CONTESTANT NUMBER:

UIL

**University Interscholastic League
A+ Mathematics Contest • Answer Sheet**

Write your contestant number in the upper right corner, and circle your grade below.
**Circle Grade Level: 6   7   8**

1.	A	B	C	D	E	26.	A	B	C	D	E
2.	A	B	C	D	E	27.	A	B	C	D	E
3.	A	B	C	D	E	28.	A	B	C	D	E
4.	A	B	C	D	E	29.	A	B	C	D	E
5.	A	B	C	D	E	30.	A	B	C	D	E
6.	A	B	C	D	E	31.	A	B	C	D	E
7.	A	B	C	D	E	32.	A	B	C	D	E
8.	A	B	C	D	E	33.	A	B	C	D	E
9.	A	B	C	D	E	34.	A	B	C	D	E
10.	A	B	C	D	E	35.	A	B	C	D	E
11.	A	B	C	D	E	36.	A	B	C	D	E
12.	A	B	C	D	E	37.	A	B	C	D	E
13.	A	B	C	D	E	38.	A	B	C	D	E
14.	A	B	C	D	E	39.	A	B	C	D	E
15.	A	B	C	D	E	40.	A	B	C	D	E
16.	A	B	C	D	E	41.	A	B	C	D	E
17.	A	B	C	D	E	42.	A	B	C	D	E
18.	A	B	C	D	E	43.	A	B	C	D	E
19.	A	B	C	D	E	44.	A	B	C	D	E
20.	A	B	C	D	E	45.	A	B	C	D	E
21.	A	B	C	D	E	46.	A	B	C	D	E
22.	A	B	C	D	E	47.	A	B	C	D	E
23.	A	B	C	D	E	48.	A	B	C	D	E
24.	A	B	C	D	E	49.	A	B	C	D	E
25.	A	B	C	D	E	50.	A	B	C	D	E

INVITATIONAL 2021-2022
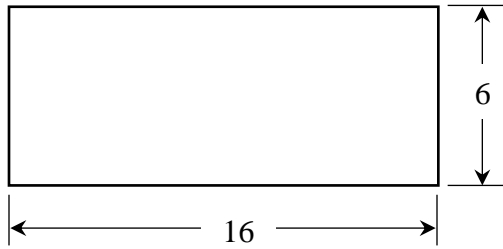
A+ ACADEMICS
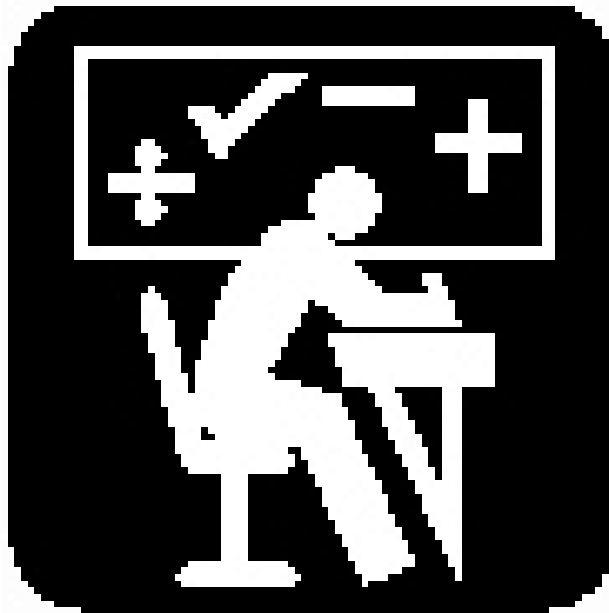
University Interscholastic League

Mathematics

DO NOT OPEN TEST
UNTIL TOLD TO DO SO

2021 – 2022 University Interscholastic League JH/MS Mathematics Contest A

(1)   Evaluate: $3^{-1} \times (6^0 + 5^2 + 1)$
        A) 27   B) 18   C) 12   D) 9   E) -81

(2)   The product of twenty-four and twelve point five percent is equal to what amount?
        A) 3   B) 2.88   C) 288   D) 300   E) 12

(3)   What is the ratio of ounces in two cups to one quart?
        A) $\dfrac{1}{2}$ B) $\dfrac{1}{4}$ C) 4   D) 2   E) $\dfrac{3}{4}$

(4)   1.5 square centimeters = _____ square millimeters.
        A) 15   B) 0.15   C) 150   D) 0.0015   E) 1500

(5)   What is the area of a circle with a diameter of 8-inches?
        A) 64 in^2 B) 64π in^2 C) 16 in^2 D) 4π in^2 E) None of These

(6)   How many minutes are between 8:45 AM and 3:30 PM of the same day?
        A) 420 minutes   B) 405 minutes   C) 435 minutes   D) 445 minutes   E) 535 minutes

(7)   If the sales tax for an item is $8\dfrac{1}{2}$ %, what is the sales tax for an item that costs $100?

        A) $82.50   B) $0.83   C) $1.83   D) $8.50   E) $8.05

(8)   How many whole numbers will evenly divide into thirty-six?
        A) 9   B) 8   C) 12   D) 36   E) 18

(9)   88 feet per second (ft/s) = _____ miles per hour (mph).

        A) 176 mph   B) $4\dfrac{2}{3}$ mph   C) 60 mph   D) 45 mph   E) 30 mph

(10)   What is the ratio of perimeter to
        area of the figure to the right?
        A) $\dfrac{48}{13}$ D) $\dfrac{13}{48}$

        B) $\dfrac{11}{48}$ E) $\dfrac{11}{24}$

        C) 16

(11)   First class postage currently costs 55¢. How many of these stamps can be purchased with $20?
        A) 35   B) 36   C) 37   D) 38   E) 110

(12)   Pi, the irrational number, is defined as
        A) the ratio of the circumference of a circle to the area of the circle.
        B) the ratio of the circumference of a circle to the length of its diameter.
        C) the ratio of the area of a circle to the length of its radius.
        D) the ratio of the area of a circle to the circumference of the circle.
        E) 3.1415.

(13)　This season, a baseball team increases ticket prices by 15% over the previous season's prices. How much will a ticket cost this season that had a price of $24 the previous season?
A) $24.36　　　B) $26.40　　　C) $25.40　　　D) $36.00　　　E) $27.60

(14)　A woodworking class spends $5 for materials to make yo-yos. The class sells the yo-yos for $2 each. How much profit would the class make if the class made and sold 15 yo-yos?
A) $30　　　B) $75　　　C) $10　　　D) $20　　　E) $25

(15)　$6\dfrac{1}{3} \times 9\dfrac{1}{3} =$
A) $54\dfrac{1}{9}$　　　B) $54\dfrac{1}{6}$　　　C) $59\dfrac{1}{9}$　　　D) $15\dfrac{1}{6}$　　　E) $69\dfrac{1}{3}$

(16)　If $1957 - a9 = 18b8$, where a and b are digits, what does $a + b$ equal?
A) 4　　　B) 5　　　C) 10　　　D) 14　　　E) 15

(17)　If $\dfrac{3}{8} + \dfrac{1}{n} = \dfrac{1}{4}$, then $n =$
A) $-\dfrac{1}{4}$　　　B) $-\dfrac{1}{8}$　　　C) $\dfrac{3}{32}$　　　D) 4　　　E) -8

(18)　If two numbers differ by 2 and their sum is 20, what is the larger number?
A) 8　　　B) 9　　　C) 10　　　D) 11　　　E) 12

(19)　A rectangle and a square have equal perimeters. The area of the square is 64 square inches and the length of the rectangle is 10 inches. What is the width of the rectangle?
A) 6-in.　　　B) 8-in.　　　C) 12-in.　　　D) 18-in.　　　E) 32-in.

(20)　In a class of 40 students, 18 said they liked apple pie, 15 said they liked chocolate cake and 12 said they did not like either. How many students in the class liked both pie and cake?
A) 3　　　B) 5　　　C) 7　　　D) 10　　　E) 15

(21)　One quarter mile = _____ feet.
A) 440 feet　　　B) 5280 feet　　　C) 1320 feet　　　D) 1760 feet　　　E) 880 feet
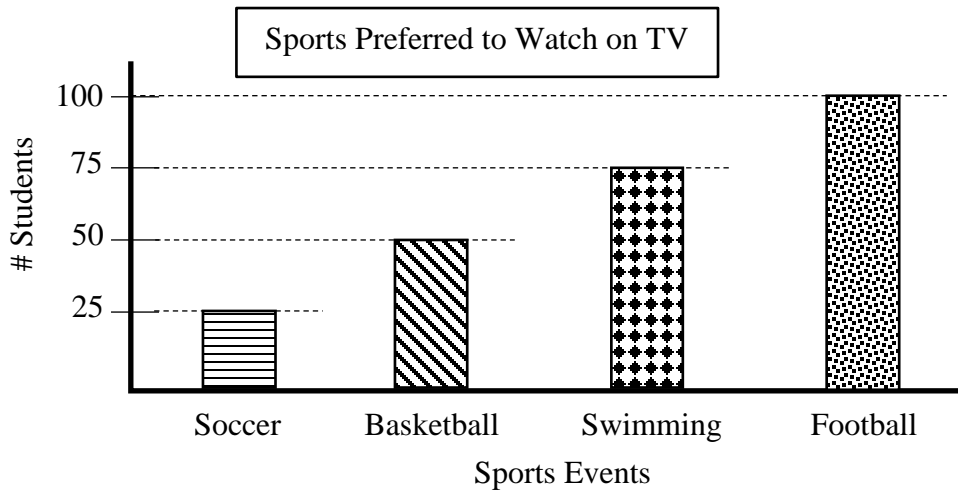
(22)　What is the area of the figure to the right?
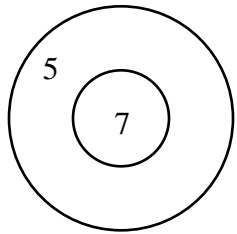A) 66 m^2
B) 54 m^2
C) 78 m^2
D) 42 m^2
E) 70 m^2
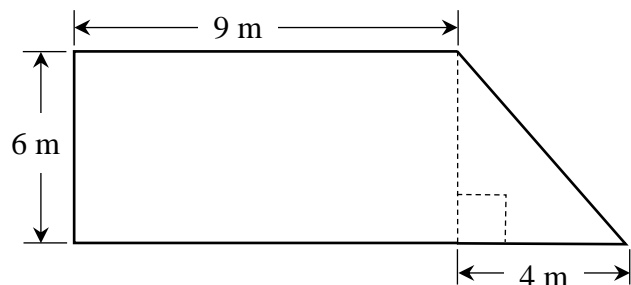
(23)　Maria set a school record for most points in a single basketball game when her team scored 48 points. The six other players on her team averaged 3.5 points each. How many points did Maria score to set her school record?
A) 32　　　B) 21　　　C) 25　　　D) 27　　　E) 17

(24)   What is the average of the two largest prime numbers less than 40?
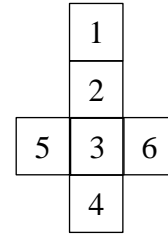   A) 34   B) 38   C) 37   D) 30   E) 17

For problems #25 – #28 please use the bar chart graph below.

Sports Preferred to Watch on TV

Students

100 ·······································

75 ·······································

50 ·······································

25 ·······································

Soccer   Basketball   Swimming   Football

Sports Events

(25)   Students at Alan Shepard Middle School were surveyed recently as to the sporting event they most liked to watch on TV. According to the survey bar graph, how many total students were surveyed?
     A) 100   B) 150   C) 175   D) 200   E) 250

(26)   Students at Alan Shepard Middle School were surveyed recently as to the sporting event they most liked to watch on TV. According to the survey bar graph, what percentage of the students preferred to watch basketball?

     A) 20%   B) 25%   C) 50%   D) $66\frac{2}{3}$ %   E) 75%

(27)   Students at Alan Shepard Middle School were surveyed recently as to the sporting event they most liked to watch on TV. If there are a total of 825 students enrolled at the surveyed school, how many students did not answer the survey?
     A) 325   B) 425   C) 575   D) 625   E) 675

(28)   Students at Alan Shepard Middle School were surveyed recently as to the sporting event they most liked to watch on TV. If you randomly picked one of the students that answered the survey, what is the probability that the student enjoyed watching soccer on TV?

     A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{3}{4}$ D) $\frac{1}{5}$ E) $\frac{1}{10}$

(29)   Noah is going to the store. One quarter of the way to the store, he stops to talk with Wes. He then continues for 12 km and reaches the store. How many kilometers does he travel altogether?
     A) 15 km   B) 16 km   C) 20 km   D) 24 km   E) 48 km

(30)   If $x = 4$ and $3x + 2y = 30$, what is the value of y?
     A) 3   B) 4   C) 6   D) 9   E) 18

(31)   If $5^{(x+2)} = 200$, then 5^x equals what number?
     A) 25   B) 125   C) 8   D) 2000   E) 10

(32)   A pro football player's autograph was once worth $100. The autograph then dropped 30% in value. If it
       then increased by 40%, what is its value now?
       A) $100   B) $98   C) $90   D) $78   E) $48

(33)   One soccer ball and one soccer shirt together cost $100. Two soccer balls and three soccer shirts
       together cost $262. What is the cost of one soccer ball?
       A) $38   B) $40   C) $48   D) $50   E) $87.30

(34)   0.3888 . . . . =

       A) $\dfrac{38}{99}$ B) $\dfrac{19}{45}$ C) $\dfrac{7}{18}$ D) $\dfrac{35}{99}$ E) $\dfrac{7}{12}$

(35)   Two identical regular hexagons are placed so that a side of each hexagon overlaps an opposite side of
       a square. If all sides of the polygons are the same length of 12-inches, what is the total perimeter of the
       new polygon.
       A) 144 in.   B) 192 in.   C) 200 in.   D) 240 in.   E) None of these

(36)   Albert chooses two different items for a snack. His choices are an apple, an orange, a banana, and a
       granola bar. How many different pairs of snacks could he choose?
       A) 3   B) 4   C) 5   D) 6   E) 7

(37)   To the right is a dart board. When you throw a dart, you earn either
       5 points, 7 points, or 0 points (if you miss). Your score is the sum of
       all the points you earn. What is the highest total score less than 100
       that is impossible to make?
       A) 11   D) 23
       B) 13   E) 34
       C) 18

(38)   In eighth grade, the ratio of boys to girls was 5:4. After 3 more girls enrolled in the eighth grade, the
       ratio was 10:9. How many students are in the eighth grade now?
       A) 22   B) 57   C) 66   D) 93   E) 109

(39)   What is the mean of all the numbers between 1 and 100 that are evenly divisible by 6?
       A) 51   B) 60   C) 96   D) 102   E) 1632

(40)   If $a*b$ means $\dfrac{a+b}{2}$, then (4*6)*2 equals what number?

       A) 7   B) $3\dfrac{1}{2}$ C) 12   D) 6   E) $4\dfrac{1}{2}$

(41)   If $a + b = 19$ and $a - b = 5$, what is the value of $3a - 4b$?
       A) 7   B) -7   C) 8   D) -8   E) 12

(42)   What is the 30th triangular number?
       A) 300   B) 360   C) 419   D) 465   E) 499

(43)   A cube is created by folding the figure shown to the right.
Which face is opposite the face with a 1 on it?
A) 2
B) 3
C) 4
D) 5
E) 6

(44)   An *arithmetic sequence* is a sequence in which each term after the
first is obtained by adding a constant to the previous term. For
example, 2, 4, 6, 8 and 1, 4, 7, 10 are arithmetic sequences. In the
grid shown to the right, the numbers in each row must form an
arithmetic sequence and the numbers in each column must form an
arithmetic sequence. What is the value of x?
A) 28   D) 43.75
B) 36   E) 46
C) 37

1			
4			25
7			x
10		36	

(45)   A brand of pasta costs $1.80 for 12 ounces. At this rate, what is the price for 26 ounces of this brand of
pasta?
A) $3.05   B) $3.10   C) $3.60   D) $3.90   E) $4.50

(46)   Every time the two wheels in the illustration
to the right are spun, two numbers are selected
by the pointers. What is the probability that the
sum of the two numbers selected is a multiple
of 3?
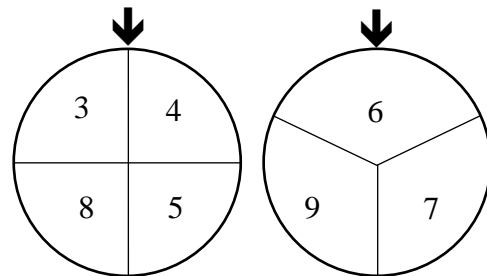
A) $\dfrac{1}{4}$ D) $\dfrac{3}{7}$

B) $\dfrac{1}{2}$ E) None of these

C) $\dfrac{1}{6}$

(47)   Which of the following pairs of numbers has a greatest common factor of 20?
A) 2000 and 200   B) 40 and 50   C) 20 and 25   D) 20 and 40   E) 40 and 80

(48)   The pyramid shown to the right is made up of four
isosceles triangles with a square base. If the congruent
sides of the triangles measure 5-cm and the base side
is 6-cm long, what is the total surface area of this
pyramid?
A) 84 cm^2 D) 36 cm^2
B) 72 cm^2 E) 24 cm^2
C) 48 cm^2

5 cm

6 cm
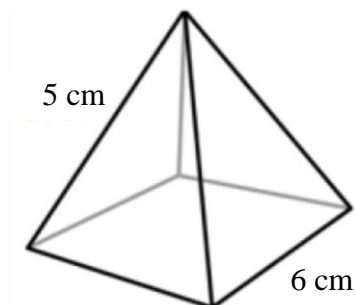
(49) Daniel begins with 64 coins in his coin jar. Each time he reaches into the jar, he removes half of the coins that are in the jar. How many times must he reach in and remove coins from his jar so that exactly 1 coin remains in the jar?

A) 5 B) 6 C) 7 D) 32 E) 63

(50) What is the x-intercept of the straight line $5y = 3x - 20$?

A) $-\dfrac{1}{4}$ B) $\dfrac{3}{5}$ C) $\dfrac{20}{3}$ D) 0 E) –4

2021 – 2022 University Interscholastic League JH/MS Mathematics Contest A – Key

(1)	D		(26)	A
(2)	A		(27)	C
(3)	A		(28)	E
(4)	C		(29)	B
(5)	E (16π)		(30)	D
(6)	B		(31)	C
(7)	D		(32)	B
(8)	A		(33)	A
(9)	C		(34)	C
(10)	E		(35)	A
(11)	B		(36)	D
(12)	B		(37)	D
(13)	E		(38)	B
(14)	E		(39)	A
(15)	C		(40)	B
(16)	D		(41)	C
(17)	E		(42)	D
(18)	D		(43)	B
(19)	A		(44)	C
(20)	B		(45)	D
(21)	C		(46)	E $(\tfrac{1}{3})$
(22)	A		(47)	D
(23)	D		(48)	A
(24)	A		(49)	B
(25)	E		(50)	C

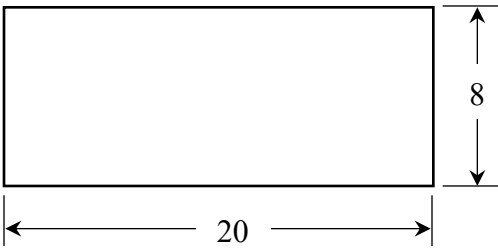# FALL/WINTER DISTRICT 2021-2022

A+ ACADEMICS

University Interscholastic League

Mathematics

DO NOT OPEN TEST
UNTIL TOLD TO DO SO

2021 – 2022 University Interscholastic League JH/MS Mathematics Contest B

(1)   Evaluate: $(1 + 11 + 21 + 31 + 41) + (9 + 19 + 29 + 39 + 49)$.
      A) 150   B) 199   C) 200   D) 249   E) 250

(2)   If the value of 20 quarters and 10 dimes equals the value of 10 quarters and **n** dimes, then **n** equals?
      A) 10   B) 20   C) 30   D) 35   E) 45

(3)   When finding the sum: $\dfrac{1}{2} + \dfrac{1}{3} + \dfrac{1}{4} + \dfrac{1}{5} + \dfrac{1}{6} + \dfrac{1}{7}$, what is the least common denominator used?
      A) 110   B) 210   C) 420   D) 840   E) 5040

(4)   Given that 1 mile = 8 furlongs and 1 furlong = 40 rods, what is the number of feet in one rod?
      A) 15 feet   B) $16\dfrac{1}{2}$ feet   C) 32 feet   D) 64 feet   E) 320 feet

(5)   What is the area of a square with a perimeter of 24-inches?
      A) 576 in²   B) 216 in²   C) 96 in²   D) 36 in²   E) 16 in²

(6)   How many minutes are between 7:30 AM and 3:20 PM of the same day?
      A) 480 minutes   B) 490 minutes   C) 500 minutes   D) 520 minutes   E) None of these

(7)   If the sales tax for an item is $8\dfrac{1}{2}$ %, what is the sales tax for an item that costs \$50?
      A) \$8.25   B) \$0.42   C) \$45.00   D) \$48.00   E) \$4.25

(8)   How many whole numbers will evenly divide into forty?
      A) 9   B) 8   C) 12   D) 36   E) 18

(9)   22 feet per second (ft/s) = _____ miles per hour (mph).
      A) 15 mph   B) $5\dfrac{2}{3}$ mph   C) 30 mph   D) 75 mph   E) 60 mph

(10) What is the ratio of perimeter to area of the figure to the right?

      A) $\dfrac{2}{5}$ D) $\dfrac{7}{48}$

      B) $\dfrac{4}{5}$ E) $\dfrac{7}{40}$

      C) $\dfrac{7}{20}$

(11) If the product of two consecutive whole numbers is 272, what is the larger whole number?
      A) 15   B) 16   C) 17   D) 18   E) 19

(12) At a wedding reception, after the bride and groom cut their wedding cake half the people in the room left. One third of those remaining started to dance. There were then 12 people who were not dancing. What was the original number of people in the room before the cake-cutting ceremony?
   A) 18   B) 30   C) 36   D) 42   E) 72

(13)   Genny has a square-shaped deck in her backyard with the dimensions 15 ft × 15 ft. She plans to enlarge the deck by adding the same amount to the length and the width of the current deck. If the length of the addition is a, which equation would provide the new area after the deck enlargement?
A) Area $= (15a)^2$ B) Area $= 15^2 + a$ C) Area $= 15^2 + a^2$ D) Area $= (15 + a)^2$ E) Area $= 15a^2$

(14)   The Austin city manager wants to graph the city's population growth across a period of 150 years. She will use a graph to illustrate changes in the rate of growth over time. Which graph would be **most** appropriate for that purpose?
A) a line graph
B) a circle graph
C) a double bar graph
D) a bimodal circle graph
E) a relative frequency histogram

(15) $8\dfrac{3}{4} \times 8\dfrac{1}{4} - \dfrac{3}{16} =$

A) 64   B) $64\dfrac{3}{8}$ C) $64\dfrac{3}{16}$ D) 72   E) $72\dfrac{3}{16}$

(16)   In the sequence: -1, 2, a, 14, 23, b, 47, . . ., what does $2a^2 - b$ equal?
A) -20   B) 64   C) -22   D) 36   E) 15

(17)   If $0.125 + \dfrac{1}{n} = \dfrac{3}{4}$, then $n =$

A) $1\dfrac{3}{5}$ B) $\dfrac{5}{8}$ C) $\dfrac{7}{8}$ D) $1\dfrac{1}{7}$ E) $-\dfrac{5}{8}$

(18)   An exhaust fan is rated to be able to remove 125 ft³ of air each minute. How long would it take this fan to remove the air in a room that measured 10 ft. by 8 ft. by 25 ft. in size?
A) 8 minutes   B) 16 minutes   C) 20 minutes   D) 30 minutes   E) 36 minutes

(19)   Matt can do a certain job in 15 minutes that takes Andy 30 minutes to do. How long would it take both of them to do the one job working together?
A) 6 minutes   B) 8 minutes   C) 10 minutes   D) 12 minutes   E) 45 minutes

(20)   What is the diameter of a sphere with a surface area of 64π square inches?
A) 128 inches   B) 64 inches   C) 16 inches   D) 8 inches   E) 4 inches

(21)   One-half mile = _____ yards.
A) 1760 yards   B) 880 yards   C) 440 yards   D) 220 yards   E) 110 yards

(22)   In trapezoid $ABCD$ to the right, the side AB and CD are equal. What is the perimeter of $ABCD$?
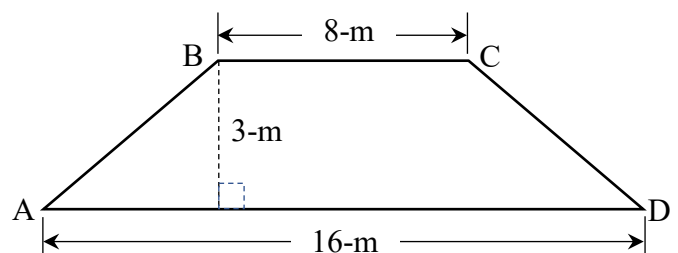
A) 27 m
B) 30 m
C) 32 m
D) 34 m
E) 48 m

(23) Which of the following illustrates the multiplicative identity property?

A) $a(0) = 0$ B) $a\left(\dfrac{1}{a}\right) = 1$ C) $a + 1 = 1 + a$ D) $a(1) = a$ E) $a(1) = 1$

(24) What is the average of the two largest prime numbers less than 60?
A) 58 B) 57 C) 56 D) 55 E) 53

**For problems #25 – #28 please use the graph below.**
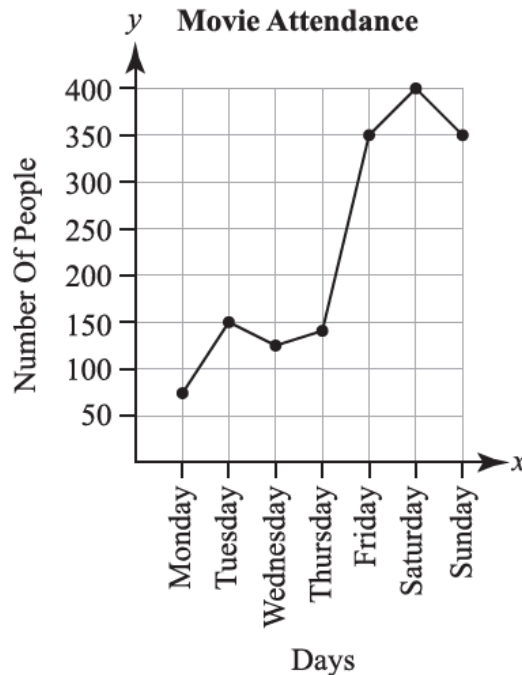
(25) The graph above shows the number of customers at a local movie theater for one week. What was the percent increase in attendance from Monday to Tuesday?
A) 100% B) 150% C) 175% D) 75% E) 15%

(26) The graph above shows the number of customers at a local movie theater for one week. What was the range of attendance from Tuesday thru Saturday?
A) 250 people B) 125 people C) 550 people D) 225 people E) 275 people

(27) The graph above shows the number of customers at a local movie theater for one week. What was the mean attendance for the weekend (Friday – Sunday)? (Please round to the whole number if necessary.)
A) 50 people B) 425 C) 375 people D) 367 people E) 1100 people

(28) The graph above shows the number of customers at a local movie theater for one week. If tickets to a movie cost $7.50 each, how much money was earned from ticket sales over the weekend (Saturday and Sunday)?
A) $6000 B) $8250 C) $5625 D) $3000 E) $2625

(29) Dan wanted to buy a video game, but at $56, it was too expensive. Later, the store put the game on sale, marking the price down by 25%. He also found a coupon in the paper that gave 10% off the sale price. Using the coupon, he bought the game. How much did he pay for the game (not including sales tax)?
A) $14.00 B) $21.00 C) $42.00 D) $37.80 E) $50.40

(30)   What is the largest radius of a circle that can be circumscribed by a square with area 324-in²?
A) 162-inches   B) 81-inches   C) 9-inches   D) 18-inches   E) 9π-inches

(31)   If $5^{(2x)} = 400$, then 5^x equals what number?
A) 2000   B) 200   C) 125   D) 20   E) 16

(32)   In a group of 16 people the average age is 25. After Andy leaves the group, the mean age falls to 22. How old is Andy?
A) 23 years   B) 55 years   C) 60 years   D) 65 years   E) 70 years

(33)   How many 6 in. by 6 in. tiles would Billy need to cover the recreation room floor which measures 9 ft. by 12 ft.?
A) 36   B) 108   C) 360   D) 410   E) 432

(34)   0.4666 . . . . =
A) $\dfrac{7}{15}$ B) $\dfrac{23}{45}$ C) $\dfrac{14}{33}$ D) $\dfrac{46}{99}$ E) $\dfrac{23}{99}$

(35)   A palindrome is a positive integer whose digits are the same when read forwards or backwards. What is the smallest number which can be added to 2002 to produce a larger palindrome?
A) 11   B) 18   C) 108   D) 110   E) 1001

(36)   Liz is walking in a straight line towards a lamp post which is 8-m high. When she is 12-m away from the lamp post, her shadow is 4-m in length. When she is 8-m from the lamp post, what is the length of her shadow?
A) $1\dfrac{1}{2}$-m   B) 2-m   C) $2\dfrac{1}{2}$-m   D) $2\dfrac{2}{3}$-m   E) 3-m

(37)   A large box of chocolates and a small box of chocolates together cost $15. If the large box costs $3 more than the small box, what is the price of the small box of chocolates?
A) $3   B) $4   C) $5   D) $6   E) $9

(38)   There are 2 boys for every 3 girls in Mr. Zapata's math class. If there are 30 students in his class, what percent of them are boys?
A) 12%   B) 20%   C) 40%   D) 60%   E) $66\dfrac{2}{3}\%$

(39)   Mike, Dan, and Matt are having a race on their tricycles. If there are no ties, in how many different possible orders can they finish?
A) 3   B) 4   C) 5   D) 6   E) 7

(40)   If $a*b$ is defined so that $a*b = a^2 + b$, what is $(3*2)*4$?
A) 24   B) 25   C) 40   D) 123   E) 125

(41)   If $x = 5$ and $y = x + 3$ and $z = 3y + 1$, then what is the value of z?
A) 7   B) 12   C) 19   D) 25   E) 46

(42) What is the sum of 8th and 9th triangular numbers?
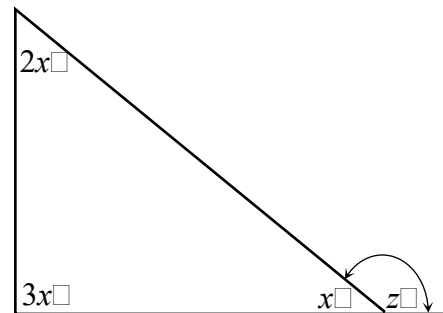   A) 81   B) 72   C) 45   D) 36   E) 17

(43) Six squares are colored, front and back, (R = red, B = blue, O = orange, Y = yellow, G = green, and W = white). They are hinged together as shown, then folded to form a cube. What is the face opposite the white face?
    A) R
    B) B
    C) O
    D) Y
    E) G

R	B	
G	Y	O
	W	
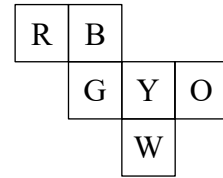
(44) In the drawing to the right, what is the value of z?

    A) 60

    B) 90

    C) 120

    D) 150

    E) 180

(Diagram: $2x°$ at top, $3x°$ at bottom left, $x°$ and $z°$ at bottom right)

(45) Larry the llama is tied to the corner of a 2-m by 3-m shed on a 3-m leash. How much area does Larry have in which to play if he can go only around the outside of the shed?
    A) 4π-m^2 B) 5π-m^2 C) 7π-m^2 D) 9π-m^2 E) 4π-m^2

(46) Every time the two wheels in the illustration to the right are spun, two numbers are selected by the pointers. What is the probability that the sum of the two numbers selected is a multiple of 2?

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

    B) $\dfrac{1}{2}$

    C) $\dfrac{3}{7}$

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

    E) $\dfrac{1}{6}$

(Wheel 1: 3, 4, 8, 5; Wheel 2: 6, 9, 7)
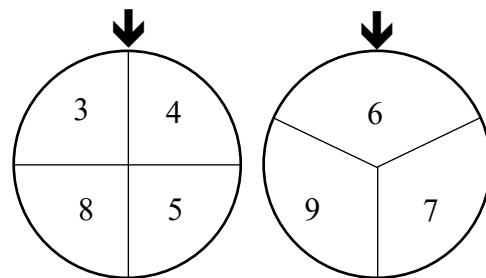
(47) Which of the following pairs of numbers has a greatest common factor of 12?
    A) 24 and 108   B) 16 and 24   C) 12 and 18   D) 36 and 40   E) 24 and 32

(48)　44 (base 6) + 33 (base 6) + 22 (base 6) + 11 (base 6) = _____ (base 6)
　　　A) 110　　　　　　B) 221　　　　　　C) 134　　　　　　D) 154　　　　　　E) 124

(49)　Ten balls numbered 1 to 10 are in a jar. Wes reaches into the jar and randomly removes one of the balls. Then Noah reaches into the jar and randomly removes a different ball. What is the probability that the sum of the two numbers on the balls removed is even?

　　　A) $\dfrac{4}{9}$　　　　B) $\dfrac{1}{5}$　　　　C) $\dfrac{25}{52}$　　　　D) $\dfrac{19}{40}$　　　　E) $\dfrac{2}{5}$

(50)　What is the x-intercept of the straight line $6y = \dfrac{3}{4}x - 12$?

　　　A) –2　　　　　　B) 16　　　　　　C) 9　　　　　　D) -9　　　　　　E) 2

2021 – 2022 University Interscholastic League JH/MS Mathematics Contest B – Key

|				
(1)	E	(26)	A
(2)	D	(27)	D
(3)	C	(28)	C
(4)	B	(29)	D
(5)	D	(30)	C
(6)	E (470 minutes)	(31)	D
(7)	E	(32)	E
(8)	B	(33)	E
(9)	A	(34)	A
(10)	C	(35)	D
(11)	C	(36)	D
(12)	C	(37)	D
(13)	D	(38)	C
(14)	A	(39)	D
(15)	D	(40)	E
(16)	B	(41)	D
(17)	A	(42)	A
(18)	B	(43)	B
(19)	C	(44)	D
(20)	D	(45)	C
(21)	B	(46)	B
(22)	D	(47)	A
(23)	D	(48)	D
(24)	C	(49)	A
(25)	B	(50)	B

University Interscholastic League

Mathematics

**DO NOT OPEN TEST
UNTIL TOLD TO DO SO**

2021 – 2022 University Interscholastic League JH/MS Mathematics Contest C

(1)   Evaluate: $(-10 + -9 + -8 + \ldots + -1) + (1 + 3 + 5 + \ldots + 11)$.
A) -19   B) 91   C) -6   D) 66   E) -36

(2)   If the value of 12 quarters and 16 dimes equals the value of 10 quarters and *n* dimes, then *n* equals?
A) 12   B) 21   C) 23   D) 34   E) 46

(3)   When finding the sum: $\dfrac{1}{2} + \dfrac{1}{3} + \dfrac{1}{4} + \dfrac{1}{5} + \dfrac{1}{6} + \dfrac{1}{8}$, what is the least common denominator used?
A) 110   B) 210   C) 120   D) 240   E) 5760

(4)   Given that 1 bushel = 4 pecks and 8 quarts = 1 peck, how many pints (dry measure) are in a bushel?
A) 64 pints   B) $16\dfrac{1}{2}$ pints   C) 128 pints   D) 32 pints   E) 80 pints

(5)   What is the area of a square with a perimeter of 32-inches?
A) 1024in^2 B) 512 in^2 C) 256 in^2 D) 128 in^2 E) 64 in^2

(6)   How many minutes are between high noon and 3:30 PM of the same day?
A) 330 minutes   B) 165 minutes   C) 183 minutes   D) 210 minutes   E) None of these

(7)   If the sales tax for an item is $8\dfrac{1}{2}$ %, what is the sales tax for an item that costs $20?
A) $1.70   B) $0.70   C) $10.85   D) $21.70   E) $17.00

(8)   How many whole numbers will evenly divide into 70?
A) 3   B) 6   C) 8   D) 35   E) 70

(9)   44 feet per second (ft/s) = _____ miles per hour (mph).
A) 30 mph   B) $1\dfrac{4}{11}$ mph   C) 88 mph   D) 44 mph   E) $6\dfrac{4}{11}$ mph

(10)   What is the ratio of perimeter to area of the figure to the right?

A) $\dfrac{2}{5}$ D) $\dfrac{7}{60}$

B) $\dfrac{4}{5}$ E) $\dfrac{7}{30}$

C) $\dfrac{7}{20}$

12

30

(11)   If the product of two consecutive whole numbers is 240, what is the larger whole number?
A) 15   B) 16   C) 17   D) 18   E) 19

(12)   At a wedding reception, after the bride and groom cut their wedding cake half the people in the room left. One third of those remaining started to dance. There were then 30 people who were not dancing. What was the original number of people in the room after the cake-cutting ceremony?
A) 24   B) 30   C) 90   D) 42   E) 45

(13) Genny has a square-shaped homemade rug in her bedroom with the dimensions 5 ft × 5 ft. She plans to enlarge the rug by adding the same amount to the length and the width of the current rug. If the length of the addition is a, which equation would provide the new area after the rug enlargement?
A) Area $= (5 + a)^2$
B) Area $= 5^2 + a$
C) Area $= 5^2 + a^2$
D) Area $= (5a)^2$
E) Area $= 5a^2$

(14) The Austin city manager wants to graph the populations for the city's three major ethnic groups for the current year. She will use the graph to illustrate the diversity of Austin's population. Which graph would be **most** appropriate for that purpose?
A) a line graph
B) a circle graph
C) a double bar graph
D) a bimodal circle graph
E) a relative frequency histogram

(15) $6\dfrac{3}{4} \times 6\dfrac{1}{4} - \dfrac{3}{16} =$

A) $42\dfrac{3}{16}$
B) $36\dfrac{3}{8}$
C) 42
D) $36\dfrac{3}{16}$
E) $42\dfrac{3}{16}$

(16) In the sequence: -1, 2, a, 14, 23, b, 47, . . ., what does $a^2 - 2b$ equal?
A) 49
B) 64
C) -68
D) -19
E) 27

(17) If $0.375 + \dfrac{1}{n} = \dfrac{3}{4}$, then $n =$

A) $1\dfrac{3}{8}$
B) $\dfrac{3}{8}$
C) $2\dfrac{2}{3}$
D) $1\dfrac{1}{3}$
E) $-\dfrac{3}{8}$

(18) An exhaust fan is rated to be able to remove 150 ft^3 of air each minute. How long would it take this fan to remove the air in a room that measured 10 ft. by 9 ft. by 25 ft. in size?
A) 8 minutes
B) 16 minutes
C) 20 minutes
D) 30 minutes
E) None of these

(19) Matt can do a certain job in 4 minutes that takes Andy 12 minutes to do. How long would it take both of them to do the one job working together?
A) 3 minutes
B) 4 minutes
C) 6 minutes
D) 8 minutes
E) 16 minutes

(20) What is the diameter of a sphere with a surface area of 36π square inches?
A) 4 inches
B) 3 inches
C) 6 inches
D) 8 inches
E) 2 inches

(21) Three-fourths mile = _____ yards.
A) 1760 yards
B) 1320 yards
C) 880 yards
D) 440 yards
E) 220 yards

(22) In trapezoid $ABCD$ to the right, the side AB and CD are equal. What is the perimeter of $ABCD$?
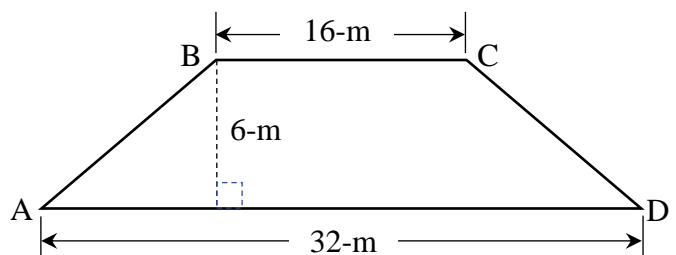
A) 42 m
B) 48 m
C) 52 m
D) 58 m
E) 68 m

(23) Which of the following illustrates the additive identity property?

A) $a + (0) = a$ B) $a\left(\dfrac{1}{a}\right) = 1$ C) $a + 1 = 1 + a$ D) $a(0) = 0$ E) $a + (1) = a$

(24) What is the average of the two largest prime numbers less than 70?
A) 68   B) 64   C) 66   D) 65   E) 63

**For problems #25 – #28 please use the graph below.**

Lunches Sold on Friday
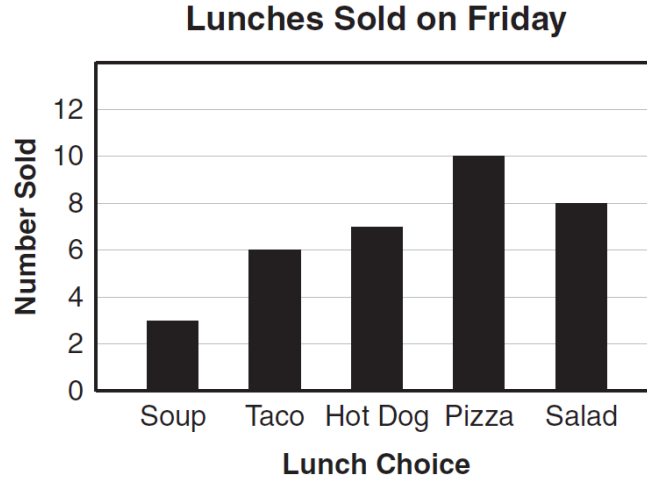
(25) The bar graph above shows the number of different lunches sold at Thurgood Marshall Middle School on a Friday. The number of pizza lunches sold was the same as the number of which two lunch choices added together?
A) soup & hot dog   B) soup & salad   C) taco & hot dog   D) taco & salad   E) taco & soup

(26) The bar graph above shows the number of different lunches sold at Thurgood Marshall Middle School on a Friday. How many more hot dogs and salads were sold than tacos and soups?
A) 24 more   B) 15 more   C) 12 more   D) 6 more   E) 5 more

(27) The bar graph above shows the number of different lunches sold at Thurgood Marshall Middle School on a Friday. If a salad cost 75¢, a bowl of soup cost 85¢ and pizza cost $1.25, how much does it cost in all to purchase these three items?
A) $1.95   B) $2.75   C) $2.85   D) $2.95   E) $3.05

(28) The bar graph above shows the number of different lunches sold at Thurgood Marshall Middle School on a Friday. It turns out that every student that ate lunch that Friday, each picked two items from the lunch choices and 8 additional students brought their own lunch. How many students total ate lunch that Friday?
A) 34 students   B) 28 students   C) 26 students   D) 25 students   E) 17 students.

(29) Dan wanted to buy a video game, but at $64, it was too expensive. Later, that store put the game on sale, marking the price down by 25%. He also found a coupon in the paper the gave 10% off the sale price. Using the coupon, he bought the game. How much did he pay for the game (not including sales tax).
A) $16.00   B) $17.60   C) $24.00   D) $48.00   E) $43.20

(30) What is the largest radius of a circle that can be circumscribed by a square with area 484-in^2?
A) 242-inches   B) 22-inches   C) 11-inches   D) 44-inches   E) 22π-inches

(31) If $5^{(2x)} = 625$, then 5^x equals what number?
A) 25   B) 200   C) 125   D) 80   E) 20

(32) In a group of 16 people the average age is 25. After Mary leaves the group, the mean age falls to 23. How old is Mary?
A) 23 years   B) 55 years   C) 60 years   D) 65 years   E) 70 years

(33) How many 6 in. by 6 in. tiles would Billy need to cover the recreation room floor which measures 6 ft. by 9 ft.?
A) 216   B) 108   C) 96   D) 54   E) 48

(34) 0.7333 . . . . =
A) $\dfrac{7}{15}$ B) $\dfrac{73}{90}$ C) $\dfrac{11}{15}$ D) $\dfrac{73}{99}$ E) $\dfrac{7}{60}$

(35) A palindrome is a positive integer whose digits are the same when read forwards or backwards. What is the smallest number which can be added to 202 to produce a larger palindrome?
A) 0   B) 1   C) 2   D) 3   E) 4

(36) Liz is walking in a straight line towards a lamp post which is 8-m high. When she is 12-m away from the lamp post, her shadow is 4-m in length. When she is 10-m from the lamp post, what is the length of her shadow?
A) $2\dfrac{1}{2}$-m   B) $3\dfrac{1}{3}$-m   C) $3\dfrac{1}{2}$-m   D) $2\dfrac{2}{3}$-m   E) 3-m

(37) A large box of chocolates and a small box of chocolates together cost $15. If the large box costs $3 more than the small box, what is the price of the large box of chocolates?
A) $3   B) $4   C) $5   D) $6   E) $9

(38) There are 2 boys for every 3 girls in Mr. Zapata's math class. If there are 30 students in his class, what percent of them are girls?
A) 12%   B) 20%   C) 40%   D) 60%   E) $66\dfrac{2}{3}$%

(39) Mike, Dan, Todd, and Matt are having a race on their tricycles. If there are no ties, in how many different possible orders can they finish?
A) 4   B) 8   C) 16   D) 20   E) 24

(40) If $a*b$ is defined so that $a*b = a^2 + b$, what is (2*3)*4?
A) 7   B) 53   C) 11   D) 28   E) 24

(41) If $x = 5$ and $y = x - 3$ and $z = 3y + 1$, then what is the value of z?
A) 7   B) 12   C) 19   D) 25   E) 42
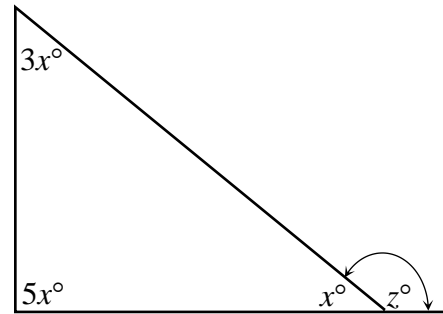
(42) What is the sum of 7th and 8th triangular numbers?
     A) 56   B) 60   C) 64   D) 72   E) 128

(43) Six squares are colored, front and back, (R = red, B = blue, O = orange, Y = yellow, G = green, and W = white). They are hinged together as shown, then folded to form a cube. What is the face opposite the red face?
     A) R
     B) B
     C) O
     D) Y
     E) G

R	B	
	G	Y	O
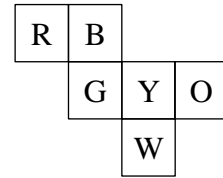
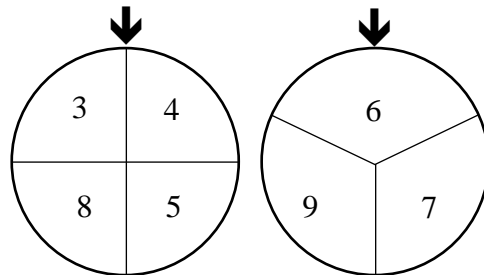(44) In the drawing to the right, what is the value of z?
     A) 30
     B) 160
     C) 20
     D) 140
     E) 150

(45) Larry the llama is tied to the corner of a 4-m by 3-m shed on a 4-m leash. How much area does Larry have in which to play if he can go only around the outside of the shed?
     A) 13π-m^2 B) $\dfrac{7}{4}\pi$-m^2 C) 17π-m^2 D) $12\dfrac{1}{4}\pi$-m^2 E) $7\dfrac{3}{4}\pi$-m^2

(46) Every time the two wheels in the illustration to the right are spun, two numbers are selected by the pointers. What is the probability that the sum of the two numbers selected is a prime number?
     A) $\dfrac{1}{3}$
     B) $\dfrac{1}{2}$
     C) $\dfrac{4}{7}$
     D) $\dfrac{2}{3}$
     E) $\dfrac{1}{4}$

(47) Which of the following pairs of numbers has a greatest common factor of 8?
     A) 18 and 24   B) 16 and 36   C) 32 and 18   D) 42 and 40   E) 24 and 32

(48) 44 (base 5) + 33 (base 5) + 22 (base 5) + 11 (base 5) = _____ (base 5)
   A) 110   B) 220   C) 130   D) 230   E) 120

(49) Six balls numbered 1 to 6 are in a jar. Wes reaches into the jar and randomly removes one of the balls. Then Noah reaches into the jar and randomly removes a different ball. What is the probability that the sum of the two numbers on the balls removed is even?

   A) $\dfrac{1}{3}$ B) $\dfrac{1}{5}$ C) $\dfrac{1}{6}$ D) $\dfrac{7}{36}$ E) $\dfrac{2}{5}$

(50) What is the x-intercept of the straight line $8y = \dfrac{3}{4}x - 24$?

   A) –3   B) 18   C) 32   D) -6   E) 3

2021 – 2022 University Interscholastic League JH/MS Mathematics Contest C – Key

(1)	A		(26)	D
(2)	B		(27)	C
(3)	C		(28)	D
(4)	A		(29)	E
(5)	E		(30)	C
(6)	D		(31)	A
(7)	A		(32)	B
(8)	C		(33)	A
(9)	A		(34)	C
(10)	E		(35)	B
(11)	B		(36)	B
(12)	E		(37)	E
(13)	A		(38)	D
(14)	B		(39)	E
(15)	C		(40)	B
(16)	D		(41)	A
(17)	C		(42)	C
(18)	E (15 minutes)		(43)	D
(19)	A		(44)	B
(20)	C		(45)	D
(21)	B		(46)	A
(22)	E		(47)	E
(23)	A		(48)	B
(24)	B		(49)	E
(25)	A		(50)	C