} 18 & 7 & 13 \\ 14 & 8 & 16 \end{bmatrix}$;
$5A - B = \begin{bmatrix} 24 & 23 & 11 \\ 58 & 32 & 56 \end{bmatrix}$

d. $A + C = \begin{bmatrix} 21 & 7 & 17 \\ 14 & 8 & 16 \end{bmatrix}$;
$5A - B = \begin{bmatrix} 48 & 23 & 41 \\ 58 & 32 & 8 \end{bmatrix}$

____ 44. If $A = \begin{bmatrix} 3 & 8 & -2 \\ -1 & 5 & 2 \\ 9 & -3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 9 & 2 & 6 \\ 2 & 5 & 5 \\ 3 & 5 & 2 \end{bmatrix}$, find $A + B$.

a. $\begin{bmatrix} 14 & 9 & 6 \\ -1 & 11 & 9 \\ 11 & -2 & 5 \end{bmatrix}$

b. $\begin{bmatrix} 12 & 10 & 4 \\ 1 & 10 & 7 \\ 12 & 2 & 6 \end{bmatrix}$

c. $\begin{bmatrix} 11 & 12 & 5 \\ 7 & 9 & 6 \\ 14 & 0 & 4 \end{bmatrix}$

d. $\begin{bmatrix} 12 & 8 & 2 \\ 0 & 8 & 6 \\ 15 & 9 & 2 \end{bmatrix}$

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____ 45. Find $\begin{bmatrix} 6 \\ -4 \\ 5 \end{bmatrix} + \begin{bmatrix} -5 \\ -9 \\ 9 \end{bmatrix}$.

a. $\begin{bmatrix} -1 \\ 13 \\ 14 \end{bmatrix}$

b. $\begin{bmatrix} -11 \\ -5 \\ 14 \end{bmatrix}$

c. $\begin{bmatrix} 1 \\ -13 \\ 14 \end{bmatrix}$

d. $\begin{bmatrix} 11 \\ 5 \\ 14 \end{bmatrix}$

____ 46. $\begin{bmatrix} 4 & 5 \\ -3 & -6 \end{bmatrix} + \frac{1}{2}\begin{bmatrix} 0 & 6 \\ -6 & -4 \end{bmatrix}$

a. $\begin{bmatrix} 2 & 5.5 \\ -4.5 & -5 \end{bmatrix}$

b. $\begin{bmatrix} 4 & 8 \\ -9 & -10 \end{bmatrix}$

c. $\begin{bmatrix} 4 & 8 \\ -6 & -8 \end{bmatrix}$

d. $\begin{bmatrix} 2 & 8.5 \\ -7.5 & -7 \end{bmatrix}$

____ 47. $\begin{bmatrix} 5 & 9 \\ -3 & -9 \end{bmatrix} - \begin{bmatrix} 0 & 2 \\ -2 & -6 \end{bmatrix}$

a. $\begin{bmatrix} 5 & 7 \\ 3 & -7 \end{bmatrix}$

b. $\begin{bmatrix} 5 & 7 \\ -1 & -3 \end{bmatrix}$

c. $\begin{bmatrix} 3 & 9 \\ 3 & -7 \end{bmatrix}$

d. $\begin{bmatrix} -5 & -7 \\ 1 & 3 \end{bmatrix}$

____ 48. $3\begin{bmatrix} 4 & 2 \\ -2 & -8 \end{bmatrix} - 2\begin{bmatrix} 0 & 6 \\ -8 & -2 \end{bmatrix}$

a. $\begin{bmatrix} 12 & -6 \\ -2 & -8 \end{bmatrix}$

b. $\begin{bmatrix} 12 & -6 \\ 10 & -20 \end{bmatrix}$

c. $\begin{bmatrix} 0 & 6 \\ -2 & -8 \end{bmatrix}$

d. $\begin{bmatrix} -4 & 4 \\ -6 & 6 \end{bmatrix}$

____ 49. If $A = \begin{bmatrix} -3 & 7 & -5 \\ 3 & 7 & 9 \end{bmatrix}$, find $-4A$.

a. $\begin{bmatrix} 12 & -28 & 20 \\ -12 & -28 & -36 \end{bmatrix}$

b. $\begin{bmatrix} 12 & -28 & 20 \\ 3 & 7 & 9 \end{bmatrix}$

c. $\begin{bmatrix} -12 & -28 & -20 \\ -12 & -28 & -36 \end{bmatrix}$

d. $\begin{bmatrix} -12 & 28 & -20 \\ 12 & 28 & 36 \end{bmatrix}$

____ 50. Use $A = \begin{bmatrix} 1 & 5 \\ -3 & 6 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 9 \\ 1 & -1 \end{bmatrix}$, and $C = \begin{bmatrix} 4 & 6 \\ -2 & -8 \end{bmatrix}$ to determine whether $A(B + C) = AB + AC$ for the given matrices.

a. Yes

b. No

____ 51. A bookstore offers a collection of books. A student can select from one of 6 algebra books, one of 4 geometry books, and one of 3 calculus books. How many different possibilities are available for that collection?

a. 48

b. 30

c. 36

d. 72

____ 52. How many ways can 6 different books be stacked on a shelf?

a. 720

b. 120

c. 24

d. 6

____ 53. Find the value of ${}_6P_4$.

a. 15

b. 2

c. 24

d. 360

____ 54. How many ways can the top 5 teams be arranged in a league containing 21 teams?

a. 15,504
b. 143,640
c. 2,441,880
d. 1,860,480

____ 55. In a race between 21 people, how many ways can the top 6 finishers be arranged?

a. 39,070,080
b. 54,264
c. 27,907,200
d. 2,441,880

____ 56. How many committees of 3 people can be chosen from a group of 12 people?

a. 1,320
b. 220
c. 165
d. 66

____ 57. From a class of 24 students, how many ways can a group of 7 students be chosen?

a. 245,157
b. 134,596
c. 1,744,364,160
d. 346,104

____ 58. Find $P(5, 3)$.

a. 20
b. 60
c. 10
d. 15

____ 59. Find $C(9, 5)$.

a. 45
b. 126
c. 15,120
d. 84

____ 60. Find the mean for the data set $\{8, 2, 4, 1, 8, 7, 11\}$.

a. 5.86
b. 5.50
c. 8
d. 7

____ 61. Find the standard deviation for the given data.

5, 6, 8, 11, 10

a. 3.28
b. 1.28
c. 2.28
d. 4.28

____ 62. Find the variance and standard deviation of the given set of data to the nearest tenth.

{450, 180, 380, 400, 160, 570, 780}

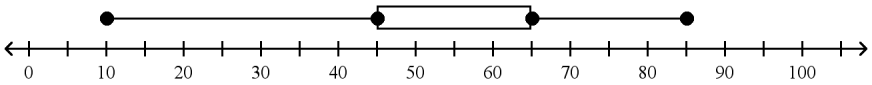
a. variance = 40,020.4, standard deviation = 200.1
b. variance = 46,690.5, standard deviation = 216.1
c. variance = 200.1, standard deviation = 40,020.4
d. variance = 40,020.4, standard deviation = 20,010.2

____ 63. Find the variance and standard deviation for the given set of data to the nearest tenth.

{5.1, 14.5, 22.7, 34.3, 22, 41.8, 18.3, 46, 15, 61.8}

a. variance = 16.5, standard deviation = 273
b. variance = 303.4, standard deviation = 17.4
c. variance = 273, standard deviation = 16.5
d. variance = 273, standard deviation = 136.5

Jeffery surveyed 50 randomly selected workers at a factory. He collected data about the individual output of a worker on an average day. The results are shown using the box-and-whisker plot.



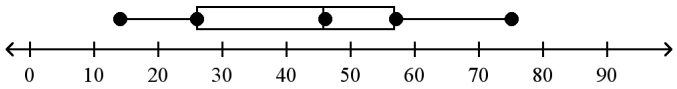
____ 64. What percent of workers have output more than 65 units?

a. 35%
b. 50%
c. 25%
d. 18%

____ 65. What is the interquartile range of the box-and-whisker plot shown?

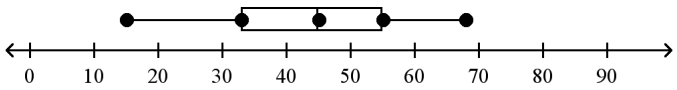
a. 15
b. 5
c. 20
d. 65

____ 66. Find the range of the data shown on the box-and-whisker plot below.



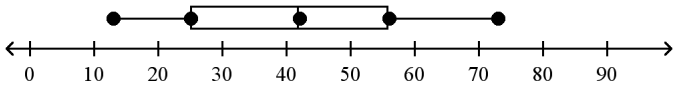
a. 46
b. 49
c. 61
d. 31

____ 67. Find the median of the data shown on the box-and-whisker plot below.



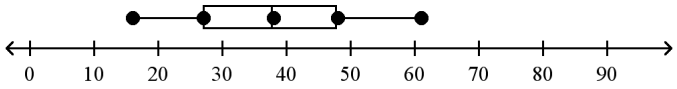
a. 45
b. 35
c. 53
d. 22

____ 68. Find the upper quartile of the data shown on the box-and-whisker plot below.



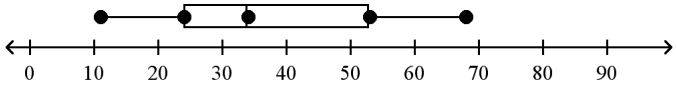
a. 42
b. 73
c. 56
d. 31

____ 69. Find the lower quartile of the data shown on the box-and-whisker plot below.



a. 38
b. 16
c. 27
d. 21

____ 70. Find the interquartile range of the data shown on the box-and-whisker plot below.



a. 53
b. 57
c. 24
d. 29

Short Answer

Let U = {–5, –4, –3, –2, –1, 0, 1, 2, 3, 4, 5}, M = {–4, –2, 0}, N = {–4, –3, –2, 3, 5}, P = {–5, –1, 2, 4, 5}, and Q = {2, 5}.

71. State whether $M \in N$ is *true* or *false*.

72. State whether $Q \in P$ is *true* or *false*.

73. Find the complement of N.

74. Find the complement of P.

75. Use set notation to write the elements of the following set.

    B is the set of negative numbers greater than –7.

Find intersections and unions of the following given sets.

76. Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11}, A = {1, 3, 5}, and B = {2, 4, 6, 8}. Find $A \cup B$ and $A \cap B$.

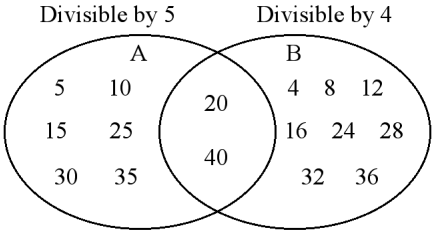
77. Let U = {21, 22, 23, 24, 31, 32, 33, 34, 41, 42, 43, 44}, M = {22, 32, 42, 44}, and N = {21,31,33,42,44}. Find $M \cup N$ and $M \cap N$.

78. Ten students from a school appear in one or more subjects for an inter school quiz competition as shown in the table given below.

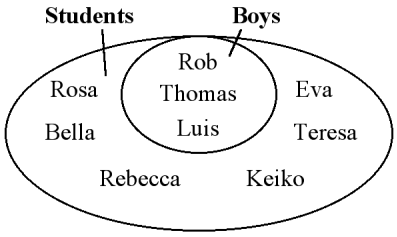
General Knowledge	Math	Science
Acel	Barek	Carlin
Acton	Bay	Acton
Anael	Max	Anael
Max	Kai	Kai
Carl	Anael	Dario
Dario	Carlin	Barek

Let G represents the set of students appearing for General Knowledge, M represents the set of students appearing for Math, and S respresents the set of students appearing for Science.
Find $G \cap M$ and $G \cup S$.

79. Use the Venn diagram to identify $A \cap B$ and $A \cup B$.



80. Use the Venn diagram to identify intersections and unions.



For the following question perform operations with pure imaginary numbers and complex numbers.

81. Simplify the power of i.
i^{531}

82. Simplify the expression $0.23 - (0.46 - 0.19i) + 0.67i$.

83. Simplify the expression $(8 - 9i)(2 - 4i) + (5 - 6i)$.

84. In an alternating-current circuit, the voltage E is given by $E = IZ$, where I is the current (in A) and Z is the impedance (in Ω). Each of these can be represented by complex numbers. Find the complex number representation for E if $I = 0.835 - 0.427i$ amperes and $Z = 250 + 170i$ ohms.

Use complex conjugates to write quotients of complex numbers in standard form for the following questions.

85. Simplify the expression $\dfrac{i\sqrt{2} - 5}{i\sqrt{2} + 3}$.

86. Simplify the expression $\dfrac{3 - \sqrt{5}\,i}{2 + \sqrt{3}\,i}$.

87. In an alternating-current circuit, the voltage E is given by $E = IZ$, where I is the current (in A) and Z is the impedance (in Ω). Each of these can be represented by complex numbers. Find the complex number representation for Z if $I = 0.235 - 0.527i$ amperes and $E = 5.20 + 1.70i$ volts.

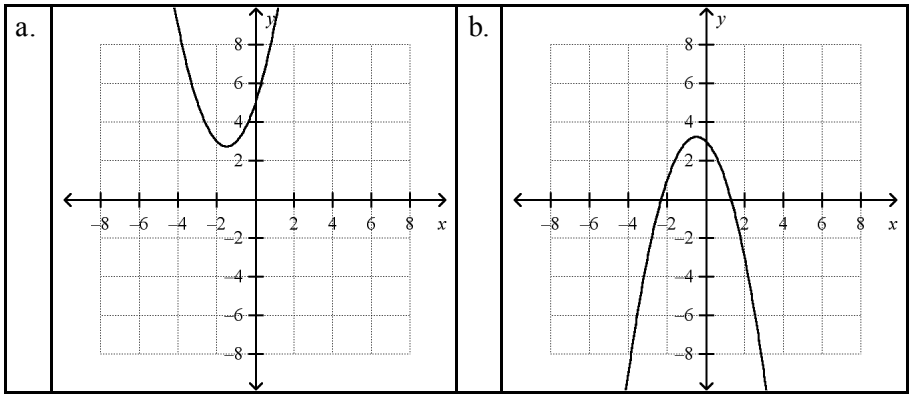
88. In an alternating-current circuit, the voltage E is given by $E = IZ$, where I is the current (in A) and Z is the impedance (in Ω). Each of these can be represented by complex numbers. Find the complex number representation for I if $E = 22 + 8i$ volts and $Z = 200 - 70i$ ohms.

89. In an alternating-current circuit, the voltage E is given by $E = IZ$, where I is the current (in A) and Z is the impedance (in Ω). Each of these can be represented by complex numbers. Find the complex number representation for I if $E = 62 + 32i$ volts and $Z = 1200 - 560i$ ohms.

90. Graph $f(x) = x^2 - 2x - 5$ by making a table of values.

91. Graph $f(x) = -x^2 - 3x - 4$ by making a table of values.

92. Determine whether each function has a maximum or minimum value.



93. Use the axis of symmetry, y-intercept, and vertex to graph $f(x) = x^2 + 4x - 5$.

94. Consider $f(x) = -2x^2 + 4x + 7$. Determine whether the function has a maximum or minimum value. Then find the value of the maximum or minimum.

95. Solve the equation $x^2 - 6x + 5 = 0$.

96. Solve the equation $x^2 - 4x + 18 = 0$.

97. Solve the equation $x^2 - 10x + 22 = 0$.

98. Solve $3x^2 - 3x - 3 = 0$ by completing the square.

99. Simplify the expression: $\sqrt[6]{x^{30}}$

100. Simplify the expression: $\sqrt[5]{\frac{243}{32}}$

101. Simplify the expression: $-\sqrt{121}$

102. Simplify the expression: $\sqrt[6]{-169}$

103. Simplify the expression: $\frac{\sqrt[8]{81}}{\sqrt[6]{3}}$

104. Simplify the expression: $\sqrt[4]{a^{15}b^{9}}$

105. Simplify the expression: $\frac{64^{\frac{5}{4}}}{64^{\frac{3}{4}}}$

106. Simplify the expression $\left(3x^{3}y^{-5}\right)^{3}$.

107. Evaluate $(125)^{\frac{-2}{3}}$.

108. Solve the following system of equations by graphing.

$2x + 5y = -10$

$x + y = -5$

109. Solve the following system of equations. State whether the system is *consistent and independent*, *consistent and dependent*, or *inconsistent*.

$2x + 3y = 15$

$8x + 12y = 60$

110. Use substitution method to solve the system of equations.

$7x - y = 12$

$5x + y = 12$

111. Solve the system of equations by graphing.

$x + y = 6$

$2x - 6y = 4$

112. Solve the system of equations algebraically.

$2x + y = 1$

$-7x + 5y = 5$

113. Solve the system of equations.

$2x + 9y + 9z = 4$

$2x + 5y + 2z = 7$

$2x + 9y + 7z = 6$

114. Solve the system of inequalities by graphing.

$y > 5x + 2$

$y < 5x - 7$

115. Solve the system of inequalities by graphing.

$y \leq 0.2x + 3$

$y \geq -5x + 1$

116. Solve the system of inequalities by graphing.

$y \geq 0.5x - 1$

$y \leq -2x + 5$

117. Solve the system of inequalities by graphing.

$y \le 7x - 1$

$-3x + 3y \ge -4$

Use $M = \begin{bmatrix} 2 & 3 & 12 & 5 \\ 1 & 7 & 13 & 9 \\ 10 & 4 & 8 & 11 \\ 17 & 18 & 20 & 21 \end{bmatrix}$ **to answer the following.**

118. State the dimensions of M.

119. Find the value of M_{23} and M_{41}.

Find each of the following for $A = \begin{bmatrix} 4 & 1 & 2 \\ 12 & 7 & 8 \\ 5 & 11 & 10 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 13 & 1 \\ 12 & 8 & 7 \\ 9 & 15 & 10 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 2 \\ 4 & 7 \end{bmatrix}$, **and** $D = \begin{bmatrix} 8 & 9 \\ 4 & 1 \end{bmatrix}$.

120. Find $A + B$.

121. Find $A - B$.

122. Find $2C + 3D$.

123. Find $A + D$.

124. If $A = \begin{bmatrix} 6 & 4 & 7 \\ 0 & 3 & 4 \\ 9 & 6 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 9 & 9 & 6 \\ 9 & 9 & 2 \\ 5 & 9 & 1 \end{bmatrix}$, find $A + B$

125. In how many ways can seven different books be arranged on a shelf if the books can be placed in any order?

126. A restaurant offers a lunch special in which a customer can select from one of the 7 appetizers, one of the 10 entrees, and one of the 6 desserts. How many different lunch specials are possible?

Three balls are drawn at random from a bag containing 4 white balls, 3 red balls, and 6 black balls.

127. What is the probability of getting 2 red balls and 1 black ball?

128. What is the probability of getting 3 white balls?

129. Find the mean, median and mode for the data set $\{330, 360, 300, 400, 360, 360, 300\}$.

130. Seven students participated in a game. Time (in minutes) required to complete the game is listed below. Find the measures of spread.
13, 11, 18, 13, 13, 13, 14

131. Make a box-and-whisker plot for the set of data below.

82, 64, 33, 77, 42, 27, 35, 32, 39, 34

Marks of 25 students listed below.
10, 15, 9, 8, 21, 25, 28, 31, 35, 38, 15, 16, 9, 35, 39, 41, 43, 48, 38, 15, 29, 35, 41, 16, 27

132. Make a frequency distribution for the data. Then determine the relative frequency distribution.

133. Construct a histogram for both the frequency distribution and the relative frequency distribution. Then compare the graphs.

134. Define cumulative frequency and cumulative relative frequency for a class.

135. Make a cumulative frequency distribution for the data. Then determine the cumulative relative frequency distribution.

136. Construct a histogram for the cumulative frequency distribution.