MTEL General Curriculum Mathematics 03
Multiple Choice Practice Test A
Debra K. Borkovitz,
Wheelock College

Note: This test is the same length as the multiple choice part of the official test, and the number of questions addressing each objective is close to the distribution on the official test. I used the official objectives and sample test to construct these questions, but I make no promises that they accurately reflect what's actually on the real test. Feel free to copy, distribute, and modify for any educational, non-profit use. See terms of use. For interactive practice questions with hints, see http://debraborkovitz.com/2011/11/mtel-practice-questions/.

1) Which of the following is equal to eleven billion four hundred thousand?

A) 11,400,000
B) 11,000,400,000
C) 11,000,000,400,000
D) 11,400,000,000

2) In each expression below, N represents a negative integer. Which expression could have a negative value?

A) N^2
B) $6 - N$
C) $-N$
D) $6 + N$

3) Which of the lists below contains <u>only</u> irrational numbers?

A) π, $\sqrt{6}$, $\sqrt{\dfrac{1}{2}}$

B) π, $\sqrt{9}$, $\pi + 1$

C) $\dfrac{1}{3}$, $\dfrac{5}{4}$, $\dfrac{2}{9}$

D) -3, 14, 0

4) In January 2011, the national debt was about 14 trillion dollars and the US population was about 300 million people. Someone reading these figures estimated that the national debt was about $5,000 per person. Which of these statements best describes the reasonableness of this estimate?

A) It is too low by a factor of 10
B) It is too low by a factor of 100
C) It is too high by a factor of 10
D) It is too high by a factor of 100

5) Use the expression below to answer the question that follows.

$$\frac{\left(4\times10^{3}\right)\times\left(3\times10^{4}\right)}{6\times10^{6}}$$

Which of the following is equivalent to the expression above?

A) 2
B) 20
C) 200
D) 2000

6) Which of the lists below is in order from least to greatest value?

A) $\dfrac{1}{2},\ \dfrac{1}{3},\ \dfrac{1}{4},\ \dfrac{1}{5}$

B) $\dfrac{1}{3},\ \dfrac{2}{7},\ \dfrac{3}{8},\ \dfrac{4}{11}$

C) $\dfrac{1}{4},\ \dfrac{2}{5},\ \dfrac{2}{3},\ \dfrac{4}{5}$

D) $\dfrac{7}{8},\ \dfrac{6}{7},\ \dfrac{5}{6},\ \dfrac{4}{5}$

7) Use the table below to answer the question that follows:

| Store	Discount
A	Buy two pounds, get the third pound half price
B	15% off per pound
C	$\frac{1}{4}$ off of three pounds
D	$1 off per pound

   Gordon wants to buy three pounds of nuts. Each of the stores above ordinarily sells the nuts for $4.99 a pound, but is offering a discount this week. At which store can he buy the nuts for the least amount of money?

A) Store A
B) Store B
C) Store C
D) Store D

8) Which of the numbers below is the decimal equivalent of $\frac{3}{8}$?

A) 0.38
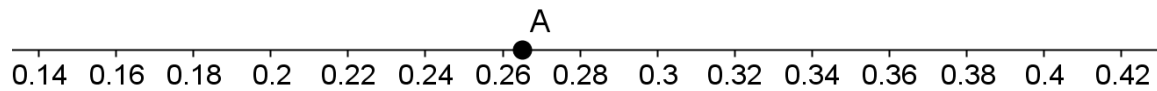B) 0.125
C) 0.375
D) 0.83

9) What fraction of the area of the picture below is shaded?
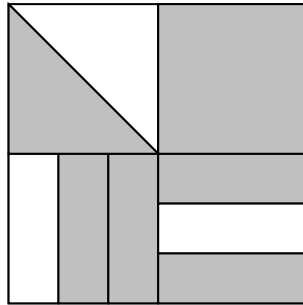
A) $\dfrac{17}{24}$

B) $\dfrac{3}{4}$

C) $\dfrac{2}{3}$

D) $\dfrac{17}{6}$

10) Below is a portion of a number line.

Point A is one-quarter of the distance from 0.26 to 0.28. What number is represented by point A?

A) 0.26

B) 0.2625

C) 0.265

D) 0.27

11) Exactly one of the numbers below is a prime number. Which one is it?

A) 511

B) 517

C) 519

D) 521

12) The letters A, B, and C represent digits in the twelve digit number

$x = 111,111,111, ABC$. For which values of A, B, and C is x divisible by 40?

A) A = 3, B = 2, C=0

B) A = 0, B = 0, C=4

C) A = 4, B = 2, C=0

D) A =1, B=0, C=0

13) The prime factorization of n can be written as $n = pqr$, where p, q, and r are distinct prime numbers. How many factors does n have, including 1 and itself?

A) 3
B) 5
C) 6
D) 8

14) P is a prime number that divides 240. Which of the following <u>must</u> be true?

A) P divides 30
B) P divides 48
C) P divides 75
D) P divides 80

15) The chairs in a large room can be arranged in rows of 18, 25, or 60 with no chairs left over. If C is the smallest possible number of chairs in the room, which of the following inequalities does C satisfy?

A) $C \leq 300$
B) $300 < C \leq 500$
C) $500 < C \leq 700$
D) $C > 700$

16) Here is a student's work on several multiplication problems:

```
      1 2              7 6                4 1
   x  3 8           x     8            x  2 2
      8 1 6         5 6 4 8               8 2
      3 6 0                            8 2 0
   1  1 7 6                            9 0 2
```

For which of the following problems is this student likely to get the correct solution, even though he is using an incorrect algorithm?

A) 58 x 22

B) 16 x 24

C) 31 x 23

D) 141 x 32

17) Use the samples of a student's work below to answer the question that follows:

$$\frac{2}{3} \times \frac{3}{4} = \frac{4 \times 2}{3 \times 3} = \frac{8}{9}$$

$$\frac{2}{5} \times \frac{7}{7} = \frac{7 \times 2}{5 \times 7} = \frac{2}{5}$$

$$\frac{7}{6} \times \frac{3}{4} = \frac{4 \times 7}{6 \times 3} = \frac{28}{18} = \frac{14}{9}$$

Which of the following best describes the mathematical validity of the algorithm the student is using?

A) It is not valid. It never produces the correct answer.
B) It is not valid. It produces the correct answer in a few special cases, but it's still not a valid algorithm.
C) It is valid if the rational numbers in the multiplication problem are in lowest terms.
D) It is valid for all rational numbers.

18) Below is a pictorial representation of $2\frac{1}{2} \div \frac{2}{3}$:

2 1/2			
2/3	2/3	2/3	
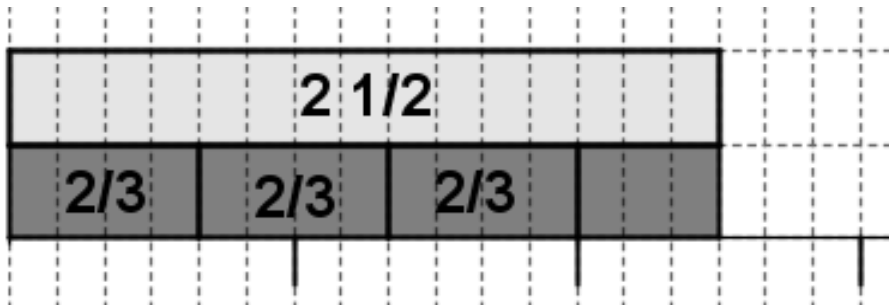
Which of the following is the best description of how to find the quotient from the picture?

A) The quotient is $3\frac{3}{4}$. There are 3 whole blocks each representing $\frac{2}{3}$ and a partial block composed of 3 small rectangles. The 3 small rectangles represent $\frac{3}{4}$ of $\frac{2}{3}$.

B) The quotient is $3\frac{1}{2}$. There are 3 whole blocks each representing $\frac{2}{3}$ and a partial block composed of 3 small rectangles. The 3 small rectangles represent $\frac{3}{6}$ of a whole, or $\frac{1}{2}$.

C) The quotient is $\frac{4}{15}$. There are four whole blocks separated into a total of 15 small rectangles.

D) This picture cannot be used to find the quotient because it does not show how to separate $2\frac{1}{2}$ into equal sized groups.

19) The expression $7^{-4} \cdot 8^{-6}$ is equal to which of the following?

A) $\dfrac{8}{(56)^4}$

B) $\dfrac{64}{(56)^4}$

C) $\dfrac{1}{8 \cdot (56)^4}$

D) $\dfrac{1}{64 \cdot (56)^4}$

20) A solution requires 4 ml of saline for every 7 ml of medicine. How much saline would be required for 50 ml of medicine?

A) $28\dfrac{4}{7}$ ml

B) $28\dfrac{1}{4}$ ml

C) $28\dfrac{1}{7}$ ml

D) 87.5 ml

21) Some children explored the diagonals in 2 x 2 squares on pages of a calendar (where all four squares have numbers in them). They conjectured that the sum of the diagonals is always equal; in the example below, 8+16=9+15.

S	M	T	W	R	F	S
		June				
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Which of the equations below could best be used to explain why the children's conjecture is correct?

A) $8x+16x=9x+15x$

B) $x+(x+2)=(x+1)+(x+1)$

C) $x+(x+8)=(x+1)+(x+7)$

D) $x+8+16=x+9+15$

22) Use the problem below to answer the question that follows:

      T shirts are on sale for 20% off. Tasha paid $8.73 for a shirt. What is the regular price of the shirt? There is no tax on clothing purchases under $175.

      Let p represent the regular price of these t-shirt. Which of the following equations is correct?

A) $0.8p=\$8.73$

B) $\$8.73+0.2*\$8.73=p$

C) $1.2*\$8.73=p$

D) $p-0.2*\$8.73=p$

23) Cell phone plan A charges $3 per month plus $0.10 per minute. Cell phone plan B charges $29.99 per month, with no fee for the first 400 minutes and then $0.20 for each additional minute.

Which equation can be used to solve for the number of minutes, m (with m>400) that a person would have to spend on the phone each month in order for the bills for plan A and plan B to be equal?

A) $3.10m = 400 + 0.2m$

B) $3 + 0.1m = 29.99 + .20m$

C) $3 + 0.1m = 400 + 29.99 + .20(m - 400)$

D) $3 + 0.1m = 29.99 + .20(m - 400)$

24) Here is a student's work solving an equation:

$$3x - 4 = -2x + 6$$

$$3x - 4 + 4 = -2x + 6 + 4$$

$$3x = -2x + 10$$

$$3x - 2x = 10$$

$$x = 10$$

Which of the following statements is true?

A) The student's solution is correct.

B) The student did not correctly use properties of integers.

C) The student did not correctly use the distributive property.

D) The student did not correctly use the commutative property.

25) In which table below is y a function of x?

A)

x	y
3	1
4	2
6	3
3	4
4	5

B)

x	y
3	4
4	3
6	5
3	5
4	3

C)

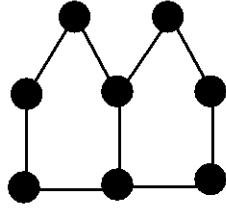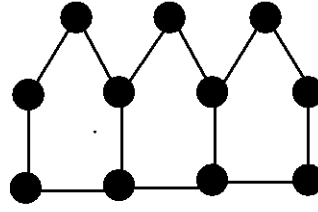| x	y
1	1
1	2
1	3
1	4
1	5

D)

x	y
3	1
4	2
6	1
3	1
4	2

26) The "houses" below are made of toothpicks and gum drops.
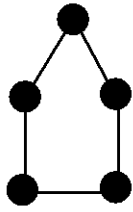
1 House
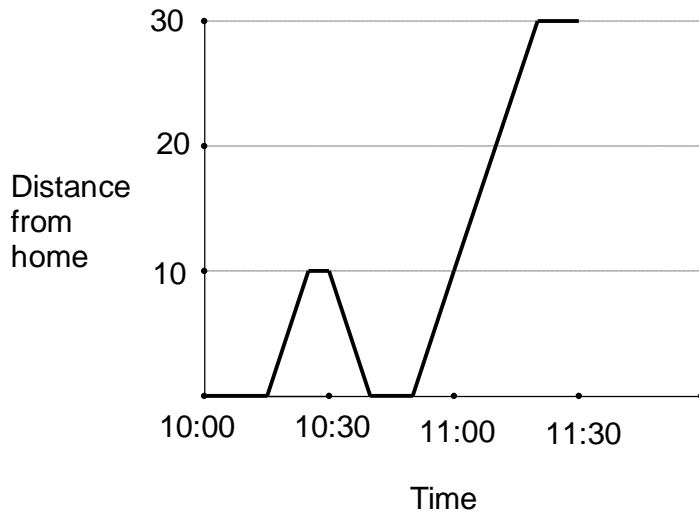5 Toothpicks
5 Gum Drops

2 Houses
9 Toothpicks
8 Gum Drops

3 Houses
13 Toothpicks
11 Gum Drops

How many toothpicks are there in a row of 53 houses?

A) 212

B) 213

C) 217

D) 265

27) Use the graph below to answer the question that follows:

The graph above best matches which of the following scenarios:

A) George left home at 10:00 and drove to work on a crooked path. He was stopped in traffic at 10:30 and 10:45. He drove 30 miles total.

B) George drove to work. On the way to work there is a little hill and a big hill. He slowed down for them. He made it to work at 11:15.

C) George left home at 10:15. He drove 10 miles, then realized he'd forgotten something at home. He turned back and got what he'd forgotten. Then he drove in a straight line, at many different speeds, until he got to work around 11:15.

 D) George left home at 10:15. He drove 10 miles, then realized he'd forgotten something at home. He turned back and got what he'd forgotten. Then he drove at a constant speed until he got to work around 11:15.

28) Use the graph below to answer the question that follows.
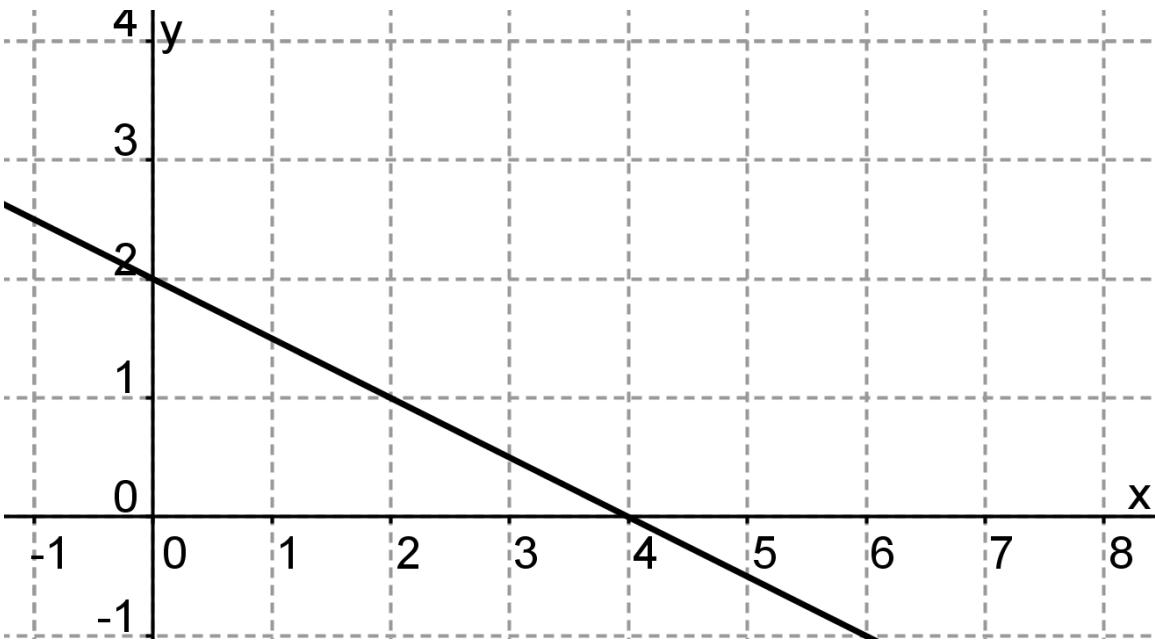
Which of the following is a correct equation for the graph of the line depicted above?
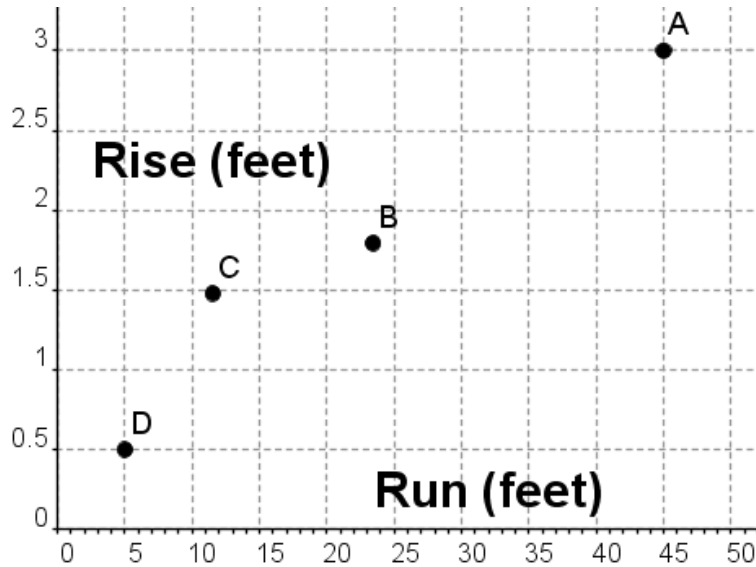
A) $y = -\dfrac{1}{2}x + 2$

B) $4x = 2y$

C) $y = x + 2$

D) $y = -x + 2$

29) The American's with Disabilties Act (ADA) regulations state that the maximum slope for a wheelchair ramp in new construction is 1:12, although slopes between 1:16 and 1:20 are preferred. The maximum rise for any run is 30 inches.   The graph below shows the rise and runs of four different wheelchair ramps. Which ramp is in compliance with the ADA regulations for new construction?

Rise (feet)

Run (feet)

(Graph showing points: A at (45, 3), B at (23, 1.75), C at (11, 1.45), D at (4, 0.45). Vertical axis Rise (feet) from 0 to 3, horizontal axis Run (feet) from 0 to 50.)

30) In March of 2012, 1 dollar was worth the same as 0.761 Euros, and 1 dollar was also worth the same as 83.03 Japanese Yen. Which of the expressions below gives the number of Yen that are worth 1 Euro?
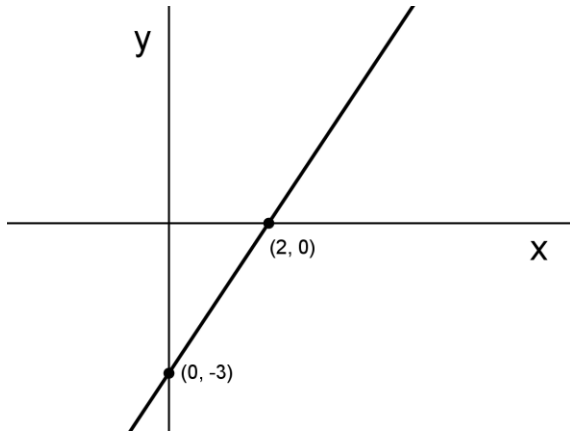
A) $83.03 \cdot 0.761$

B) $\dfrac{0.761}{83.03}$

C) $\dfrac{83.03}{0.761}$
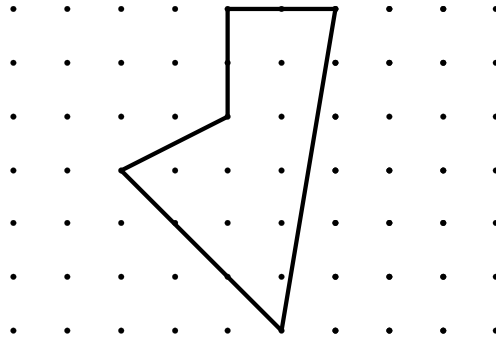
D) $\dfrac{1}{0.761} \cdot \dfrac{1}{83.03}$

31) Use the graph below to answer the question that follows:

The graph above represents the equation $3x + Ay = B$, where A and B are integers. What are the values of A and B?

A) A = -2, B= 6

B) A = 2, B = 6

C) A = -1.5, B=-3

D) A = 2, B = -3

32) The picture below represents a board with pegs on it, where the closest distance between two pegs is 1 cm. What is the area of the pentagon shown?

A) 8 cm^2

B) 11 cm^2

C) 11.5 cm^2

D) 12.5 cm^2

33) The column below consists of two cubes and a cylinder. The cylinder has diameter y, which is also the length of the sides of each cube. The total height of the column is $5y$. Which of the formulas below gives the volume of the column?

A) $2y^3 + \dfrac{3\pi y^3}{4}$

B) $2y^3 + 3\pi y^3$

C) $y^3 + 5\pi y^3$

D) $2y^3 + \dfrac{3\pi y^3}{8}$

34) A car is traveling at 60 miles per hour. Which of the expressions below could be used to compute how many feet the car travels in 1 second? Note that 1 mile = 5,280 feet.

A) $60\dfrac{\text{miles}}{\text{hour}} \cdot 5280\dfrac{\text{feet}}{\text{mile}} \cdot 60\dfrac{\text{minutes}}{\text{hour}} \cdot 60\dfrac{\text{seconds}}{\text{minute}}$

B) $60\dfrac{\text{miles}}{\text{hour}} \cdot 5280\dfrac{\text{feet}}{\text{mile}} \cdot \dfrac{1}{60}\dfrac{\text{hour}}{\text{minutes}} \cdot \dfrac{1}{60}\dfrac{\text{minute}}{\text{seconds}}$

C) $60\dfrac{\text{miles}}{\text{hour}} \cdot \dfrac{1}{5280}\dfrac{\text{foot}}{\text{miles}} \cdot 60\dfrac{\text{hours}}{\text{minute}} \cdot \dfrac{1}{60}\dfrac{\text{minute}}{\text{seconds}}$

D) $60\dfrac{\text{miles}}{\text{hour}} \cdot \dfrac{1}{5280}\dfrac{\text{mile}}{\text{feet}} \cdot 60\dfrac{\text{minutes}}{\text{hour}} \cdot \dfrac{1}{60}\dfrac{\text{minute}}{\text{seconds}}$

35) A cylindrical soup can has diameter 7 cm and height 11 cm. The can holds g grams of soup. How many grams of the same soup could a cylindrical can with diameter 14 cm and height 33 cm hold?

A) $6g$

B) $12g$

C) $18g$

D) $36g$

36) What is the mathematical name of the three-dimensional polyhedron depicted below?

A) Tetrahedron

B) Triangular Prism

C) Triangular Pyramid

D) Trigon

37) Which of the following is <u>not</u> possible?

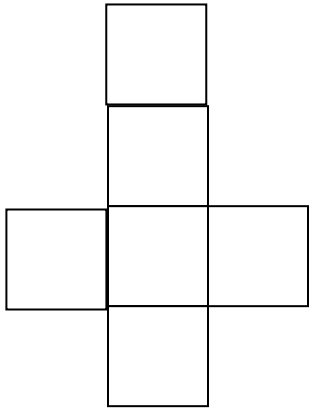A) An equiangular triangle that is not equilateral.

B) An equiangular quadrilateral that is not equilateral.

C) An equilateral quadrilateral that is not equiangular
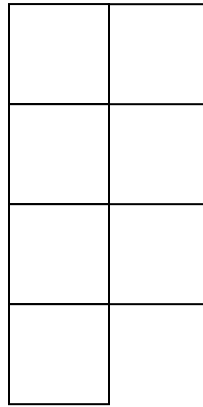
D) An equiangular hexagon that is not equilateral.

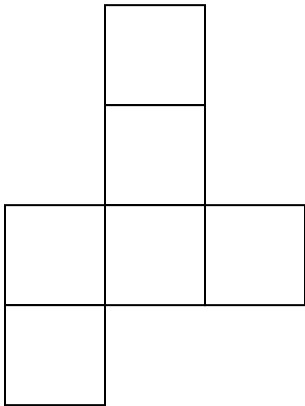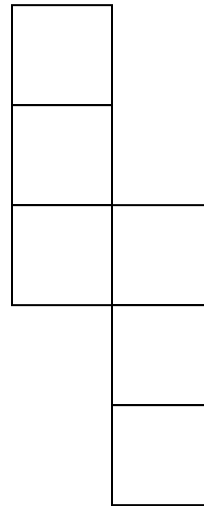38) Which of the following nets will <u>not</u> fold into a cube?

A)

B)
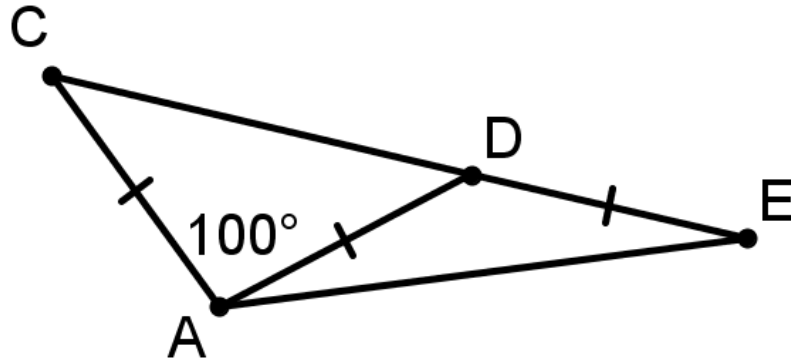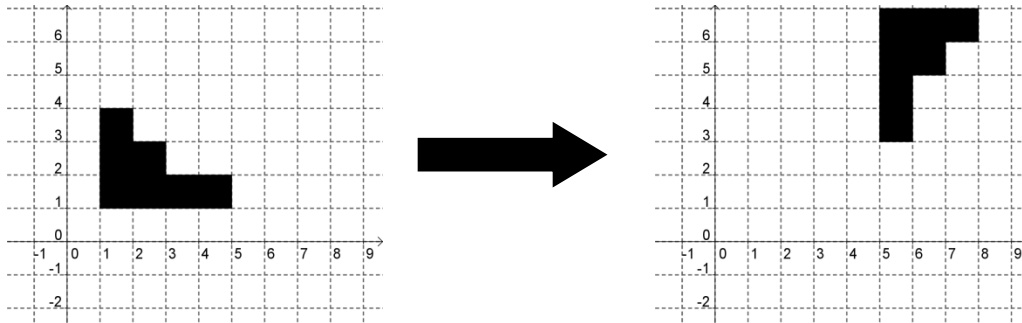
C)

D)

39) In the triangle below, $\overline{AC} \cong \overline{AD} \cong \overline{DE}$ and $m\angle CAD = 100°$. What is $m\angle DAE$?

A) 20°

B) 25°

C) 30°

D) 40°

40) What set of transformations will transform the leftmost image into the rightmost image?

A) A 90 degree clockwise rotation about (2,1) followed by a translation of two units to the right.

B) A translation 3 units up, followed by a reflection about the line y=x.

C) A 90 degree clockwise rotation about (5,1), followed by a translation of 2 units up.

D) A 90 degree counterclockwise rotation about (3,3) followed by a translation of 2 units up.

41) The histogram below shows the number of pairs of footware owned by a group of college students.
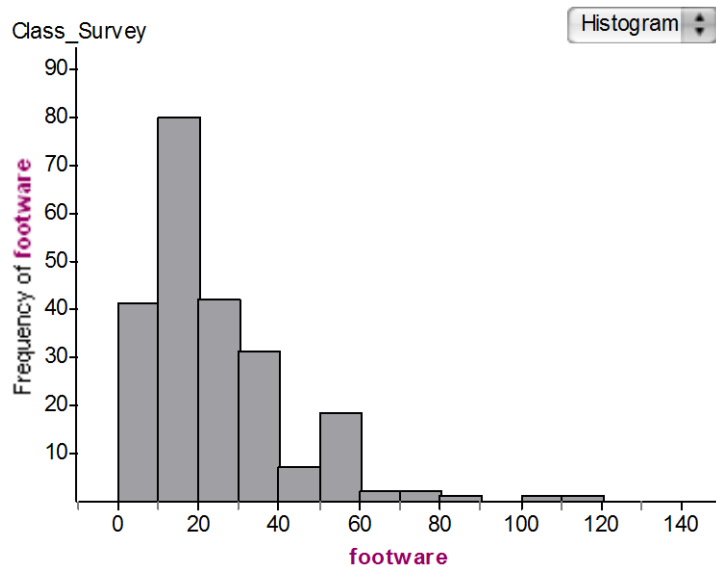
Which of the following statements can be inferred from the graph above?

A) The median number of pairs of footware owned is between 50 and 60 pairs.

B) The mode of the number of pairs of footware owned is 20.

C) The mean number of pairs of footware owned is less than the median number of pairs of footware owned.

D) The median number of pairs of footware owned is between 10 and 20.

42) The histogram below shows the frequency of a class's scores on a 4 question quiz.

Collection 1
Histogram
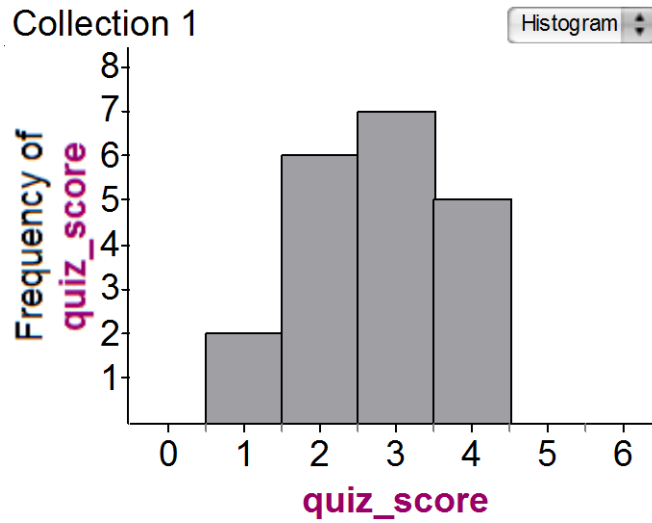
What was the mean score on the quiz?

A) 2.75

B) 2

C) 3

D) 2.5

43) There are six gumballs in a bag – two red and four green. Six children take turns picking a gumball out of the bag without looking. They do not return any gumballs to the bag. What is the probability that the first two children to pick from the bag pick the red gumballs?

A) $\dfrac{1}{3}$

B) $\dfrac{1}{8}$

C) $\dfrac{1}{9}$

D) $\dfrac{1}{15}$

44) The table below gives data from various years on how many young girls drank milk.

Nationwide Food Survey Years

		1987-1988	1989-1991	1994-1996	Total
Drinks Fluid Milk	Yes	354	502	366	1222
	No	226	335	366	927
	Total	580	837	732	2149

Based on the data given above, what was the probability that a randomly chosen girl in 1990 drank milk?

A) $\dfrac{502}{1222}$

B) $\dfrac{502}{2149}$

C) $\dfrac{502}{837}$

D) $\dfrac{1222}{2149}$

45) Four children randomly line up, single file. What is the probability that they are in height order, with the shortest child in front?   All of the children are different heights.

A) $\dfrac{1}{4}$

B) $\dfrac{1}{256}$

C) $\dfrac{1}{16}$

D) $\dfrac{1}{24}$

Answer Key

1	B		24	B
2	D		25	D
3	A		26	B
4	A		27	D
5	B		28	A
6	C		29	B
7	C		30	C
8	C		31	A
9	A		32	C
10	C		33	A
11	D		34	B
12	A		35	B
13	D		36	B
14	A		37	A
15	D		38	B
16	C		39	A
17	B		40	C
18	A		41	D
19	D		42	A
20	A		43	D
21	C		44	C
22	A		45	D
23	D			