

CHAPTER 1-1

CENTRAL TENDENCY

1. 080501a, P.I. A.S.4
The weights of all the students in grade 9 are arranged from least to greatest. Which statistical measure separates the top half of this set of data from the bottom half?

[A] median [B] mode
[C] mean [D] average

2. 080402a, P.I. 6.S.5
Rosario and Enrique are in the same mathematics class. On the first five tests, Rosario received scores of 78, 77, 64, 86, and 70. Enrique received scores of 90, 61, 79, 73, and 87. How much higher was Enrique's average than Rosario's average?

[A] 3 points [B] 4 points
[C] 2 points [D] 15 points

3. 080008a, P.I. A2.S.3
On an English examination, two students received scores of 90, five students received 85, seven students received 75, and one student received 55. The average score on this examination was

[A] 75 [B] 76 [C] 79 [D] 77

4. 080535a, P.I. 6.S.5
Seth bought a used car that had been driven 20,000 miles. After he owned the car for 2 years, the total mileage of the car was 49,400. Find the average number of miles he drove *each month* during those 2 years.

5. 010005a, P.I. 6.S.5

What was the median high temperature in Middletown during the 7-day period shown in the table below?

Daily High Temperature in Middletown	
Day	Temperature (°F)
Sunday	68
Monday	73
Tuesday	73
Wednesday	75
Thursday	69
Friday	67
Saturday	63

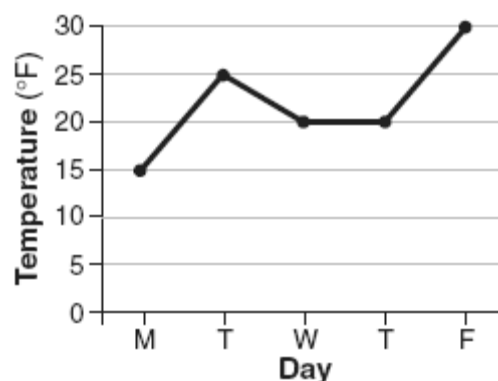
[A] 73 [B] 70 [C] 69 [D] 75

6. 060637a, P.I. 6.S.5

Sara's test scores in mathematics were 64, 80, 88, 78, 60, 92, 84, 76, 86, 78, 72, and 90. Determine the mean, the median, and the mode of Sara's test scores.

7. 080608a, P.I. 6.S.5

The accompanying graph shows the high temperatures in Elmira, New York, for a 5-day period in January.



Which statement describes the data?

[A] median = mean [B] mean = mode
[C] mean < mode [D] median = mode

8. 010118a, P.I. 6.S.5
From January 3 to January 7, Buffalo recorded the following daily high temperatures: 5° , 7° , 6° , 5° , and 7° . Which statement about the temperatures is true?
[A] median = mode [B] mean = median
[C] mean = mode [D] mean < median
9. 010315a, P.I. 6.S.5
The ages of five children in a family are 3, 3, 5, 8, and 18. Which statement is true for this group of data?
[A] median > mean [B] mode > mean
[C] median = mode [D] mean > median
10. 010618a, P.I. 6.S.5
Melissa's test scores are 75, 83, and 75. Which statement is true about this set of data?
[A] mean < mode [B] mode < median
[C] mode = median [D] mean = median
11. 010321b, P.I. A.S.4
Two social studies classes took the same current events examination that was scored on the basis of 100 points. Mr. Wong's class had a median score of 78 and a range of 4 points, while Ms. Rizzo's class had a median score of 78 and a range of 22 points. Explain how these classes could have the same median score while having very different ranges.
14. 010432a, P.I. A.A.6
TOP Electronics is a small business with five employees. The mean (average) weekly salary for the five employees is \$360. If the weekly salaries of four of the employees are \$340, \$340, \$345, and \$425, what is the salary of the fifth employee?
15. 060204a, P.I. A.A.6
During each marking period, there are five tests. If Vanita needs a 65 average to pass this marking period and her first four grades are 60, 72, 55, and 80, what is the *lowest* score she can earn on the last test to have a passing average?
[A] 80 [B] 58 [C] 65 [D] 100
16. 080110a, P.I. A.A.6
The exact average of a set of six test scores is 92. Five of these scores are 90, 98, 96, 94, and 85. What is the other test score?
[A] 86 [B] 91 [C] 89 [D] 92
17. 010230a, P.I. A.A.6
The students in Woodland High School's meteorology class measured the noon temperature every schoolday for a week. Their readings for the first 4 days were Monday, 56° ; Tuesday, 72° ; Wednesday, 67° ; and Thursday, 61° . If the mean (average) temperature for the 5 days was exactly 63° , what was the temperature on Friday?

AVERAGE KNOWN WITH MISSING DATA

12. 069929a, P.I. A.A.6
The mean (average) weight of three dogs is 38 pounds. One of the dogs, Sparky, weighs 46 pounds. The other two dogs, Eddie and Sandy, have the same weight. Find Eddie's weight.
13. 089913a, P.I. A.A.6
If 6 and x have the same mean (average) as 2, 4, and 24, what is the value of x ?
[A] 14 [B] 5 [C] 10 [D] 36
18. 060017a, P.I. A.A.6
For five algebra examinations, Maria has an average of 88. What must she score on the sixth test to bring her average up to exactly 90?
[A] 92 [B] 98 [C] 100 [D] 94

- ## **FREQUENCY HISTOGRAMS, BAR GRAPHS** **AND TABLES**

- ### Mathematics Quiz Scores

Interval	Tally	Frequency
50–59		
60–69		
70–79		
80–89		
90–99		

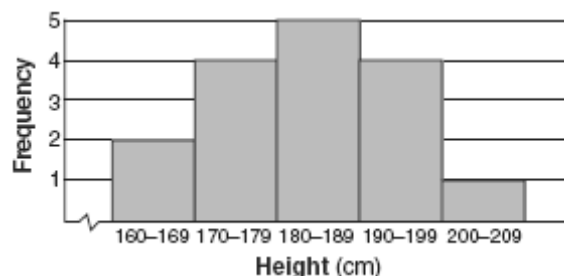
A full-page sheet of white graph paper featuring a light gray grid. The grid consists of small, equal-sized squares covering the entire area. There are no margins, text, or other markings on the page.

- Complete the accompanying table, and use the table to construct a frequency histogram for these scores.

Score	Tally	Frequency
40–49		
50–59		
60–69		
70–79		
80–89		

A full page of blank graph paper with a uniform grid of small squares. The grid consists of 20 columns and 20 rows, creating a total of 400 small square units. The lines are thin and black, set against a white background. There are no margins or additional markings on the page.

- The accompanying histogram shows the heights of the students in Kyra's health class.



What is the total number of students in the class?

- [A] 15 [B] 16 [C] 5 [D] 209

- Sarah's mathematics grades for one marking period were 85, 72, 97, 81, 77, 93, 100, 75, 86, 70, 96, and 80.

a Complete the tally sheet and frequency table below, and construct and label a frequency histogram for Sarah's grades using the accompanying grid.

Interval (grades)	Tally	Frequency
61–70		
71–80		
81–90		
91–100		

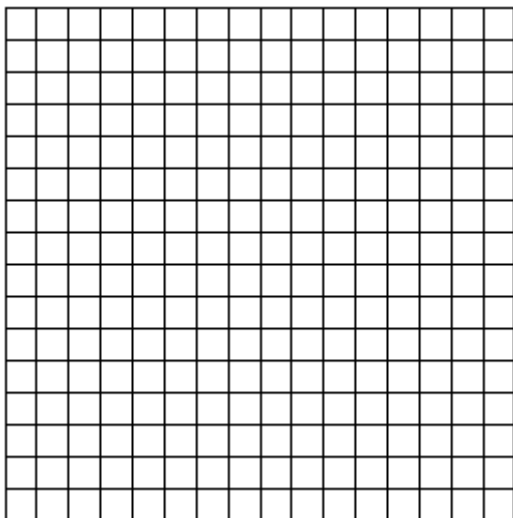
- b** Which interval contains the 75th percentile (upper quartile)?

28. 010032a, P.I. A.S.5

In the time trials for the 400-meter run at the state sectionals, the 15 runners recorded the times shown in the table below.

400-Meter Run	
Time (sec)	Frequency
50.0–50.9	
51.0–51.9	II
52.0–52.9	
53.0–53.9	III
54.0–54.9	IIII

a Using the data from the frequency column, draw a frequency histogram on the grid provided below.



b What percent of the runners completed the time trial between 52.0 and 53.9 seconds?

29. 060401a, P.I. A.S.9

The test scores for 10 students in Ms. Sampson's homeroom were 61, 67, 81, 83, 87, 88, 89, 90, 98, and 100. Which frequency table is accurate for this set of data?

[A]

Interval	Frequency
61–70	2
71–80	0
81–90	8
91–100	10

[B]

Interval	Frequency
61–70	2
71–80	2
81–90	7
91–100	10

[C]

Interval	Frequency
61–70	2
71–80	0
81–90	6
91–100	2

[D]

Interval	Frequency
61–70	2
71–80	2
81–90	8
91–100	10

30. fall0737ia, P.I. A.S.4

The values of 11 houses on Washington St. are shown in the table below.

Value per House	Number of Houses
\$100,000	1
\$175,000	5
\$200,000	4
\$700,000	1

Find the mean value of these houses in dollars. Find the median value of these houses in dollars. State which measure of central tendency, the mean or the median, *best* represents the values of these 11 houses. Justify your answer.

31. 060507b, P.I. A2.S.3

What is the mean of the data in the accompanying table?

Scores (x_i)	Frequency (f_i)
25	3
20	2
11	5
10	4

[A] 15 [B] 16 [C] 11 [D] 14.5

32. 010807b, P.I. A2.S.3

Mayken collected data about the size of the honors classes in her school building. This set of data is shown in the accompanying table.

Class Size	Frequency
8	1
10	3
14	2

Which statement about the range of this sample is true?

[A] range > mean

[B] range < standard deviation

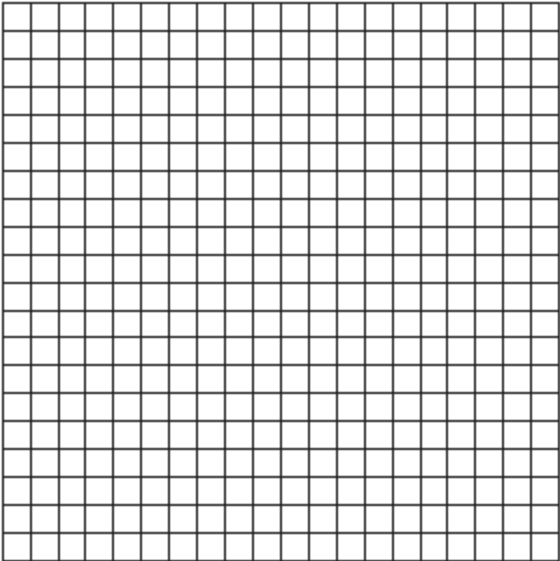
[C] range < mean

[D] range = mean

NY LESSON 9

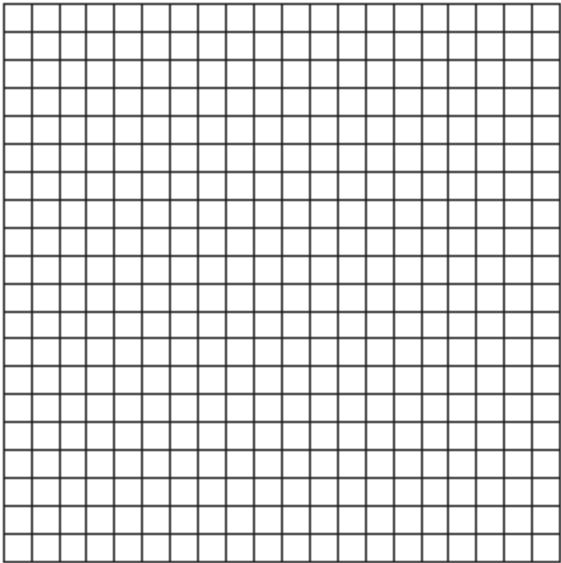
33. 080134a, P.I. A.S.5
 The following data consists of the weights, in pounds, of 30 adults:
 195, 206, 100, 98, 150, 210, 195, 106, 195, 168, 180, 212, 104, 195, 100, 216, 195, 209, 112, 99, 206, 116, 195, 100, 142, 100, 135, 98, 160, 155
 Using the data, complete the accompanying cumulative frequency table and construct a cumulative frequency histogram on the grid below.

Interval	Frequency	Cumulative Frequency
51–100		
101–150		
151–200		
201–250		



34. 010739a, P.I. A.S.5
 The accompanying table shows the weights, in pounds, for the students in an algebra class. Using the data, complete the cumulative frequency table and construct a cumulative frequency histogram on the grid below.

Interval	Frequency	Cumulative Frequency
91–100	6	
101–110	3	
111–120	0	
121–130	3	
131–140	0	
141–150	2	
151–160	2	

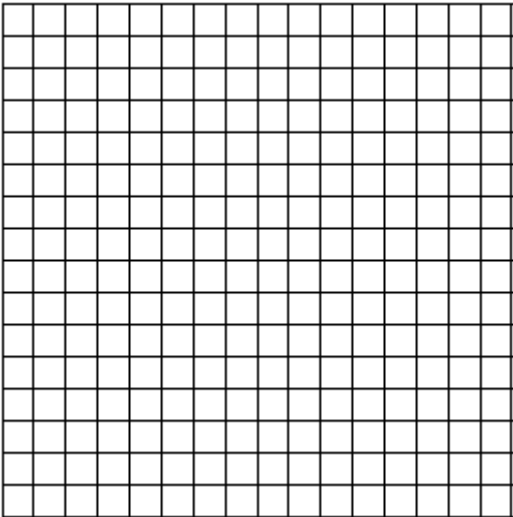


MATH TOOLBOX P. 10

STEM-AND-LEAF PLOTS

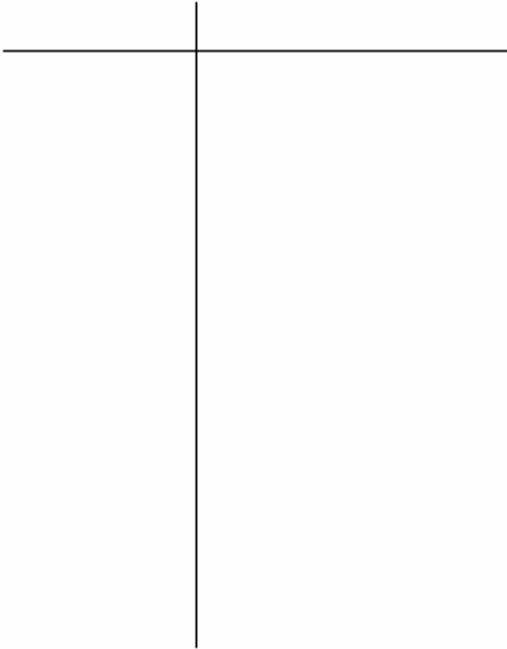
35.

010132a, P.I. A.S.5
- On a science quiz, 20 students received the following scores: 100, 95, 95, 90, 85, 85, 85, 80, 80, 80, 80, 75, 75, 75, 70, 70, 65, 65, 60, 55. Construct a statistical graph, such as a histogram or a stem-and-leaf plot, to display this data. *[Be sure to title the graph and label all axes or parts used.]*



36.

010535a
- Construct a stem-and-leaf plot listing the scores below in order from lowest to highest.
 15, 25, 28, 32, 39, 40, 43, 26, 50, 75, 65, 19, 55, 72, 50



37.

060321a, P.I. 6.S.5
- The student scores on Mrs. Frederick’s mathematics test are shown on the stem-and-leaf plot below.



Key: 4 | 3 = 43 points

Find the median of these scores.

38. 080714a, P.I. 6.S.5

The accompanying stem-and-leaf plot represents Ben's test scores this year.

6	5	8					
7	2	3	3	3	3	9	
8	1	3	3	6	7		
9	6	9	9				

Key: 7 | 2 = 72

What is the median score for this set of data?

[A] 73 [B] 81 [C] 80 [D] 79

39. 060509a, P.I. 6.S.5

Jorge made the accompanying stem-and-leaf plot of the weights, in pounds, of each member of the wrestling team he was coaching.

Stem	Leaf
10	9
11	
12	3 8
13	2 4 4 6 8
14	1 3 5 5 9
15	2 3 7 7 9
16	1 3 7 8 8 8 9
17	3 8

Key: 16 | 1 = 161

What is the mode of the weights?

[A] 150 [B] 152 [C] 145 [D] 168

CHAPTER 1-2

MODELING RELATIONSHIPS

40. 080420a, P.I. 7.A.10

Which linear equation represents the data in the accompanying table?

c	d
0	20.00
1	21.50
2	23.00
3	24.50

[A] $d = 20.00c + 1.50$ [B] $d = 21.50c$

[C] $d = 1.50c$ [D] $d = 1.50c + 20.00$

41. 010211a, P.I. 7.A.10

If x and y are defined as indicated by the accompanying table, which equation correctly represents the relationship between x and y ?

x	y
2	1
3	3
5	7
7	11

[A] $y = x + 2$ [B] $y = 2x - 3$

[C] $y = 2x + 2$ [D] $y = 2x + 3$

42. 010813a, P.I. 7.A.10

Which equation expresses the relationship between x and y , as shown in the accompanying table?

x	0	1	2	3	4
y	2	5	8	11	14

[A] $y = x + 2$ [B] $y = 2x + 3$

[C] $y = 3x + 2$ [D] $y = x + 3$

43. 010113a, P.I. 7.A.10

Which equation could represent the relationship between the x and y values shown in the accompanying table?

x	y
0	2
1	3
2	6
3	11
4	18

- [A] $y = x^2$ [B] $y = 2^x$
[C] $y = x^2 + 2$ [D] $y = x + 2$

44. 060411b

Which equation models the data in the accompanying table?

Time in hours, x	0	1	2	3	4	5	6
Population, y	5	10	20	40	80	160	320

- [A] $y = 2^x$ [B] $y = 2x$
[C] $y = 5(2^x)$ [D] $y = 2x + 5$

45. fall0729ia, P.I. A.A.2

Which verbal expression represents $2(n - 6)$?

- [A] two times six minus n
[B] two times n minus six
[C] two times the quantity n less than six
[D] two times the quantity six less than n

46. 060408a, P.I. A.A.1

Tara buys two items that cost d dollars each. She gives the cashier \$20. Which expression represents the change she should receive?

- [A] $20 - d$ [B] $20 - 2d$
[C] $2d - 20$ [D] $20 + 2d$

47. 080509a, P.I. A.A.1

The sum of Scott's age and Greg's age is 33 years. If Greg's age is represented by g , Scott's age is represented by

- [A] $33g$ [B] $33 - g$
[C] $g - 33$ [D] $g + 33$

48. 010604a, P.I. A.A.1

Which expression represents "5 less than the product of 7 and x "?

- [A] $5 - 7x$ [B] $7 + x - 5$
[C] $7(x - 5)$ [D] $7x - 5$

49. 010820a, P.I. A.A.1

If x represents a given number, the expression "5 less than twice the given number" is written as

- [A] $5 < 2 + x$ [B] $5 < 2x$
[C] $5 - 2x$ [D] $2x - 5$

50. 060113b, P.I. A.A.1

A store advertises that during its Labor Day sale \$15 will be deducted from every purchase over \$100. In addition, after the deduction is taken, the store offers an early-bird discount of 20% to any person who makes a purchase before 10 a.m. If Hakeem makes a purchase of x dollars, $x > 100$, at 8 a.m., what, in terms of x , is the cost of Hakeem's purchase?

- [A] $0.80x - 12$ [B] $0.20x - 3$
[C] $0.85x - 20$ [D] $0.20x - 15$

CHAPTER 1-3

ORDER OF OPERATIONS

51. 060314a, P.I. 7.N.11
If the expression $3 - 4^2 + \frac{6}{2}$ is evaluated,
what would be done *last*?
[A] squaring [B] dividing
[C] adding [D] subtracting
52. 080612a, P.I. 7.N.11
What is the first step in simplifying the
expression $(2 - 3 \times 4 + 5)^2$?
[A] square 5 [B] subtract 3 from 2
[C] add 4 and 5 [D] multiply 3 by 4
53. 060217a, P.I. 7.N.11
The expression $15 - 3[2 + 6(-3)]$ simplifies to
[A] -33 [B] -45 [C] 192 [D] 63
54. 010403a, P.I. 7.N.13
On February 18, from 9 a.m. until 2 p.m., the
temperature rose from -14°F to 36°F .
What was the total increase in temperature
during this time period?
[A] 50° [B] 36° [C] 32° [D] 22°

EVALUATING VARIABLE EXPRESSIONS

55. 060432a, P.I. A.CM.5
Brett was given the problem: "Evaluate
 $2x^2 + 5$ when $x = 3$." Brett wrote that the
answer was 41. Was Brett correct? Explain
your answer.
56. 080408a, P.I. 8.N.2
If $x = -4$ and $y = 3$, what is the value of
 $x - 3y^2$?
[A] -23 [B] -85 [C] -13 [D] -31

57. 010015a, P.I. 8.N.2
If $t = -3$, then $3t^2 + 5t + 6$ equals
[A] -6 [B] -36 [C] 18 [D] 6
58. 060726a, P.I. 8.N.2
If $a = 3$ and $b = -1$, what is the value of
 $ab - b^2$?
[A] -4 [B] -2 [C] 2 [D] 4
59. 010406a, P.I. 8.N.2
What is the value of $\frac{x^2 - 4y}{2}$, if $x = 4$ and
 $y = -3$?
[A] 10 [B] -2 [C] 2 [D] 14
60. 080617a, P.I. 8.N.2
If $x = 4$ and $y = -2$, the value of $\frac{1}{2}xy^2$ is
[A] 32 [B] -4 [C] -8 [D] 8

CHAPTER 1-4

PROPERTIES OF INTEGERS

61. 010824a, P.I. A.A.1
The larger of two consecutive integers is
represented by $x + 4$. Which expression
represents the *smaller* integer?
[A] $x + 5$ [B] $x + 2$
[C] $x + 6$ [D] $x + 3$
62. 010006a, P.I. A.A.1
If the number represented by $n - 3$ is an odd
integer, which expression represents the next
greater odd integer?
[A] $n - 2$ [B] $n - 1$ [C] $n - 5$ [D] $n + 1$
63. 010506a, P.I. A.A.1
If $n + 4$ represents an odd integer, the next
larger odd integer is represented by
[A] $n + 6$ [B] $n + 3$
[C] $n + 2$ [D] $n + 5$

64. 080716a, P.I. A.A.1
In the Ambrose family, the ages of the three children are three consecutive even integers. If the age of the youngest child is represented by $x + 3$, which expression represents the age of the oldest child?

[A] $x + 6$ [B] $x + 7$
[C] $x + 8$ [D] $x + 5$

65. 010712a, P.I. A.A.1
Which expression represents the product of two consecutive odd integers, where n is an odd integer?

[A] $n(n + 2)$ [B] $n(n + 3)$
[C] $2n + 1$ [D] $n(n + 1)$

66. 080113a, P.I. 7.N.11
If n represents an odd number, which computation results in an answer that is an even number?

[A] $3 \times n + 1$ [B] $2 \times n - 1$
[C] $2 \times n + 1$ [D] $3 \times n - 2$

67. 060113a, P.I. 7.N.11
If a is an odd number, b an even number, and c an odd number, which expression will always be equivalent to an odd number?

[A] $ac(b)^0$ [B] $a(bc)$
[C] $ac(b)^2$ [D] $ac(b)^1$

68. 060525a, P.I. 7.N.11
If a and b are both odd integers, which expression must always equal an odd integer?

[A] $a - b$ [B] $a \cdot b$ [C] $a + b$ [D] $\frac{a}{b}$

69. 080326b, P.I. 7.N.11
Tom scored 23 points in a basketball game. He attempted 15 field goals and 6 free throws. If each successful field goal is 2 points and each successful free throw is 1 point, is it possible he successfully made all 6 of his free throws? Justify your answer.

70. 010107a, P.I. A.N.1
If a and b are integers, which equation is always true?

[A] $a + b = b + a$ [B] $\frac{a}{b} = \frac{b}{a}$
[C] $a + 2b = b + 2a$ [D] $a - b = b - a$

71. 080129a, P.I. A.N.1
Ramón said that the set of integers is *not* closed for one of the basic operations (addition, subtraction, multiplication, or division). You want to show Ramón that his statement is correct. For the operation for which the set of integers is *not* closed, write an example using:
o a positive even integer and a zero
o a positive and a negative even integer
o two negative even integers
Be sure to explain why *each* of your examples illustrates that the set of integers is *not* closed for that operation.

72. 010217a, P.I. A.N.1
Which set is closed under division?

[A] whole numbers [B] counting numbers
[C] integers [D] $\{1\}$

ABSOLUTE VALUE

73. 010518a, P.I. A.N.6
The expression $-|-7|$ is equivalent to

[A] 7 [B] 1 [C] 0 [D] -7

74. 060522a, P.I. A.N.6
If $r = 2$ and $s = -7$, what is the value of $|r| - |s|$?

[A] 5 [B] 9 [C] -9 [D] -5

CHAPTER 1-6

RATIONAL NUMBERS

75. 080208a, P.I. 7.N.17
The number $0.14114111411114 \dots$ is
[A] rational [B] whole
[C] integral [D] irrational
76. 010632a, P.I. 7.N.2
Write an irrational number and explain why it is irrational.
77. 069923a, P.I. 7.N.2
Which number below is irrational?
 $\sqrt{\frac{4}{9}}$, $\sqrt{20}$, $\sqrt{121}$
Why is the number you chose an irrational number?
78. 010416a, P.I. 7.N.2
Which number is irrational?
[A] $\sqrt{8}$ [B] $\sqrt{9}$ [C] $\frac{2}{3}$ [D] 0.3333
79. 060303a, P.I. 7.N.2
Which expression represents an irrational number?
[A] $\sqrt{2}$ [B] 0 [C] $\frac{1}{2}$ [D] 0.17
80. 010219a, P.I. 7.N.2
Which is an irrational number?
[A] 3.14 [B] $\sqrt{3}$ [C] $\sqrt{9}$ [D] $\frac{3}{4}$
81. 060211a, P.I. 7.N.2
Which is an irrational number?
[A] π [B] 0 [C] $-\frac{1}{3}$ [D] $\sqrt{9}$

82. 080523a, P.I. 7.N.2
Which is an irrational number?
[A] π [B] $0.\bar{3}$ [C] $\frac{3}{8}$ [D] $\sqrt{49}$
83. 080718a, P.I. 7.N.2
Which number is irrational?
[A] π [B] $\frac{5}{4}$ [C] $0.\bar{3}$ [D] $\sqrt{121}$
84. 080432a, P.I. 7.N.2
Given: $\frac{\sqrt{99}}{11}$, $\sqrt{164}$, $\sqrt{196}$
Identify the expression that is a rational number and explain why it is rational.
85. 060003a, P.I. 7.N.2
Which number is rational?
[A] $\frac{5}{4}$ [B] π [C] $\sqrt{\frac{3}{2}}$ [D] $\sqrt{7}$
86. 060120a, P.I. 7.N.2
Which is a rational number?
[A] $5\sqrt{9}$ [B] $6\sqrt{2}$ [C] $\sqrt{8}$ [D] π
87. 080102a, P.I. 7.N.2
Which expression is rational?
[A] $\sqrt{3}$ [B] π [C] $\sqrt{\frac{1}{2}}$ [D] $\sqrt{\frac{1}{4}}$

COMPARING REALS

88. 060433a, P.I. 7.N.3
Kyoko's mathematics teacher gave her the accompanying cards and asked her to arrange the cards in order from least to greatest. In what order should Kyoko arrange the cards?

π	$\sqrt{8}$	$3.\bar{1}$	$2\sqrt{3}$	$2\frac{4}{5}$
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89. 010304a, P.I. 7.N.3

In which list are the numbers in order from least to greatest?

[A] $3.2, \pi, 3\frac{1}{3}, \sqrt{3}$ [B] $3.2, 3\frac{1}{3}, \sqrt{3}, \pi$

[C] $\sqrt{3}, 3.2, \pi, 3\frac{1}{3}$ [D] $\sqrt{3}, \pi, 3.2, 3\frac{1}{3}$

90. 080516a, P.I. 7.N.3

Which numbers are arranged from smallest to largest?

[A] $3.14, \frac{22}{7}, \pi, \sqrt{9.1}$

[B] $\sqrt{9.1}, \pi, 3.14, \frac{22}{7}$

[C] $\sqrt{9.1}, 3.14, \frac{22}{7}, \pi$

[D] $\sqrt{9.1}, 3.14, \pi, \frac{22}{7}$

91. 060609a, P.I. 7.N.3

Which list is in order from smallest value to largest value?

[A] $3.1, \pi, \frac{22}{7}, \sqrt{10}$ [B] $3.1, \frac{22}{7}, \pi, \sqrt{10}$

[C] $\sqrt{10}, \frac{22}{7}, \pi, 3.1$ [D] $\pi, \frac{22}{7}, 3.1, \sqrt{10}$

92. 010816a, P.I. 7.N.3

In which group are the numbers arranged in order from smallest value to largest value?

[A] $\sqrt{9.86}, \frac{22}{7}, 3.14, \pi$

[B] $\pi, 3.14, \sqrt{9.86}, \frac{22}{7}$

[C] $\frac{22}{7}, 3.14, \pi, \sqrt{9.86}$

[D] $3.14, \sqrt{9.86}, \pi, \frac{22}{7}$

93. 080621a, P.I. 7.N.3

Which list shows the numbers

$|-0.12|, \sqrt{\frac{1}{82}}, \frac{1}{8}, \frac{1}{9}$ in order from smallest to largest?

[A] $|-0.12|, \frac{1}{8}, \frac{1}{9}, \sqrt{\frac{1}{82}}$

[B] $\frac{1}{8}, \frac{1}{9}, \sqrt{\frac{1}{82}}, |-0.12|$

[C] $\sqrt{\frac{1}{82}}, |-0.12|, \frac{1}{9}, \frac{1}{8}$

[D] $\sqrt{\frac{1}{82}}, \frac{1}{9}, |-0.12|, \frac{1}{8}$

94. 010526a, P.I. 7.N.3

Which expression has the *smallest* value?

[A] $-\frac{16}{5}$ [B] $-\pi$

[C] $-\sqrt{10}$ [D] -3.02

95. 010002a, P.I. 7.N.3

Which number has the greatest value?

[A] 1.5 [B] $\frac{\pi}{2}$ [C] $1\frac{2}{3}$ [D] $\sqrt{2}$

96. 010213a, P.I. 7.N.3

Which inequality is true if $x = \frac{3.04}{1.48}$,

$y = 1.99 + 0.33$, and $z = (1.3)^3$?

[A] $y < x < z$ [B] $x < z < y$

[C] $x < y < z$ [D] $y < z < x$

97. 080717a, P.I. 7.N.3

If $t < \sqrt{t}$, t could be

[A] 2 [B] 0 [C] $\frac{1}{2}$ [D] 4

98. 069917a, P.I. 7.N.3

If $t^2 < t < \sqrt{t}$, then t could be

- [A] $\frac{1}{4}$ [B] 4 [C] $-\frac{1}{4}$ [D] 0

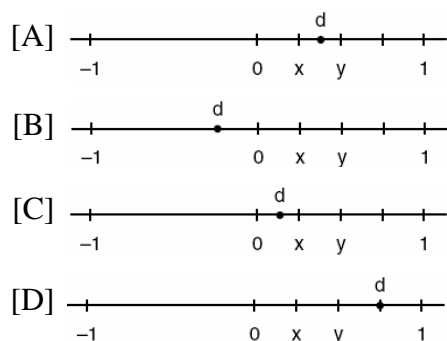
99. 010512a, P.I. 7.N.3

If $x^3 < x < \frac{1}{x}$, then x could be equal to

- [A] 1 [B] $\frac{6}{5}$ [C] $\frac{1}{5}$ [D] 5

100. 010120a, P.I. 7.N.3

Let x and y be numbers such that $0 < x < y < 1$, and let $d = x - y$. Which graph could represent the location of d on the number line?



101. 080006a, P.I. 7.N.3

If $a < b$, $c < d$, and a , b , c , and d are all greater than 0, which expression is always true?

- [A] $a + c > b + d$ [B] $a - c + b - d = 0$
[C] $\frac{a}{d} > \frac{b}{c}$ [D] $ac < bd$

MATH TOOLBOX P. 35

NY LESSON 12

PROPERTIES OF REALS

102. 060424a, P.I. A.N.1

Which expression is an example of the associative property?

- [A] $x \cdot 1 = x$
[B] $(x + y) + z = x + (y + z)$
[C] $x(y + z) = xy + xz$
[D] $x + y + z = z + y + x$

103. 010428a, P.I. A.N.1

Which equation illustrates the associative property of addition?

- [A] $3(x + 2) = 3x + 6$
[B] $x + y = y + x$
[C] $(3 + x) + y = 3 + (x + y)$
[D] $3 + x = 0$

104. 080725a, P.I. A.N.1

Which equation illustrates the associative property?

- [A] $(a + b) + c = a + (b + c)$
[B] $a(b + c) = (ab) + (ac)$
[C] $a(1) = a$ [D] $a + b = b + a$

105. 060503a, P.I. A.N.1

Which equation illustrates the distributive property?

- [A] $a + (b + c) = (a + b) + c$
[B] $5(a + b) = 5a + 5b$
[C] $a + b = b + a$ [D] $a + 0 = a$

106. 060108a, P.I. A.N.1

Which equation illustrates the distributive property for real numbers?

[A] $\frac{1}{3} + \frac{1}{2} = \frac{1}{2} + \frac{1}{3}$

[B] $-3(5 + 7) = (-3)(5) + (-3)(7)$

[C] $(1.3 \times 0.07) \times 0.63 = 1.3 \times (0.07 \times 0.63)$

[D] $\sqrt{3} + 0 = \sqrt{3}$

107. 089907a, P.I. A.N.1

Which equation is an illustration of the additive identity property?

[A] $x - x = 0$

[B] $x + 0 = x$

[C] $x \cdot 1 = x$

[D] $x \cdot \frac{1}{x} = 1$

108. 060624a, P.I. A.N.1

Which statement best illustrates the additive identity property?

[A] $6 + (-6) = 0$

[B] $6(2) = 2(6)$

[C] $6 + 0 = 6$

[D] $6 + 2 = 2 + 6$

109. 010314a, P.I. A.N.1

Which equation illustrates the multiplicative identity element?

[A] $x - x = 0$

[B] $x \cdot 1 = x$

[C] $x + 0 = x$

[D] $x \cdot \frac{1}{x} = 1$

110. 010207a, P.I. A.N.1

Which expression must be added to $3x - 7$ to equal 0?

[A] $3x + 7$

[B] $-3x - 7$

[C] $-3x + 7$

[D] 0

111. 060315a, P.I. A.N.1

What is the additive inverse of $\frac{2}{3}$?

[A] $\frac{1}{3}$ [B] $\frac{3}{2}$ [C] $-\frac{2}{3}$ [D] $-\frac{3}{2}$

112. 010821a, P.I. A.N.1

The additive inverse of $\frac{1}{a}$ is

[A] $-a$

[B] $-\frac{1}{a}$

[C] a

[D] 0

113. 060011a, P.I. A.N.1

If $a \neq 0$ and the sum of x and $\frac{1}{a}$ is 0, then

[A] $x = -a$

[B] $x = a$

[C] $x = -\frac{1}{a}$

[D] $x = 1 - a$

114. 010516a, P.I. A.N.1

What is the multiplicative inverse of $\frac{3}{4}$?

[A] -1

[B] $-\frac{3}{4}$

[C] $\frac{4}{3}$

[D] $-\frac{4}{3}$

115. 010730a, P.I. A.N.1

The multiplicative inverse of $-\frac{1}{3}$ is

[A] $-\frac{1}{3}$

[B] -3

[C] 3

[D] $\frac{1}{3}$

116. 010630a, P.I. A.N.1

Which equation illustrates the multiplicative inverse property?

[A] $1 \cdot 0 = 0$

[B] $1 \cdot x = x$

[C] $x \cdot \frac{1}{x} = 1$

[D] $-1 \cdot x = -x$

117. 080115a

If $a + b$ is less than $c + d$, and $d + e$ is less than $a + b$, then e is

[A] less than c

[B] equal to c

[C] greater than d

[D] less than d

118. 060207b

Which statement is true for all real number values of x ?

[A] $\sqrt{x^2} = x$ [B] $|x - 1| > 0$

[C] $|x - 1| > (x - 1)$ [D] $\sqrt{x^2} = |x|$

119. 060224a, P.I. A.N.1

An addition table for a subset of real numbers is shown below. Which number is the identity element? Explain your answer.

+	0	1	2	3
0	0	1	2	3
1	1	2	3	4
2	2	3	4	0
3	3	4	0	1

120. 080112a, P.I. A.N.1

The operation element @ is determined by the following table:

@	a	b	c
a	a	b	c
b	b	c	a
c	c	a	b

What is the identity element of this operation?

- [A] a and b [B] c
[C] b , only [D] a , only

121. 080514a, P.I. A.N.1

What is the identity element for \clubsuit in the accompanying table?

\clubsuit	r	s	t	u
r	t	r	u	s
s	r	s	t	u
t	u	t	s	r
u	s	u	r	t

- [A] r [B] t [C] u [D] s

122. 080222a, P.I. A.N.1

In the addition table for a subset of real numbers shown below, which number is the inverse of 3? Explain your answer.

\oplus	1	2	3	4
1	2	3	4	1
2	3	4	1	2
3	4	1	2	3
4	1	2	3	4

123. 080010a, P.I. A.N.1

The operation $*$ for the set $\{p, r, s, v\}$ is defined in the accompanying table. What is the inverse element of r under the operation $*$?

$*$	p	r	s	v
p	s	v	p	r
r	v	p	r	s
s	p	r	s	v
v	r	s	v	p

- [A] v [B] s [C] p [D] r

[1] A

[2] A

[3] C

[2] 1,225, and appropriate work is shown, such as solving an equation or writing an explanation.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown, but the conversion from years to months is incorrect, but an appropriate solution is found.

or [1] 1,225, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure.

[5] C

[3] Mean = 79, median = 79, and mode = 78, and appropriate work is shown.

[2] Appropriate work is shown, but only two of the three measures of central tendency are determined and identified correctly.

or [2] Appropriate work is shown and all three measures of central tendency are determined correctly, but the measures are not identified or are identified incorrectly.

[1] Appropriate work is shown, but only one of the three measures of central tendency is determined and identified correctly.

or [1] Mean = 79, median = 79, and mode = 78, but no work is shown.

[0] 79, 79, and 78, but no work is shown, and the answers are not identified or are identified incorrectly.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[6] obviously incorrect procedure.

[7] D

[8] B

[9] D

[10] C

[2] An appropriate explanation is given, such as:

One very high or very low score in either class would have a great effect on the range for that class, but might not affect the median at all. The range is the difference between the two most extreme values, the lowest and the highest. The median, being the middle value, is not very sensitive to outliers or to extreme values.

or [2] Specific examples are shown to illustrate the situation.

[1] An understanding of median and range is demonstrated, but the specific situation is not explained.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[11] incorrect procedure.

[3] 34 and an appropriate explanation is given, such as $38 = \frac{46 + 2x}{3}$.

[2] An appropriate method or equation is shown, but one computational mistake is made.

or [2] The student does not take into consideration two dogs of equal weight and gives an answer of 68.

[1] The student understands weighted average in that three dogs averaging 38 pounds must have a total weight of 114 pounds but does not subtract the known weight.

or [1] 34 and no explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[12] incorrect procedure.

[13] A

[2] \$350, and appropriate work is shown,
such as $\frac{1450 + x}{5} = 360$ or trial and error with

at least three trials and appropriate checks.

[1] Appropriate work is shown, but one computational error is made.

or [1] The total of the five salaries is shown to be $5 \times 360 = 1800$, but no further correct work is shown.

or [1] \$350, but no work is shown or fewer than three trials with appropriate checks are shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[14] incorrect procedure.

[15] B

[16] C

[3] 59 or 59°, and appropriate work is shown,
such as $63 = \frac{256 + x}{5}$ or

$56 + 72 + 67 + 61 = 256$, $63 \times 5 = 315$, and
 $315 - 256 = 59$.

[2] Appropriate work is shown, but one computational error is made.

or [2] A value is chosen for Friday's temperature that rounds to 63, such as 57 or 61,

but whose mean is not exactly 63, and appropriate work is shown.

[1] A limited understanding of the concept of the mean is shown, such as the sum of the temperatures must be 315, but the given temperatures are not subtracted.

or [1] The correct mean of the four given temperatures is calculated.

or [1] 59 or 59°, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[17] incorrect procedure.

[18] C

[3] 95 and an appropriate method is shown that obtains an answer, such as $344 - 249$ or a similar equation or method.

or [3] Four scores are tried that round off to an average of 86, such as 93 or 94. Round off to 86 must be shown.

[2] An appropriate method is shown, but one computational mistake is made.

[1] The student understands weighted average and shows that the average of 83 for 3 tests is a total of 249 points.

or [1] 95 and no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[19] incorrect procedure.

[20] A

[4] Median = 91.5, mode = 92, and seventh test score = 96, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] Seventh test score = 96, but only the median or the mode is found correctly, but appropriate work is shown.

or [3] 91.5, 92, and 96, and appropriate work is shown, but the median and mode are not labeled or are labeled incorrectly.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Both the median and the mode are found and labeled correctly, and appropriate work is shown, but the seventh test score is not found or is found incorrectly.

or [2] Seventh test score = 96, and appropriate work is shown, but the median and the mode are not found or are found incorrectly.

[1] Either the median or the mode is found and labeled correctly, and appropriate work is shown, but no further correct work is shown.

or [1] Median = 91.5, mode = 92, and seventh test score = 96, but no work is shown.

[0] Median = 91.5 or mode = 92 or seventh test score = 96, but no work is shown.

or [0] 91.5, 92, and 96, but no work is shown and the answers are not labeled.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[21] obviously incorrect procedure.

[3] 63, and appropriate work is shown, such as $400 - (81 + 88 + 88)$ and determining the highest and lowest possible scores remaining that total 143.

[2] Appropriate work is shown, but one computational error is made.

[1] A total of 400 is shown, but one conceptual error is made, such as 257 is subtracted, and then 143 is split into 72 and 71, resulting in an answer of 71.

or [1] Appropriate work is shown, but more than one computational error is made.

or [1] No answer or an incorrect answer is found, but a list such as ____, ____, 81, 88, 88 is shown.

or [1] 63, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[22] incorrect procedure.

[4] Angelo is 66, Brandon is 26, and Carl is 31, and appropriate work is shown, such as solving an equation or trial and error with at least three trials and appropriate checks.

[3] Appropriate work is shown, but one computational error is made.

or [3] 66, 26, and 31, and appropriate work is shown, but the solutions are not labeled or are labeled incorrectly.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.

or [2] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.

or [2] Carl is 31, and appropriate work is shown, but the ages of the other men are not found.

or [2] An incorrect equation of equal difficulty is solved appropriately.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] A correct equation is written, but no further correct work is shown.

or [1] Angelo is 66, Brandon is 26, and Carl is 31, but no work or only one trial with an appropriate check is shown.

[0] Angelo is 66 *or* Brandon is 26 *or* Carl is 31, but no work is shown.

or [0] 66, 26, and 31, but no work is shown, and the answers are not labeled or are labeled incorrectly.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[23] obviously incorrect procedure.

[3] The frequency table is completed correctly, showing frequencies of 6, 2, 4, 5, and 3, and a frequency histogram is drawn and labeled correctly.

[2] The frequency table is completed correctly, but one graphing error is made, such as not labeling the axes, having nonequal intervals, or starting the x -axis at 50.

or [2] The frequency table is completed incorrectly, but an appropriate frequency histogram is drawn.

or [2] The frequency histogram is drawn and labeled correctly, but the frequency table is not completed.

[1] The frequency table is completed correctly, but two or more graphing errors are made.

or [1] The frequency table is completed correctly, but no frequency histogram is drawn or a bar graph is drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[24] incorrect procedure.

[4] A correct table and histogram with appropriate labels and scales are shown, such as the table below.

SCORE	TALLY	FREQUENCY
40-49	/	1
50-59	/	1
60-69	///	3
70-79	///	3
80-89	///	3

[3] An incorrect table is shown, but the histogram is appropriate, based on this table.

or [3] A correct table is shown, but one error is made on the histogram, such as using incorrect labels or no labels.

or [3] An incomplete table is shown, but the histogram is correct.

[2] An incomplete table is shown, and the histogram is partially correct.

or [2] A correct table is shown, and a correct bar graph is made.

[1] A correct table is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[25] incorrect procedure.

[26] B _____

a [3] The frequency table is completed correctly, and a histogram is drawn with a correct scale and is labeled correctly.

[2] One or two errors are made in the frequency table, but an appropriate histogram is drawn.

or [2] The frequency table is completed correctly, but one error is made in drawing the histogram.

[1] A correct histogram is drawn, but the frequency table is not completed.

b [1] The interval 91-100 is identified as containing the 75th percentile.

or [1] The appropriate interval is identified, based on an incorrect frequency table in part *a*.

a and *b*

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[27] incorrect procedure.

a [2] An appropriate histogram is drawn with both axes labeled with a correct numerical scale.

[1] A correct bar graph is drawn.

or [1] The parts of the histogram are not labeled.

or [1] Equal interval scales are not shown.

or [1] One error on frequency calculation is made.

[0] Two or more mistakes on frequency calculation are made.

b [2] 60% and an appropriate explanation is given.

[1] An appropriate method to find percent is shown, but a mistake is made in reading the

chart, such as $\frac{6}{15} = 40\%$ or $\frac{9}{15}$ is shown but

not given as a percent answer.

or [1] 60% and no explanation is given.

a and *b*

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[28] incorrect procedure.

[29] C _____

[4] Mean = 225,000, median = 175,000, and the median is stated to be the best measure of central tendency, an appropriate justification is given, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made, but an appropriate measure of central tendency is stated, and an appropriate justification is given.

or [3] Mean = 225,000, median = 175,000, and the median is stated to be the best measure of central tendency, but no justification is given.

[2] Appropriate work is shown, but two or more computational errors are made, but an appropriate measure of central tendency is stated, and an appropriate justification is given.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Appropriate work is shown to find mean = 225,000 and median = 175,000, but no further correct work is shown.

[1] Appropriate work is shown, but one computational error and one conceptual error are made.

or [1] Mean = 225,000 and median = 175,000, but no further work is shown.

[0] Mean = 225,000 or median = 175,000, but no further work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[30] obviously incorrect procedure.

[31] A

[32] C

[4] Correct cumulative frequencies of 7, 14, 24, and 30 and a fully labeled correct histogram are shown.

[3] Incorrect cumulative frequencies are shown, but the histogram is appropriate for the data.

or [3] Correct cumulative frequencies are shown, but a partially incorrect histogram is shown, such as the axes not being labeled, having nonequal intervals, or the x-axis starting at 50.

[2] Only a frequency histogram is completed correctly.

or [2] Only a correct cumulative frequency table and a correct bar graph are shown.

[1] An appropriate bar graph is shown, but it is based on frequencies, not the cumulative frequency.

or [1] Only a correct cumulative frequency table is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[33]

[4] The table is completed correctly, and an appropriate cumulative frequency histogram is drawn and labeled.

[3] The table is completed correctly, but one error is made in drawing the cumulative frequency histogram or one or more labeling errors are made.

or [3] The table is not completed correctly, but an appropriate cumulative frequency histogram is drawn, based on the table.

[2] One error is made in completing the table, and one graphing error is made in drawing the cumulative frequency histogram.

or [2] The table is completed correctly, but one conceptual error is made, such as drawing a frequency histogram or a cumulative frequency bar graph.

[1] The table is completed correctly, but no histogram is drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[34] incorrect procedure.

- [4] The student draws a histogram, a stem-and-leaf plot, or any other acceptable statistical graph, with proper labels and a title.
[3] The student makes one or two minor errors, such as a lack of label, title, or connected dots.
[2] The student makes several minor errors or one major error, such as not accounting for all 20 scores.
[1] The student draws just the beginning of a graph.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[35]

- [2] A correct stem-and-leaf plot is drawn, including a key.
[1] The data are arranged correctly, but incorrect labels are written on the stem-and-leaf columns. [Columns do not need to be labeled for a full-credit response, but full credit may not be awarded if the columns are labeled incorrectly.]
or [1] The data are listed in the stem-and-leaf plot, but not in ascending order.
or [1] One or two of the scores are left out of the stem-and-leaf plot.
or [1] Duplicate values are left out of the stem-and-leaf plot.
[0] Incorrect labels are written on the stem-and-leaf columns, and scores are left out of the plot.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[36]

- [2] 77, and appropriate work is shown, such as $(76 + 78) \div 2$.
[1] 76 and 78 are identified.
or [1] 77, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[37]

[38] C

[39] D

[40] D

[41] B

[42] C

[43] C

[44] C

[45] D

[46] B

[47] B

[48] D

[49] D

[50] A

[51] C

[52] D

[53] D

[54] A

- [2] No, and an appropriate explanation is given or the expression is evaluated correctly.
[1] No, and the correct order of operations is used to evaluate $2(3)2 + 5$, but one computational error is made.
or [1] One conceptual error is made in evaluating the expression, but the question is answered appropriately.
or [1] Appropriate work is shown, but the question is not answered.
[0] No, but no explanation or an inappropriate explanation is given.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[55]

[56] D

[57] C

[58] A

[59] D

[60] D

[61] D

[62] B

[63] A

[64] B

[65] A

[66] A

[67] A

[68] B

[2] No, and a correct justification is given.

[1] No, but an incomplete or partially incorrect explanation is given.

[0] No, but no explanation is given.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[69] obviously incorrect procedure.

[70] A

[3] All three examples are illustrated under division correctly, such as $2 \div 0$, $-2 \div 4$, $-2 \div -4$, and correct explanations are given.

[2] Only two of the three examples are illustrated and explained correctly.

or [2] All three examples are illustrated correctly, but only one explanation is given or is correct.

or [2] The division examples and explanations are correct, but at most two incorrect examples are also shown, such as examples for addition, subtraction, or multiplication.

[1] The division examples and explanations are correct, but more than two incorrect examples are shown, such as examples for addition, subtraction, or multiplication.

or [1] All three examples are illustrated correctly, but no correct explanation is given.

or [1] Only one correct example with a correct explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[71] incorrect procedure.

[72] D

[73] D

[74] D

[75] D

[2] An irrational number is written, and an appropriate explanation is written, such as an irrational number cannot be written as a fraction or as a repeating or terminating decimal.

[1] An irrational number is written, such as π or the square root of a nonperfect square, but no explanation or an inappropriate explanation is written.

or [1] A correct definition of an irrational number is written, but the example is missing or is inappropriate.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[76] incorrect procedure.

[2] $\sqrt{20}$ and an appropriate explanation is given, such as the number cannot be written as a repeating or terminating decimal or it cannot be written as a fraction or it is not a perfect square.

[1] $\sqrt{20}$ and an inappropriate explanation or no explanation is given.

or [1] $\sqrt{20}$ and a correct explanation is given, but one other number is also identified as irrational.

[0] All three numbers are identified as irrational.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[77] obviously incorrect procedure.

[78] A

[79] A

[80] B

[81] A

[82] A

[83] A

[2] $\sqrt{196}$, and an appropriate explanation is given.

[1] An incorrect answer is chosen, but an appropriate explanation is given.

or [1] $\sqrt{196}$, but no explanation or an incorrect explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[84] incorrect procedure.

[85] A

[86] A

[87] D

[2] $2\frac{4}{5}$, $\sqrt{8}$, $3.\bar{1}$, π , $2\sqrt{3}$ and appropriate

work is shown, such as converting each value to a decimal equivalent.

[1] All values are correctly converted to decimal equivalents, but the order is not indicated or is indicated incorrectly.

or [1] One or two computational errors are made in finding decimal equivalents, but the appropriate order is indicated.

or [1] Appropriate work is shown, but one conceptual error is made, such as indicating the order from greatest to least.

or [1] $2\frac{4}{5}$, $\sqrt{8}$, $3.\bar{1}$, π , $2\sqrt{3}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[88] incorrect procedure.

[89] D

[90] D

[91] A

[92] D

[93] D

[94] A

[95] C

[96] B

[97] C

[98] A

[99] C

[100] B

[101] D

[102] B

[103] C

[104] A

[105] B

[106] B

[107] B

[108] C

[109] B

[110] C

[111] C

[112] B

[113] C

[114] C

[115] B

[116] C

[117] A

[118] D

[2] 0, and an appropriate explanation is given, such as 0 is the number that when added to any number results in that number or does not change it, or $1 + 0 = 1$, $2 + 0 = 2$, and $3 + 0 = 3$.

[1] 0, but no explanation or an incorrect explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[119] incorrect procedure.

[120] D

[121] D

[2] 1, and an appropriate explanation is given, such as when 1 is added to 3, the result is the identity element, 4; therefore 1 is the inverse of 3.

[1] $1 + 3 = 4$, but the identity element is not identified.

or [1] 4 is identified as the inverse because the identity element and inverse element are confused.

or [1] 1, but no explanation or an incorrect explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[122] incorrect procedure.

[123] A