Student Name _____

Teacher Name _____

School _____

System _____

Item Sampler

Tennessee End of Course Assessment
Algebra I Form 5

Reporting Category 5:
Data Analysis, Statistics, and Probability

PEARSON

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Algebra I Reference Page

Abbreviations for Geometric Formulas

A = area	d = diameter	r = radius
B = area of base	h = height	s = length of side
b = base	ℓ = length	V = volume
C = circumference	P = perimeter	w = width

Perimeter (P) and Circumference (C)

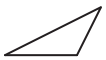
Any Polygon: P = sum of side lengths

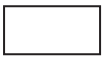
Rectangle: $P = 2\ell + 2w$

Circle: $C = 2\pi r$ or πd

$\pi \approx 3.14$ or $\frac{22}{7}$

Plane Figures — Area (A)

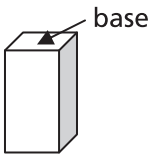
Triangle:  $A = \frac{1}{2}bh$

Rectangle:  $A = \ell w$

Circle: $A = \pi r^2$

$\pi \approx 3.14$ or $\frac{22}{7}$

Solid Figures — Volume (V)

Right Rectangular Prism 

$V = Bh$ or $V = \ell wh$

Cube $V = s^3$

Algebraic Formulas and Equations

$d = rt$ — distance = rate × time

Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

d = distance between two points

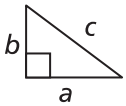
Midpoint Formula: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Slope Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Standard Form of a Linear Equation: $Ax + By = C$

Slope-Intercept Equation: $y = mx + b$

Point-Slope Equation: $y - y_1 = m(x - x_1)$

Pythagorean Theorem: $a^2 + b^2 = c^2$ 

Quadratics

For $ax^2 + bx + c = 0$: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Discriminant: $b^2 - 4ac$

Measurement Conversions

LENGTH

1 foot (ft) = 12 inches (in.)
1 yard (yd) = 3 feet
1 yard = 36 inches
1 mile = 1,760 yards
1 mile = 5,280 feet

CAPACITY

1 cup (c) = 8 fluid ounces (fl oz)
1 pint (pt) = 2 cups
1 quart (qt) = 2 pints
1 quart = 4 cups
1 gallon (gal) = 4 quarts

WEIGHT

1 pound (lb) = 16 ounces (oz)
1 ton (T) = 2,000 pounds

CONVERSION BETWEEN CUSTOMARY AND METRIC MEASUREMENT

1 yard = 0.9144 m
1 foot = 0.3048 m
1 inch = 2.54 cm
1 quart = 0.946 L
1 ounce = 28.35 g
1 lb = 0.45 kg

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Introduction to Algebra I

Content of tests

The testing program titled the *Tennessee End of Course Assessment* was established to meet the Tennessee mandate for end of course assessments in Tennessee secondary schools. These tests measure the Tennessee State Performance Indicators. Subject areas covered by the end of course assessments include Mathematics, Language Arts, History, and Science.

Test development

For the *Tennessee End of Course Assessment*, a staff of writers – composed of both teachers and professional test developers experienced in each of the content areas – researched and wrote the items. Professional editors and content specialists carefully reviewed all items and test directions for content and accuracy. To provide a large pool of items for final test selection, the test developers created approximately twice as many items as were needed in the final editions of the tests.

After tryout tests were administered, student responses were analyzed. Professional content editors and researchers carefully reviewed items, their data, and test directions for content, suitability, and accuracy before including particular items and test directions in operational tests.

Test administration

Tennessee End of Course Assessments are given to students as they near the end of courses that are included in the program. Tests may be given midyear for block schedules or at the end of the school year.

This test contains 65 multiple-choice questions.

You will have ample time to read and answer each of the questions. The Algebra I test has been designed to be administered in one session and is not timed. The first 15 minutes are set aside to complete identifying data on the answer sheet.

Calculator use is optional. Sharing calculators during testing is not permitted.

The following types of calculators/devices may **NOT** be used during the test:

- pocket organizers
- electronic writing pads or input devices
- Some examples of prohibited calculators are:
    - Casio models: CFX-9970G, Algebra FX 2.0
    - Hewlett-Packard models: HP-40G, HP-49G
    - Texas Instruments models: TI-89, TI-92, Voyage 200, TI-NSPIRE – the CAS version (The non-CAS version of TI-NSPIRE is allowable.)
- calculators that can communicate (transfer data or information) wirelessly with other student calculators/devices
- cell phones, PSPs, and/or iPods
- Students may use any four-function, scientific, or graphing calculator does not have any of the above features. The use of units that have a Computer Algebra System (CAS) is NOT allowed.

Tips for Taking the Test

Preparing for the test

- Review this Tennessee End of Course Item Sampler for Algebra I carefully and thoroughly.
- Acquire the Tennessee End of Course Practice Test for Algebra I, and take the test several times.
- Become familiar with the correct way to mark answers on the answer sheet. There is a sample answer sheet in this Practice Test.

Before the test

- Get a good night's sleep. To do your best, you need to be rested.

During the test

- Relax. It is normal to be somewhat nervous before the test. Try to relax and not worry.
- Listen. Listen to and read the test directions carefully. Ask for an explanation of the directions if you do not understand them.
- Plan your time. Do not spend too much time on any one question. If a question seems to take too long, skip it and return to it later. First answer all questions that you are sure about.
- Think. If you are not sure how to answer a question, read it again and try your best to answer the question. Rule out answer choices that you know are incorrect and choose from those that remain.

Directions for Using the Item Sampler

This Item Sampler for Algebra I provides specific information to students and teachers. It contains examples of different item types for each Performance Indicator that may be tested in any given end of course test administration. Performance Indicators have been grouped by Reporting Categories. These Reporting Categories will be used to report information regarding performance on the end of courts test to students, teachers, schools, and systems.

The items in this Item Sampler will not be found in the end of course tests. The number of items in this Item Sampler does not reflect the emphasis of content on the test. In order to identify the emphasis of content, the End of Course Assessment Practice Test for Algebra I should be used. The Practice Test gives a better representation of content emphasis across Reporting Categories and Performance Indicators.

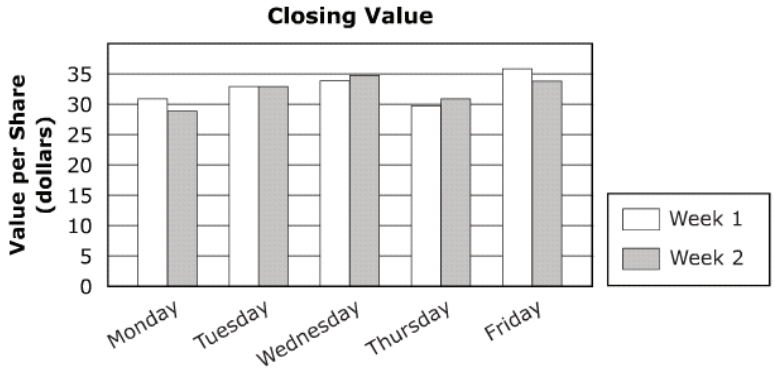
An Answer Key is located in Page 21. Use it to check your answers. Review items that you get wrong.

Reporting Category: Data Analysis, Statistics, and Probability

Numbers 1 through 24

Performance Indicator: 3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).

1. **The graph below shows the closing value of a share of stock each day over a two-week period.**

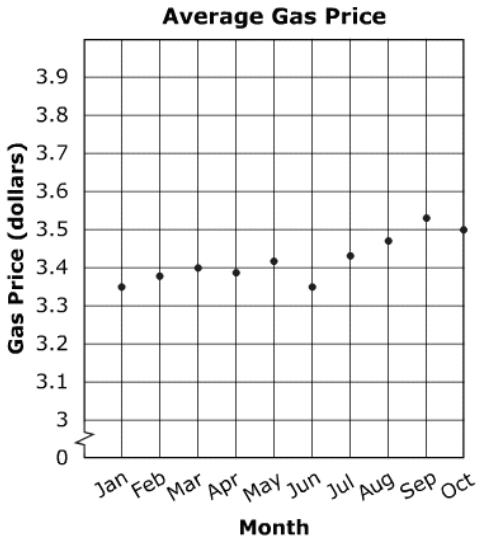


Which statement is true?

- **A** The value per share decreases steadily in the first three days of Week 1 and Week 2.
- **B** The value per share increases steadily in the last three days of Week 1 and Week 2.
- **C** The value per share decreases steadily in the last three days of Week 1 and Week 2.
- **D** The value per share increases steadily in the first three days of Week 1 and Week 2.

Performance Indicator: 3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).

2. **The scatterplot below shows how the average monthly price of gasoline varied with time over a period of ten months.**



If the trend continues, which gas price could be considered an outlier for the month of November?

- **A** $3.95
- **B** $3.65
- **C** $3.45
- **D** $3.25

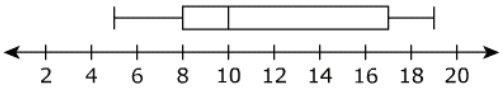
Go On ▶

Performance Indicator: 3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).

3.

The box-and-whisker graph below represents the number of hours spent watching television in a week by 15 students.

Number of Hours Spent Watching Television



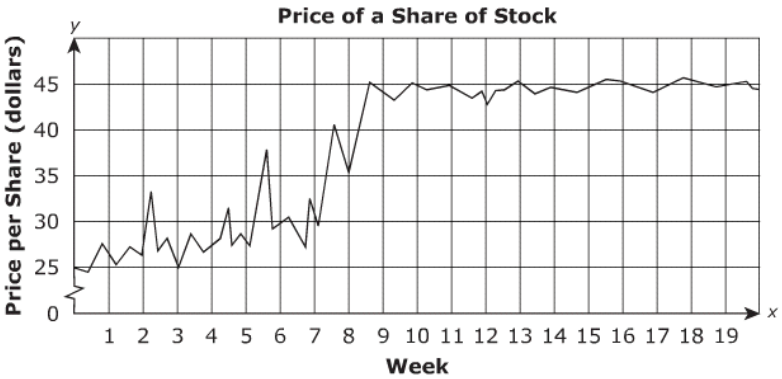
Which statement is <u>best</u> supported by the graph?

- **A** The minimum number of hours spent watching television is 8.
- **B** The maximum number of hours spent watching television is 17.
- **C** The difference between the maximum and minimum number of hours spent watching television is 11.
- **D** The difference between the maximum and minimum number of hours spent watching television is 14.

Performance Indicator: 3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).

4.

The graph below shows the changes in price of a share of stock during a five-month period.



Which statement is true?

- **A** The price decreased over the 19-week period.
- **B** The price increased steadily throughout the 19-week period.
- **C** The price remained fairly constant for the last 10 weeks.
- **D** The price remained fairly constant for the first 10 weeks.

Go On ▶

Performance Indicator: 3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).

5.

The stem-and-leaf plot below represents the number of gold medals won by nine countries during the 2004 Olympic Games.

Number of Gold Medals Won

0	4 4 6 8 9 9
1	1 6
2	
3	5

KEY
1|6 = 16

Which statement is <u>best</u> supported by the stem-and-leaf plot?

- **A** The minimum number of gold medals won by a country is 2.
- **B** The maximum number of gold medals won by a country is 40.
- **C** An outlier in the given data is 4.
- **D** An outlier in the given data is 35.

Performance Indicator: 3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).

6.

The stem-and-leaf plot below shows the number of points scored by 11 players on a basketball team. The points scored by the 12th player are not displayed in the stem-and-leaf plot.

Number of Points Scored

0	4 6 8 9
1	2 3 4 8
2	3 7
3	0

KEY
2|3 = 23

If the points scored by the 12th player can be considered an outlier, which could be the points the 12th player scored?

- **A** 54
- **B** 32
- **C** 27
- **D** 11

Go On ▶

Performance Indicator: 3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.

7.

Lyle found the price of a gallon of milk at 6 grocery stores. He calculated the mean price for a gallon of milk at $2.08. If the price for a gallon of milk is increased by $0.80 at each grocery store, what is the new mean price for a gallon of milk?

- **A** $1.28
- **B** $1.66
- **C** $2.08
- **D** $2.88

Performance Indicator: 3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.

8.

Six students competed in a math contest. The mean of their scores is 93. If the score of one student is reduced by 12, what is the new mean?

- **A** 81
- **B** 91
- **C** 93
- **D** 95

Go On ▶

Performance Indicator: 3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.

9.

For a class assignment, Wang conducted a survey of the ages of the people on his block. The results of his survey are shown below.

$$\{16, 28, 34, 75, 12, 29, 7, 28, 13, 78\}$$

The ages of two more people, who are 25 and 35 years old, are added to this group. What is the effect of these additions on the median?

- **A** The median age increases by 2.
- **B** The median age decreases by 2.
- **C** The median age decreases by 2.5.
- **D** The median age does not change.

Performance Indicator: 3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.

10.

Katherine competes in gymnastics tournaments. Her last 7 scores on the balance beam are listed below.

$$\{8.4, 7.8, 8.5, 7.6, 8.1, 8.3, 8.6\}$$

If her minimum and maximum scores are <u>not</u> considered, which statement is true?

- **A** The median score will increase by 0.1.
- **B** The median score will increase by 0.2.
- **C** The median score will increase by 0.5.
- **D** The median score will not change.

Performance Indicator: 3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.

11. **The mode of a set of 10 numbers is 38. Each number in the set is increased by 2. What is the mode of the new set of numbers?**

- **A** 38
- **B** 40
- **C** 58
- **D** 76

Performance Indicator: 3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.

12. **The data set given below shows the durations of telephone calls in minutes.**

$$\{12, 18, 4, 8, 6, 11, 10, 3\}$$

If the duration of each call is increased by 2 minutes, what is the effect on the range?

- **A** The range is doubled.
- **B** The range increases by 2.
- **C** The range decreases by 2.
- **D** The range does not change.

Go On ▶

Performance Indicator: 3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.

13.

A range in speed of 25 miles per hour is allowed on a highway. If the maximum speed allowed is reduced by 5 miles per hour with no change in the minimum speed, what is the new range of speed allowed on the highway?

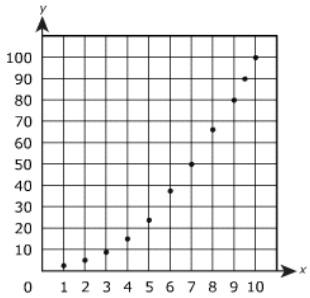
- **A** 15 miles per hour
- **B** 20 miles per hour
- **C** 25 miles per hour
- **D** 30 miles per hour

Performance Indicator: 3102.5.3 Using a scatterplot, determine if a linear relationship exists and describe the association between variables.

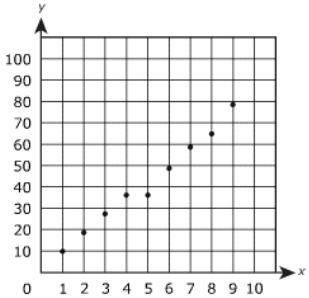
14.

Which scatterplot <u>best</u> shows a linear relationship between variables *x* and *y* ?

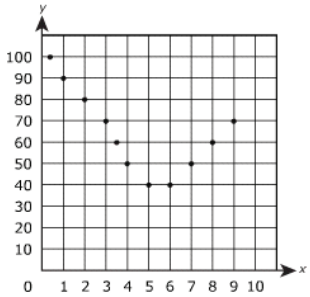
A



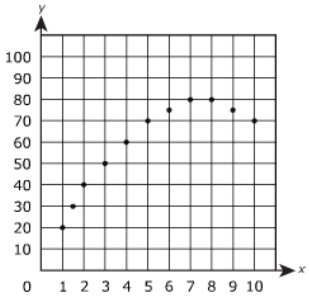
C



B



D

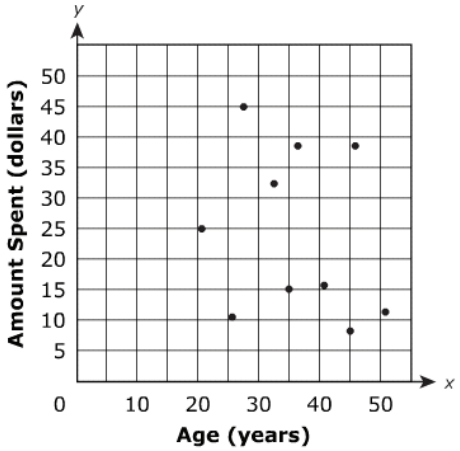


Go On ▶

Performance Indicator: 3102.5.3 Using a scatterplot, determine if a linear relationship exists and describe the association between variables.

15. **Ms. Thomas recorded the ages of 12 customers at her convenience store and the amounts of money they spent while shopping there. She made the scatterplot shown below.**

Customer Age Versus Amount Spent



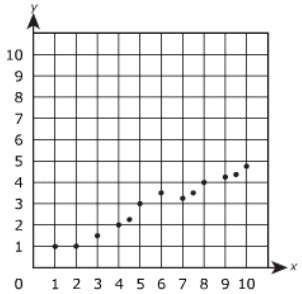
Which statement best describes the correlation between the ages of the customers and the money they spent?

- A positive correlation
- B negative correlation
- C steady correlation
- D no correlation

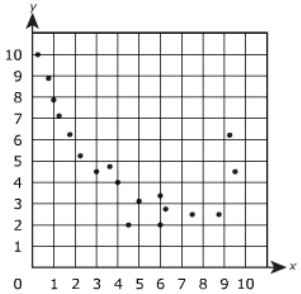
Performance Indicator: 3102.5.3 Using a scatterplot, determine if a linear relationship exists and describe the association between variables.

16. **Which scatterplot shows a strong negative linear relationship between variables *x* and *y* ?**

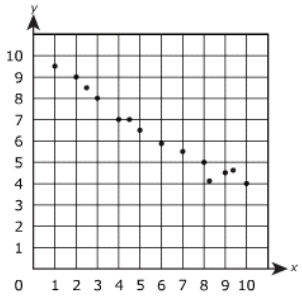
A



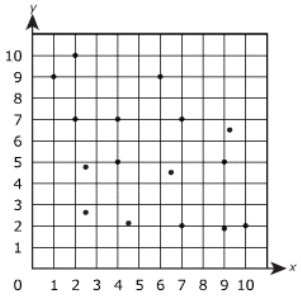
C



B



D

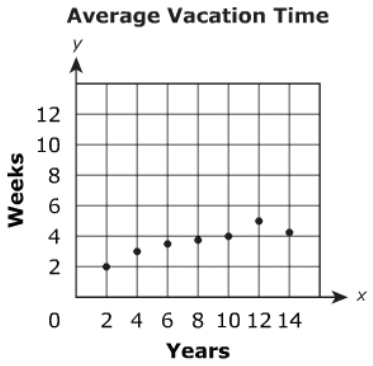


Go On ▶

Performance Indicator: 3102.5.3 Using a scatterplot, determine if a linear relationship exists and describe the association between variables.

17.

Joan is gathering information about the average vacation time for employees in a company each year from 1992 to 2006. The scatterplot below shows the results for every other year, where *x* represents the number of years since 1992, and *y* represents the average number of weeks that the employees were on vacation.



What type of linear relationship does the data show?

- **A** strong positive
- **B** weak positive
- **C** strong negative
- **D** weak negative

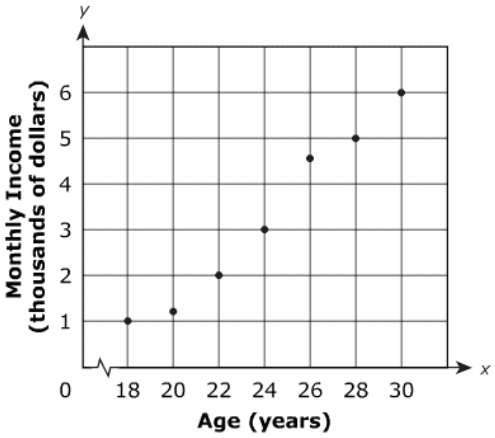
Performance Indicator: 3102.5.4 Generate the equation of a line that fits linear data and use it to make a prediction.

18.

The graph below shows how Daniel's monthly income increases as he grows older.

Daniel's Monthly Income

Age (years)	Monthly Income (thousands of dollars)
18	1
20	1.2
22	2
24	3
26	4.6
28	5
30	6



If the trend continues, what is the <u>best</u> prediction of Daniel's monthly income at age 34?

- **A** $6,800
- **B** $7,000
- **C** $7,800
- **D** $8,000

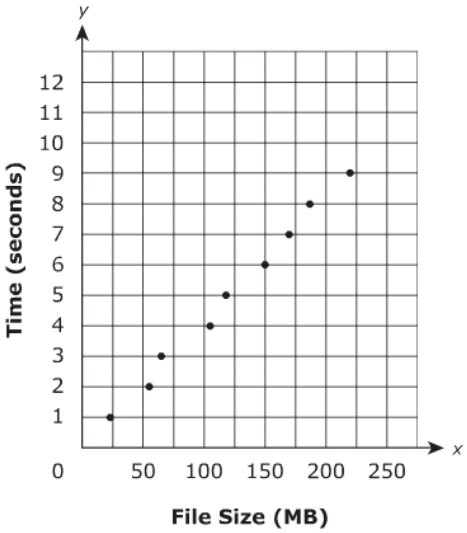
Go On ▶

Performance Indicator: 3102.5.4 Generate the equation of a line that fits linear data and use it to make a prediction.

19. **The scatterplot below shows the time it takes a virus detection program to scan computer files of different sizes.**

Time to Scan Computer Files

File Size (MB)	Time (seconds)
23	1
55	2
65	3
105	4
118	5
150	6
170	7
187	8
220	9



If the trend continues, to the nearest 25 megabytes (MB), what size file could be scanned in 13 seconds?

- **A** 250 MB
- **B** 275 MB
- **C** 325 MB
- **D** 400 MB

Performance Indicator: 3102.5.4 Generate the equation of a line that fits linear data and use it to make a prediction.

20. **The table below shows the number of alternative-fueled vehicles in use for a 5-year period.**

Alternative-Fueled Vehicles in Use

Year	Number of Alternative-Fueled Vehicles in Use
1	533,999
2	565,492
3	592,125
4	634,562
5	695,766

If the trend continues, which is the <u>best</u> prediction for the number of alternative-fueled vehicles that will be in use in year 8?

- **A** 722,170
- **B** 761,430
- **C** 800,691
- **D** 839,951

Go On ▶

Performance Indicator: 3102.5.5 Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.

21. **The table below shows the number of bottles of flavored drinks in a refrigerator.**

Drink Flavor	Number of Bottles
Berry Blast	8
Fruit Punch	12
Lemon Lime	15
Great Grape	6
Optimum Orange	9

Derek randomly picked one flavor from the refrigerator. What is the probability that he picked a Lemon Lime or an Optimum Orange?

- **A** 0.48
- **B** 0.30
- **C** 0.18
- **D** 0.12

Performance Indicator: 3102.5.5 Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.

22. **Ted performed an experiment using a single number cube with sides numbered 1 through 6. He rolled the number cube 30 times. He recorded the results in the table below.**

Number Cube Outcomes

Outcome	Number of Times Rolled
1	5
2	8
3	6
4	4
5	2
6	5

Based on Ted's results, what is the experimental probability of rolling a 3?

- **A** $\frac{1}{2}$
- **B** $\frac{1}{4}$
- **C** $\frac{1}{5}$
- **D** $\frac{1}{30}$

Go On ▶

Performance Indicator: 3102.5.5 Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.

23.

Jasmine has 2 red T-shirts, 3 pink T-shirts, and 4 blue T-shirts. She randomly picks one T-shirt. What is the probability that she picks a red T-shirt?

- **A** $\frac{1}{9}$
- **B** $\frac{2}{9}$
- **C** $\frac{2}{7}$
- **D** $\frac{1}{2}$

Performance Indicator: 3102.5.5 Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.

24.

A spinner has 4 equal-sized colored sections. The table below shows the results of spinning the spinner 50 times.

Spinner Outcomes

Outcome	Number of Spins
Red	15
Blue	12
Green	10
Yellow	13

Based on these results, what is the experimental probability of the spinner landing on blue?

- **A** $\frac{19}{25}$
- **B** $\frac{6}{19}$
- **C** $\frac{6}{25}$
- **D** $\frac{1}{12}$

Reporting Category 5: Data Analysis, Statistics, and Probability		
Item Number	**Correct Answer**	**Performance Indicator**
1	D	3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).
2	A	3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).
3	D	3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).
4	C	3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).
5	D	3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).
6	A	3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).
7	D	3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.
8	B	3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.
9	D	3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.
10	A	3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.
11	B	3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.
12	D	3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.

13	B	3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.
14	C	3102.5.3 Using a scatterplot, determine if a linear relationship exists and describe the association between variables.
15	D	3102.5.3 Using a scatterplot, determine if a linear relationship exists and describe the association between variables.
16	B	3102.5.3 Using a scatterplot, determine if a linear relationship exists and describe the association between variables.
17	A	3102.5.3 Using a scatterplot, determine if a linear relationship exists and describe the association between variables.
18	C	3102.5.4 Generate the equation of a line that fits linear data and use it to make a prediction.
19	C	3102.5.4 Generate the equation of a line that fits linear data and use it to make a prediction.
20	C	3102.5.4 Generate the equation of a line that fits linear data and use it to make a prediction.
21	A	3102.5.5 Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.
22	C	3102.5.5 Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.
23	B	3102.5.5 Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.
24	C	3102.5.5 Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.