

CONTESTANT NUMBER:

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**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

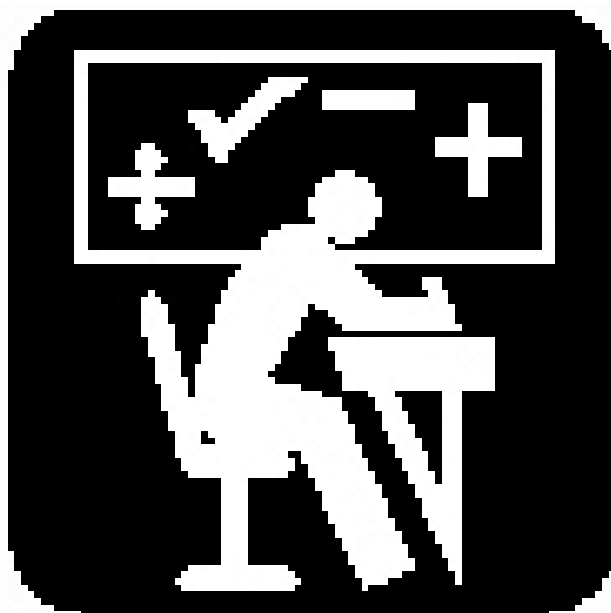
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| 4. A B C D E | 29. A B C D E |
| 5. A B C D E | 30. A B C D E |
| 6. A B C D E | 31. A B C D E |
| 7. A B C D E | 32. A B C D E |
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| 11. A B C D E | 36. A B C D E |
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INVITATIONAL 2023-2024

A+ ACADEMICS



University Interscholastic League



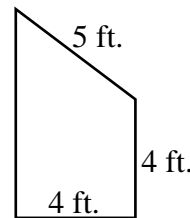
Mathematics

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

2023 – 2024 University Interscholastic League JH/MS Mathematics Contest A

- (1) Evaluate: $8 + 24 \div 2^3$
 A) 12 B) 4 C) 14 D) 11 E) $6\frac{1}{3}$
- (2) Two straight lines cross each other, forming four angles. If one angle is 28° , the other largest angle is
 A) 28° B) 62° C) 152° D) 332° E) None of These
- (3) A turtle had a journey 240 feet to crawl. In the first hour it crawled $\frac{1}{2}$ the total distance. The turtle stopped and rested and then crawled $\frac{1}{3}$ the remaining distance. Again, the turtle stopped and rested. Next the turtle crawled $\frac{1}{4}$ of the remaining distance and stopped to rest. How much distance was left for the turtle to crawl?
 A) 60 feet B) 120 feet C) 10 feet D) 20 feet E) 40 feet
- (4) Susan can bicycle 5 feet/second while Mario can bicycle 4 feet/second. If they are racing side by side initially, how far apart will they be after Susan bicycles 100 yards?
 A) 100 feet B) 75 feet C) 60 feet D) 30 feet E) 15 feet
- (5) A chessboard is comprised of 8 by 8 identical size squares. If a nickel is placed on each square what is the total amount of money placed on the chessboard?
 A) \$64.00 B) \$3.20 C) \$32 D) \$6.40 E) 64¢
- (6) What is the largest prime number less than 100?
 A) 99 B) 95 C) 91 D) 89 E) None of These
- (7) $1001 \times 87 =$
 A) 8,787 B) 80,887 C) 87,807 D) 87,870 E) 87,087
- (8) What is the total area of the figure to the right?
 A) 25 sq. ft. D) 22 sq. ft.
 B) 36 sq. ft. E) 28 sq. ft.
 C) 20 sq. ft.

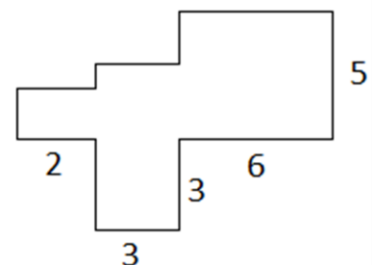
Problem
8



- (9) If there are $16\frac{1}{2}$ feet in a rod, how many rods are in one mile?
 A) 320 rods B) 5,280 rods C) 1,760 rods D) 440 rods E) 160 rods
- (10) Armando pours 2 gallons of grape juice into a container and 3 quarts of water into the same container. Later he pours out 6 pints of the liquid in the container. How much liquid is left in the container?
 A) 12 quarts B) $2\frac{1}{2}$ gallons D) 22 pints D) $2\frac{3}{4}$ gallons E) 8 quarts
- (11) Black-Jack, one of Goldie's kittens, was born on March 18th. How old was Back-Jack at the end of the day on May 18th?
 A) 59 days B) 60 days C) 61 days D) 62 days E) None of These

- (12) Susie is twice as old as Tina. Five years ago, Tina was two years younger than Penelope. If Penelope is twelve, how many years old is Susie?
 A) 16 years B) 18 years C) 20 years D) 22 years E) 24 years
- (13) Wesley has taken 5 reading quizzes and has scored an average of 80 on the quizzes. If he scored 70, 80, 85, and 95 on four of the quizzes, what did he score on the other quiz?
 A) 60 B) 68 C) 70 D) 72 E) 80
- (14) Matt and Mike are running in opposite directions around a circular track with a circumference of 960 m. Matt runs at a speed of 50 m/s and Mike runs at a speed of 70 m/s. If they start at the same point, after how many seconds will they meet?
 A) 48 seconds B) 45 seconds C) $19\frac{1}{5}$ seconds D) $13\frac{5}{7}$ seconds E) 8 seconds
- (15) Points A , B , C , and D lie on a line in alphabetical order. If $BC = CD$, $AB = 10$ and $AD = 38$, what is the value of BC ?
 A) 14 B) 12 C) 16 D) 24 E) 28
- (16) Albert is shoveling snow from his 20-foot by 50-foot driveway. If one foot of snow has fallen on the ground, what volume of snow will he have to shovel, in cubic feet?
 A) 70 ft^3 B) 100 ft^3 C) 140 ft^3 D) $10,000 \text{ ft}^3$ E) None of These
- (17) An equilateral triangle and a square have the same perimeter. If the square has an area of 36 square centimeters (cm^2), what is the area of the triangle in square centimeters?
 A) 16 cm^2 B) $16\sqrt{3} \text{ cm}^2$ C) $12\sqrt{3} \text{ cm}^2$ D) 36 cm^2 E) $9\sqrt{3} \text{ cm}^2$
- (18) Li and James each have identical pumpkin pies. Li eats $\frac{2}{3}$ of his pie and James eats $\frac{3}{4}$ of his pie. If they put the remainder of their pies together, what fraction of a whole pie do they have left?
 A) $\frac{1}{4}$ B) $\frac{5}{12}$ C) $\frac{5}{6}$ D) $\frac{7}{12}$ E) $\frac{3}{4}$
- (19) What is the smallest positive integer with only 4 positive divisors?
 A) 24 B) 20 C) 8 D) 6 E) 4
- (20) What is the product of the least common multiple and the greatest common factor of 16 and 25?
 A) 100 B) 180 C) 200 D) 320 E) 400
- (21) Eighteen is 30% of what number?
 A) 6 B) 21 C) 36 D) 54 E) None of These
- (22) In the figure below, all angles are right angles and side lengths are as labeled. What is the perimeter of the figure?

Problem
22



- A) 36
 B) 38
 C) 40
 D) 42
 E) 44

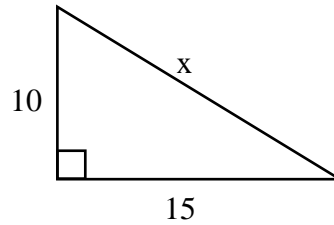
- (23) A local thrift store is holding its annual “buy 2 get 1 free” sale on shirts. If one shirt usually costs \$15, how many dollars would you save by getting a total of 6 shirts?
 A) \$90 B) \$60 C) \$30 D) \$15 E) None of These

- (24) If $0 < a, b, c < 1$, which of the following inequalities must be true?
 A) $a^2 + b^2 + c^2 < 0$ B) $a + b + c > 0$ C) $-1 < abc < 0$ D) $(abc)^2 > 1$ E) $abc < 0$

- (25) Given the right triangle below, what integer is closest to the value of x ?

- A) 18
 B) 19
 C) 20
 D) 25
 E) 325

Problem # 25



- (26) I have a bag of beans. There are four coffee beans, six java beans, three string beans, three pinto beans, and four black beans. I draw a bean from the bag randomly. If each bean is the same size, what is the probability that I get a java bean?

- A) $\frac{1}{5}$ B) $\frac{3}{5}$ C) $\frac{3}{10}$ D) $\frac{1}{4}$ E) $\frac{1}{6}$

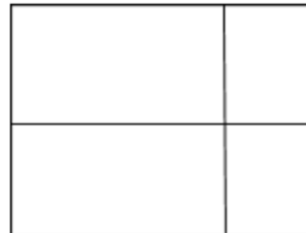
- (27) If $5x + 2 = 11x - 34$, what does the variable x equal?

- A) 6 B) 32 C) 33 D) 66 E) 76

- (28) How many rectangles of any size are in the image below?

- A) 12
 B) 10
 C) 9
 D) 6
 E) 4

Problem #28



- (29) How many ways are there to arrange the letters “B”, “U”, “R”, and “T”?

- A) 4 B) 8 C) 12 D) 16 E) 24

- (30) There are 24 students in Ms. Woodall’s class. One-half of the students are boys and one-third of the boys have brown hair. What is the number of boys in Ms. Woodall’s class who have brown hair?

- A) 4 B) 6 C) 8 D) 12 E) 20

- (31) Which of the following numbers has a value that is between 10% and $\frac{1}{9}$?

- A) 0.019 B) 0.108 C) 0.112 D) 0.151 E) None of These

- (32) What is the value of the expression: $|-5| - |-12|$?

- A) -17 B) 17 C) 7 D) -7 E) -60

- (33) What is the ninth triangular number?

- A) 9 B) 10 C) 18 D) 45 E) 81

The table below shows the scores Analisa and Luke earned on four science projects. Analisa and Luke worked on a fifth science project together. They each earned the same score on the project. When the fifth score is included in the table, Analisa’s mean score does not change. Please use this table to answer questions 34 – 38.

Science Project Scores

Project	Analisa	Luke
1	95	90
2	81	84
3	76	95
4	88	91
5	?	?

- (34) What was the score on Analisa’s fifth project?
 A) 82 B) 83 C) 85 D) 86 E) 88
- (35) Which of the following statements describes how Luke’s mean score changes when his fifth score is included in the table?
 A) increases by 1 B) decreases by 1 C) increases by 1.5 D) decreases by 2.5 E) increases by 2.5
- (36) Including the fifth project score, what is the range of scores for Analisa?
 A) 13 B) 16 C) 19 D) 14 E) 11
- (37) Including the fifth project score, what is the median of scores for Luke?
 A) $84\frac{1}{5}$ B) 88 C) $88\frac{1}{5}$ D) 89 E) 90
- (38) Including all five project scores, what is the positive difference in the mean and median scores for Analisa?
 A) 0 B) 1 C) 1.5 D) 2 E) 2.5
- (39) Liz took five ping-pong balls and labeled them {1, 3, 4, 5, 6}. Genny took five different ping-pong balls and labeled them {2, 4, 6, 8, 9}. If all the balls were placed in a black bag and Andy pulled one ball out randomly, what is the probability the ball has an even number on it?
 A) $\frac{1}{2}$ B) $\frac{3}{5}$ C) $\frac{2}{5}$ D) $\frac{7}{10}$ E) $\frac{3}{4}$
- (40) Mike is 6 feet tall and casts a shadow that is 8 feet long. If Paige is 5 feet 3 inches tall, how long is her shadow?
 A) $6\frac{1}{3}$ feet B) $6\frac{1}{2}$ feet C) 7 feet D) 8 feet E) $8\frac{1}{2}$ feet
- (41) $12 \times 1.1666 \dots =$
 A) 9 B) 10 C) 13 D) 14 E) 15

2023 – 2024 University Interscholastic League JH/MS Mathematics Contest A – Key

- (1) D
- (2) C
- (3) A
- (4) C
- (5) B
- (6) E (97)
- (7) E
- (8) D
- (9) A
- (10) E
- (11) C
- (12) C
- (13) C
- (14) E
- (15) A
- (16) E (1000)
- (17) B
- (18) D
- (19) D
- (20) E
- (21) E (60)
- (22) B
- (23) C
- (24) B
- (25) A

- (26) C
- (27) A
- (28) C
- (29) E
- (30) A
- (31) B
- (32) D
- (33) D
- (34) C
- (35) B
- (36) C
- (37) E
- (38) A
- (39) B
- (40) C
- (41) D
- (42) C
- (43) D
- (44) E
- (45) A
- (46) C
- (47) C
- (48) D
- (49) D
- (50) A

FALL/WINTER DISTRICT 2023-2024

A+ ACADEMICS



University Interscholastic League



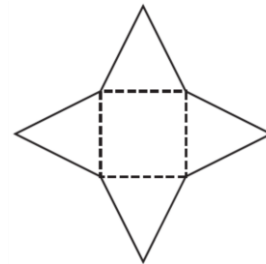
Mathematics

**DO NOT OPEN TEST
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2023 – 2024 University Interscholastic League JH/MS Mathematics Contest B

- (1) Evaluate: $12 + 18 \div 6 - 4$
 A) 1 B) 9 C) 11 D) 15 E) $-\frac{2}{3}$
- (2) $1 + 3 + 5 + \dots + 49 =$
 A) 625 B) 576 C) 256 D) 125 E) None of These
- (3) Wes was driving a go-kart 12 mph at a local park. He drove for 20 minutes, how far did he travel?
 A) 1.2 miles B) 2.4 miles C) 4 miles D) 6 miles E) 12 miles
- (4) Ben rotated each of the letters below 180° about its center and drew the resulting image. Which letter would have a resulting image that is unchanged from the original letter?
 A) Z B) R C) K D) T E) L
- (5) Ribbon costs 30 cents per foot. What is the total cost of three pieces measuring $1\frac{1}{2}$ ft., 2 ft., and 15 inches?
 A) 55¢ B) 80¢ C) \$1.43 D) \$1.45 E) \$5.55
- (6) Which of the following is the prime factorization of 72?
 A) $8^1 \times 9^1$ B) $3^2 \times 2^3$ C) $2^8 \times 3^9$ D) $2^3 \times 3^2$ E) $2^8 \times 9^1$
- (7) $143 \times 210 =$
 A) 30,003 B) 30,030 C) 33,030 D) 3,003 E) 33,003
- (8) Which three-dimensional shape could be made by folding the following net below on the dashed lines?
 A) Square Prism
 B) Square Pyramid
 C) Triangular Prism
 D) Triangular Pyramid
 E) Equilateral Triangular Pyramid

Problem
8

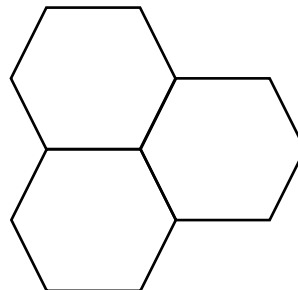


- (9) If a furlong in horse racing is 220 yards, how many furlongs are in one mile?
 A) 7 furlongs B) $7\frac{5}{11}$ furlongs C) 8 furlongs D) $8\frac{1}{2}$ furlongs E) 110 furlongs
- (10) Terry needs 12 quarts of juice to have enough for 6 batches of fruit punch. How many gallons of juice will he need?
 A) 2 gallons B) 3 gallons C) 4 gallons D) 5 gallons E) 6 quarts
- (11) Honey, one of Goldie's kittens, was born on March 18th. How old was Honey at the end of the day on June 8th?
 A) 61 days B) 69 days C) 74 days D) 82 days E) None of These
- (12) On a triangle, Side B is twice as long as Side A. Side C is 1 centimeter shorter than Side B. If the perimeter of the triangle is 11.5 centimeters, how long is Side B?
 A) 2 centimeters B) 2.5 centimeters C) 4.2 centimeters D) 6 centimeters E) None of These

- (13) Mackenzie knows that she will have five tests this grading period and that she must have at least an 80% average to play on the school's golf team. Her mean for the first four tests is 77%. What is the least score she can get on the last test and still qualify to play golf?
 A) 94 B) 92 C) 90 D) 89 E) 85
- (14) Jo and Jen live 56 kilometers apart. They are both going to leave at 10:00 am riding bikes toward each other. Jo's average speed is 6 km per hour. Jen's average speed is 8 km per hour. If they take no breaks, what time will they meet?
 A) 2:00 PM B) 3:30 PM C) 4:20 PM D) 5:05 PM E) 6:10 PM
- (15) What is the sum of the mean, median, and mode of the numbers {2, 3, 0, 3, 1, 4, 0, 3} ?
 A) $6\frac{1}{2}$ B) 7 C) $7\frac{1}{2}$ D) $8\frac{1}{2}$ E) 9
- (16) Which of the following statements is true for the equation $8x - 2y + 10 = 0$?
 A) The graph of the equation is a straight line parallel to the y-axis.
 B) The graph of the equation is the straight line with slope negative 4.
 C) The graph of the equation is a straight line crossing the y-axis at (0, 5).
 D) The graph of the equation is a straight line crossing the y-axis at the origin.
 E) The graph of the equation is a parabola crossing the x-axis at (5, 0) and (-5,0).
- (17) An isosceles triangle has sides of 10-in., 10 in., and 16 in. What is the area of this triangle?
 A) 48 in^2 B) 96 in^2 C) $96\sqrt{2} \text{ in}^2$ D) 80 in^2 E) $48\sqrt{2} \text{ in}^2$
- (18) A rectangle has an area of 12 square yards and a perimeter of 16 yards. What is the length of the longer side of the rectangle?
 A) 4 yards B) 6 yards C) 5 yards D) 3 yards E) 2 yards
- (19) If Clara doubles a number and then adds 3, the result is 23. What is the original number?
 A) 10 B) 13 C) 17 D) 20 E) 49
- (20) $3\frac{1}{2}\%$ of 12 is equal to what percent of 7?
 A) 42 B) 36 C) 6 D) 14 E) 421
- (21) Lisa charges \$7 for travel costs and then \$10 per hour for babysitting. Which expression always represents the number of dollars that she charges for y hours of babysitting?
 A) $y + 7$ B) $17y$ C) $10y - 7$ D) $10y + 7$ E) $17y - 7$
- (22) In the figure below, there are three congruent hexagons. If each side measures 4-cm, what is the perimeter of the figure?

- A) 72 cm
 B) 66 cm
 C) 60 cm
 D) 48 cm
 E) 44 cm

Problem
 # 22



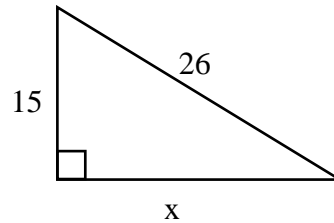
- (23) If I spent \$4.65, which includes 25 cents tax, for soft drinks which cost 40 cents each, how many soft drinks did I buy?
 A) 9 B) 10 C) 11 D) 12 E) None of These

- (24) If a , b , and c are integers and $ac = bc$ then which of the following is true?
 A) $a = b$ B) $a - b = c$ C) $a + b = c$ D) $ab = c$ E) $a = b$ or $c = 0$

- (25) Given the right triangle below, what integer is closest to the value of x ?

- A) 18
 B) 19
 C) 20
 D) 21
 E) 451

Problem # 25



- (26) One ball is drawn randomly from a bag containing 4 blue balls, 6 yellow balls, and 5 red balls. What is the probability that the ball that is drawn is not red?

- A) $\frac{2}{3}$ B) $\frac{3}{5}$ C) $\frac{2}{5}$ D) $\frac{1}{3}$ E) $\frac{3}{4}$

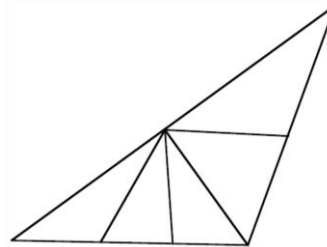
- (27) What is the value of y that satisfies the equation $5y - 100 = 125$?

- A) 100 B) 45 C) 25 D) -5 E) -25

- (28) How many triangles of any size are in the image below?

- A) 8
 B) 10
 C) 12
 D) 15
 E) 17

Problem #28



- (29) Andy has purchased five trees of different varieties to plant along the front of his lawn. How many different arrangements of the trees are possible after the spots for planting have been selected?

- A) 5 B) 25 C) 120 D) 125 E) 3,125

- (30) At the sandwich shop, you have a choice of four meats, three breads, five kinds of chips, and three different beverages. How many different meals (one each of meat, bread, chips, and drink) are possible?

- A) 15 B) 20 C) 27 D) 60 E) 180

- (31) If today were Sunday, what day of the week would it be 500 days from today? (Note: tomorrow is one day from today.)

- A) Saturday B) Monday C) Thursday D) Tuesday E) None of These

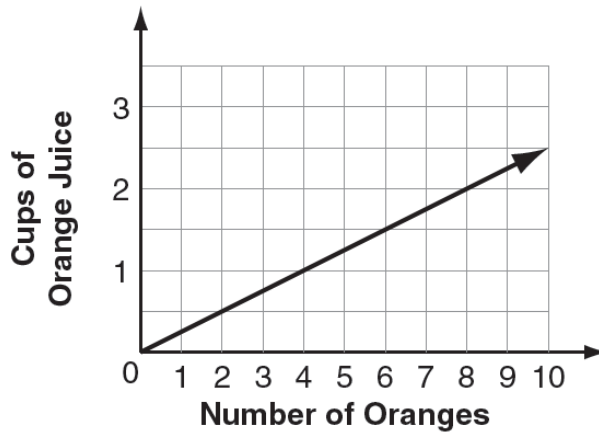
- (32) Find the least common multiple for the following set of numbers: $\{4, 9, 12\}$.

- A) 1 B) 12 C) 24 D) 36 E) 72

- (33) What is the sum of the tenth and eleventh triangular numbers?

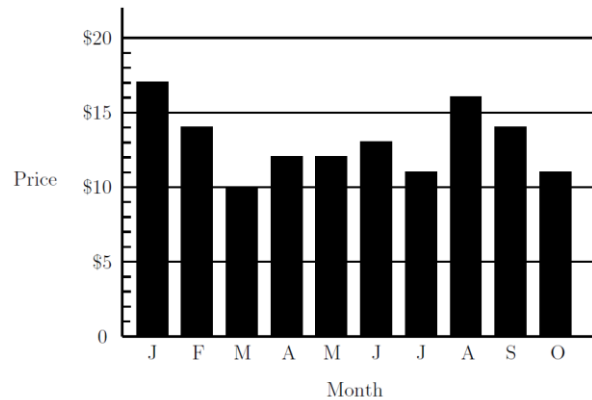
- A) 55 B) 66 C) 121 D) 132 E) 242

The graph below shows the number of cups of orange juice that can be made from different numbers of oranges. Please use this graph to answer questions 34 – 38.



- (34) How many cups of orange juice can be made from 4 oranges?
 A) 16 cups B) 8 cups C) 4 cups D) 2 cups E) 1 cup
- (35) If you had a dozen oranges, how much orange juice can you make?
 A) 12 cups B) 8 cups C) 6 cups D) 3 cups E) 2 cups
- (36) How many oranges would you need to make 8 ounces of orange juice?
 A) 1 B) 2 C) 3 D) 4 E) 16
- (37) If oranges cost 25¢ each, how much should 12 ounces of orange juice cost?
 A) \$1.25 B) \$1.50 C) \$2.25 D) \$3.00 E) \$2.50
- (38) What is the slope of the graph?
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{2}{1}$ D) $\frac{4}{1}$ E) $\frac{3}{4}$
- (39) One ounce of baked potato chips has 80% less fat than one ounce of “classic” potato chips. How many ounces of baked potato chips would you have to eat to get the same amount of fat as in two ounces of “classic” chips?
 A) 5 ounces B) 8 ounces C) 10 ounces D) 20 ounces E) 80 ounces
- (40) The ratio of the number of girls to the number of boys in a class of 24 students is 3 to 5. How many fewer girls than boys are in the class?
 A) 2 B) 4 C) 5 D) 6 E) 8
- (41) How many prime numbers are there between 10 and 30?
 A) 3 B) 4 C) 5 D) 6 E) 7

- (42) The graph below shows the price of five gallons of gasoline during the first ten months of the year. By what percent is the highest price more than the lowest price?



- A) 50% B) 62% C) 70% D) 89% E) 100%
- (43) 10111011 (base 2) = _____ (base 8)
 A) 308 B) 273 C) 307 D) 282 E) 7,032
- (44) A certain large ranch in Texas is 12 square miles. How many acres does this represent?
 A) 144 acres B) 1,440 acres C) 2,440 acres D) 7,680 acres E) 12,000 acres
- (45) What is the probability of drawing, at random, a red queen from a standard deck of 52 cards?
 A) $\frac{1}{26}$ B) $\frac{1}{13}$ C) $\frac{2}{13}$ D) $\frac{1}{52}$ E) $\frac{1}{4}$
- (46) A trapezoid has bases of 8 meters and 15 meters, and a height of 6 meters. What is the area of the trapezoid?
 A) 53 m^2 B) 69 m^2 C) 80 m^2 D) 84 m^2 E) 138 m^2
- (47) Matt advertises that every item in his store is sold at 25% off the regular price. If he wishes to sell a coat for \$135, what price should he mark as the regular price?
 A) \$180 B) \$97.50 C) \$205 D) \$100 E) \$500
- (48) There are six cards that spell out **C H A N C E**. Suppose you choose one card at random. What is the probability that you do not draw a vowel?
 A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{3}{5}$ E) $\frac{1}{6}$
- (49) The coordinates of one endpoint of a line segment are (3, -3). The coordinates of the midpoint are (7, 5). What are the coordinates of the other endpoint?
 A) (5, 1) B) (7, 17) C) (17, 7) D) (13, 11) E) (11, 13)
- (50) A jar contains five different colors of candies: 30% are blue, 20% are brown, 15% are red, 10% are yellow, and the other 30 candies are green. If half of the blue candies are replaced by brown candies, how many of the candies will be brown?
 A) 35 B) 36 C) 42 D) 48 E) 64

2023 – 2024 University Interscholastic League JH/MS Mathematics Contest B – Key

- (1) C
- (2) A
- (3) C
- (4) A
- (5) C
- (6) D
- (7) B
- (8) B
- (9) C
- (10) B
- (11) D
- (12) E (5)
- (13) B
- (14) A
- (15) C
- (16) C
- (17) B
- (18) B
- (19) A
- (20) C
- (21) D
- (22) D
- (23) C
- (24) E
- (25) D

- (26) A
- (27) B
- (28) B
- (29) C
- (30) E
- (31) E (Wednesday)
- (32) D
- (33) C
- (34) E
- (35) D
- (36) D
- (37) B
- (38) A
- (39) C
- (40) D
- (41) D
- (42) C
- (43) B
- (44) D
- (45) A
- (46) B
- (47) A
- (48) C
- (49) E
- (50) C

SPRING DISTRICT 2023-2024

A+ ACADEMICS



University Interscholastic League



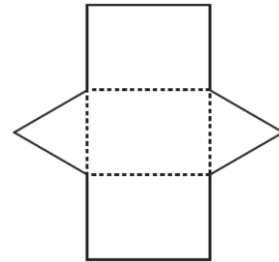
Mathematics

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

2023 – 2024 University Interscholastic League JH/MS Mathematics Contest C

- (1) Evaluate: $8 + 12 \div 6 - 3$
 A) $\frac{1}{3}$ B) 7 C) 8 D) 12 E) $-\frac{1}{3}$
- (2) $2 + 4 + 6 + \dots + 50 =$
 A) 5,050 B) 2,550 C) 1,275 D) 650 E) None of These
- (3) Wes was driving a go-kart 12 mph at a local park. If he drove for 15 minutes, how far did he travel?
 A) 18 miles B) 6 miles C) 4.25 miles D) 3.75 miles E) 3 miles
- (4) Ben rotated each of the letters below 180° about its center and drew the resulting image. Which letter would have a resulting image that is unchanged from the original letter?
 A) R B) I C) K D) T E) L
- (5) Ribbon costs 25 cents per foot. What is the total cost of three pieces measuring $1\frac{1}{2}$ ft., 2 ft., and 18 inches?
 A) 50¢ B) 75¢ C) \$3.75 D) \$4.25 E) \$1.25
- (6) Which of the following is the prime factorization of 60?
 A) $2^2 \times 3^1 \times 5^1$ B) $3^2 \times 10^1$ C) $2^6 \times 3^{10}$ D) $2^3 \times 3^2 \times 5^2$ E) $2^3 \times 3^2 \times 5^1$
- (7) $143 \times 77 =$
 A) 11,110 B) 1,111 C) 10,111 D) 11,011 E) None of These
- (8) Which three-dimensional shape could be made by folding the net below on the dashed lines?
 A) Triangular Prism
 B) Hexagonal Pyramid
 C) Rectangular Prism
 D) Parallelogram Prism
 E) Equilateral Pyramid

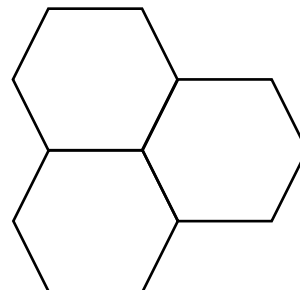
Problem
8



- (9) If a furlong in horse racing is 220 yards, how many furlongs are in one-half mile?
 A) 4 furlongs B) $4\frac{5}{11}$ furlongs C) 8 furlongs D) $8\frac{1}{2}$ furlongs E) 110 furlongs
- (10) Noah needs 8 quarts of juice to have enough for 12 batches of fruit punch. How many gallons of juice will he need?
 A) 2 gallons B) 3 gallons C) 4 gallons D) 5 gallons E) 6 quarts
- (11) Blackjack, one of Faisy's kittens, was born on March 11th. How old was Blackjack at the end of the day on July 4th?
 A) 91 days B) 95 days C) 111 days D) 114 days E) None of These
- (12) On a triangle, Side B is twice as long as Side A. Side C is 1 centimeter shorter than Side B. If the perimeter of the triangle is 9 centimeters, how long is Side B?
 A) 2 centimeters B) 2.5 centimeters C) 4 centimeters D) 6 centimeters E) None of These

- (13) Mackenzie knows that she will have five tests this grading period and that she must have at least an 80% average to play on the school's golf team. Her mean for the first four tests is 78%. What is the least score she can get on the last test and still qualify to play golf?
 A) 92 B) 91 C) 90 D) 89 E) 88
- (14) Jose and Juan live 42 kilometers apart. They are both going to leave at 10:00 am riding bikes toward each other. Jose's average speed is 6 km per hour. Juan's average speed is 8 km per hour. If they take no breaks, what time will they meet?
 A) 1:00 PM B) 1:30 PM C) 2:00 PM D) 2:30 PM E) 3:00 PM
- (15) What is the sum of the mean, median, and mode of the numbers {1, 2, 1, 3, 1, 4, 0, 4} ?
 A) $2\frac{1}{2}$ B) 4 C) $4\frac{1}{2}$ D) 8 E) $8\frac{1}{2}$
- (16) Which of the following statements is true for the equation $6x - 2y - 8 = 0$?
 A) The graph of the equation is a straight line parallel to the x-axis.
 B) The graph of the equation is the straight line with slope negative $\frac{1}{3}$.
 C) The graph of the equation is a straight line crossing the y-axis at (0, -4).
 D) The graph of the equation is a straight line crossing the y-axis at the origin.
 E) The graph of the equation is a parabola crossing the x-axis at (5, 0) and (0, -5).
- (17) An isosceles triangle has sides of 5 in., 5 in., and 8 in. What is the area of this triangle?
 A) 100 in^2 B) 20 in^2 C) $20\sqrt{2} \text{ in}^2$ D) 12 in^2 E) $8\sqrt{2} \text{ in}^2$
- (18) A rectangle has an area of 12 square yards and a perimeter of 14 yards. What is the length of the longer side of the rectangle?
 A) 4 yards B) 6 yards C) 7 yards D) 3 yards E) 2 yards
- (19) If Genny doubles a number and then subtracts 5, the result is 11. What is the original number?
 A) 4 B) 5 C) 7 D) 8 E) 16
- (20) $7\frac{1}{2}\%$ of 18 is equal to what percent of 15?
 A) 30 B) 24 C) 16 D) 12 E) 9
- (21) Lisa charges \$8 for travel costs and then \$15 per hour for pet-sitting. Which expression always represents the number of dollars that she charges for y hours of pet-sitting?
 A) $15y + 8$ B) $15y$ C) $15y - 8$ D) $8y + 15$ E) $23y$
- (22) In the figure below, there are three congruent hexagons. If perimeter of the figure is 132-m, what is the length of each side?

Problem
22



- A) 10 m
 B) 11 m
 C) 12 m
 D) 13 m
 E) 14 m

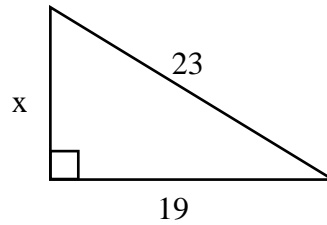
- (23) If I spent \$6.49, which includes 49 cents tax, for soft drinks which cost 50 cents each, how many soft drinks did I buy?
 A) 9 B) 10 C) 11 D) 12 E) None of These

- (24) If a , b , and c are integers and $a + c = b + c$ then which of the following is true?
 A) $a = b$ B) $a - b = c$ C) $a + b = c$ D) $ab = c$ E) $a = b$ or $c = 0$

- (25) Given the right triangle below, what integer is closest to the value of x ?

- A) 13
 B) 14
 C) 15
 D) 30
 E) 168

Problem # 25



- (26) One ball is drawn randomly from a bag containing 4 blue balls, 6 yellow balls, and 5 red balls. What is the probability that the ball that is drawn is not yellow?

- A) $\frac{2}{3}$ B) $\frac{3}{5}$ C) $\frac{2}{5}$ D) $\frac{1}{3}$ E) $\frac{3}{4}$

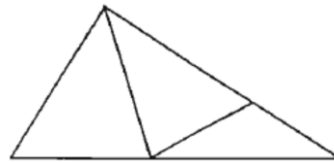
- (27) What is the value of y that satisfies the equation $4y - 100 = 120$?

- A) 5 B) 45 C) 55 D) -5 E) 220

- (28) How many triangles of any size are in the image below?

- A) 5
 B) 6
 C) 7
 D) 8
 E) 9

Problem #28



- (29) Andy has purchased four bushes of different varieties to plant along the front of his lawn. How many different arrangements of the bushes are possible after the spots for planting have been selected?

- A) 4 B) 8 C) 12 D) 16 E) 24

- (30) At the sandwich shop, you have a choice of five meats, four breads, five kinds of chips, and three different beverages. How many different meals (one each of meat, bread, chips, and drink) are possible?

- A) 17 B) 20 C) 35 D) 100 E) 300

- (31) If today were Monday, what day of the week would it be 500 days from today? (Note: tomorrow is one day from today.)

- A) Saturday B) Monday C) Thursday D) Tuesday E) None of These

- (32) Find the least common multiple for the following set of numbers: {4, 8, 12}.

- A) 2 B) 12 C) 24 D) 48 E) 72

- (33) What is the sum of the sixth and seventh triangular numbers?

- A) 42 B) 49 C) 84 D) 168 E) 242

Juan organizes the stamps in his collection by country and by the decade in which they were issued. The prices he paid for them at a stamp shop were: Brazil and France, 6¢ each; Peru 4¢ each; and Spain 5¢ each. (Brazil and Peru are South American countries and France and Spain are in Europe.) Please use the table below to answer questions 34 – 38.

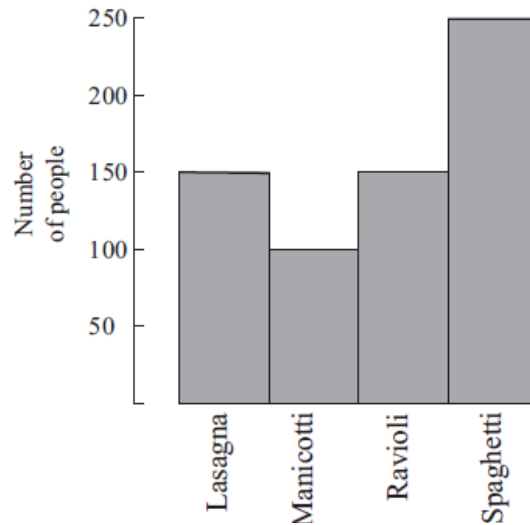
Number of Stamps by Decade

Country	'50s	'60s	'70s	'80s
Brazil	4	7	12	8
France	8	4	12	15
Peru	6	4	6	10
Spain	3	9	13	9

Juan's Stamp Collection

- (34) How much did his South American stamps issued before the '70s cost him?
 A) 40¢ B) \$1.06 C) \$1.80 D) \$2.38 E) \$2.64
- (35) How many of his European stamps were issued in the '80s?
 A) 9 stamps B) 15 stamps C) 18 stamps D) 24 stamps E) 42 stamps
- (36) What is the total cost of his '70s stamps?
 A) \$1.44 B) \$2.09 C) \$2.33 D) \$2.67 E) \$2.75
- (37) How much more or less did he pay for his '80s French stamps versus his '80s Spanish stamps?
 A) 1¢ less B) 1¢ more C) 72¢ less D) 65¢ less E) 45¢ more
- (38) What is the closest average cost of his '70s stamps?
 A) $5\frac{1}{2}$ ¢ B) 6¢ C) 4¢ D) $7\frac{1}{2}$ ¢ E) $3\frac{1}{2}$ ¢
- (39) One ounce of baked potato chips has 80% less fat than one ounce of "classic" potato chips. How many ounces of baked potato chips would you have to eat to get the same amount of fat as in four ounces of "classic" chips?
 A) 5 ounces B) 8 ounces C) 10 ounces D) 20 ounces E) 80 ounces
- (40) The ratio of the number of girls to the number of boys in a class of 32 students is 3 to 5. How many fewer girls than boys are in the class?
 A) 2 B) 4 C) 5 D) 6 E) 8
- (41) How many prime numbers are there between 0 and 20?
 A) 6 B) 7 C) 8 D) 9 E) 10
- (42) What is the probability of drawing, at random, a black-Jack from a standard deck of 52 cards?
 A) $\frac{1}{13}$ B) $\frac{1}{26}$ C) $\frac{2}{13}$ D) $\frac{1}{52}$ E) $\frac{1}{4}$

- (43) Six-hundred fifty students were surveyed about their pasta preferences. The choices were lasagna, manicotti, ravioli, and spaghetti. The results of the survey are displayed in the bar graph. What is the ratio of the number of students who preferred spaghetti to the number of students who preferred manicotti?



- A) $\frac{2}{5}$ B) $\frac{1}{2}$ C) $\frac{5}{2}$ D) $\frac{5}{3}$ E) $\frac{5}{4}$
- (44) 11011011 (base 2) = _____ (base 8)
 A) 222 B) 273 C) 282 D) 303 E) 333
- (45) A certain large ranch in Texas is 15 square miles. How many acres does this represent?
 A) 9,600 acres B) 2,225 acres C) 2,250 acres D) 22,500 acres E) 225,000 acres
- (46) A trapezoid has bases of 18 meters and 20 meters, and a height of 12 meters. What is the area of the trapezoid?
 A) 114 m^2 B) 180 m^2 C) 224 m^2 D) 228 m^2 E) $4,320 \text{ m}^2$
- (47) Matt advertises that every item in his store is sold at 25% off the regular price. If he wishes to sell a coat for \$126, what price should he mark as the regular price?
 A) \$94.50 B) \$97.50 C) \$152 D) \$156 E) \$168
- (48) There are six cards that spell out **C H A N C E**. Suppose you choose one card at random. What is the probability that you draw a vowel?
 A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{3}{5}$ E) $\frac{1}{6}$
- (49) The coordinates of one endpoint of a line segment are (3, -3). The coordinates of the midpoint are (-2, 3). What are the coordinates of the other endpoint?
 A) (-7, 12) B) (-7, 9) C) (10, 0) D) (-10, 12) E) (-1, 10)
- (50) A jar contains five different colors of candies: 30% are blue, 20% are brown, 15% are red, 10% are yellow, and the other 30 candies are green. If half of the red candies are replaced by brown candies, how many of the candies will be brown?
 A) 30 B) 33 C) 36 D) 42 E) 48

2023 – 2024 University Interscholastic League JH/MS Mathematics Contest C – Key

- (1) B
- (2) D
- (3) E
- (4) B
- (5) E
- (6) A
- (7) D
- (8) A
- (9) A
- (10) A
- (11) E
- (12) C
- (13) E
- (14) A
- (15) C
- (16) C
- (17) D
- (18) A
- (19) D
- (20) E
- (21) A
- (22) B
- (23) D
- (24) A
- (25) A

- (26) B
- (27) C
- (28) A
- (29) E
- (30) E
- (31) C
- (32) C
- (33) B
- (34) B
- (35) D
- (36) C
- (37) E
- (38) A
- (39) D
- (40) E
- (41) C
- (42) B
- (43) C
- (44) E
- (45) A
- (46) D
- (47) E
- (48) A
- (49) B
- (50) D