R

Grade 8

Form R

North Carolina

End-of-Grade Tests–Grade 8

Mathematics—Calculator Active

Public Schools of North Carolina
www.ncpublicschools.org
State Board of Education
Department of Public Instruction
Division of Accountability Services/North Carolina Testing Program
Raleigh, North Carolina 27699-6314

1. Which is the largest value?

    A $6\sqrt{2}$

    B $4\sqrt{3}$

    C $3\sqrt{5}$

    D $2\sqrt{10}$

2. What is the ***approximate*** length of the diagonal of a square if the perimeter of the square is 12 ft?

    A   1.7 ft

    B   3.5 ft

    C   4.2 ft

    D   12.7 ft

3. Which set of real numbers contains only rational numbers?

    A $\left\{ \sqrt{121},\ \sqrt{196},\ \sqrt{24},\ 12 \right\}$

    B $\left\{ \sqrt{144},\ \frac{13}{2},\ \frac{5}{3},\ \sqrt{10} \right\}$

    C $\left\{ \sqrt{169},\ \frac{5}{2},\ \sqrt{121},\ \frac{14}{4} \right\}$

    D $\left\{ \sqrt{169},\ \frac{58}{3},\ \frac{13}{2},\ \sqrt{31} \right\}$

4. A 70-foot tree has a 35-foot shadow. If the building next to the tree has an 80-foot shadow, how tall is the building?

    A   160 feet

    B   120 feet

    C   115 feet

    D   40 feet

5. Ralph's garden is in the shape of a square. How does the area of the garden change if he doubles the length of each side of the garden?

    A   The area is halved.

    B   The area is doubled.

    C   The area is tripled.

    D   The area is quadrupled.

6. Constance bought a box to hold her jelly beans. The dimensions of the box are 6 inches by 2 inches by 1 inch. The jelly beans weigh a total of 36 ounces. If each cubic inch inside the box can hold two ounces, how many ounces of jelly beans will have to be left out of the box?

    A   24

    B   18

    C   12

    D   6

7.	In the figure shown below, $\triangle A'B'C'$ is the image produced by applying a dilation to $\triangle ABC$.
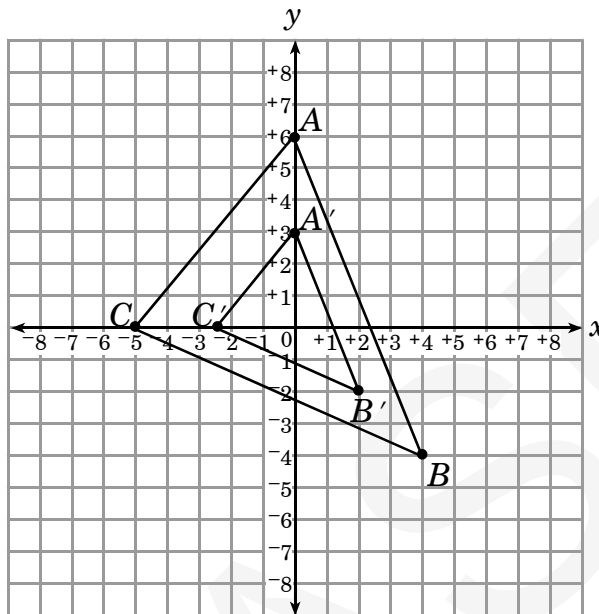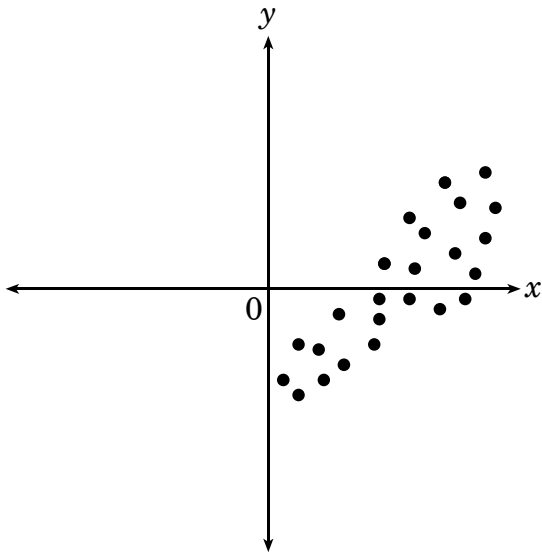

What is the scale factor for this dilation?

A	$\frac{1}{3}$

B	$\frac{2}{5}$

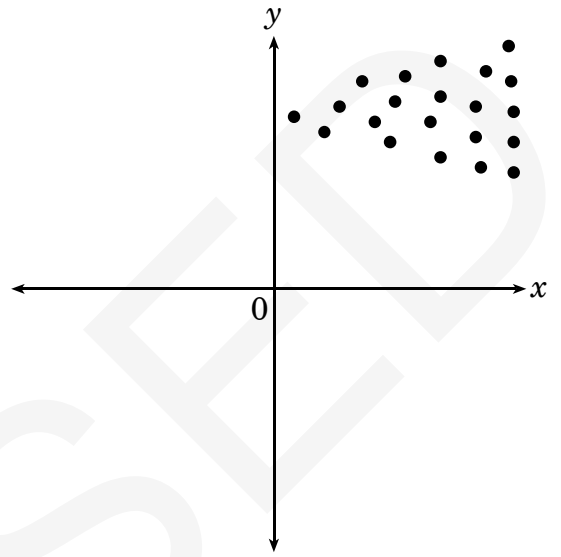C	$\frac{1}{2}$

D	$\frac{5}{2}$

Go to next page

8.   Which scatterplot shows a positive correlation between the variables?
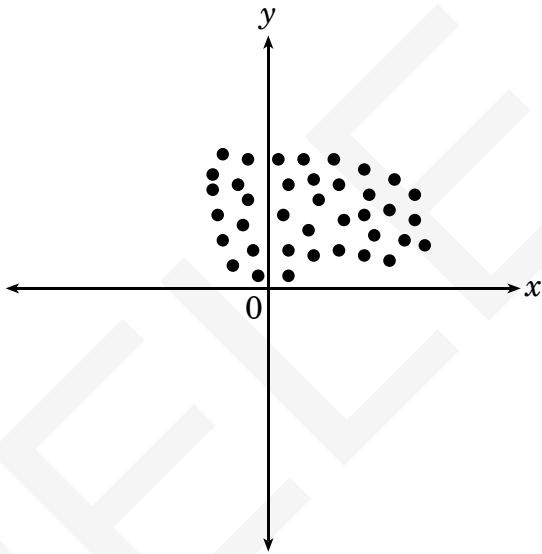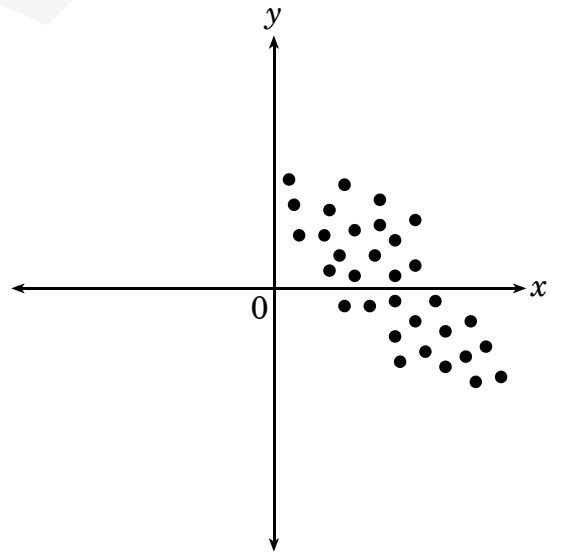
A

B

C

D

9.   The direct route from Marta's apartment to work is a road that is a straight line. The road is closed for repairs. Marta had to drive 8 miles west and then 6 miles south to get to work. She returned home by the same route. How many miles would she have saved round-trip if she had taken the direct route?

A   2

B   8

C   10

D   24

10.   Harold took a survey on America's favorite movies by asking 50 students at his school to complete the survey. Which is the **best** reason why his survey may be flawed?

A   The students were not old enough to take a survey.

B   Some students are not American citizens.

C   The students may include people who do not go to the movies.

D   Harold is not getting a diverse representation from the American population.

11.   The data displayed represent what type of correlation?
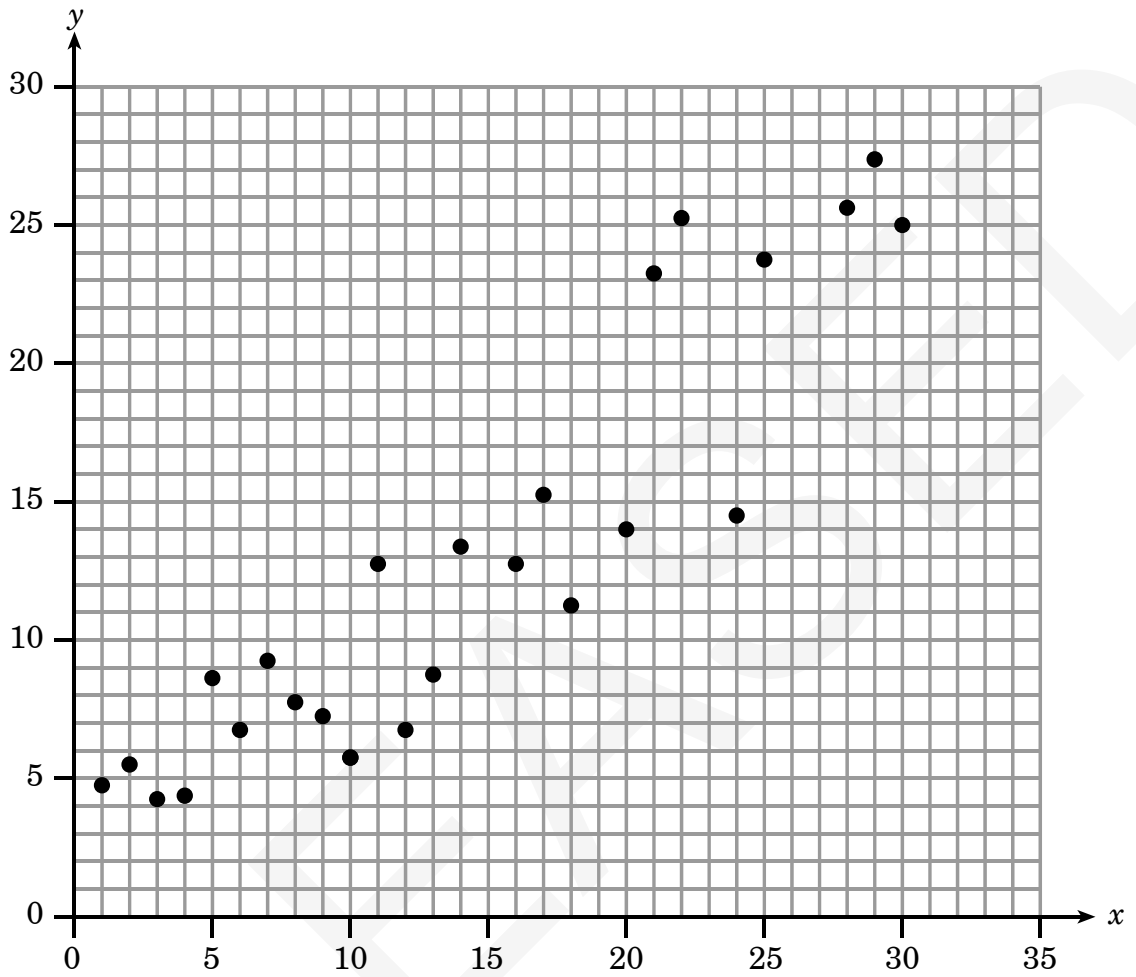
A   a positive correlation where the *y* values are exactly predicted by the line of best fit

B   a negative correlation where the *y* values are exactly predicted by the line of best fit

C   a positive correlation where the *y* values are approximately predicted by the line of best fit

D   a negative correlation where the *y* values are approximately predicted by the line of best fit

12.   The Smiths made a scatterplot comparing their daily electricity costs to the outside
       temperature.

Smith Family Electricity Costs
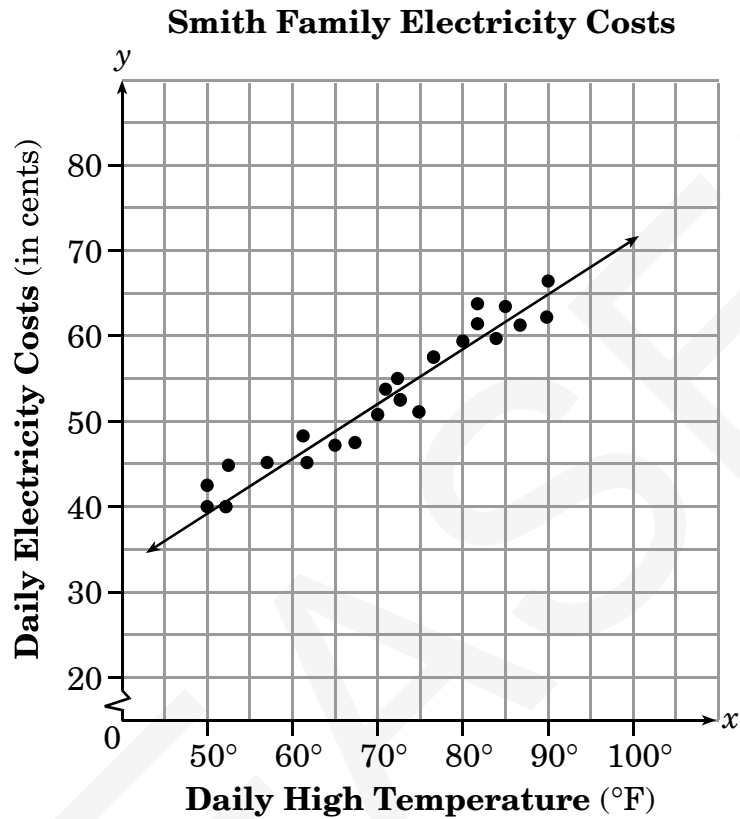
If the high temperature on a day is 95°, ***about*** how much will their cost for electricity be
on that day?

A $0.95

B $0.70

C $0.67

D $0.64

NCDPI

North Carolina Test of Mathematics. Grade 8 Form R RELEASED Fall 2009

13. Which data will **most likely** show a negative correlation when graphed on a scatterplot?

   A   the outside temperature and the number of people wearing gloves

   B   the distance a student lives from school and the amount of time it takes to get to school

   C   the number of visitors at an amusement park and the length of the lines for the rides

   D   a student's height and grade point average

14. Hector's math test grades for the final quarter are 89, 93, 100, 98, and 95. He has one more test to take this quarter. All tests count equally. What is the minimum grade Hector must make on the last test in order to obtain an average of at least 93?

   A   78

   B   79

   C   83

   D   95

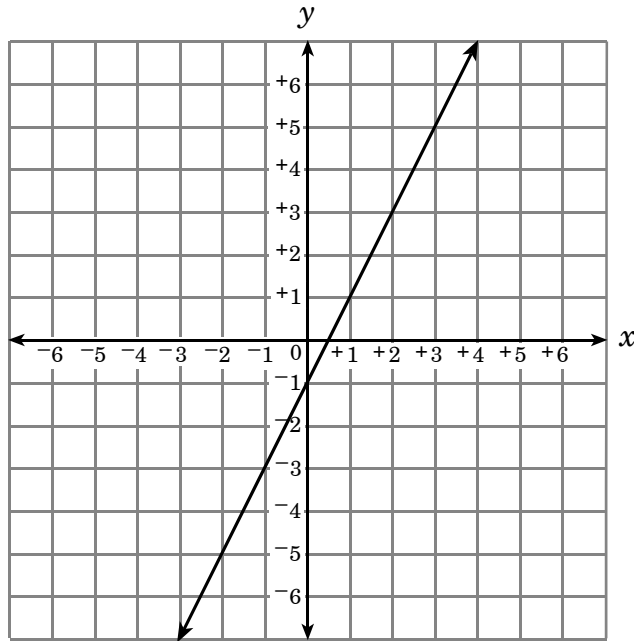15. Solve for b:

   $$3b^3 = 81$$

   A   9

   B   6.2

   C   3

   D   1.4

16. Which statement **best** describes the similarities of the graphs $2y = 5x + \frac{6}{7}$ and $2y = 3x + \frac{6}{7}$?

   A   The y-intercepts are the same.

   B   The slopes are the same.

   C   The x-intercepts are the same.

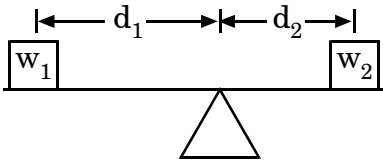   D   The graphs are identical.

17.   What is the slope of the line graphed below?

A   ⁻2

B $\frac{^-1}{2}$

C   1

D   2

NCDPI

North Carolina Test of Mathematics. Grade 8 Form R RELEASED Fall 2009

18. The equation for a balanced seesaw is $w_1 d_1 = w_2 d_2$. As shown in the figure below, w_1 and w_2 are weights, and d_2 and d_1 are distances from the balance point.

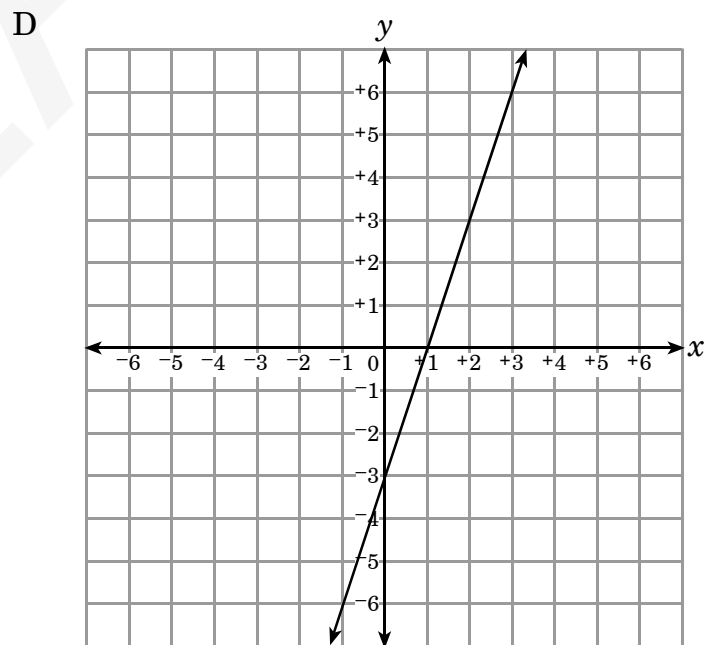If $w_1 = 50$ pounds , $d_1 = 5$ feet , and $w_2 = 100$ pounds , what value of d_2 would balance the seesaw?
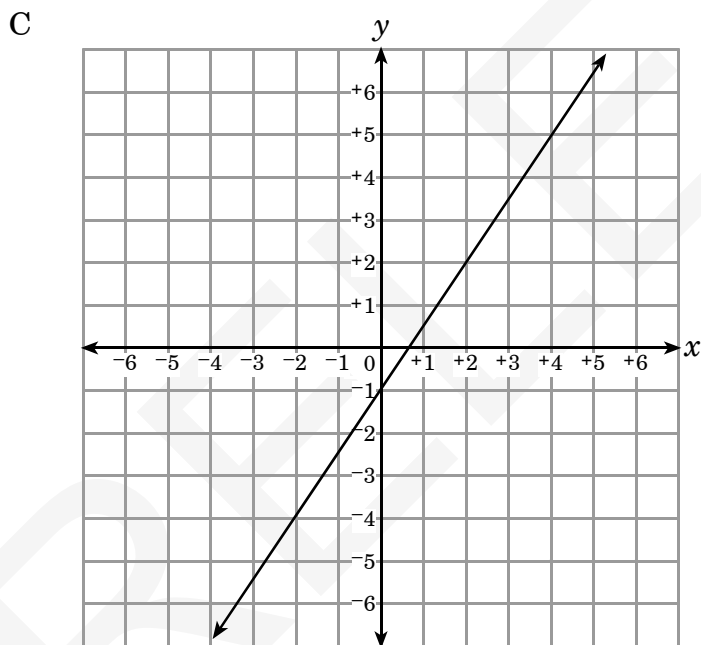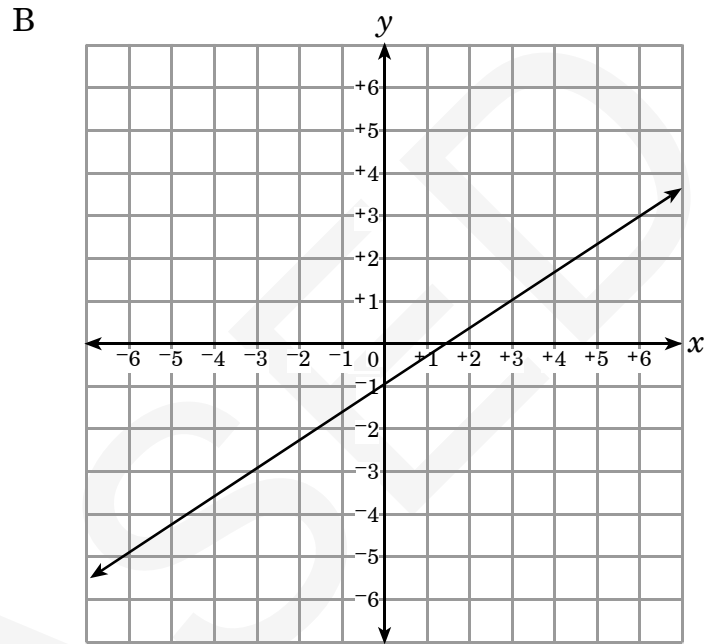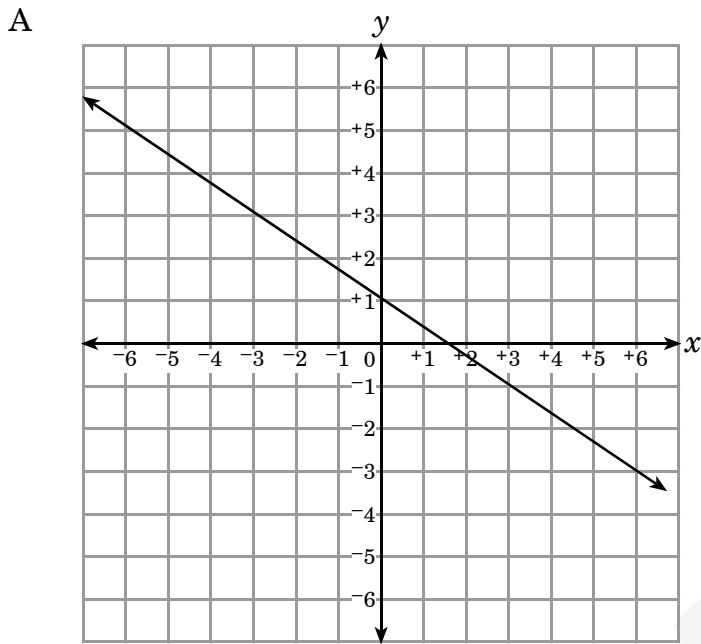
A   2.5 feet

B   5.0 feet

C   7.5 feet

D   10.0 feet

19. A line has a slope of $-\dfrac{2}{3}$ and a y-intercept of $^-10$. Which is an equation of the line?

A $2x - 3y = {}^-30$

B $2x - 3y = {}^-10$

C $2x + 3y = 10$

D $2x + 3y = {}^-30$

20. Which is the correct graph for $3y = 2x - 3$?

A

B

C

D

21. Mary's fish tank can hold $11\sqrt{2}$ gallons of water. Which is the greatest number of gallons of water it can hold without overflowing?

A 22

B 15

C 9

D 5

22. Which choice lists the lengths in order from least to greatest?

A $\frac{1}{3}$ ft, 0.25 ft, 2 ft, $\sqrt{8}$ ft

B 0.25 ft, $\frac{1}{3}$ ft, $\sqrt{8}$ ft, 2 ft

C 0.25 ft, $\frac{1}{3}$ ft, 2 ft, $\sqrt{8}$ ft

D 2 ft, 0.25 ft, $\frac{1}{3}$ ft, $\sqrt{8}$ ft

23. The two legs of a right triangle have lengths 5 and 7. Which term *best* describes the length of the hypotenuse?

A an irrational number less than 9

B an irrational number greater than 9

C a rational number less than 9

D a rational number greater than 9

24. If three is added to both the length and width of the rectangle, what will happen to the area?

5 in.

2 in.
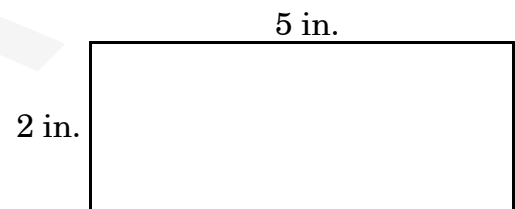
A The area will be four times the original area.

B The area will be three times the original area.

C The area will be 12 sq in. more than the original area.

D The area will be 4 sq in. more than the original area.

NCDPI

North Carolina Test of Mathematics. Grade 8 Form R RELEASED Fall 2009

25.   Joe wanted to know the distance across a river. He made a drawing with two similar triangles, as shown below.

2.0 cm

6.4 cm

5.0 m

x
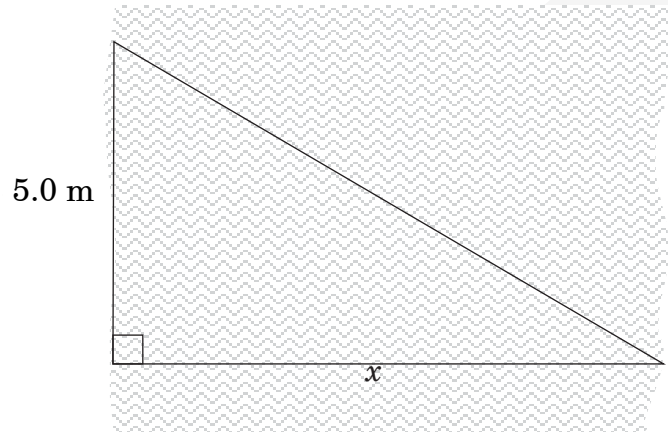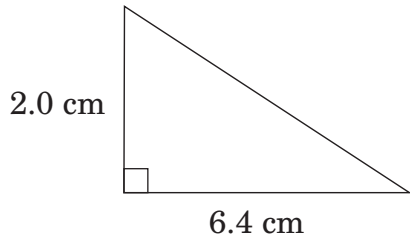
What is the distance across the river, x?

A   1.6 m

B   9.4 m

C   16.0 m

D   25.6 m

26. A square tile has an area of 110 square centimeters. Which is the **best** estimate of the length of one side?

A   10.0 centimeters

B   10.5 centimeters

C   11.0 centimeters

D   11.5 centimeters

27. The vertices of a rectangle are $(0,0), (0,4), (2,4), (2,0)$. Which of the following points is a vertex for the image produced by a dilation with a scale factor of $\frac{1}{2}$?

A $(0,3)$

B $(0,2)$

C $(0,1)$

D $(2,1)$

28.   Kendra has a rectangular poster board with dimensions of 10 ft by 4 ft. She would like to cut this poster board into 6 pieces, so she can construct a box.
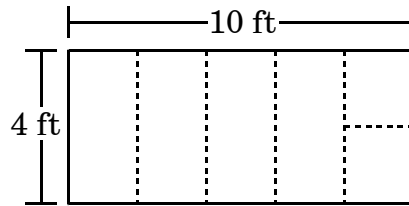
If she uses the indicated cutting guides, what will be the dimensions of her box?

A $2 \text{ ft} \times 2 \text{ ft} \times 4 \text{ ft}$

B $4 \text{ ft} \times 4 \text{ ft} \times 2 \text{ ft}$

C $5 \text{ ft} \times 2 \text{ ft} \times 1 \text{ ft}$

D $10 \text{ ft} \times 4 \text{ ft} \times 1 \text{ ft}$

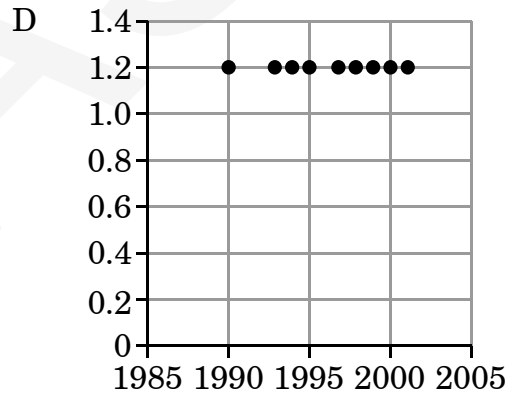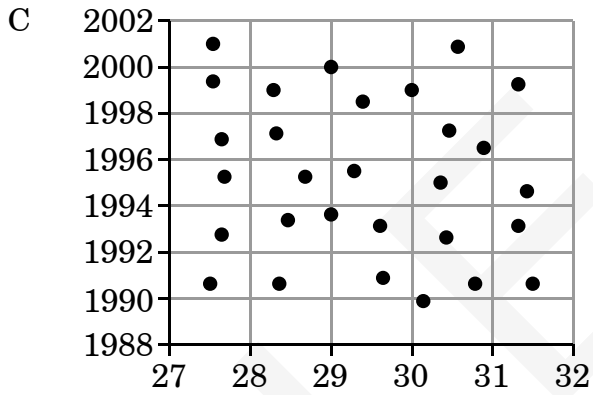29. Which scatterplot displays a negative correlation?

A

B

C

D
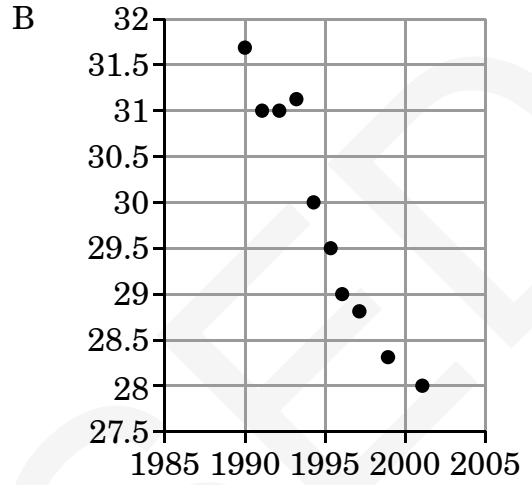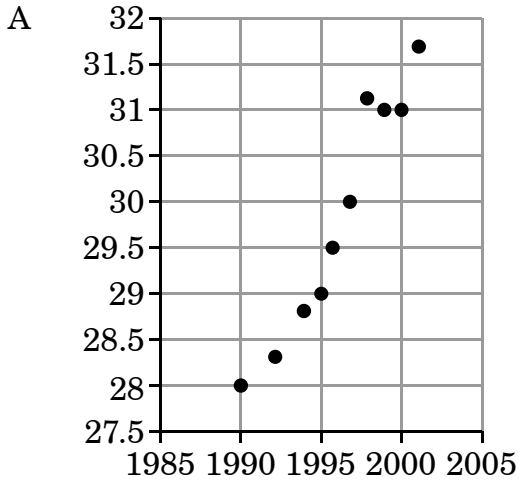
30. Which suggestion would result in an unbiased sample that would ***best*** represent the favorite books of the whole eighth-grade class?

   A Ask five randomly chosen students from each class in the eighth grade.

   B Ask eighth-grade girls.

   C Ask randomly chosen eighth-grade students who play sports.

   D Ask students in the library after school.

31. This scatterplot could show the relationship between which two variables?
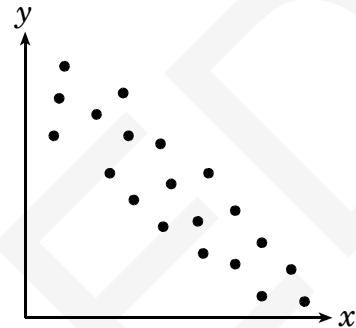
   A speed of an airplane (x) vs. distance traveled in one hour (y)

   B outside air temperature (x) vs. air conditioning costs (y)

   C age of an adult (x) vs. height of an adult (y)

   D distance traveled (x) vs. gas remaining in the tank (y)

32. According to the pattern established in the scatterplot, what *y*-value would correspond to an *x*-value of 11?
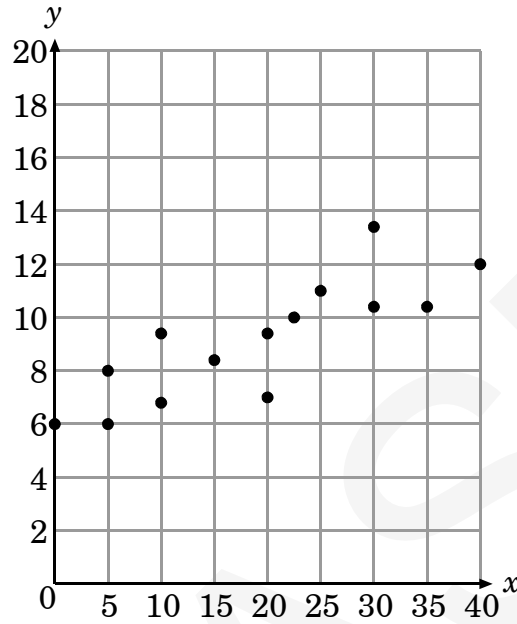
A   32

B   25

C   15

D   8

33.   Bill collected and plotted data concerning gestation and longevity for a science project.

Animal Gestation vs. Longevity
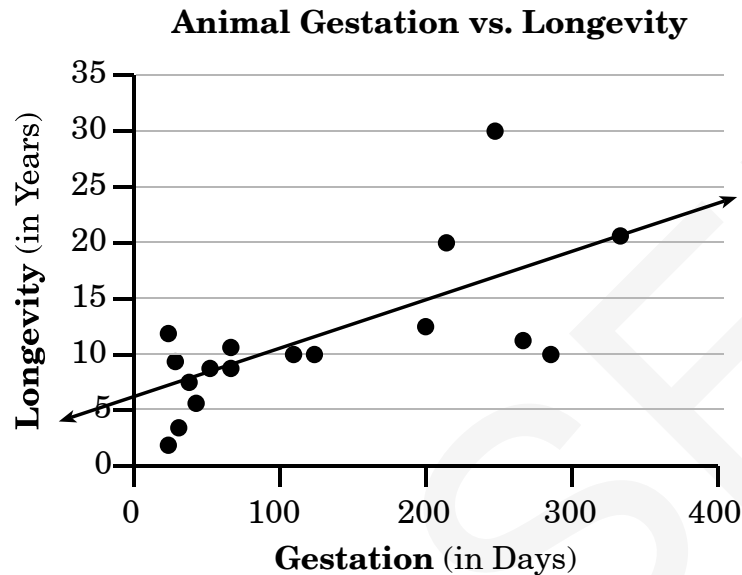
Based on the line of best fit shown, **about** how long would an animal be expected to live if its gestation period is 300 days?

A   10 years

B   12 years

C   20 years

D   22 years

34.   A rental company charges a flat fee of $50 to rent a jet ski. In addition, renters must pay $17.50 per hour of ski use. Which equation correctly represents the total cost, c, to rent a jet ski for h hours?

A $c = 50.00h + 17.50$

B $c = 17.50h + 50.00$

C $c = 32.5h$

D $c = 67.5h$

35. Heather recorded the 7 a.m. temperature at her house the first five days of four different months. Which data are nonlinear?

A   **January**

Day	°F
1	⁻1
2	4
3	9
4	14
5	19

B   **February**

Day	°F
1	31
2	29
3	27
4	25
5	23

C   **March**

Day	°F
1	41
2	51
3	46
4	51
5	53

D   **April**

Day	°F
1	53
2	57
3	61
4	65
5	69

NCDPI

North Carolina Test of Mathematics. Grade 8 Form R RELEASED Fall 2009

36. Which line has a slope of $\frac{1}{2}$ and passes through the point $(2, 3)$?

A

B

C

D

NCDPI

North Carolina Test of Mathematics. Grade 8 Form R RELEASED Fall 2009
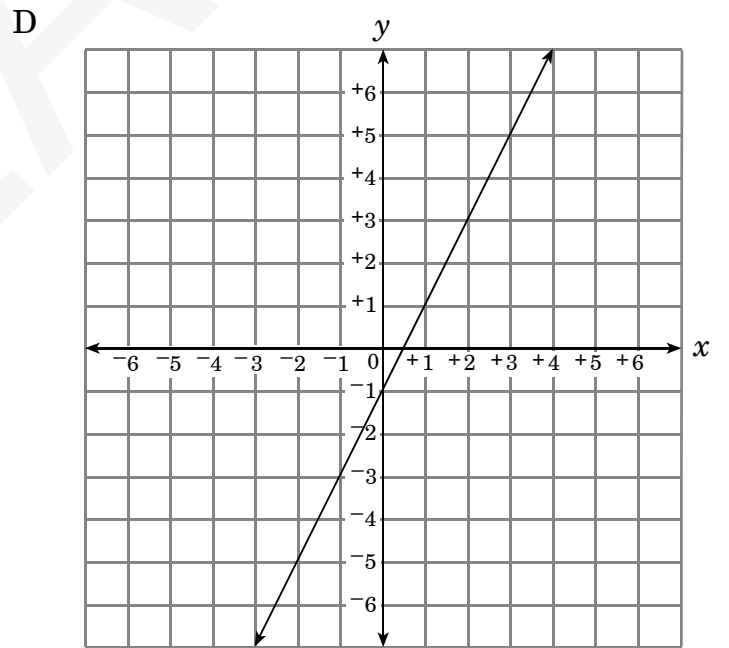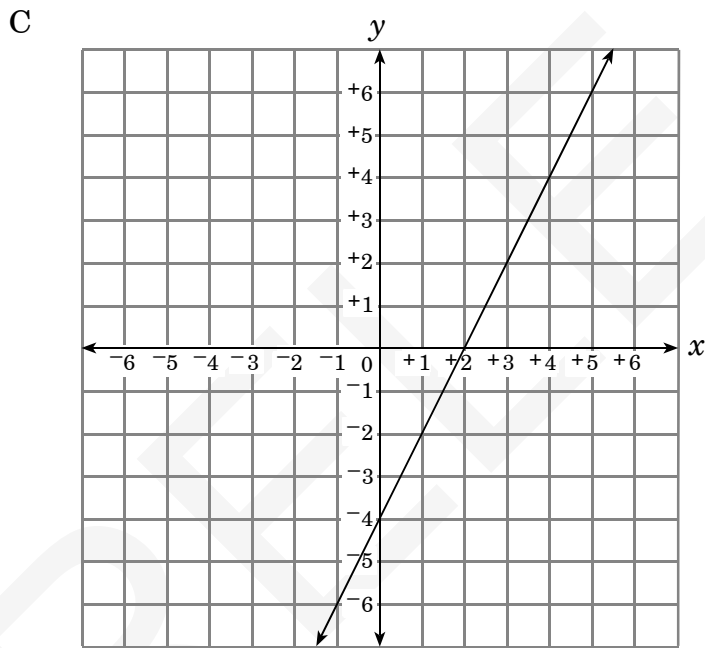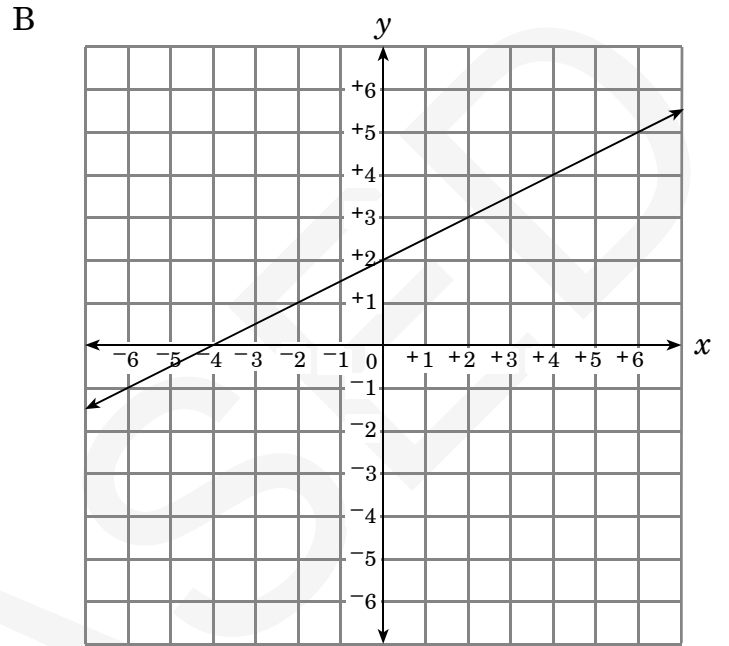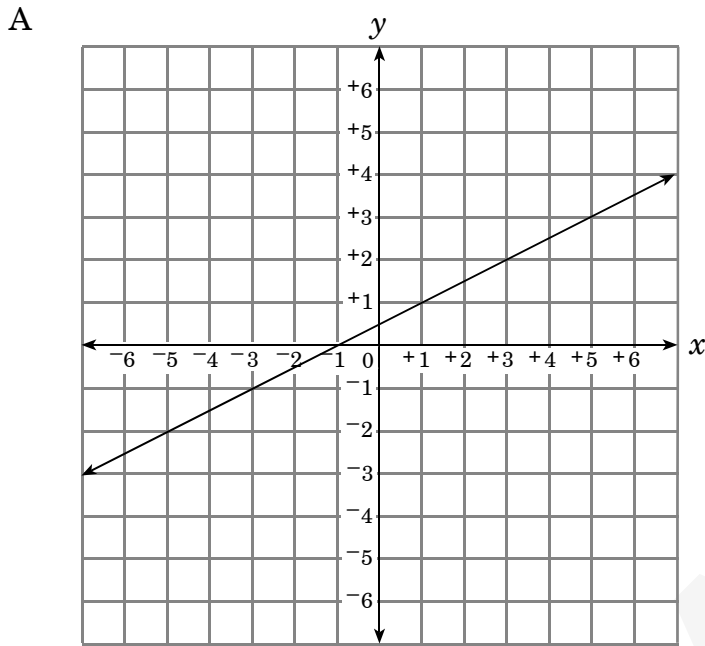
37. What is the equation of the line that contains the point $\left(\frac{1}{2}, {}^-3\right)$ and has a slope of $^-3$?

A $y = {}^-3x - \frac{3}{2}$

B $y = {}^-3x - \frac{17}{2}$

C $y = {}^-3x + \frac{3}{2}$

D $y = {}^-3x + \frac{17}{2}$

38. A cube has a volume of 24 cubic units. What is the *approximate* length of each side of the cube?

A   8 units

B   4.9 units

C   2.9 units

D   2 units

39. The equation $y = \frac{9}{5}x + 32$ can be used to find Fahrenheit temperature (y) when given Celsius temperature (x). If this equation were graphed in a coordinate plane, what would be the x- and y-intercepts?

A x-intercept $= (32, 0)$; y-intercept $= \left(0, \frac{^-160}{9}\right)$

B x-intercept $= (0, 32)$; y-intercept $= \left(\frac{^-160}{9}, 0\right)$

C x-intercept $= \left(0, \frac{^-160}{9}\right)$; y-intercept $= (32, 0)$

D x-intercept $= \left(\frac{^-160}{9}, 0\right)$; y-intercept $= (0, 32)$

40. A truck rental company charges $20 plus 9 cents per mile. Joe's friend offers to rent Joe his truck for $35 and won't charge him mileage. What is the minimum number of miles Joe has to drive to save money using his friend's truck?

A   17

B   55

C   121

D   167

41. What is the order of the numbers from least to greatest?

$$\sqrt{2}, \sqrt[3]{16}, \frac{15}{7}, 1.6$$

A $1.6, \sqrt{2}, \sqrt[3]{16}, \frac{15}{7}$

B $\sqrt{2}, 1.6, \frac{15}{7}, \sqrt[3]{16}$

C $1.6, \sqrt{2}, \frac{15}{7}, \sqrt[3]{16}$

D $\sqrt{2}, \sqrt[3]{16}, \frac{15}{7}, 1.6$

42. The formula $s = 20\sqrt{273 + T}$ gives an estimate for the speed (s) of sound in meters per second when the air temperature is $T°$C. **About** how fast is the speed of sound when the temperature is ⁻5°C?

A   268 m/s

B   278 m/s

C   327 m/s

D   333 m/s

43. The solution to an inequality is $x \geq 5$. Which number is included in that solution?

A $\sqrt{10}$

B $\sqrt{30}$

C $2\sqrt{5}$

D $3\sqrt{2}$

44. What is the perimeter of a triangle whose dimensions are three times the size of $\triangle PQR$?
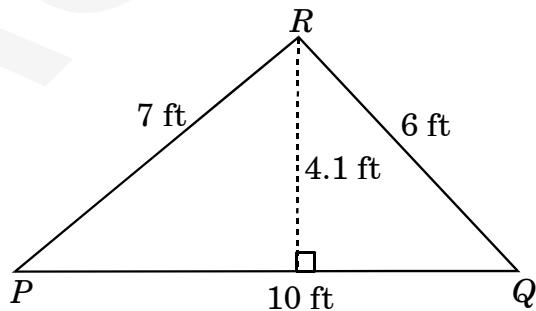
A   23 ft

B   27.1 ft

C   69 ft

D   81.3 ft

45. A tree has a shadow 12 feet long. At the same time, John, who is five feet tall, has a shadow 4 feet long. If Sherry wants to find the height of the tree, which proportion should she use?

A $\dfrac{x}{4} = \dfrac{5}{12}$

B $\dfrac{x}{5} = \dfrac{8}{4}$

C $\dfrac{x}{8} = \dfrac{5}{4}$

D $\dfrac{x}{12} = \dfrac{5}{4}$

46. Triangle ABC has vertices at A (2, 2), B (2, 7), and C (6, 3). This triangle is dilated by a scale factor of 3. What is the location of point C'?

A   (2, 1)

B   (6, 6)

C   (6, 21)

D   (18, 9)

47. The diagonal of a square television screen measures 27 inches. What is the **approximate** length of the screen?

A   13 in.

B   15 in.

C   19 in.

D   21 in.

48. The coffee can below is $\dfrac{3}{4}$ full.
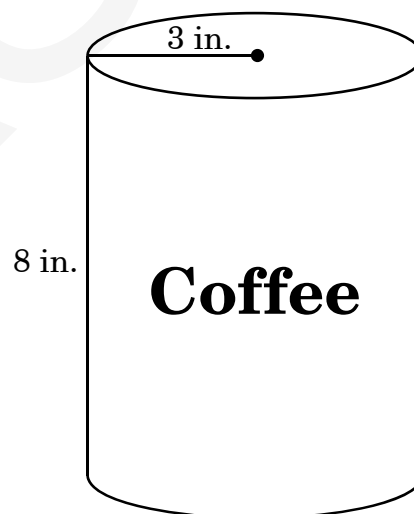
How much coffee is in the can?

A   about 57 in.^{3}

B   about 130 in.^{3}

C   about 170 in.^{3}

D   about 226 in.^{3}

NCDPI

North Carolina Test of Mathematics. Grade 8 Form R RELEASED Fall 2009

49. Each point on the graph represents the relationship between the number of pencils in a package and how much the package costs.
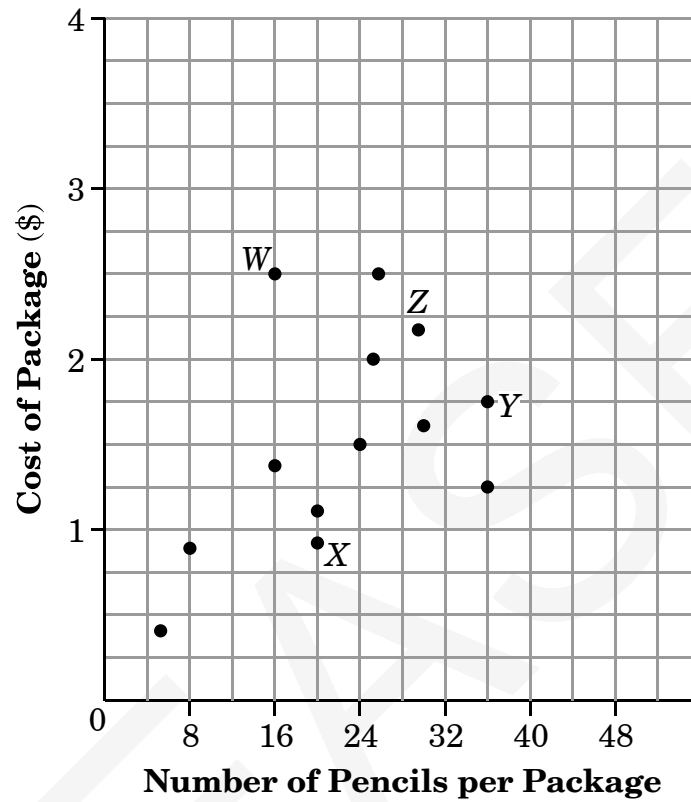
Which package has the highest cost for each pencil?

A   *W*

B   *X*

C   *Y*

D   *Z*

NCDPI

North Carolina Test of Mathematics. Grade 8 Form R RELEASED Fall 2009

50.   Charles researched the price of video games over the last decade.

Video Game Prices

Based on the data shown, what would be the projected price of a video game in 2005?

A $9.50

B $15.50

C $18.00

D $19.50

51.   Mr. Larson's first math test resulted in the following grades:

21, 23, 35, 43, 46, 50, 53, 59,
62, 66, 66, 66, 67, 75, 89, 95

A passing grade is anything above a 60. Mr. Larson says the central tendency for the class was to fail the test. Which statistical measure supports his claim?

A   mode

B   median

C   upper quartile

D   mean

52.   Kevin made a scatterplot of noon temperatures for a two-week period.
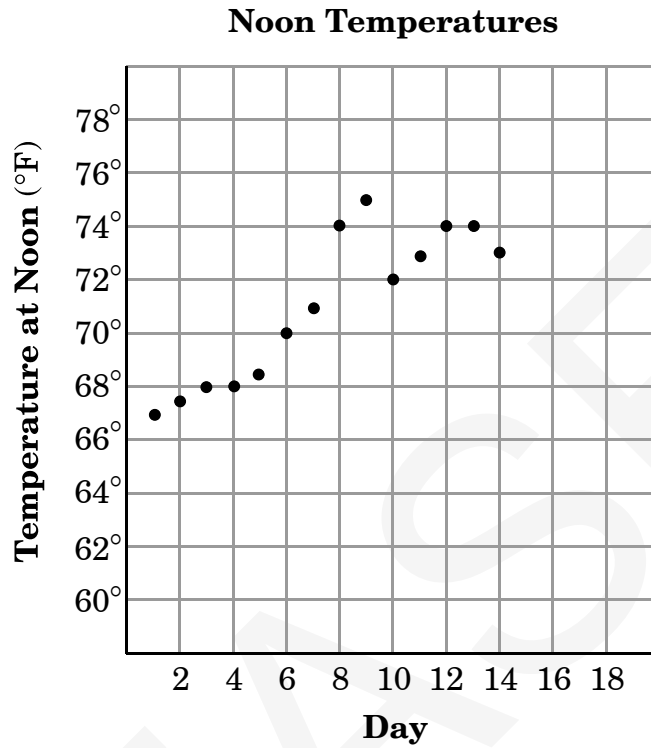
Noon Temperatures

Which statement about the data is ***most accurate***?

A   The temperature had a slight increase each day.

B   The temperature had a slight decrease each day.

C   There was a trend for the temperature to increase during the second week.

D   There was a trend for the temperature to increase during the first week.

53. A scatterplot is shown to have a negative relationship between the two variables. Which line of best fit could represent that scatterplot?

   A $y = {}^-2x + 4$

   B $y = {}^-1$

   C $y = x - 5$

   D $y = 3x + 4$

54. Which would be an appropriate first step to solve $y = 5x + 3$ for x?

   A   subtract 3 from both sides

   B   add 3 to both sides

   C   subtract 5 from both sides

   D   add 5 to both sides

55. Brittany programs the treadmill so that she will burn 3.2 calories per minute as she works out. What is the equation relating walking time (x) in minutes to total calories burned (y)?

   A $y = 3.2x$

   B $y = 3.2 + x$

   C $y = \frac{3.2}{x}$

   D $y = \frac{x}{3.2}$

56. The cost of attending the state fair is a $5.00 admission charge and $1.50 per ride. Elizabeth's mother gave her d dollars to spend at the state fair. Which equation could be used to determine the maximum number of rides, r, Elizabeth can go on?

   A $r = 1.50d + 5.00$

   B $r = (d + 5.00) \div 1.50$

   C $r = (d - 5.00) \div 1.50$

   D $r = 1.50d - 5.00$

57. The equation $d = 65h$ describes the distance (d) a vehicle travels in h hours. Based on this formula, how long will it take a car to travel 90 miles?

   A   98 minutes

   B   83 minutes

   C   43 minutes

   D   25 minutes

58. Which equation is nonlinear?

   A $2x - y = 9$

   B $y = x^2 + 3$

   C $y = 2x - 3$

   D $x = y$

59. What is the slope of the line that passes through the points $(1, {}^-3)$ and $(4,2)$?

A $\dfrac{5}{3}$

B $\dfrac{3}{5}$

C $\dfrac{{}^-3}{5}$

D $\dfrac{{}^-5}{3}$

60. What is the equation of the line with a slope of $\dfrac{2}{3}$ and a y-intercept of 4?

A $2x + 3y = 12$

B $2x + 3y = 4$

C $3x - 2y = {}^-4$

D $2x - 3y = {}^-12$

STOP

**End of Mathematics—
Calculator Active**

North Carolina Test of Mathematics
Grade 8 Form R RELEASED Fall 2009
Answer Key

CALCULATOR ACTIVE

Item Number	Correct Answer	Goal
1	A	1 — Number and Operations
2	C	1 — Number and Operations
3	C	1 — Number and Operations
4	A	2 — Measurement
5	D	2 — Measurement
6	C	3 — Geometry
7	C	3 — Geometry
8	A	4 — Data Analysis and Probability
9	B	3 — Geometry
10	D	4 — Data Analysis and Probability
11	C	4 — Data Analysis and Probability
12	C	4 — Data Analysis and Probability
13	A	4 — Data Analysis and Probability
14	C	5 — Algebra
15	C	5 — Algebra
16	A	5 — Algebra
17	D	5 — Algebra
18	A	5 — Algebra
19	D	5 — Algebra
20	B	5 — Algebra
21	B	1 — Number and Operations
22	C	1 — Number and Operations
23	A	1 — Number and Operations
24	A	2 — Measurement
25	C	2 — Measurement
26	B	3 — Geometry
27	B	3 — Geometry
28	A	3 — Geometry
29	B	4 — Data Analysis and Probability
30	A	4 — Data Analysis and Probability
31	D	4 — Data Analysis and Probability
32	D	4 — Data Analysis and Probability
33	C	4 — Data Analysis and Probability
34	B	5 — Algebra
35	C	5 — Algebra
36	B	5 — Algebra
37	A	5 — Algebra
38	C	5 — Algebra
39	D	5 — Algebra

40	D	5 — Algebra
41	B	1 — Number and Operations
42	C	1 — Number and Operations
43	B	1 — Number and Operations
44	C	2 — Measurement
45	D	2 — Measurement
46	D	3 — Geometry
47	C	3 — Geometry
48	C	3 — Geometry
49	A	4 — Data Analysis and Probability
50	B	4 — Data Analysis and Probability
51	D	4 — Data Analysis and Probability
52	D	4 — Data Analysis and Probability
53	A	4 — Data Analysis and Probability
54	A	5 — Algebra
55	A	5 — Algebra
56	C	5 — Algebra
57	B	5 — Algebra
58	B	5 — Algebra
59	A	5 — Algebra
60	D	5 — Algebra

North Carolina Test of Mathematics
Grade 8 Form R RELEASED Fall 2009
Raw to Scale Score Conversion

Raw Score	Scale Score
0	332
1	333
2	333
3	334
4	334
5	335
6	335
7	336
8	337
9	337
10	338
11	339
12	340
13	341
14	342
15	343
16	344
17	345
18	346
19	347
20	348
21	349
22	350
23	351
24	352
25	353
26	354
27	355
28	356
29	357
30	357
31	358
32	359
33	360
34	360
35	361
36	361
37	362
38	363
39	363
40	364
41	364

42	365
43	366
44	366
45	367
46	367
47	368
48	369
49	369
50	370
51	371
52	372
53	372
54	373
55	374
56	375
57	377
58	378
59	381
60	383