

1. 060901ia, P.I. A.M.1  
It takes Tammy 45 minutes to ride her bike 5 miles. At this rate, how long will it take her to ride 8 miles?

[A] 1.125 hours      [B] 0.89 hours  
[C] 72 minutes      [D] 48 minutes

2. 060902ia, P.I. A.A.28  
What are the roots of the equation  $x^2 - 7x + 6 = 0$ ?

[A] 1 and 6      [B] -1 and -6  
[C] -1 and 7      [D] 1 and 7

3. 060903ia, P.I. A.A.12  
Which equation represents  $\frac{27x^{18}y^5}{9x^6y}$  in simplest form?

[A]  $3x^3y^5$       [B]  $3x^{12}y^4$   
[C]  $18x^3y^5$       [D]  $18x^{12}y^4$

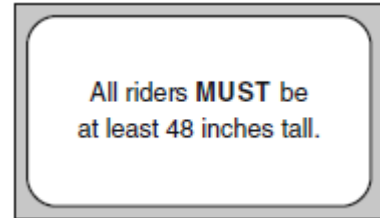
4. 060904ia, P.I. A.A.1  
Marie currently has a collection of 58 stamps. If she buys  $s$  stamps each week for  $w$  weeks, which expression represents the total number of stamps she will have?

[A]  $58 + s + w$       [B]  $58sw$   
[C]  $58 + sw$       [D]  $58s + w$

5. 060905ia, P.I. A.S.1  
Which data set describes a situation that could be classified as qualitative?

[A] the favorite ice cream flavor of each of Mr. Hayden's students  
[B] the test scores of the students in Ms. Fitzgerald's class  
[C] the ages of the students in Ms. Marshall's Spanish class  
[D] the heights of the players on the East High School basketball team

6. 060906ia, P.I. A.A.4  
The sign shown below is posted in front of a roller coaster ride at the Wadsworth County Fairgrounds.



If  $h$  represents the height of a rider in inches, what is a correct translation of the statement on this sign?

[A]  $h < 48$       [B]  $h \geq 48$   
[C]  $h > 48$       [D]  $h \leq 48$

7. 060907ia, P.I. A.A.25  
Which value of  $x$  is the solution of the equation  $\frac{2x}{3} + \frac{x}{6} = 5$ ?

[A] 15      [B] 30      [C] 6      [D] 10

8. 060908ia, P.I. A.S.21  
Students in Ms. Nazzeer's mathematics class tossed a six-sided number cube whose faces are numbered 1 to 6. The results are recorded in the table below.

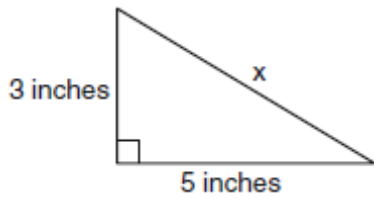
Result	Frequency
1	3
2	6
3	4
4	6
5	4
6	7

Based on these data, what is the empirical probability of tossing a 4?

[A]  $\frac{8}{30}$       [B]  $\frac{1}{30}$       [C]  $\frac{5}{30}$       [D]  $\frac{6}{30}$

9. 060909ia, P.I. A.A.45

What is the value of  $x$ , in inches, in the right triangle below?



- [A]  $\sqrt{15}$     [B] 8    [C] 4    [D]  $\sqrt{34}$

10. 060910ia, P.I. A.N.2

What is  $\sqrt{32}$  expressed in simplest radical form?

- [A]  $4\sqrt{2}$                       [B]  $4\sqrt{8}$   
[C]  $2\sqrt{8}$                       [D]  $16\sqrt{2}$

11. 060911ia, P.I. A.M.2

If the speed of sound is 344 meters per second, what is the approximate speed of sound, in meters per hour?

60 seconds = 1 minute
60 minutes = 1 hour

- [A] 20,640                      [B] 41,280  
[C] 1,238,400                [D] 123,840

12. 060912ia, P.I. A.A.7

The sum of two numbers is 47, and their difference is 15. What is the larger number?

- [A] 31    [B] 16    [C] 32    [D] 36

13. 060913ia, P.I. A.A.23

If  $a + ar = b + r$ , the value of  $a$  in terms of  $b$  and  $r$  can be expressed as

- [A]  $\frac{1+b}{r}$                       [B]  $\frac{1+b}{r+b}$   
[C]  $\frac{b}{r} + 1$                 [D]  $\frac{b+r}{1+r}$

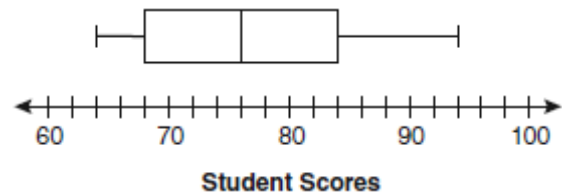
14. 060914ia, P.I. A.A.21

Which value of  $x$  is in the solution set of  $\frac{4}{3}x + 5 < 17$ ?

- [A] 9    [B] 12    [C] 8    [D] 16

15. 060915ia, P.I. A.S.6

The box-and-whisker plot below represents students' scores on a recent English test.



What is the value of the upper quartile?

- [A] 68    [B] 94    [C] 76    [D] 84

16. 060916ia, P.I. A.A.15

Which value of  $n$  makes the expression  $\frac{5n}{2n-1}$  undefined?

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

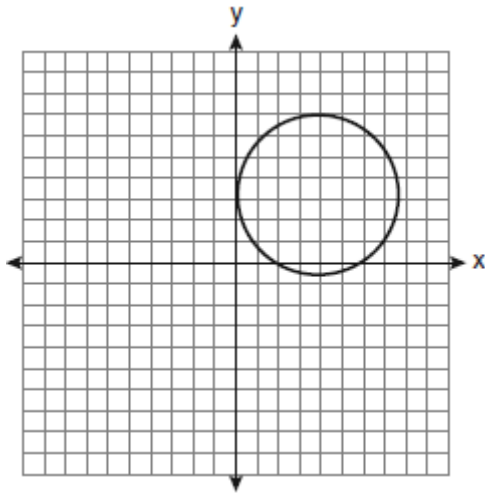
17. 060917ia, P.I. A.A.7

At Genesee High School, the sophomore class has 60 more students than the freshman class. The junior class has 50 fewer students than twice the students in the freshman class. The senior class is three times as large as the freshman class. If there are a total of 1,424 students at Genesee High School, how many students are in the freshman class?

- [A] 236    [B] 202    [C] 205    [D] 235

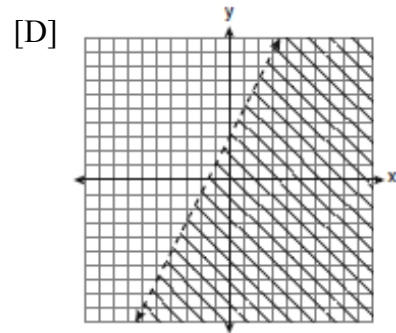
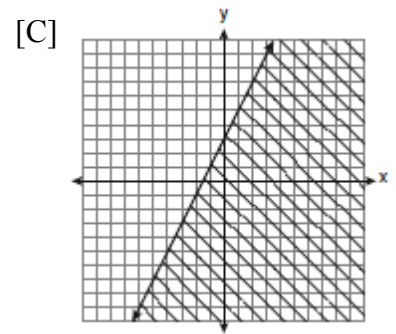
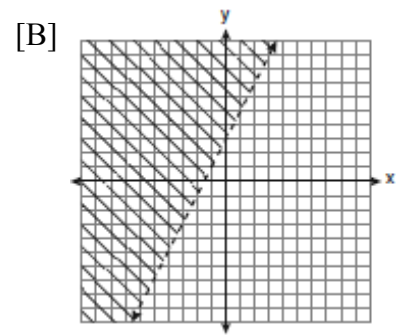
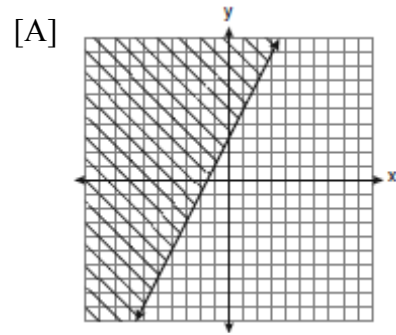
18. 060918ia, P.I. A.A.41  
What are the vertex and axis of symmetry of the parabola  $y = x^2 - 16x + 63$ ?
- [A] vertex:  $(-8,1)$ ; axis of symmetry:  $x = -8$   
[B] vertex:  $(-8,-1)$ ; axis of symmetry:  $x = -8$   
[C] vertex:  $(8,-1)$ ; axis of symmetry:  $x = 8$   
[D] vertex:  $(8,1)$ ; axis of symmetry:  $x = 8$

19. 060919ia, P.I. A.G.3  
Which statement is true about the relation shown on the graph below?



- [A] It is a function because there exists one  $x$ -coordinate for each  $y$ -coordinate.  
[B] It is *not* a function because there are multiple  $y$ -values for a given  $x$ -value.  
[C] It is a function because there exists one  $y$ -coordinate for each  $x$ -coordinate.  
[D] It is *not* a function because there are multiple  $x$ -values for a given  $y$ -value.

20. 060920ia, P.I. A.G.6  
Which graph represents the solution of  $3y - 9 \leq 6x$ ?



21. 060921ia, P.I. A.A.16

Which expression represents  $\frac{x^2 - 2x - 15}{x^2 + 3x}$  in simplest form?

- [A]  $\frac{-2x - 5}{x}$                       [B]  $\frac{-2x - 15}{3x}$   
[C]  $\frac{x - 5}{x}$                         [D] -5

22. 060922ia, P.I. A.A.34

What is an equation of the line that passes through the point (4,-6) and has a slope of -3?

- [A]  $y = -3x + 10$             [B]  $y = -3x + 14$   
[C]  $y = -3x - 6$             [D]  $y = -3x + 6$

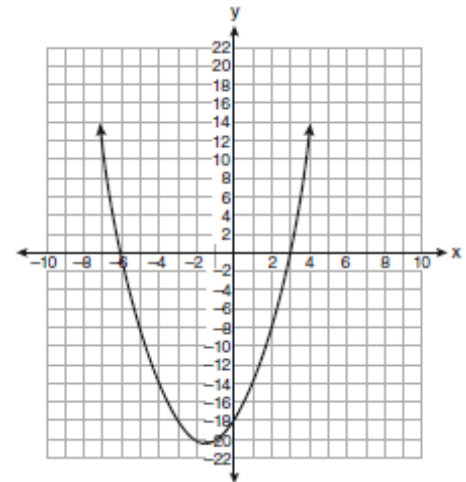
23. 060923ia, P.I. A.A.13

When  $4x^2 + 7x - 5$  is subtracted from  $9x^2 - 2x + 3$ , the result is

- [A]  $5x^2 + 5x - 2$             [B]  $-5x^2 + 5x - 2$   
[C]  $5x^2 - 9x + 8$             [D]  $-5x^2 + 9x - 8$

24. 060924ia, P.I. A.G.8

The equation  $y = x^2 + 3x - 18$  is graphed on the set of axes below.



Based on this graph, what are the roots of the equation  $x^2 + 3x - 18 = 0$ ?

- [A] 3 and -6                      [B] 3 and -18  
[C] -3 and 6                      [D] 0 and -18

25. 060925ia, P.I. A.A.10

What is the value of the y-coordinate of the solution to the system of equations  $x + 2y = 9$  and  $x - y = 3$ ?

- [A] 6            [B] 5            [C] 2            [D] 3

26. 060926ia, P.I. A.N.1

What is the additive inverse of the expression  $a - b$ ?

- [A]  $a + b$                       [B]  $-a - b$   
[C]  $a - b$                       [D]  $-a + b$

27. 060927ia, P.I. A.N.4

What is the product of 12 and  $4.2 \times 10^6$  expressed in scientific notation?

- [A]  $50.4 \times 10^6$                 [B]  $50.4 \times 10^7$   
[C]  $5.04 \times 10^6$                 [D]  $5.04 \times 10^7$

28. 060928ia, P.I. A.M.3  
To calculate the volume of a small wooden cube, Ezra measured an edge of the cube as 2 cm. The actual length of the edge of Ezra's cube is 2.1 cm. What is the relative error in his volume calculation to the *nearest hundredth*?

[A] 0.13 [B] 0.14 [C] 0.15 [D] 0.16

29. 060929ia, P.I. A.A.17  
What is  $\frac{6}{4a} - \frac{2}{3a}$  expressed in simplest form?

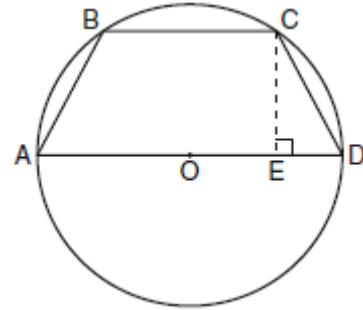
[A]  $\frac{10}{12a}$  [B]  $\frac{8}{7a}$  [C]  $\frac{4}{a}$  [D]  $\frac{5}{6a}$

30. 060930ia, P.I. A.A.29  
The set  $\{11, 12\}$  is equivalent to  
[A]  $\{x | 11 < x < 12, \text{ where } x \text{ is an integer}\}$   
[B]  $\{x | 11 < x \leq 12, \text{ where } x \text{ is an integer}\}$   
[C]  $\{x | 10 \leq x < 12, \text{ where } x \text{ is an integer}\}$   
[D]  $\{x | 10 < x \leq 12, \text{ where } x \text{ is an integer}\}$
31. 060931ia, P.I. A.N.8  
Determine how many three-letter arrangements are possible with the letters  $A$ ,  $N$ ,  $G$ ,  $L$ , and  $E$  if no letter may be repeated.

32. 060932ia, P.I. A.A.19  
Factor completely:  $4x^3 - 36x$

33. 060933ia, P.I. A.S.18  
Some books are laid on a desk. Two are English, three are mathematics, one is French, and four are social studies. Theresa selects an English book and Isabelle then selects a social studies book. Both girls take their selections to the library to read. If Truman then selects a book at random, what is the probability that he selects an English book?

34. 060934ia, P.I. A.G.1  
In the diagram below, the circumference of circle  $O$  is  $16\pi$  inches. The length of  $\overline{BC}$  is three-quarters of the length of diameter  $\overline{AD}$  and  $CE = 4$  inches. Calculate the area, in square inches, of trapezoid  $ABCD$ .



35. 060935ia, P.I. A.A.9  
A bank is advertising that new customers can open a savings account with a  $3\frac{3}{4}\%$  interest rate compounded annually. Robert invests \$5,000 in an account at this rate. If he makes no additional deposits or withdrawals on his account, find the amount of money he will have, to the *nearest cent*, after three years.

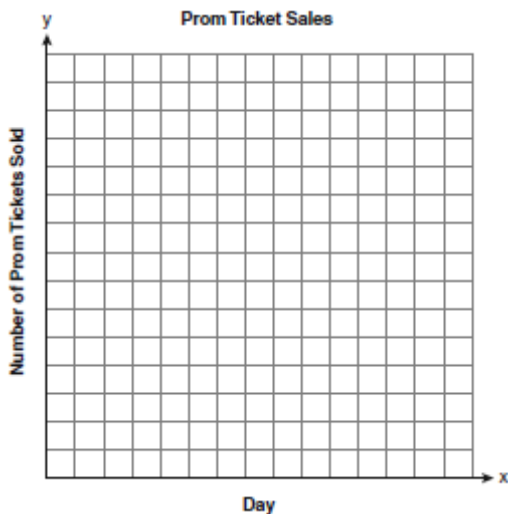
36. 060936ia, P.I. A.S.8

The table below shows the number of prom tickets sold over a ten-day period.

**Prom Ticket Sales**

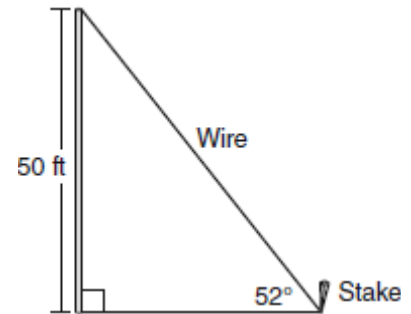
Day ( $x$ )	1	2	5	7	10
Number of Prom Tickets Sold ( $y$ )	30	35	55	60	70

Plot these data points on the coordinate grid below. Use a consistent and appropriate scale. Draw a reasonable line of best fit and write its equation.



37. 060937ia, P.I. A.A.44

A stake is to be driven into the ground away from the base of a 50-foot pole, as shown in the diagram below. A wire from the stake on the ground to the top of the pole is to be installed at an angle of elevation of  $52^\circ$ .



How far away from the base of the pole should the stake be driven in, to the *nearest foot*? What will be the length of the wire from the stake to the top of the pole, to the *nearest foot*?

38. 060938ia, P.I. A.S.5

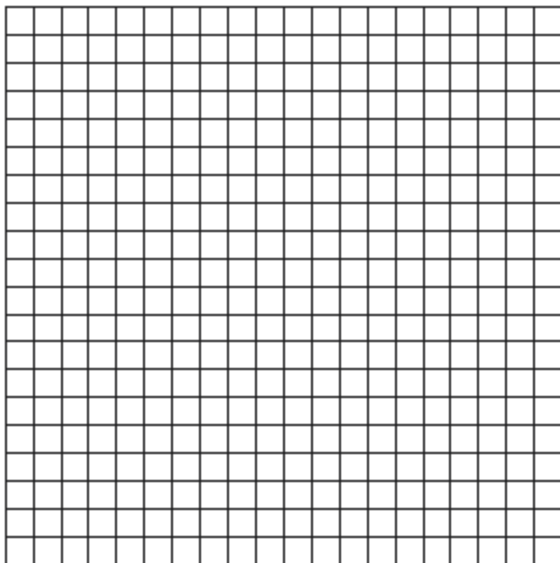
The Fahrenheit temperature readings on 30 April mornings in Stormville, New York, are shown below.

41°, 58°, 61°, 54°, 49°, 46°, 52°, 58°, 67°, 43°  
47°, 60°, 52°, 58°, 48°, 44°, 59°, 66°, 62°, 55°  
44°, 49°, 62°, 61°, 59°, 54°, 57°, 58°, 63°, 60°

Using the data, complete the frequency table below.

Interval	Tally	Frequency
40–44		
45–49		
50–54		
55–59		
60–64		
65–69		

On the grid below, construct and label a frequency histogram based on the table.

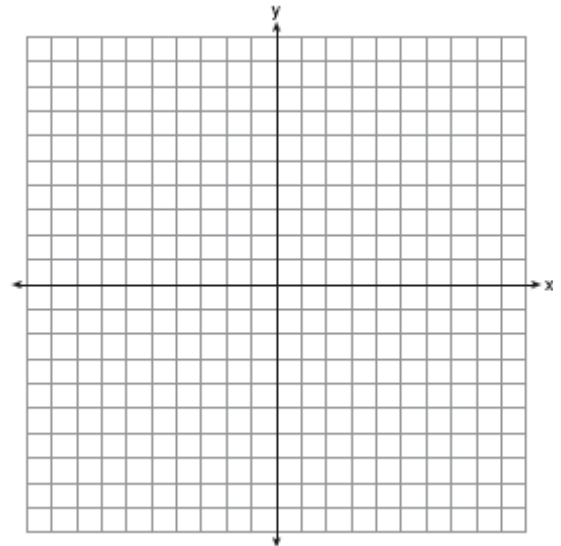


39. 060939ia, P.I. A.G.9

On the set of axes below, solve the following system of equations graphically for all values of  $x$  and  $y$ .

$$y = x^2 - 6x + 1$$

$$y + 2x = 6$$



- [1] C \_\_\_\_\_
- [2] A \_\_\_\_\_
- [3] B \_\_\_\_\_
- [4] C \_\_\_\_\_
- [5] A \_\_\_\_\_
- [6] B \_\_\_\_\_
- [7] C \_\_\_\_\_
- [8] D \_\_\_\_\_
- [9] D \_\_\_\_\_
- [10] A \_\_\_\_\_
- [11] C \_\_\_\_\_
- [12] A \_\_\_\_\_
- [13] D \_\_\_\_\_
- [14] C \_\_\_\_\_
- [15] D \_\_\_\_\_
- [16] B \_\_\_\_\_
- [17] B \_\_\_\_\_
- [18] C \_\_\_\_\_
- [19] B \_\_\_\_\_
- [20] C \_\_\_\_\_
- [21] C \_\_\_\_\_
- [22] D \_\_\_\_\_
- [23] C \_\_\_\_\_
- [24] A \_\_\_\_\_
- [25] C \_\_\_\_\_
- [26] D \_\_\_\_\_
- [27] D \_\_\_\_\_
- [28] B \_\_\_\_\_

[29] D \_\_\_\_\_

[30] D \_\_\_\_\_

[2] 60, and appropriate work is shown, such as  ${}_5P_3$  or  $5 \times 4 \times 3$ .

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

or [1] Appropriate work is shown, but one conceptual error is made, such as determining the value of  ${}_5C_3$ .

or [1] 60, 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

[31] incorrect procedure. \_\_\_\_\_

[2]  $4x(x - 3)(x + 3)$ , and appropriate work is shown.

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

or [1] Appropriate work is shown, but one conceptual error is made, such as leaving the answer as  $4x(x^2 - 9)$ .

or [1]  $4x(x - 3)(x + 3)$ , 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

[32] incorrect procedure. \_\_\_\_\_

[2]  $\frac{1}{8}$  or an equivalent answer, and

appropriate work is shown.

[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]  $\frac{1}{8}$  or an equivalent answer, 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

[33] incorrect procedure. \_\_\_\_\_

[3] 56, and appropriate work is shown.  
[2] Appropriate work is shown, but one computational error is made.  
or [2] Appropriate work is shown to find  $A = \frac{1}{2}(4)(12 + 16)$  or an equivalent equation, but no further correct work is shown.  
[1] Appropriate work is shown, but two or more computational errors are made.  
or [1] Appropriate work is shown, but one conceptual error is made.  
or [1] Appropriate work is shown to find  $AD=16$  and  $BC=12$ , but no further correct work is shown.  
or [1] 56, 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.

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[34]

[3] 5,583.86, and appropriate work is shown.  
[2] Appropriate work is shown, but one computational or rounding error is made.  
[1] Appropriate work is shown, but two or more computational or rounding errors are made.  
or [1] Appropriate work is shown, but one conceptual error is made.  
or [1]  $A = 5000(1 + 0.0375)^3$  or an equivalent equation, but no further correct work is shown.  
or [1] 5,583.86, 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.

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[35]

[3] The data are plotted correctly, an appropriate line of best fit is drawn, and its equation is stated.  
[2] The data are plotted incorrectly, but an appropriate line of best fit is drawn, and an appropriate equation is stated.  
or [2] The data are plotted correctly, but an incorrect line of best fit is drawn, but an appropriate equation is stated.  
or [2] The data are plotted correctly, and an appropriate line of best fit is drawn, but its equation is not stated or is stated incorrectly.  
[1] The data are plotted correctly, but no further correct work is shown.  
or [1] The data are plotted incorrectly, but an appropriate line of best fit is drawn, but no further correct 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.

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[36]

[4] 39 and 63, and appropriate work is shown, such as using trigonometry or the Pythagorean theorem.

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

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

or [2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function.

or [2]  $\tan 52 = \frac{50}{x}$  and  $\sin 52 = \frac{50}{y}$  or an

equivalent equation, but no further correct work is shown.

or [2] 39 or 63, and appropriate work is shown.

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

or [1]  $\tan 52 = \frac{50}{x}$  or  $\sin 52 = \frac{50}{y}$  or an

equivalent equation, but no further correct work is shown.

or [1] 39 and 63, but no work is shown.

[0] 39 or 63, but no work is shown.

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

[37] obviously incorrect procedure.

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

[3] The frequency table is completed correctly, but one graphing or labeling error is made in the frequency histogram.

or [3] The frequency table is completed incorrectly, but an appropriate frequency histogram is drawn and labeled.

[2] The frequency table is completed correctly, but two or more graphing or labeling errors are made in the frequency histogram.

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

[1] Appropriate work is shown, but one conceptual error and one graphing or labeling error are made in the frequency histogram.

or [1] The frequency table is completed incorrectly, and two or more graphing or labeling errors are made in the frequency histogram.

or [1] The frequency table is completed correctly, but no further correct work is shown.

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

[38] incorrect procedure.

[4] Both equations are graphed correctly, and  $(-1,8)$  and  $(5,-4)$  are stated.

[3] Appropriate work is shown, but one computational or graphing error is made, but the appropriate points of intersection are stated.

or [3] Both equations are graphed correctly, but only one point of intersection is stated.

[2] Appropriate work is shown, but two or more computational or graphing errors are made, but appropriate points of intersection are stated.

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

or [2] Both equations are graphed correctly, but the points of intersection are not stated or are stated incorrectly.

or [2]  $(-1,8)$  and  $(5,-4)$  are found as points of intersection, but a method other than a graphic method is used.

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

or [1] One of the equations is graphed correctly, but no further correct work is shown.

or [1]  $(-1,8)$  and  $(5,-4)$  are stated, but no work is shown.

[0]  $(-1,8)$  or  $(5,-4)$  is stated, but no work is shown.

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

[39] obviously incorrect procedure.