VA SOL Middle School Math Samples
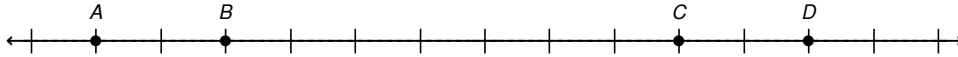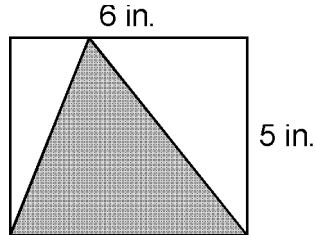
1) Label the number line below so that "0" is between points *B* and *C*. Then describe the value of the points that are graphed on the number line.

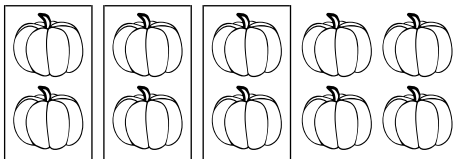2) In the figure shown, what is the ratio of the shaded area to the unshaded area inside the rectangle?

A. 2:1

B. 1:1

C. 1:2

D. 1:3

6 in.

5 in.

3) A lifeboat from a cruise ship contains 20 children, 18 women, 12 men, and 6 crewmen. What is the ratio of crewmen to total passengers?

A. 6:43   B. 3:17   C. 6:20   D. 3:25

4) Look at the pumpkins.

Which of the following expressions describes the pumpkins that are in boxes?

A. 3×10 B. 3×3

C. $\dfrac{1}{3} \times 10$ D. $\dfrac{2}{10} \times 3$

5) Hotaka wrote an expression and Jaden created a word problem to use the expression.

$$2 \div \frac{1}{8}$$

Which of these did Jaden create to use the expression?

A. Mr. Pickrell wrote emails for 2 hours. It took $\dfrac{1}{8}$ hour to write each email. How many emails did he write?

B. Mr. Pickrell carries 2 keys on his keychain. Each key weighs $\dfrac{1}{8}$ pound. How many pounds in all?

C. Mr. Pickrell has 2 poodles that each eat $\dfrac{1}{8}$ cup dog food each day. How many cups do the poodles eat in a week?

D. Mr. Pickrell owns 2 aquariums. Each aquarium contains $\dfrac{1}{8}$ cubic meter water. How many cubic meters in all?

6) In the equation $9{,}500 = 95 \times n$, which of the following powers of 10 should replace *n* to make this statement true?

A. 10^1 B. 10^2 C. 10^4 D. 10^5

7) What is the prime factorization of 504?

A. $2^4 \times 7$ B. $2^3 \times 3^2 \times 7$

C. $3^2 \times 2 \times 5^2$ D. $7^2 \times 3^2$

8) Mukta has 2 orange socks, 2 red socks, 2 blue socks, and 2 green socks. She packs $\frac{1}{2}$ of her socks into a suitcase. How many socks did Mukta pack?

A. 8 socks because $2 \times 2 \times 2 \times 2 = 16$ and $\frac{1}{2}$ of 16 is 8

B. 4 socks because $2 + 2 + 2 + 2 = 8$ and $\frac{1}{2}$ of 8 is 4

C. 16 socks because $2 \times 2 \times 2 \times 2 \times 2 = 32$ and $\frac{1}{2}$ of 32 is 16

D. 6 socks because $2 + 2 + 2 + 2 = 12$ and $\frac{1}{2}$ of 12 is 6

9) The bakery made 5 bowls of cannoli dough to fill customer orders. Each order requires $\frac{1}{4}$ bowl of dough.

$$5 \div \frac{1}{4} = \square$$

How many customer orders of cannolis can be filled with 5 bowls of dough?

A. $1\frac{1}{4}$ B. 20   C. 4   D. $\frac{1}{20}$

10) A fence 68 feet long is made using posts $\frac{1}{2}$ foot thick with 7 feet of space between posts. How many posts are used for the fence?

A. 6   B. 8   C. 10   D. 11

11) The Wilsons have non-monthly expenses for their home and two cars as shown.

February 1	Property taxes advance	$ 600
April 7	Car license and insurance	$1200
July 3	Property taxes	$1500
October 10	Car license and insurance	$ 900
October 31	Home insurance	$ 450

They want to save money each month in order to pay these expenses. How much do they need to set aside each month?

A. $387.50   B. $400

C. $412.50   D. $465

12) The model shown best represents the answer to which expression?
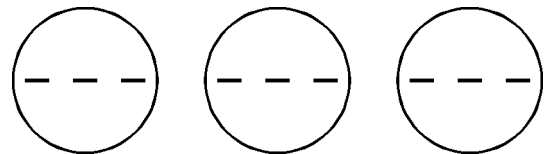
A. 3×3 B. -9×-3

C. $-9 \div 3$ D. $-9 \div 2$

13) The expression below can be used to calculate the number of cookies a bakery has remaining at the end of one day.
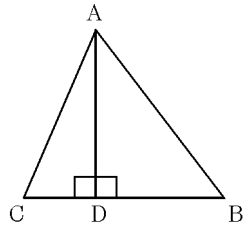
$$72 - (10(2) + 19(1) + 4(3) + 6)$$

How many cookies are left at the end of the day?

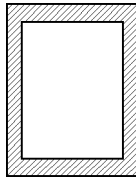A. 15 cookies   B. 18 cookies

C. 25 cookies   D. 28 cookies

14) What is the area of $\triangle ABC$ if $AD = 20$ and $BC = 25$?

A. 150   B. 200

C. 250   D. 550

15) Della's yard measures 18 meters by 12 meters. She mowed a 2.5-meter strip around the edge, then decided to wait until evening when it would be cooler. How many square meters remain to be mowed?
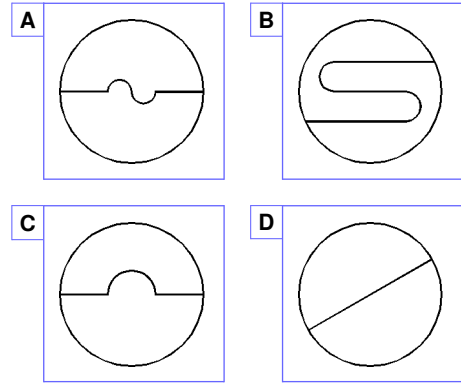
A. $84\,m^2$ B. $91\,m^2$

C. $156\,m^2$ D. $232\,m^2$

16) Paul agreed to build a fence around a garden that is a rectangle 29 ft by 18 ft to keep out the rabbits. How many yards of 24 inch high fence does he need?

A. 90 ft   B. $15\frac{2}{3}$ yd

C. $31\frac{1}{3}$ yds   D. $33\frac{1}{3}$ ft

17) The figures below show circles divided into two parts.

In which of the figures are the two parts congruent? Drag each figure into the correct box.

Congruent	Not Congruent

18) Mrs. Larkin asked her students the following question:

If each number in a list is increased by 4, how does the mean of the new list compare with the mean of the old list?

Andy said, "The mean of the new list will be four times the mean of the old list."

Betty said, "The mean of the new list will be four points higher than the mean of the old list."

Carl said, "The mean of the new list will be four points lower than the mean of the old list."

Denise said, "There is no way to find out what the mean of the new list would be."

Which student answered correctly?

A. Andy   B. Betty

C. Carl   D. Denise

19) The table shows the mileage between four cities.

	A	B	C	D
A	—	550	250	130
B	550	—	300	280
C	250	300	—	90
D	130	280	90	—

If Emma drives 30 miles per hour from City C to City D, approximately how fast must she drive from City D to City A in order to complete the drive in the same amount of time?

A. 30 miles per hour

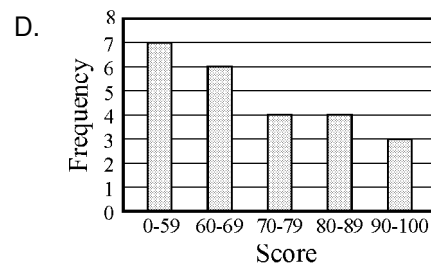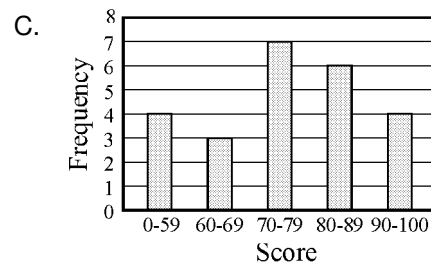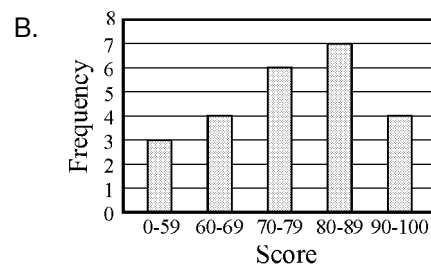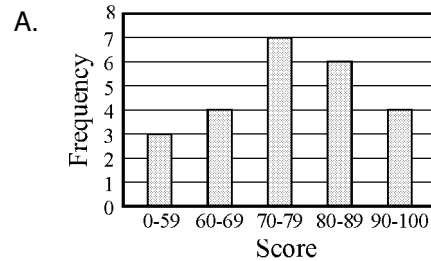B. 40 miles per hour

C. 50 miles per hour

D. 70 miles per hour

20) If $t \div 3 = 4$, what does $3t \div 3$ equal?

A. 8   B. 12   C. 24   D. 36

21) The 24 cars surveyed had the following smog check ratings:

32, 48, 55, 62, 65, 66, 67, 71, 71, 73, 76, 76, 77, 79, 85, 86, 86, 86, 87, 87, 90, 93, 100, 100

Which histogram depicts the same data?

A.

Score	Frequency
0-59	3
60-69	4
70-79	7
80-89	6
90-100	4

B.

Score	Frequency
0-59	3
60-69	4
70-79	6
80-89	7
90-100	4

C.

Score	Frequency
0-59	4
60-69	3
70-79	7
80-89	6
90-100	4

D.

Score	Frequency
0-59	7
60-69	6
70-79	4
80-89	4
90-100	3

22) When written in decimal form, which of these is a repeating decimal?

A. $\dfrac{0}{1}$ B. $\dfrac{1}{6}$ C. $\dfrac{1}{2}$ D. $\dfrac{1}{5}$

23) Match each question on the left to its correct answer on the right.

9 is 2% of what number?   ●   ●   45

35% of what number is 28?   ●   ●   80

45 is 36% of what number?   ●   ●   125

140% of what number is 175? ●   ●   245

192 is 240% of what number? ●   ●   450

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24) Indicate whether the value of the expressions is less than 10 or greater than 10.

	< 10	> 10
$|-10 + 3|$	○	○
$|-2 + -14|$	○	○
$|15 - (-7)|$	○	○
$|-48 \div 3|$	○	○

25) A car can travel 240 miles on 8 gallons of gas. Which of the following correctly shows how far the car could travel on 6 gallons of gas?

A.   180 miles; $(240 \div 8) \times 6$

B.   224 miles; $240 - (8 + 6)$

C.   288 miles; $240 + (6 \times 8)$

D.   320 miles; $(240 \div 6) \times 8$

26) Choose the correct proportion to solve this problem: At an animal shelter every 2 out of 3 animals are dogs. If there are 45 animals at the shelter, how many are dogs?
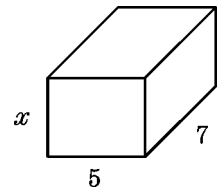
A. $\dfrac{2}{45} = \dfrac{3}{n}$ B. $\dfrac{45}{2} = \dfrac{n}{3}$

C. $\dfrac{2}{3} = \dfrac{n}{45}$ D. $\dfrac{3}{2} = \dfrac{n}{45}$

27) Felicia spent $7.20 on 4 dozen pencils. How much did each pencil cost?

A. $0.14   B. $0.15

C. $0.25   D. $1.15
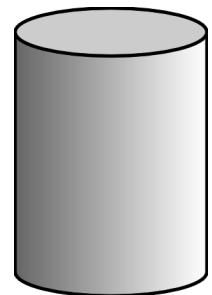
28) The volume of the figure is 140. What is x?

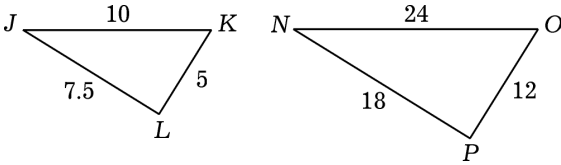A.   4   B.   6

C.   10   D.   20

x 7   5

29) The volume of the container shown is approximately 311 cubic inches. If the height of the container is 11 inches, which expression can be used to find the area of the base?

A. $311 \div 11$

B. $311 \div 11(3.14)$

C. $311 \div 11 \div 3.14$

D. $(311 \times 11) \div 3.14$

30) Study the diagram.

Select all the true statements.

$\triangle JKL \sim \triangle NOP$	$\dfrac{JL}{LK} = \dfrac{NP}{PO}$
$\dfrac{JL}{NP} = \dfrac{12}{5}$	$\dfrac{NO}{JK} = \dfrac{12}{5}$
$\dfrac{NO}{JK} = \dfrac{OP}{JL}$	$\dfrac{OP}{KL} = \dfrac{12}{5}$

31) A bag contains 4 red marbles, 6 orange marbles, 10 black marbles, and 3 yellow marbles. If a marble is drawn from the bag at random, what is the probability that it will be either orange or yellow?

A. $\dfrac{9}{14}$ B. $\dfrac{4}{23}$ C. $\dfrac{9}{23}$ D. $\dfrac{14}{23}$

32) While driving on a family trip, Jack counted the number of vans, trucks, and cars he saw on the highway from Savona, NY to Williamsport, PA. He saw 176 cars, 24 buses, and 95 vans. Based on these observations, what is the probability that the next car he sees will be a van in lowest terms? Explain your reasoning.

33) For a chain of department stores, the day after Thanksgiving was its busiest day of the year. (That day is popularly known as "Black Friday".) The table shows the total amount of sales each hour at the cosmetics counter for all of the 20 stores in the chain.

Hour	Sales	Hour	Sales	Hour	Sales
1	$15,780	6	$16,979	11	$16,435
2	$14,965	7	$13,480	12	$17,865
3	$55,690	8	$36,890	13	$19,400
4	$52,960	9	$37,465	14	$23,800
5	$13,285	10	$14,300	15	$27,921

a) Draw a histogram to display the distribution of sales.

b) What are the clusters of data observed from the graph?

c) What are the gaps in data observed from the graph?

d) What could explain the gaps and clusters?

34) Jaunita wants to buy several cans of beans, which sell for $1.29 a can, but she has only a twenty-dollar bill. Which inequality could she use to find out how many cans x she is able to purchase if she also buys a loaf of bread, which costs $1.40?

A. $1.40x - 1.29 \leq 20.00$

B. $20x + 1.40 > 1.29$

C. $1.29x + 1.40 \leq 20.00$

D. $\dfrac{x}{20} > 1.40(1.29)$

35) It is an old saying that if the temperature is above 45° then the number of times a cricket chirps in a minute is related to the temperature by multiplying the temperature by 4 and adding 20. According to this method, what is the temperature when there are 360 cricket chirps per minute?

A. 75°   B. 80°   C. 85°   D. 95°

36) Consider the following three numbers:

$$\dfrac{7}{5}, \ \sqrt{2}, \ 1.414$$

Indicate whether each of these statements about the numbers is true or false.

	true	false
$\dfrac{7}{5}$ is greater than $\sqrt{2}$	○	○
$\dfrac{7}{5}$ is greater than 1.414	○	○
1.414 is greater than $\sqrt{2}$	○	○
$\sqrt{2}$ is greater than 1.414	○	○

37) Which number is the closest to the square root of 421?

A. 20   B. 21   C. 22   D. 19

38) Carli created a sculpture as shown in the diagram. The sculpture is 8 centimeters tall and the area of the bottom of the sculpture is 49 square inches. Which expression can be used to find how much clay Carli used to make the sculpture?

8 cm

area of base = 49 cm²
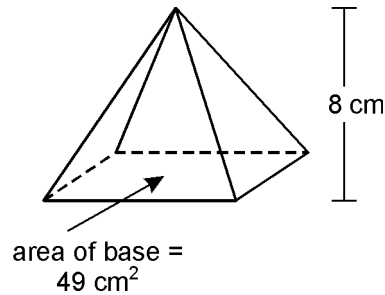
A. 8×49 B. $49 \times 49 \times 8$

C. $\frac{1}{3} \times 7 \times 8$ D. $8 \times 49 \times \frac{1}{3}$
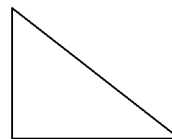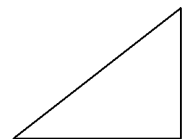
39) Look at the figures below.

Figure A   Figure B

Which statement is *not* true about Figures A and B?

A. Figure B is a rotation of Figure A.

B. Figures B is a reflection of Figure A

C. Figure A and Figure B are congruent.
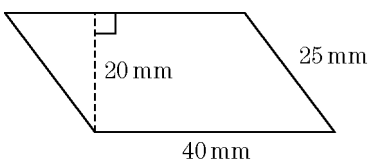
D. Figure B shows a translation of Figure A.

40) Which of these solids is the best match for the three profile views?

TOP   LEFT   FRONT

A.

LEFT
FRONT

B.

LEFT
FRONT

C.

LEFT
FRONT

D.

LEFT
FRONT
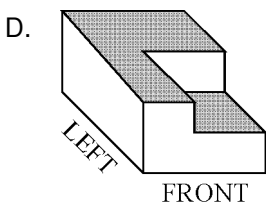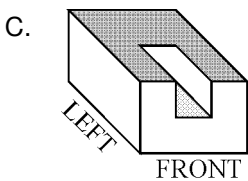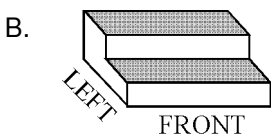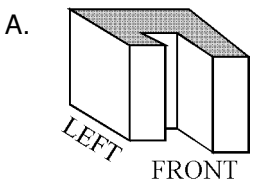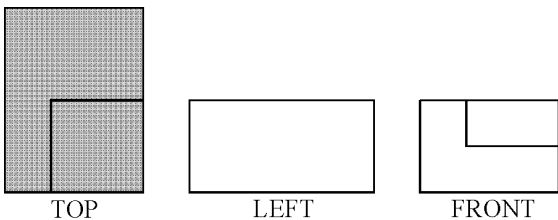
41) Which of the following measurements can be the lengths of the sides of a right triangle?

A. 5, 12, 13   B. 5, 6, 7

C. 3, 5, 7   D. 2, 3, 4

42) What is the area of the parallelogram?

20 mm
25 mm
40 mm

A. 130 mm²   B. 250 mm²

C. 800 mm²   D. 1000 mm²

43) Decide if each set of events is independent or dependent. Explain your answer.

A) Bernie has 8 pennies, 3 nickels and a quarter in his pocket. He randomly chooses one coin and gives the coin to his younger brother. Then he randomly chooses another coin.

B) Desiree spins a spinner. Then she spins the spinner again.

C) Franklin takes a peach from a bowl of fruit. Then he takes an apple from the bowl of fruit.

D) Clark rolls one die. Then he rolls the die again.

44) Which box-and-whisker plot represents the following information?

Temperature: 94, 72, 76, 100, 60, 96, 87

A.

60 70 80 90 100

B.

60 70 80 90 100

C.

60 70 80 90 100

D.

60 70 80 90 100
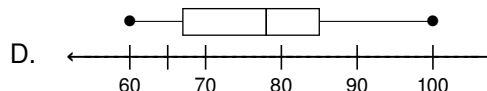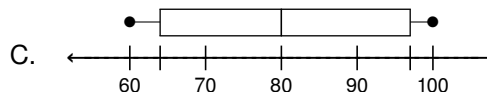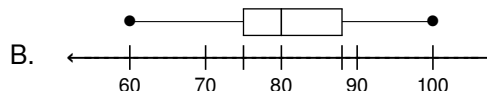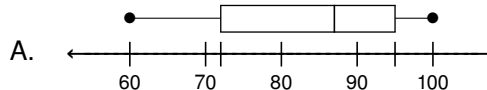
45) The table corresponds to which of the following scatterplots?

Miles Traveled	Miles Left to Destination
2	40
4	36
5	35
7	33
9	31
14	26
16	24
18	22
21	19
24	16

A.

B.

C.

D.

46) Wynona wants to simplify this expression:

$3t + 8t$

Which of these shows the simplified expression?

A. $11t$

B. $24t$

C. $11 + t$

D. $24t^2$

47) Simplify: $6(y \cdot 3)$

A. $3y$

B. $\dfrac{y}{6} - \dfrac{1}{2}$

C. $6y + 18$

D. $18y$

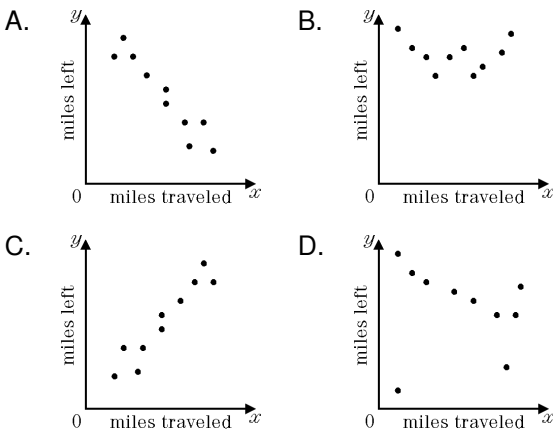48) Which of the following descriptions could apply to the variable y in the equation $y = 4 \cdot 7 \cdot x$?

A. The area of a trapezoid with bases equal to 4 cm and 7 cm and a height of x cm.

B. The perimeter of a triangle with sides that are 4 cm, 7 cm, and x cm.

C. The volume of a triangular prism with a base of 11 cm and height of x cm.

D. The surface area of a rectangular prism with edges that are 4 cm, 7 cm, and x cm.

49) Mr. Bentley drove to the electronics conference.

a) Write an equation that shows the relationship between D, the distance Mr. Bentley traveled, t, the amount of time he traveled, and r, his rate of travel.

b) Mr. Bentley had driven for 3 hours at an average speed of 67 mph. What distance had he traveled?

c) Mr. Bentley calculated that there were 132 miles left to drive. If he wanted to complete the trip in 2 hours, what was the average speed he drove?

50) Cassandra wants to buy personalized tee shirts for her cheerleading team. Store X charges $4.75 per shirt plus a delivery fee of $12. Store Y charges $3.50 per shirt and a delivery fee of $17.

Which inequality can be used to find n, the maximum number of shirts that Cassandra can buy so that the total charge at Store Y is less than or equal to the total charge at Store X?

A. $12 + 4.75n \le 17 + 3.5n$

B. $3.5 + 17n \le 4.75 + 12n$

C. $12 + 4.75n \ge 17 + 3.5n$

D. $3.5 + 17n \ge 4.75 + 12n$

VA SOL Middle School Math Samples

1.
Answer: [numberline]
Objective: 6.3b
Points: 1

2.
Answer: B
Objective: 6.1
Points: 1

3.
Answer: D
Objective: 6.1
Points: 1

4.
Answer: D
Objective: 6.5a
Points: 1

5.
Answer: A
Objective: 6.5b
Points: 1

6.
Answer: B
Objective: 6.4
Points: 1

7.
Answer: B
Objective: 6.4
Points: 1

8.
Answer: B
Objective: 6.5b
Points: 1

9.
Answer: B
Objective: 6.5b
Points: 1

10.
Answer: C
Objective: 6.5b
Points: 1

11.
Answer: A
Objective: 6.5c
Points: 1

12.
Answer: C
Objective: 6.6a
Points: 1

13.
Answer: A
Objective: 6.6b
Points: 1

14.
Answer: C
Objective: 6.7c
Points: 1

15.
Answer: B
Objective: 6.7c
Points: 1

16.
Answer: C
Objective: 6.7c
Points: 1

17.
Answer: [A,B,D][C]
Objective: 6.9
Points: 1

18.
Answer: B
Objective: 6.11b
Points: 1

19.
Answer: C
Objective: 6.12a
Points: 1

20.
Answer: B
Objective: 6.13
Points: 1

21.
Answer: A
Objective: 6.10c
Points: 1

22.
Answer: B
Objective: 7.1c
Points: 1

23.
Answer: [1,5],[2,2],[3,3],[4,3],[5,2]
Objective: 7.2
Points: 1

24.
Answer: [1],[2],[2],[2]
Objective: 7.2
Points: 1

25.
Answer: A
Objective: 7.3
Points: 1

26.
Answer: C
Objective: 7.3
Points: 1

27.
Answer: B
Objective: 7.3
Points: 1

28.
Answer: A
Objective: 7.4a
Points: 1

29.
Answer: A
Objective: 7.4a
Points: 1

30.
Answer: 1,2,4,6
Objective: 7.5
Points: 1

31.
Answer: C
Objective: 7.8a
Points: 1

32.
Answer: $\frac{19}{59}$
Objective: 7.8a
Points: 1

33.
Answer: [graph]; $10000 to $19999: $40000 to $49999: Cluster at lower sales level might indicate bargain shopping habits. Different number of shoppers during different hours, different sales-generating ability of salespersons during the different hours.
Objective: 7.9b
Points: 1

34.
Answer: C
Objective: 7.13
Points: 1

35.
Answer: C
Objective: 7.12
Points: 1

36.
Answer: [2],[2],[2],[1]
Objective: 8.1
Points: 1

37.
Answer: B
Objective: 8.3a
Points: 1

38.
Answer: D
Objective: 8.6a
Points: 1

39.
Answer: D
Objective: 8.7b
Points: 1

40.
Answer: D
Objective: 8.8
Points: 1

41.
Answer: A
Objective: 8.9b
Points: 1

42.
Answer: C
Objective: 8.10
Points: 1

43.
Answer: dependent; independent; dependent; independent
Objective: 8.11a
Points: 1

44.
Answer: A
Objective: 8.12a
Points: 1

45.
Answer: A
Objective: 8.13a
Points: 1

46.
Answer: A
Objective: 8.14b
Points: 1

47.
Answer: D
Objective: 8.14b
Points: 1

48.
Answer: D
Objective: 8.16e
Points: 1

49.
Answer: $D = rt$; 201 miles; 66 mph
Objective: 8.16e
Points: 1

50.
Answer: C
Objective: 8.18
Points: 1