Sharyland ISD Study Guide

Advanced Quantitative Reasoning Semester 2

Student Name: _____

Student ID: _____

CBE Review Advanced Quantitative Reasoning (AQR) Semester B

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

Jeremy boiled one cup of water and then let it cool at room temperature. The table shows the temperature, in degrees Fahrenheit, of the water after a given number of five-minute intervals. Jeremy used an exponential function to model the temperature $w(t)$, in degrees Fahrenheit, of the water after t intervals.

Interval	0	1	2	3	4
Temperature	210	167	145	131	121

1 Which of the following is an exponential model for this data?

Ⓐ $w(t) = 210(1.26)^x$ 　　　　　　　Ⓒ $w(t) = 1.26(210)^x$
Ⓑ $w(t) = 210(0.874)^x$ 　　　　　　　Ⓓ $w(t) = 0.874(210)^x$
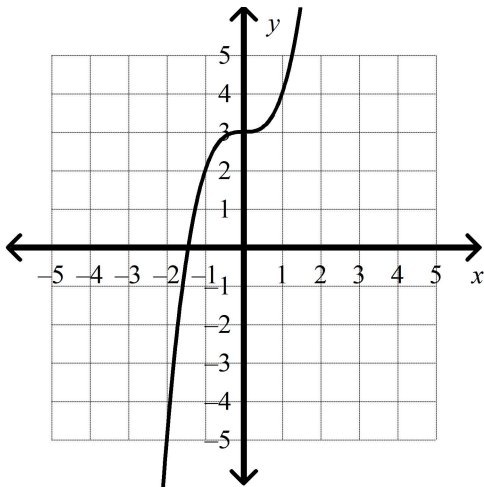
2 What type of relationship is shown by the scatter plot?
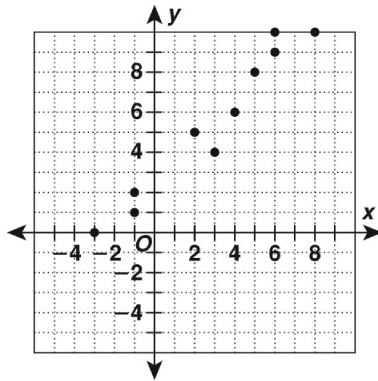
Ⓐ strong positive correlation 　　　　Ⓒ strong negative correlation
Ⓑ weak positive correlation 　　　　　Ⓓ weak negative correlation
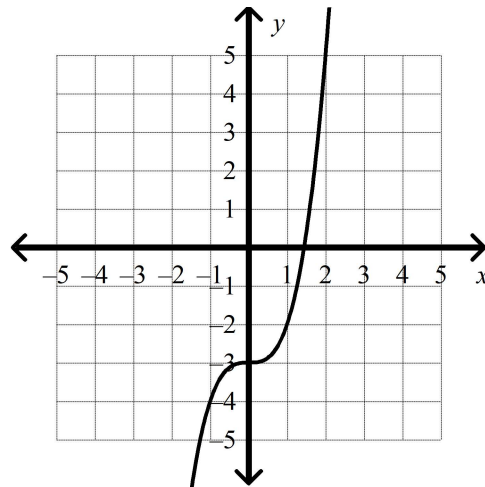
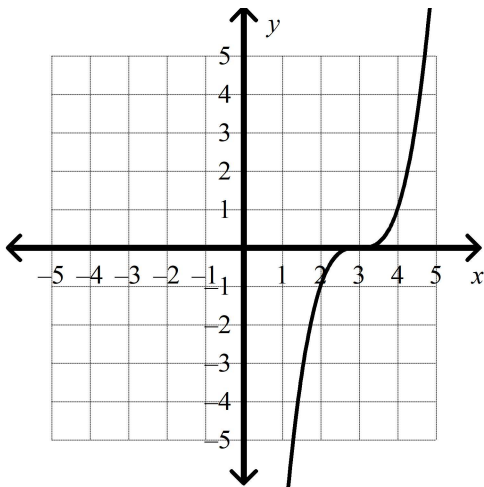**3** Graph $y = x^3 + 3$. State the y-intercept of the function.
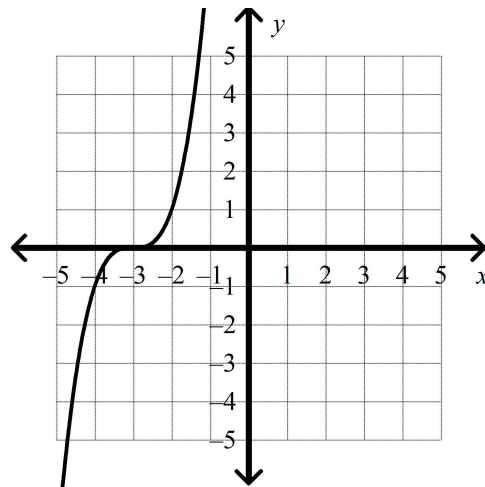
Ⓐ

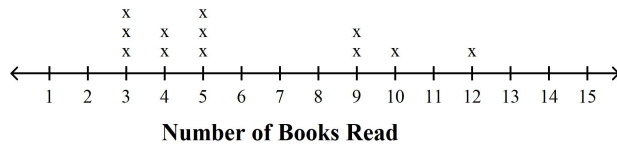y-intercept: $(0, 3)$

Ⓒ

y-intercept: $(0, -3)$

Ⓑ

y-intercept: $(0, -27)$

Ⓓ

y-intercept: $(0, 27)$

4 Reading from the line plot, James says that there are 5 students who read 3 books. What is James' error?

```
          x       x
          x   x   x
          x   x   x                   x
                              x   x         x
  ←—+—+—+—+—+—+—+—+—+—+—+—+—+—+—+—→
     1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
```
**Number of Books Read**

Ⓐ   James read the line plot incorrectly. There are more than 5 students who read 3 books.
Ⓑ   James read the line plot incorrectly. The line plot does not show the number of students who read 3 books.
Ⓒ   James read the line plot incorrectly. There are twice as many students who read 3 books.
Ⓓ   James read the line plot incorrectly. There are 3 students who read 5 books, not 5 students who read 3 books.

5 Which year has been the most expensive for computers so far? Use the line graph to answer the question.

Average Cost of Computers

Ⓐ 2000   Ⓒ 2003
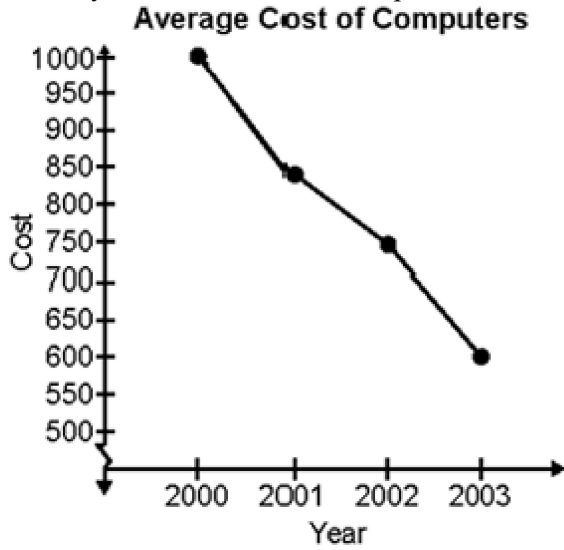
Ⓑ 2002   Ⓓ 2001

6 The box-and-whisker plots show the distribution of two data sets. Which data set has a greater interquartile range?
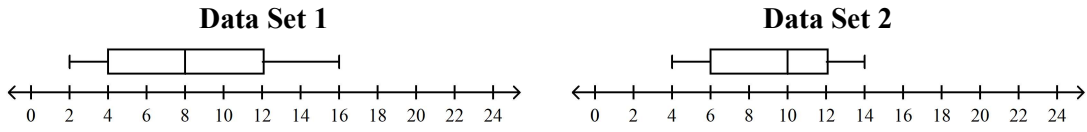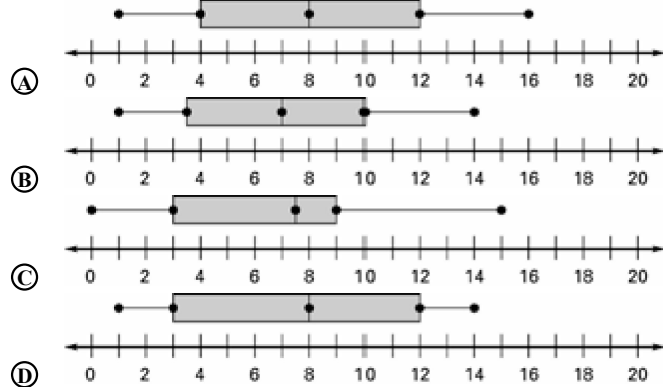
Data Set 1   **Data Set 2**

Ⓐ Data Set 2   Ⓑ Data Set 1

7 Find the slope of the line that passes through $(-3,-1)$ and $(-5,4)$.

Ⓐ $-\dfrac{5}{2}$ Ⓒ $\dfrac{5}{2}$

Ⓑ $-\dfrac{2}{5}$ Ⓓ $\dfrac{2}{5}$

8 Find the sample standard deviation and the population standard deviation of the data set.
52, 19, 44, 49, 37, 46, 52, 36, 54, 13, 14, 17, 34, 16, 51

Ⓐ $s = 15.19$ Ⓒ $s = 15.72$

$\sigma = 15.72$ $\sigma = 15.19$

Ⓑ $s = 4.06$ Ⓓ $s = 3.92$

$\sigma = 3.92$ $\sigma = 4.06$

9 Use this data set.

    10, 1, 3, 14, 8, 12, 5

Which is the correct box-and-whisker plot for the data set?

Ⓐ

Ⓑ

Ⓒ

Ⓓ

10 The table shows the height of a plant over time. Which type of function best models the data? Write an equation to model the data.

| Year	Height (cm)
0	97
1	116
2	135
3	154
4	173

Ⓐ linear; $y = 19x + 97$

Ⓑ quadratic; $y = 19x^2 + 97$

Ⓒ exponential; $y = 97 \cdot 19^x$

Ⓓ quadratic; $y = 97x^2 + 19$

11 Showton Middle School has 840 students. Teresa surveys a random sample of 60 students and finds that 8 of them have more than 3 siblings. How many students at the school are likely to have more than 3 siblings?

Ⓐ 112

Ⓑ 6,300

Ⓒ 780

Ⓓ 480

12 The probability that a new tire will have a blowout in the first year is .10. If the four tires on a new car function independently of each other, what is the probability that at least one tire blows out in the first year?

Ⓐ $1 - (.90 \times .90 \times .90 \times .90)$

Ⓑ $1 - (.10 \times .10 \times .10 \times .10)$

Ⓒ $.10 \times .10 \times .10 \times .10$

Ⓓ $.90 \times .90 \times .90 \times .90$

13 Write the equation $4x + 8y = -24$ in slope-intercept form. Then graph the equation.
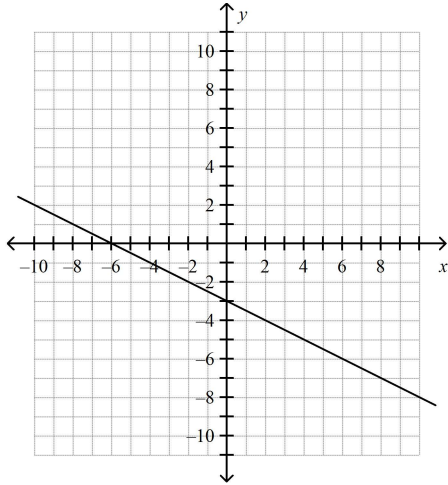
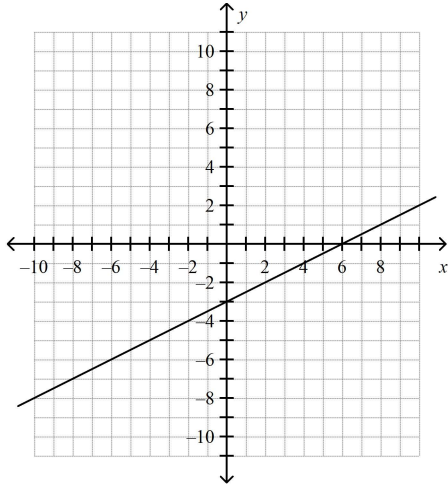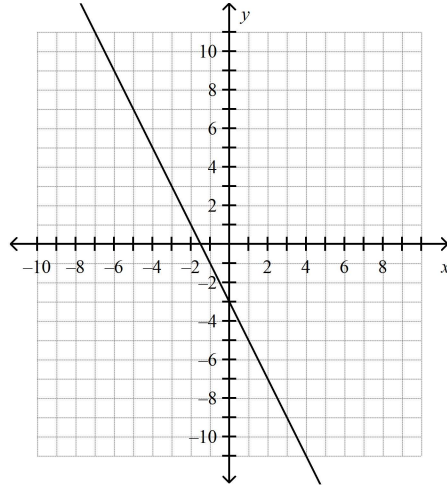Ⓐ $y = -\frac{1}{2}x - 3$ Ⓒ $y = -\frac{1}{2}x - 3$
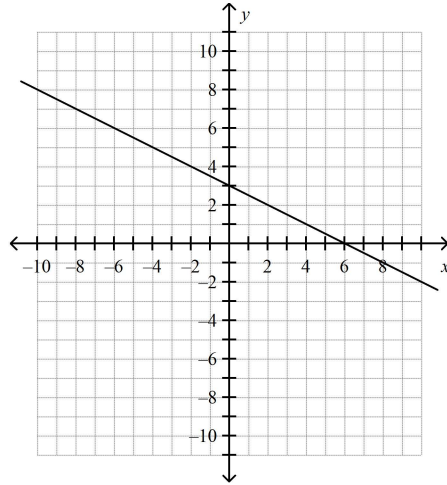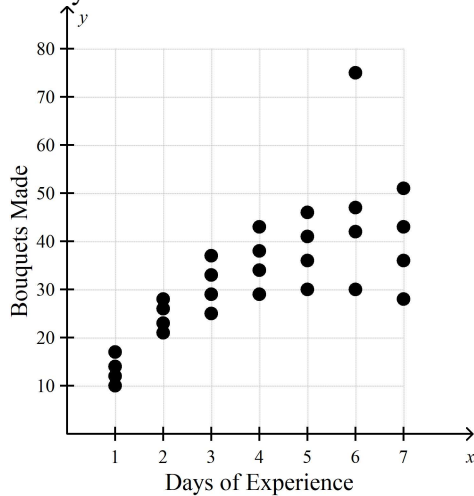
Ⓑ $y = -\frac{1}{2}x - 3$ Ⓓ $y = -\frac{1}{2}x - 3$

14 For which of the following statistics would one <u>not</u> need to put the data in order from smallest to largest?

Ⓐ   the variance

Ⓑ   the range

Ⓒ   the interquartile range

Ⓓ   the trimmed mean

Ⓔ   the median

15 A floral delivery company conducts a study to measure the effect of worker experience on productivity. Tell whether the scatter plot appears to have a linear or non-linear pattern of association. Describe any clustering and identify outliers.

Ⓐ The pattern of association appears to be linear.
There appears to be clustering of the data points at 1 and 2 days. After that, the results become less clustered.
The point near (6, 75) appears to be an outlier.
Ⓑ The pattern of association appears to be non-linear.
There appears to be clustering of the data points at 1 and 2 days. After that, the results become less clustered.
The point near (6, 75) appears to be an outlier.
Ⓒ The pattern of association appears to be linear.
There appears to be clustering of the data points at 1 and 2 days. After that, the results become less clustered.
There do not appear to be any outliers.
Ⓓ The pattern of association appears to be non-linear.
There appears to be clustering of the data points at 6 and 7 days. Before that, the results are less clustered.
There do not appear to be any outliers.

16 There are 18 students participating in a spelling bee. How many ways can the students who go first and second be chosen?
Ⓐ 4,896 ways
Ⓑ 18 ways
Ⓒ 306 ways
Ⓓ 73,440 ways

17 Which data set could the histogram represent?
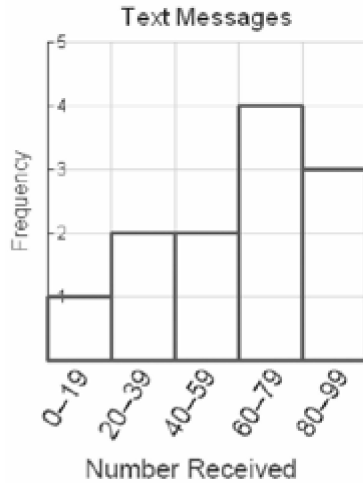
Ⓐ 6, 21, 33, 39, 59, 68, 70, 76, 79, 82, 94, 96
Ⓑ 6, 12, 33, 45, 59, 68, 70, 76, 79, 82, 94, 96
Ⓒ 6, 21, 33, 45, 59, 68, 70, 76, 83, 85, 94, 96
Ⓓ 6, 21, 33, 45, 59, 68, 70, 76, 79, 82, 94, 96

18 Find the slope of the line that passes through (1, 2) and (2, 4).

Ⓐ $\frac{1}{2}$

Ⓒ 2

Ⓑ 1

Ⓓ $\frac{3}{2}$

19 Gabriel tossed a paper cup 40 times and recorded how the cup landed each time. He organized the results in the table shown. Find the experimental probability that the cup will NOT land right-side up. Express your answer as a fraction in simplest form.

Outcome	Right-side up	Upside down	On its side
Frequency	9	12	19

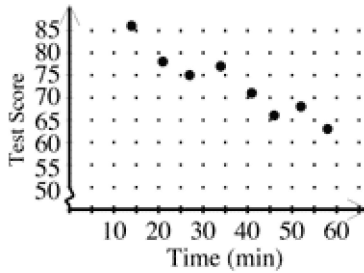Ⓐ $\frac{19}{40}$

Ⓒ $\frac{31}{40}$

Ⓑ $\frac{1}{3}$

Ⓓ $\frac{9}{40}$

20 Which of these functions is a linear function?

Ⓐ $f(x) = \frac{4}{x}$

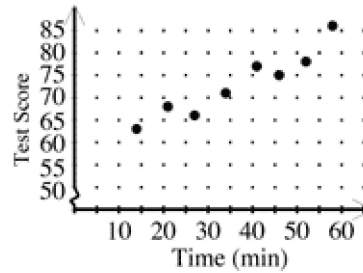Ⓒ $f(x) = 4x$

Ⓑ $f(x) = 4x^2$

Ⓓ $f(x) = -4(x+2)$

21 The table shows the study times and test scores for a number of students. Create a scatter plot corresponding to the data.

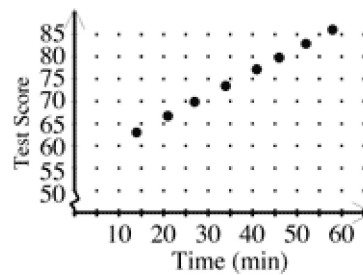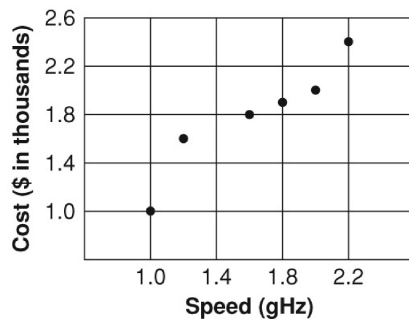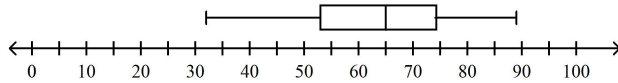| Study Time (min)	14	21	27	34	41	46	52	58
Test Score	63	68	66	71	77	75	78	86

Ⓐ

Ⓒ

Ⓑ

Ⓓ
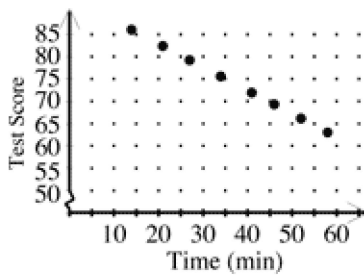
22 Which of the statements is true about the data displayed in the scatter plot?

Computer Cost vs. Speed

Ⓐ As speed increases, cost decreases.   Ⓒ It shows no correlation.
Ⓑ It shows a negative correlation.   Ⓓ It shows a positive correlation.

23 Which statement is *not* true about the data shown by the box plot below?

    Ⓐ The median of the lower half of the data is 53.
    Ⓑ Half the data lies between 53 and 74.
    Ⓒ Three fourths of the data is greater than 65.
    Ⓓ The range is 57.

24 A biologist took a count of the number of fish in a particular lake, and recounted the lake's population of fish on each of the next six weeks.

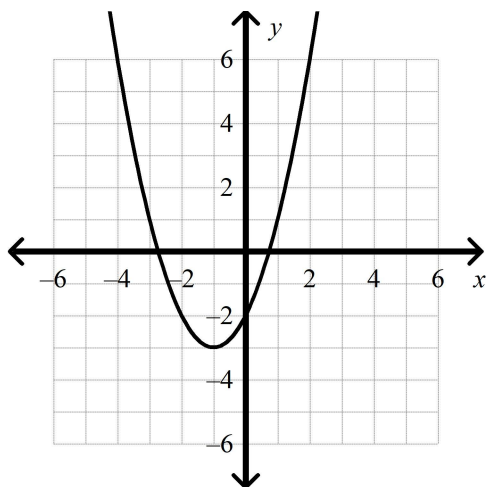| Week	0	1	2	3	4	5	6
Population	495	483	481	489	507	535	573

Find a quadratic function that models the data as a function of *x*, the number of weeks. Use the model to estimate the number of fish at the lake on week 11.

    Ⓐ $P(x) = 5x^2 - 17x + 495$; 621 fish   Ⓒ $P(x) = 10x^2 + 17x + 445$; 1,054 fish
    Ⓑ $P(x) = 5x^2 - 17x + 495$; 1,842 fish   Ⓓ $P(x) = 10x^2 + 17x + 445$; 1,842 fish

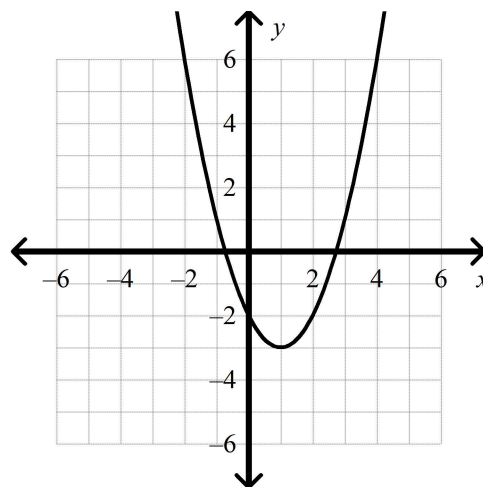**Graph each function. How is each graph a translation of** $f(x) = x^2$ **?**
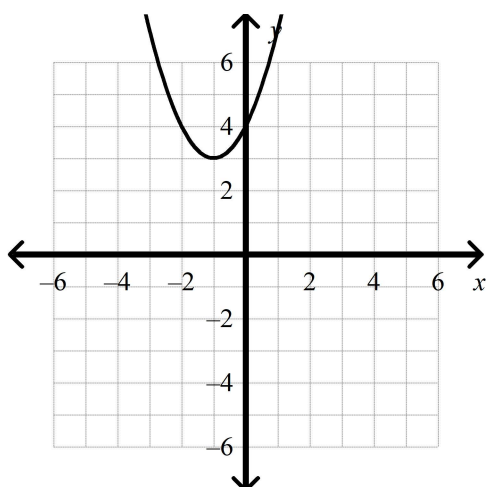
25   $y = (x - 1)^2 + 3$

Ⓐ

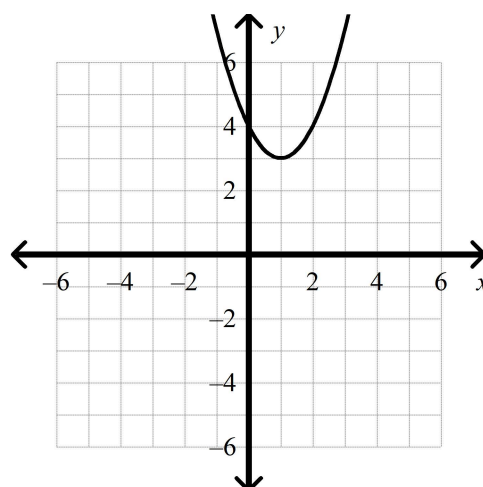$f(x)$ translated down 3 unit(s) and translated to the left 1 unit(s)

Ⓒ

$f(x)$ translated down 3 unit(s) and translated to the right 1 unit(s)

Ⓑ

$f(x)$ translated up 3 unit(s) and translated to the left 1 unit(s)

Ⓓ

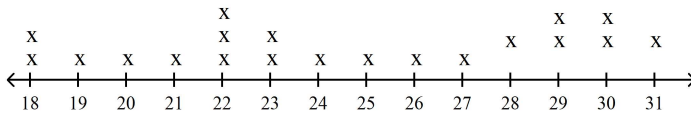$f(x)$ translated up 3 unit(s) and translated to the right 1 unit(s).

26 The stem-and-leaf plot shows the ages of 20 participants in a local theater play. Make a line plot to show the data. What does the line plot show more clearly than a stem-and-leaf plot shows?

Theatre Play Participants' Age

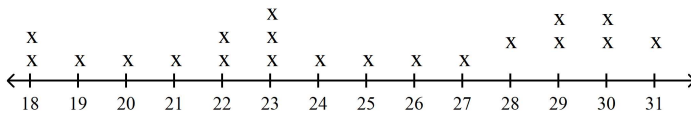| Stems	Leaves
1	8 8 9
2	0 1 2 2 2 3 3 4 5 6 7 8 9 9
3	0 0 1

Ⓐ

Theatre Play Participants' Age

The line plot shows the mode and the median more clearly than a stem-and-leaf plot does.
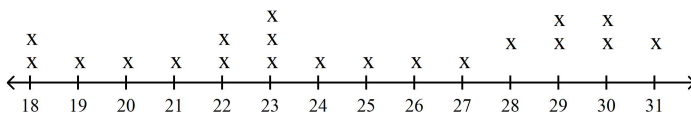
Ⓑ

Theatre Play Participants' Age

The line plot shows the mode and the median more clearly than a stem-and-leaf plot does.
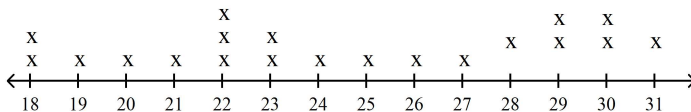
Ⓒ

Theatre Play Participants' Age

The line plot shows the mean more clearly than a stem-and-leaf plot does.

Ⓓ

Theatre Play Participants' Age

The line plot shows the mean more clearly than a stem-and -leaf plot does.

27 The table represents the Martin family's budget. Their net monthly income is $3,900. How much does the Martin family put in savings in a year?

Category	Percent
Emergency Fund	4%
Savings	10%
Housing	25%
Food	15%
Clothing	8%
Entertainment	15%
Transportation	12%
Medical costs	11%

Ⓐ $120   Ⓒ $2,028

Ⓑ $4,680   Ⓓ $390

28 In a box-and-whisker plot, the *interquartile range* is a measure of the spread of the middle half of the data. Find the interquartile range for the data set: 10, 6, 7, 6, 9, 12, 17.

Ⓐ 7   Ⓒ 8

Ⓑ 12   Ⓓ 6

29 What is the rule for this linear function?
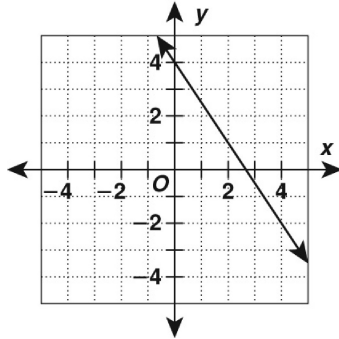
Ⓐ $f(x) = -2x + 4$ Ⓒ $f(x) = -\dfrac{3}{2}x + 4$

Ⓑ $f(x) = \dfrac{3}{2}x + 4$ Ⓓ $f(x) = 3x + 4$

30 You randomly choose a letter from the word ENGAGEMENT. Find the probability of choosing either an N or an A.

Ⓐ $\dfrac{7}{10}$ Ⓒ $\dfrac{1}{5}$

Ⓑ $\dfrac{3}{10}$ Ⓓ $\dfrac{1}{3}$

31 Which equation is graphed?
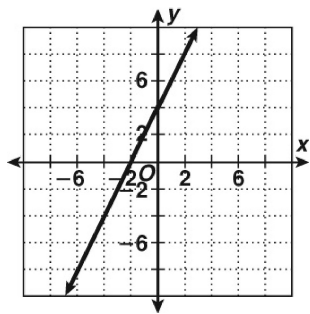
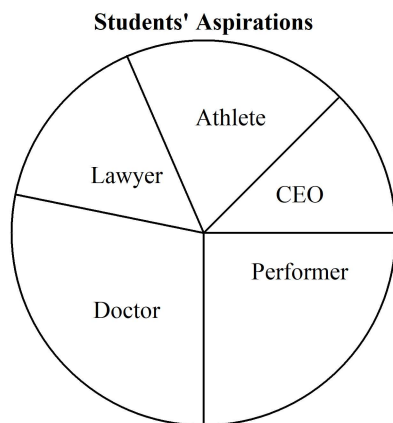 Ⓐ $y = 2x + 4$ Ⓒ $y = -2x + 4$

  Ⓑ $y = 2x - 4$ Ⓓ $y = -2x - 4$

32 Determine the *x*-intercept of the function $f(x) = 2^x - 4$.

  Ⓐ $(2, 0)$ Ⓒ $(4, 0)$

  Ⓑ   There is no *x*-intercept.   Ⓓ $(0, -3)$

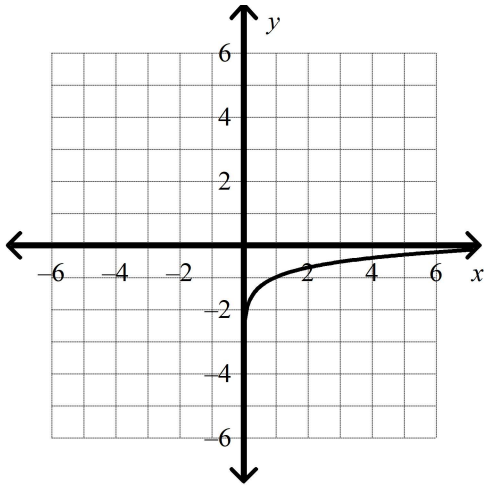**33** Approximately what percent of students aspire to be either a doctor or an athlete?

  Ⓐ   about 85%   Ⓒ   about 25%

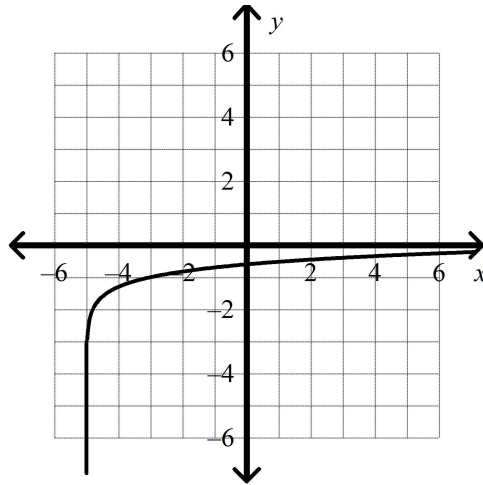 Ⓑ   about 75%   Ⓓ   about 50%

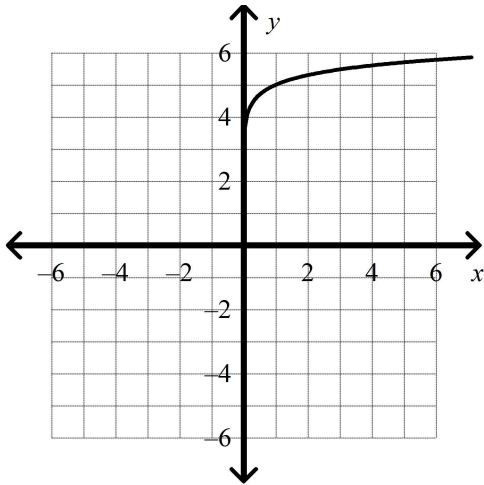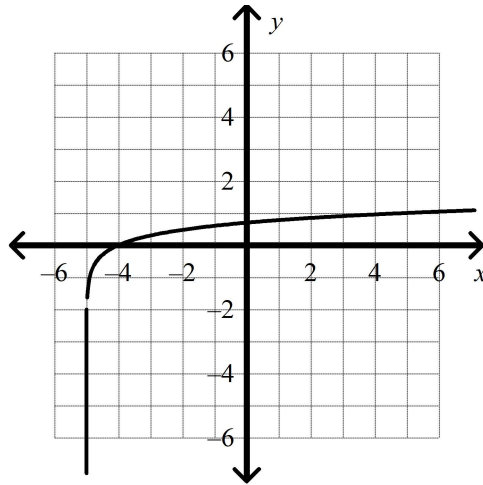**34** Graph the function $f(x) = \log_{10} x + 5$. Determine the equation of any asymptotes.

Ⓐ

$x = 0$ and $y = 0$

Ⓒ

$y = 0$

Ⓑ

$x = 0$

Ⓓ

no asymptotes

35 To wrap presents, Hannah has 2 different colors of wrapping paper—blue and red. To top the present, she has 3 different types of bows to choose from—striped, polka dots, and clear. What are all the possible ways Hannah can wrap the present?
Ⓐ   {blue and striped; blue and polka dots; blue and clear; red and striped; blue and red; striped and polka dots}
Ⓑ   {blue and striped; blue and polka dots; blue and clear}
Ⓒ   {red and striped; red and polka dots; red and clear}
Ⓓ   {blue and striped; blue and polka dots; blue and clear; red and striped; red and polka dots; red and clear}

36 Which equation represents the values in the table?

x	−1	0	1	2	3
y	5	7	9	11	13

 Ⓐ $y = 2x + 8$ Ⓒ $y = 2x − 7$
  Ⓑ $y = 3x + 7$ Ⓓ $y = 2x + 7$

37 The heights of 1250 students at a local school were recorded and found to be approximated by the normal curve below. Which answer could represent the mean and standard deviation for these data?

       60   63   66   69   72   75   78
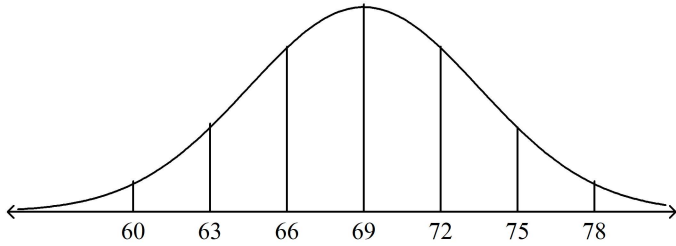
  Ⓐ 69, 3   Ⓒ 72, 4
  Ⓑ 69, 6   Ⓓ 60, 3

38 Use a tree diagram to find the probability that the spinner will land on a consonant both times, if the spinner is spun twice. The spinner is divided into equal parts.

  Ⓐ $\dfrac{7}{18}$ Ⓒ $\dfrac{5}{12}$
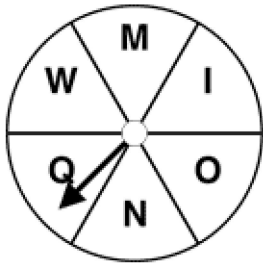
  Ⓑ $\dfrac{13}{36}$ Ⓓ $\dfrac{4}{9}$
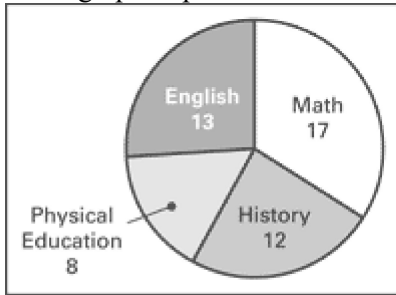
39 A distribution can have more than one:
  Ⓐ mode.
  Ⓑ median.
  Ⓒ mean.
  Ⓓ interquartile range.
  Ⓔ standard deviation.

Short Answer

40 Fifty students were asked what they believe their most important school subject is. Use the results shown in the circle graph to predict the number of students out of 250 that would choose math.

CBE Review Advanced Quantitative Reasoning (AQR) Semester B
Answer Section

MULTIPLE CHOICE

  1 B
  2 A
  3 A
  4 D
  5 A
  6 B
  7 A
  8 C
  9 D
10 A
11 A
12 A
13 A
14 B
15 B
16 C
17 D
18 C
19 C
20 D
21 C
22 D
23 C
24 B
25 D
26 A
27 B
28 D
29 D
30 B
31 A
32 A
33 D
34 B
35 D
36 D
37 A
38 D

39 A

SHORT ANSWER

40 85