CONTESTANT NUMBER:

FOR GRADER USE ONLY Score Test Below: _____out of 250. Initials_____ _____out of 250. Initials_____ **Papers contending to place:** _____out of 250. Initials_____	**University Interscholastic League** **A+ Mathematics Contest • Answer Sheet**

Write your contestant number in the upper right corner, and circle your grade below.

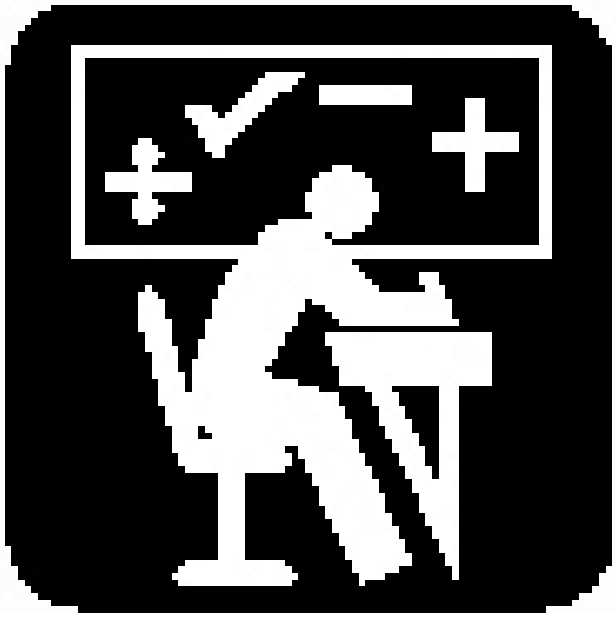
Circle Grade Level: 6 7 8

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 2024-2025

A+ ACADEMICS

University Interscholastic League



Mathematics

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2024 – 2025 University Interscholastic League JH/MS Mathematics Contest A

(1) Evaluate: $8 + 12 \div 2^{-2}$.

A) 11 B) 48 C) -5 D) 56 E) $5\frac{1}{4}$

(2) Which number is a rational number?

A) $\sqrt{144}$ B) $\sqrt{2}$ C) $\pi \div 2$ D) 2π E) $\frac{\pi}{4}$

(3) Paige uses the inequality shown, where q is the number of question she can miss on her quiz and still earn an 80 on a quiz.

$$80 \le 100 - 5q$$

Which statement below represents the number of questions Paige can miss on her quiz?

A) $q = 4$ B) $q \ge 4$ C) $q \le 4$ D) $q \ge 16$ E) $q \le 16$

(4) The dance committee is making punch for the eighth-grade dance. How many 1-cup servings will be provided from a punch bowl containing 6.5 quarts of punch?

A) 8 B) 12 C) 13 D) 24 E) 26

(5) If five-sixths of a number is 2500, what is two-thirds of that number?

A) 1,500 B) 2,000 C) 2,200 D) 2,400 E) 3,000

(6) The variables a and b represent real numbers, and b is not 0. Which statement describes the relation between a and b if $a\left(\frac{1}{b}\right)=1$.

A) $a = b$ B) $a = -b$ C) $a = 1 - b$ D) $a > b$ E) $a < b$

(7) The ratio of overtime pay to regular pay is 3:2. If Mackenzie earns \$72 for a regular 8-hour day, what does she earn for 3 hours of overtime?

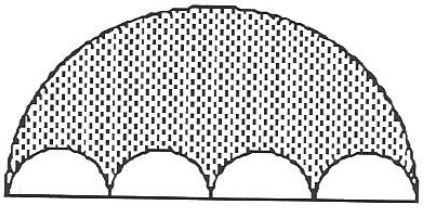
A) \$9.00 B) \$12.00 C) \$13.50 D) \$36.00 E) \$40.50

(8) If the radius of each of the smaller semicircles in the figure to the right is 1-cm, what is the area of the shaded region of the larger semicircle?

A) 4π sq. cm. D) 16π sq. cm.

B) 6π sq. cm. E) 64π sq. cm.

C) 12π sq. cm.



Problem # 8

(9) A person drives 100 miles in 2 hours and then drives 200 miles in 3 hours. What is the average speed for the entire trip in miles per hour (mph)?

A) 52 mph B) 58 mph C) $58\frac{1}{3}$ mph D) 60 mph E) $62\frac{2}{3}$ mph

(10) Find the number of terms in the sequence: 7, 11, 15, 19, . . ., 203.

A) 5 B) 29 C) 49 D) 50 E) 203

(11) If $x - 4$ is 2 greater than y, then $x + 5$ is how much greater than y?

A) 1 B) 4 C) 5 D) 7 E) None of These

(12) If 2 people can paint a house in 3 days, how long will it take 4 people to paint the same house?

A) 1 day B) $1\frac{1}{4}$ days C) $1\frac{1}{2}$ days D) 2 days E) 6 days

(13) Amanda averages 12 MPH riding her bicycle to school. Averaging 36 MPH by car takes her one-half hour less time. How far does she travel to school?

A) 9 miles B) 12 miles C) 15 miles D) 20 miles E) 36 miles

(14) Joe and Janice ordered a large pizza that was cut into equal-sized pieces. Joe ate one half of the pizza and Janice ate one fourth of it. If there were five pieces left, how many pieces were there to begin with?

A) 12 B) 16 C) 20 D) 24 E) 28

(15) If a rectangle has sides of $2x$ and $3x$ and an area of 24, what is the value of x?

A) 2 B) 3 C) 4 D) 6 E) 12

(16) If you skip-count backwards by 5's starting from 83 and not going below 0, then how many of those whole numbers will be multiples of 3?

A) 4 B) 5 C) 6 D) 7 E) None of These

(17) Margaret has a farm with pigs and chickens. She counts 30 feet and 9 heads at her farm. How many pigs does she have?

A) 2 B) 3 C) 4 D) 5 E) 6

(18) The average of Sara's first three test scores is 95 points. The average of her next two tests was 90 points. What is her overall average?

A) 91 B) 92 C) 93 D) 94 E) None of These

(19) A school has 40 teachers. Each teacher teaches 4 classes. Each class has 30 students and 1 teacher. If each student takes 5 classes, how many students does the school have?

A) 960 B) 1,000 C) 1,200 D) 1,500 E) 4,800

(20) The Outlet is having a clearance sale. $80 jeans were 50% off and now are an additional 20% off. How much do the jeans cost now?

A) $24 B) $28 C) $32 D) $48 E) $56

(21) What is the least common multiple (LCM) for $9xy^4$ and $12x^2y^2$?

A) $3xy$ B) $18x^2y^2$ C) $36x^3y^6$ D) $108x^2y^8$ E) None of These

(22) In the figure to the right and below, all angles are right angles and side lengths are as labeled. What is the perimeter of the figure?

A) 24 cm

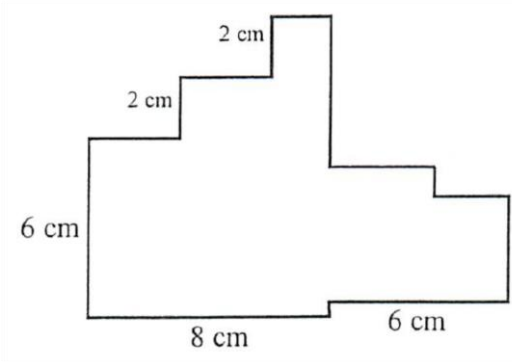
B) 32 cm

C) 40 cm

D) 48 cm

E) None of These

Problem # 22



(23) When each side of a square increased in length by 50%, its area increased by 180 square inches. How many square inches are in the original square?

A) 80 B) 90 C) 100 D) 144 E) 270

(24) Find the mean, median, and mode, respectively, for the following set of data listed below.

{11, 6, 13, 12, 8, 12, 12, 10, 6}

A) 10, 12, 11 B) 11, 10, 12 C) 12, 11, 10 D) 11, 12, 10 E) 10, 11, 12

(25) Each student in a class of 25 students was surveyed about his or her favorite pizza topping. Using the graph below, determine what percentage of the students selected cheese or hamburger topping as their favorite.

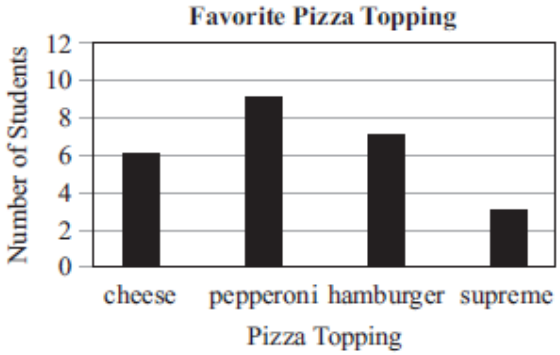
A) 25%

B) 40%

C) 48%

D) 52%

E) 60%



Problem # 25

(26) What time is it 456 minutes after 2:22 PM?

A) 6:48 PM B) 7:36 PM C) 8:48 PM D) 9:36 PM E) 9:58 PM

(27) A point is located on the line $6x - 3y = 12$. If the x-coordinate of this point is 4, what is the y-coordinate?

A) 2 B) 3 C) 4 D) 6 E) 12

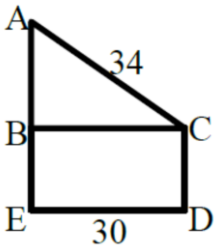
(28) In the rectangle BCDE, BC = 30 cm. A is on the extension of EB, and AC = 34 cm. The area of triangle ABC is 30 cm^2 less than half of the area of BCDE. What is the perimeter of the quadrilateral ACDE?

A) 58 cm D) 112 cm

B) 80 cm E) 116 cm

C) 85 cm

Problem #28



(29) If n% of 6 kilometers is 150 meters, then what is 6% of n kilometers?

A) 0.15 km B) 0.3 km C) 3 km D) 9 km E) 15 km

(30) Josh is making campaign posters for the student council election. He has 5 colors of markers and 4 colors of poster paper. How many different color combinations of paper and marker are possible?

A) 1 B) 9 C) 16 D) 20 E) 25

(31) What number is doubled when $\frac{3}{4}$ of it is subtracted from 99?

A) 32 B) 34 C) 36 D) 40 E) 44

(32) What is the sum of all of the whole number factors of 12?
A) 16 B) 18 C) 21 D) 24 E) None of These

(33) How long will it take a 2-mile-long train going 20 mph to go completely through a 2-mile tunnel?
A) 3 min B) 6 min C) 9 min D) 12 min E) 20 min

At the Abraham Lincoln Middle School Harvest Dance, there is a large bucket filled with 90 ping-pong balls. These are for drawing for door prizes. Each ball is numbered with a single-digit natural number. There is an equal number of each digit. (Please remember that zero is not a natural number when counting!) **Please use this information to answer questions 34 – 37**.

(34) What is the probability that you pick a ball having an odd digit?
A) $\frac{45}{90}$ B) $\frac{40}{90}$ C) $\frac{49}{90}$ D) $\frac{4}{9}$ E) $\frac{5}{9}$

(35) What is the probability that you pick a ball having an even digit?
A) $\frac{50}{90}$ B) $\frac{45}{90}$ C) $\frac{49}{90}$ D) $\frac{4}{9}$ E) $\frac{4}{5}$

(36) Which expression represents the probability of picking two balls (no replacement) having odd digits?
A) $\frac{45}{90}\times\frac{44}{89}$ B) $\frac{5}{9}\times\frac{1}{2}$ C) $\frac{50}{90}\times\frac{44}{89}$ D) $\frac{5}{9}\times\frac{4}{9}$ E) $1-\frac{50}{90}$

(37) What is the probability of picking up a number that represents a multiple of ten?
A) zero B) $\frac{1}{11}$ C) $\frac{1}{9}$ D) $\frac{1}{5}$ E) $\frac{1}{10}$

(38) If $\frac{x}{4}+\frac{x}{2}=6$, then what does *x* equal?
A) 2 B) 4 C) 6 D) 8 E) 12

(39) You have 2 circles. The smaller circle has a radius of 1 and the larger circle has a radius of 6. What is the ratio of the circumference of the larger circle to the smaller circle?
A) 1 : 6 B) 6 : 1 C) 12 : 1 D) 5 : 1 E) 36 : 1

(40) Wesley is measuring the height of an oak tree in his yard. Wesley is 4 feet tall and his shadow is 7 feet long. The oak tree's shadow, at the same time of day, is 28 feet long. How tall is the oak tree?
A) 16 feet B) 32 feet C) 36 feet D) 48 feet E) 49 feet

(41) A sports arena has 15,000 seats. About two-thirds of the seats are sold for each event. If tickets cost $25 per seat, approximately how much money would the arena collect for a season with 10 sporting events?
A) $1,250,000 B) $1,750,000 C) $2,500,000 D) $3,750,000 E) $7,500,000

(42) If six students can assemble 24 bicycles in 8 hours, how many bicycles can 3 students make in 4 hours?
A) 3 B) 4 C) 5 D) 6 E) 8

(43) Larry skated 1 hr 15 min each day for 5 days and 1 hr 30 min each day for 3 days. How long would he have to skate the ninth day to average 85 minutes of skating each day for the entire time?
A) 1 hr. B) 1 hr. 10 min. C) 1 hr. 20 min. D) 1 hr. 40 min. E) 2 hrs.

(44) Three positive integers are in the ratio 1:3:4 and have a sum of 72. What is the smallest of the three integers?
A) 9 B) 8 C) 6 D) 4 E) 1

(45) Five of the six sides of a cube are marked with 1, 2, 3, 4, and 5. The sixth side is blank. Five sides of another cube are marked 1, 2, 3, 5, and 6. The other side is blank. What is the probability of rolling a sum of 7 on a throw of this pair of cubes?
A) $\frac{1}{6}$ B) $\frac{1}{9}$ C) zero D) $\frac{1}{7}$ E) $\frac{1}{4}$

(46) How many odd numbers are there between 20 and 100?
A) 32 B) 36 C) 40 D) 48 E) 50

(47) What is largest integer that will divide both 126 and 336 evenly?
A) 24 B) 28 C) 32 D) 36 E) 42

(48) The three brothers Tom, John, and Steve were born exactly 4 years apart. The eldest is exactly 5 times as old as the youngest. How old is the youngest brother?
A) 2 years B) 3 years C) 4 years D) 5 years E) 10 years

(49) The average of 5 consecutive integers is 27. One of the integers is removed and the sum of the remaining integers is 106. What is the value of the integer that was removed?
A) 26 B) 27 C) 28 D) 29 E) 30

(50) Li wants to conduct an opinion survey at her middle school using a sample set that would best represent the entire school. Which of the following groups of students should be the best sample set for Li to survey?
A) All the students that ride the school bus daily
B) Half of the students enrolled in 8^{th} grade English
C) Every 15^{th} student who enters school one morning
D) Every 10^{th} student buying a ticket to the football game
E) Half of the students who belong to school-sponsored clubs

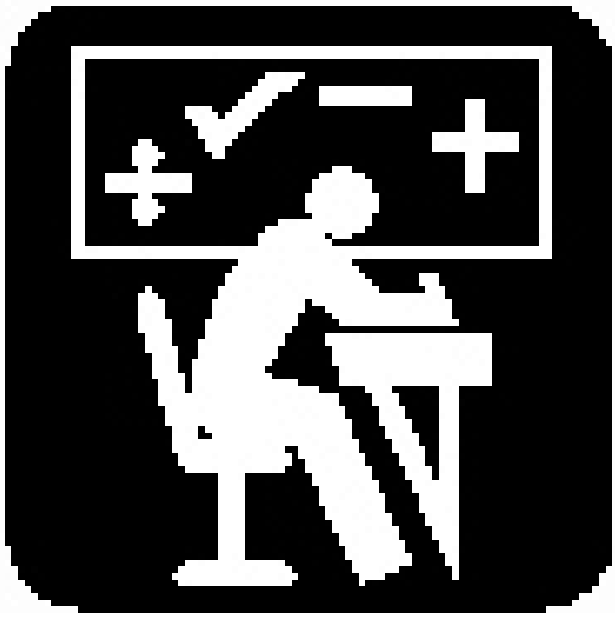
2024 – 2025 University Interscholastic League JH/MS Mathematics Contest A – Key

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

FALL/WINTER DISTRICT 2024-2025

A+ ACADEMICS

University Interscholastic League



Mathematics

DO NOT OPEN TEST
UNTIL TOLD TO DO SO

2024 – 2025 University Interscholastic League JH/MS Mathematics Contest B

(1) Evaluate: $18 + 4^0 \times 2 - 8 \div 2^{-2}$

A) -12 B) 6 C) 48 D) -14 E) 7

(2) Which of the following numbers is a triangular number?

A) 2 B) 4 C) 8 D) 10 E) 12

(3) (-0.1) + (-0.2) + (-0.3) + . . . + (-1.0) = ?

A) -4.5 B) -5.5 C) 3.9 D) -4.9 E) 5.5

(4) If three-eighths of a pound of hamburger costs $0.57, then how much does two pounds of hamburger cost?

A) 38¢ B) $1.14 C) $1.52 D) $3.04 E) $4.56

(5) If the edge of a cube is doubled, by what percent does the surface area increase?

A) 50% B) 100% C) 200% D) 300% E) 400%

(6) $4\frac{1}{3} \times 4\frac{2}{3} = ?$

A) $20\frac{2}{9}$ B) $8\frac{2}{3}$ C) $16\frac{2}{9}$ D) $8\frac{2}{9}$ E) None of These

(7) In a jar, the ratio of the number of oatmeal cookies to the number of chocolate chip cookies is 5:2. If there are 20 oatmeal cookies, how many chocolate chip cookies are in the jar?

A) 8 B) 12 C) 18 D) 28 E) 50

(8) In the figure to the right, angle ∠B = 45°; angles ∠A and ∠D are right angles; the m∠E = m∠F = 135°. What is the area of the figure?

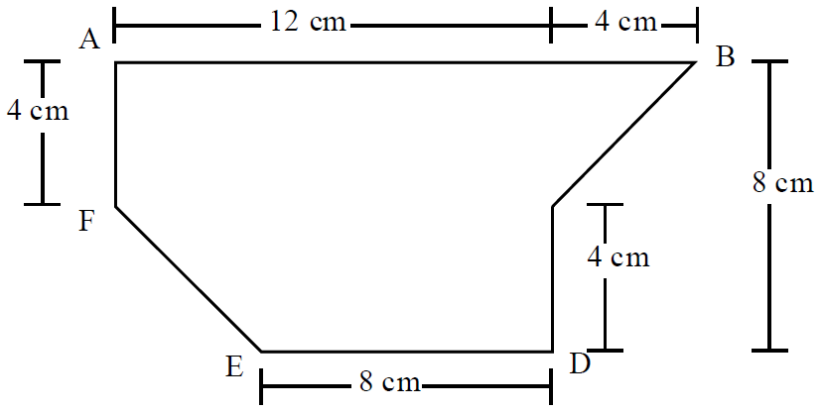
A) 50 sq. cm.

B) 90 sq. cm.

C) 96 sq. cm.

D) 100 sq. cm.

E) 128 sq. cm.



Problem # 8

(9) Noah is making 1½ batches of muffins. If one batch calls for 1¾ cups flour, how much flour will he need?

A) $\frac{7}{8}$ cup B) $\frac{13}{8}$ C) $2\frac{5}{8}$ cups D) $3\frac{1}{2}$ cups E) 5 cups

(10) When expanded, what is the number of zeros in 1000^{10}?

A) 4 B) 10 C) 13 D) 30 E) 1,000

(11) If $a + b = 12$, $b + c = 16$, and $c = 7$, what is the value of a?

A) 1 B) 3 C) 5 D) 7 E) None of These

(12) Juan began peeling a pile of 44 potatoes at the rate of 3 potatoes per minute. Four minutes later Diego joined him and peeled at the rate of 5 potatoes per minute. When they finished, how many potatoes had Diego peeled?

A) 20 B) 24 C) 32 D) 33 E) 40

(13) A wheel with radius 1 meter is rolled in a straight line through one complete revolution on a flat horizontal surface. How many meters did the center of the wheel travel horizontally from its starting location?

A) 1 meter B) 2 meters C) π meters D) 2π meters E) 4π meters

(14) Find the sum of all solutions for x if $x^2 + 3x - 12 = 6$.

A) -12 B) -3 C) 3 D) 6 E) 18

(15) What is the smallest possible average of four distinct positive even integers?

A) 2 B) 3 C) 4 D) 6 E) None of These

(16) Two dice are thrown. What is the probability that the product of the two numbers is a multiple of 5?

A) $\frac{1}{36}$ B) $\frac{1}{18}$ C) $\frac{2}{9}$ D) $\frac{1}{3}$ E) $\frac{5}{36}$

(17) I'm thinking of two whole numbers. Their product is 24 and their sum is 11. What is the larger number?

A) 3 B) 4 C) 6 D) 8 E) 12

(18) If snow falls at a rate of 1 mm every 6 minutes, then how many hours will it take for 1 m of snow to fall?

A) 10 hours B) 26 hours C) 33 hours D) 60 hours E) None of These

(19) Liz may pay \$1.50 for a single bus ticket or \$5.75 for a package of 5 tickets. If Liz requires 40 tickets, how much does she save by buying all of the tickets in packages of 5 rather than buying 40 single tickets?

A) \$4.25 B) \$8.25 C) \$14.00 D) \$34.00 E) \$54.25

(20) Genny made soup which contains 75 total ounces of beans. If the soup has two kinds of beans, black and red, while there are 4 times as many ounces of black beans as red beans, how many ounces of red beans are in the soup?

A) 5 ounces B) 6 ounces C) 12 ounces D) 15 ounces E) 19 ounces

(21) The number 6 has exactly four positive divisors: 1, 2, 3, and 6. How many positive divisors does 20 have?

A) 2 B) 3 C) 4 D) 5 E) 6

(22) A class of 32 students plans to buy the following items listed in the table below. If the class of 32 students splits the cost evenly, and assuming there is no tax, which equivalent can be used to find **T** (the amount each student should pay)?

A) $\mathbf{T} = 5(5.99) + 6(0.99) + 1.79$

B) $\mathbf{T} = (5 \times 5.99 + 6 \times 0.99 + 1.79) \div 32$

C) $\mathbf{T} = (5 \times 0.99 + 6 \times 5.99 + 1.79) \div 32$

D) $\mathbf{T} = (5 \times 5.99 + 6 \times 0.99 + 1.79) \times 32$

E) $\mathbf{T} = 5(5.99) + 6(0.99) - 1.79 \div 32$

Quantity	Item	Unit Price
5	Pepperoni Pizza	\$5.99
6	2-Liter Drinks	\$0.99
1	Pack of Cups	\$1.79

Problem # 22

(23) Mr. Gonzales was 125 miles from home at 8:30 A.M. He arrived home at 11:00 A.M. What was his average speed for the time-period from 8:30 A.M. to 11:00 A.M.?

A) 32 miles/hour B) 38 miles/hour C) 42 miles/hour D) 50 miles/hour E) 55 miles/hour

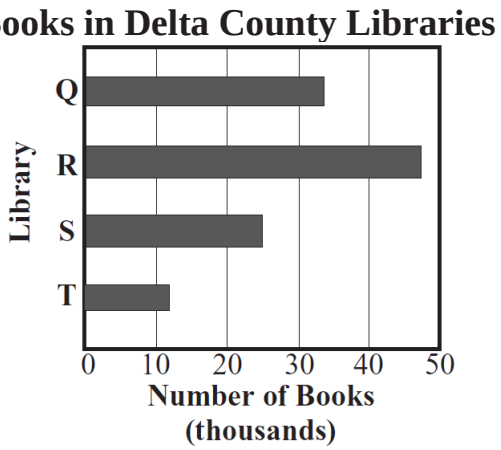
(24) What number should go in the empty box to make the equation true?

$$\frac{44 \times 7}{35 - \square} = 28$$

A) 8.8 B) 10 C) 12 D) 18 E) None of These

(25) Delta County has 4 libraries. The number of books in each library is shown on the bar graph to the right. According to the data shown on the graph, Library R has how many times the number of books as Library T?

A) 3
B) 4
C) 6
D) 48
E) 60



Problem # 25

(26) How many whole numbers less than 50 are multiples of 7 but not of 5?

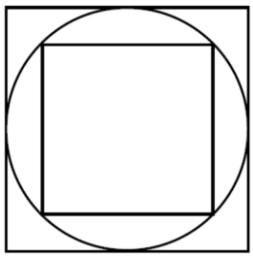
A) 2 B) 4 C) 6 D) 7 E) 8

(27) The points (-3, -1) and (-3, 5) are adjacent vertices of a rectangle. Two of the sides of the rectangle have a length of 8 inches. What is the length of a diagonal of the rectangle?

A) 9 inches B) 10 inches C) 12 inches D) 14 inches E) 15 inches

(28) In the diagram to the right, a circle is inscribed in a large square and a smaller square is inscribed in the circle. If the area of the large square is 36, the area of the smaller square is

A) 9
B) 12
C) 15
D) 18
E) 24


Problem #28

(29) If the pattern shown below continues, what will be the 1002nd letter?

MATHISFUNMATHISFUNMATHISFUNMATHISFUNMATHISFUN…

A) **M** B) **A** C) **T** D) **H** E) **I**

(30) What is the perimeter of a regular dodecagon with side length 5?

A) 60 B) 55 C) 50 D) 45 E) 40

(31) What is the larger root of the quadratic equation: $x^2 - 7x + 12 = 0$?

A) 1 B) 2 C) 3 D) 4 E) 6

(32) Ramona has the following scores on her science tests.

88, 91, 89, 85, 92

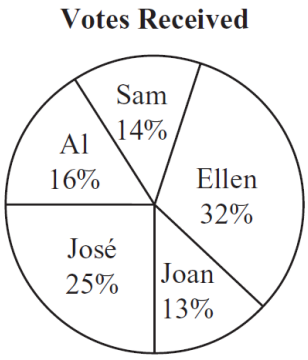
If she wants to increase her current test mean by at least 1 point, what is the minimum score she must make on her next test?

A) 88 B) 89 C) 90 D) 92 E) 95

(33) How long will it take a 3-mile-long train going 48 mph to go completely through a 5-mile tunnel?

A) 3 min B) 6 min C) 10 min D) 12 min E) 15 min

The percent of votes received by each of the 5 candidates who ran for president of the Student Council is shown in the circle graph below. Please use this graph to answer questions 34 – 37. Note that students that voted were only allowed to vote for one candidate.



Problem #33

(34) Which 2 candidates combined received more than half of the total votes?

A) Al and Sam B) Ellen and José C) Sam and Ellen D) Ellen and Joan E) Al and José

(35) If 300 total student votes were counted, how many students voted for Sam or Al?

A) 90 B) 45 C) 48 D) 42 E) 30

(36) If 300 total student votes were counted, how many students did not vote for either Ellen or Joan?

A) 125 B) 135 C) 145 D) 155 E) 165

(37) If 300 total student votes were counted, how many students voted for the candidate with the shortest name?

A) 16 B) 18 C) $\frac{4}{75}$ D) 48 E) 84

(38) What is the probability a randomly chosen card from a 52-card deck is either a red card or a spade?

A) $\frac{3}{4}$ B) $\frac{1}{26}$ C) $\frac{1}{13}$ D) $\frac{1}{2}$ E) $\frac{1}{3}$

(39) How many cubes of side length 5 fit inside of a rectangular prism of side lengths 30, 35, and 50?

A) 125 B) 150 C) 160 D) 210 E) 420

(40) Amanda is painting the wooden fence around her backyard. She can paint 8 boards in 30 minutes. How long will it take her to paint 100 boards?

A) 6 hours
B) 6 hours and 15 minutes
C) 6 hours and 25 minutes
D) 6 hours and 30 minutes
E) 6 hours and 45 minutes

(41) Twenty percent of the seats in a theater are in the balcony. The rest are on the main floor. Twenty-five percent of the balcony seats are filled. Fifty percent of the main floor seats are filled. There are 132 empty seats in the theater. How many seats does the theater have?

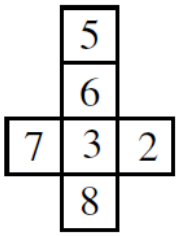
A) 198 B) 227 C) 240 D) 264 E) 440

(42) If a square has diagonal length of $\sqrt{42}$, what is its area?

A) 21 B) 22 C) 28 D) 48 E) 84

(43) The figure shown to the right is folded to form a cube. Three faces meet at each corner. If the numbers on the three faces at a corner are multiplied, what is the largest possible product?

A) 144
B) 168
C) 240
D) 280
E) 336



Problem # 43

(44) Last week, Edna earned $84 for working 14 hours. This week, she earned $120 at the same hourly rate. Exactly how many hours did Edna work this week?

A) 6 hrs. B) 8 hrs. C) 14 hrs. D) 20 hrs. E) 36 hrs.

(45) Each side of a cube is x cm wide. Which formula can be used to find a, the combined area of the top and bottom faces of the cube?

A) $a = \frac{1}{6}x^2$ B) $a = 2x^2$ C) $a = x^2$ D) $a = \frac{1}{3}x^2$ E) $a = \frac{1}{4}x^2$

(46) The weight limit for an elevator is 1500 kilograms. The average weight of a person in the elevator is 80 kilograms. If the combined weight of the people is 100 kilograms over the limit, how many people are in the elevator?

A) 12 B) 14 C) 16 D) 18 E) None of These

(47) What is the largest prime factor of 357?

A) 3 B) 7 C) 11 D) 13 E) None of These

(48) Suppose Alicia, Frank, and Martin are in a band which makes $1,800,000 selling CDs. If Martin gets twice as much money as Alicia, but only one third as much as Frank, how much money do Alicia and Martin make together?

A) $100,000 B) $200,000 C) $400,000 D) $500,000 E) $600,000

(49) The mean of a set of five numbers is known to be 9.4. If four of the numbers in the set are 7, 11, 15, and 19, what is the missing number?

A) -5 B) 0 C) 9.4 D) 12 E) 21

(50) In the figure below and to the right, lines *l* and *m* are parallel to one another and cut by transversals *s* and *t*. What is the value of angle *x*?

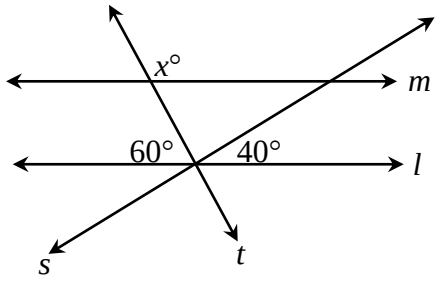
A) 60°

B) 70°

C) 80°

D) 120°

E) 140°



Problem #50

2024 – 2025 University Interscholastic League JH/MS Mathematics Contest B – Key

(1) A
(2) D
(3) B
(4) D
(5) D
(6) A
(7) A
(8) C
(9) C
(10) D
(11) B
(12) A
(13) D
(14) B
(15) E (5)
(16) E
(17) D
(18) E (100)
(19) C
(20) D
(21) E
(22) B
(23) D
(24) E (24)
(25) B
(26) C
(27) B
(28) D
(29) C
(30) A
(31) D
(32) E
(33) C
(34) B
(35) A
(36) E
(37) D
(38) A
(39) E
(40) B
(41) C
(42) A
(43) D
(44) D
(45) B
(46) E (20)
(47) E (17)
(48) E
(49) A
(50) D

SPRING DISTRICT 2024-2025

A+ ACADEMICS

University Interscholastic League

Mathematics

DO NOT OPEN TEST
UNTIL TOLD TO DO SO

2024 – 2025 University Interscholastic League JH/MS Mathematics Contest C

(1) Evaluate: $24 + 4^2 \times 2^{-2} - 8 \div 2^0$

A) -28 B) 20 C) 28 D) -14 E) 36

(2) Which of the following numbers is a triangular number?

A) 6 B) 10 C) 15 D) 21 E) All of These

(3) (-0.2) + (-0.4) + (-0.6) + . . . + (-1.0) = ?

A) 2 B) 3 C) -3 D) -3.2 E) 4

(4) If three-eighths of a pound of hamburger costs $1.25, then how much does three pounds of hamburger cost?

A) $3.75 B) $10.00 C) $11.25 D) $9.38 E) 94¢

(5) If the edge of a square is doubled, by what percent does the area increase?

A) 50% B) 100% C) 200% D) 300% E) 400%

(6) $4\frac{3}{4} \times 4\frac{1}{4} = ?$

A) $20\frac{3}{4}$ B) $16\frac{1}{4}$ C) $20\frac{3}{16}$ D) $16\frac{3}{4}$ E) None of These

(7) In a jar, the ratio of the number of oatmeal cookies to the number of chocolate chip cookies is 5:2. If there are 25 oatmeal cookies, how many chocolate chip cookies are in the jar?

A) 8 B) 10 C) 12 D) 15 E) 25

(8) In the figure to the right, angle ∠B = 45°; angles ∠A and ∠D are right angles; the m∠E = m∠F = 135°. What is the area of the figure?

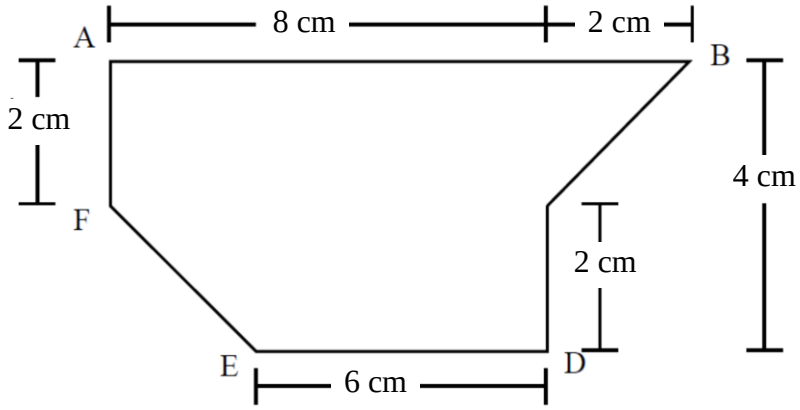
A) 28 sq. cm.

B) 32 sq. cm.

C) 36 sq. cm.

D) 40 sq. cm.

E) 60 sq. cm.



Problem # 8

(9) Noah is making 1½ batches of muffins. If one batch calls for 2¾ cups flour, how much flour will he need?

A) $4\frac{1}{8}$ cup B) $3\frac{3}{8}$ C) $2\frac{5}{8}$ cups D) $3\frac{1}{4}$ cups E) $4\frac{3}{8}$ cups

(10) When expanded, what is the number of zeros in 100^{10}?

A) 2 B) 10 C) 20 D) 30 E) 1,000

(11) If $a + b = 12$, $b + c = 16$, and $c = 5$, what is the value of a?

A) 1 B) 2 C) 11 D) 12 E) None of These

(12) Juan began peeling a pile of 36 potatoes at the rate of 3 potatoes per minute. Four minutes later Diego joined him and peeled at the rate of 5 potatoes per minute. When they finished, how many potatoes had Diego peeled?

A) 12 B) 15 C) 20 D) 24 E) 30

(13) A wheel with radius 2 meters is rolled in a straight line through one complete revolution on a flat horizontal surface. How many meters did the center of the wheel travel horizontally from its starting location?

A) 1 meter B) 2 meters C) π meters D) 2π meters E) 4π meters

(14) Find the sum of all solutions for x if $x^2 + 13x - 23 = 7$.

A) 23 B) 13 C) 7 D) -13 E) -23

(15) What is the smallest possible average of three distinct positive even integers?

A) 2 B) 3 C) 4 D) 6 E) None of These

(16) Two dice are thrown. What is the probability that the product of the two numbers is a multiple of 4?

A) $\frac{11}{36}$ B) $\frac{1}{9}$ C) $\frac{2}{9}$ D) $\frac{5}{12}$ E) $\frac{1}{4}$

(17) I'm thinking of two whole numbers. Their product is 24 and their sum is 11. What is the smaller number?

A) 3 B) 4 C) 6 D) 8 E) 12

(18) If snow falls at a rate of 1 mm every 3 minutes, then how many hours will it take for 1 m of snow to fall?

A) 10 hours B) 26 hours C) 50 hours D) 60 hours E) None of These

(19) Liz may pay \$1.50 for a single bus ticket or \$6.00 for a package of 5 tickets. If Liz requires 40 tickets, how much does she save by buying all of the tickets in packages of 5 rather than buying 40 single tickets?

A) \$4.50 B) \$12.00 C) \$14.00 D) \$28.00 E) \$48.00

(20) Genny made soup which contains 60 total ounces of beans. If the soup has two kinds of beans, black and red, while there are 4 times as many ounces of black beans as red beans, how many ounces of red beans are in the soup?

A) 5 ounces B) 6 ounces C) 12 ounces D) 15 ounces E) 48 ounces

(21) The number 6 has exactly four positive divisors: 1, 2, 3, and 6. How many positive divisors does 18 have?

A) 2 B) 3 C) 4 D) 5 E) 6

(22) A class of 28 students plans to buy the following items listed in the table below. If the class of 28 students splits the cost evenly, and assuming there is no tax, which equivalent can be used to find **T** (the amount each student should pay)?

A) $\mathbf{T} = 5(5.99) + 6(0.99) + 1.79$

B) $\mathbf{T} = (5 \times 0.99 + 6 \times 5.99 + 1.79) \div 28$

C) $\mathbf{T} = (5 \times 5.99 + 6 \times 0.99 + 1.79) \div 28$

D) $\mathbf{T} = (5 \times 5.99 + 6 \times 0.99 + 1.79) \times 28$

E) $\mathbf{T} = 5(5.99) + 6(0.99) - 1.79 \div 28$

Quantity	Item	Unit Price
5	Pepperoni Pizza	\$5.99
6	2-Liter Drinks	\$0.99
1	Pack of Cups	\$1.79

Problem # 22

(23) Mr. Gonzales was 150 miles from home at 8:30 A.M. He arrived home at 11:00 A.M. What was his average speed for the time-period from 8:30 A.M. to 11:00 A.M.?

A) 25 miles/hour B) 30 miles/hour C) 36 miles/hour D) 50 miles/hour E) 60 miles/hour

(24) What number should go in the empty box to make the equation true?

$$\frac{44 \times 7}{35 - \square} = 77$$

A) 31 B) 28 C) 14 D) 6 E) None of These

(25) Delta County has 4 libraries. The number of books in each library is shown on the bar graph to the right. According to the data shown on the graph, Library Q has about how many more books than Library T?

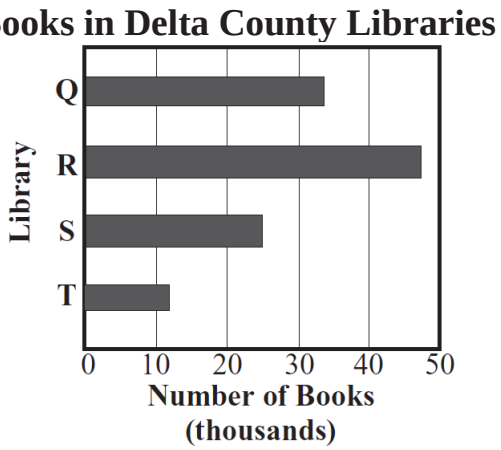
A) 21

B) 31,000

C) 21,000

D) 31

E) 18,000



Problem # 25

(26) How many whole numbers less than 50 are multiples of 4 but not of 5?

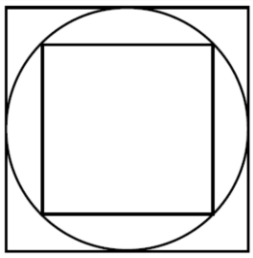
A) 6 B) 8 C) 9 D) 10 E) 11

(27) The points (3, -1) and (3, 11) are adjacent vertices of a rectangle. Two of the sides of the rectangle have a length of 5 inches. What is the length of a diagonal of the rectangle?

A) 10 inches B) 11 inches C) 12 inches D) 13 inches E) 15 inches

(28) In the diagram to the right, a circle is inscribed in a large square and a smaller square is inscribed in the circle. If the area of the large square is 100, the area of the smaller square is

A) 10
B) 20
C) 25
D) 50
E) 120


Problem #28

(29) If the pattern shown below continues, what will be the 100th letter?

MATHISFUNMATHISFUNMATHISFUNMATHISFUNMATHISFUN…

A) **M** B) **A** C) **T** D) **H** E) **I**

(30) What is the perimeter of a regular dodecagon with side length 4?

A) 80 B) 60 C) 48 D) 40 E) 24

(31) What is the smaller root of the quadratic equation: $x^2 - 7x + 12 = 0$?

A) 1 B) 2 C) 3 D) 4 E) 6

(32) Ramona has the following scores on her science tests.

78, 81, 79, 75, 82

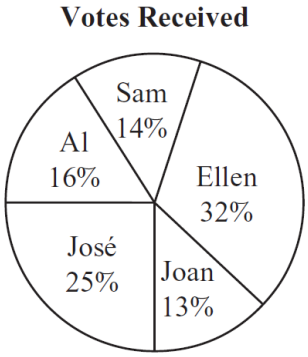
If she wants to increase her current test mean by at least 1 point, what is the minimum score she must make on her next test?

A) 84 B) 85 C) 86 D) 87 E) 88

(33) How long will it take a 3-mile-long train going 20 mph to go completely through a 2-mile tunnel?

A) 3 min B) 6 min C) 9 min D) 12 min E) 15 min

The percent of votes received by each of the 5 candidates who ran for president of the Student Council is shown in the circle graph below. Please use this graph to answer questions 34 – 37. Note that students that voted were only allowed to vote for one candidate.



Problem #33

(34) Which 2 candidates combined received the total votes closest to the leader's total?

A) Al and Sam B) Ellen and José C) Sam and Ellen D) Ellen and Joan E) Al and José

(35) If 200 total student votes were counted, how many students voted for Sam or Al?

A) 600 B) 60 C) 48 D) 32 E) 28

(36) If 200 total student votes were counted, how many students did not vote for either Ellen or José?

A) 114 B) 104 C) 92 D) 86 E) 72

(37) If 200 total student votes were counted, how many students voted for the candidate with the shortest name?

A) 32 B) 34 C) $\frac{3}{25}$ D) 42 E) 68

(38) What is the probability a randomly chosen card from a 52-card deck is either a queen or a spade?

A) $\frac{1}{4}$ B) $\frac{1}{26}$ C) $\frac{4}{13}$ D) $\frac{1}{13}$ E) $\frac{22}{117}$

(39) How many cubes of side length 5 fit inside of a rectangular prism of side lengths 25, 30, and 50?

A) 150 B) 200 C) 250 D) 300 E) 750

(40) Amanda is painting the wooden fence around her backyard. She can paint 8 boards in 30 minutes. How long will it take her to paint 120 boards?

A) 7 hours
B) 7 hours and 15 minutes
C) 7 hours and 25 minutes
D) 7 hours and 30 minutes
E) 7 hours and 45 minutes

(41) Twenty percent of the seats in a theater are in the balcony. The rest are on the main floor. Twenty-five percent of the balcony seats are filled. Fifty percent of the main floor seats are filled. There are 121 empty seats in the theater. How many seats does the theater have?

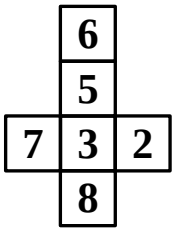
A) 198 B) 220 C) 240 D) 264 E) 440

(42) If a square has diagonal length of $\sqrt{140}$, what is its area?

A) 28 B) 35 C) 70 D) 120 E) 140

(43) The figure shown to the right is folded to form a cube. Three faces meet at each corner. If the numbers on the three faces at a corner are multiplied, what is the largest possible product?

A) 144
B) 168
C) 240
D) 280
E) 336



Problem # 43

(44) Last week, Edna earned $168 for working 14 hours. This week, she earned $120 at the same hourly rate. Exactly how many hours did Edna work this week?

A) 8 hrs. B) 10 hrs. C) 12 hrs. D) 14 hrs. E) 20 hrs.

(45) Each side of a cube is x cm wide. Which formula can be used to find a, the combined area of three faces of the cube?

A) $a = \frac{1}{6}x^2$ B) $a = 2x^2$ C) $a = 3x^2$ D) $a = \frac{1}{3}x^2$ E) $a = \frac{1}{4}x^2$

(46) The weight limit for an elevator is 1180 kilograms. The average weight of a person in the elevator is 80 kilograms. If the combined weight of the people is 100 kilograms over the limit, how many people are in the elevator?

A) 12 B) 14 C) 16 D) 18 E) None of These

(47) What is the largest prime factor of 429?

A) 3 B) 7 C) 11 D) 13 E) None of These

(48) Suppose Alicia, Frank, and Martin are in a band which makes $900,000 selling CDs. If Martin gets twice as much money as Alicia, but only one third as much as Frank, how much money do Alicia and Martin make together?

A) $100,000 B) $200,000 C) $300,000 D) $400,000 E) $500,000

(49) The mean of a set of five numbers is known to be 9.6. If four of the numbers in the set are 7, 11, 15, and 19, what is the missing number?

A) -5 B) -3 C) 0 D) 9.6 E) None of these

(50) In the figure below and to the right, lines *l* and *m* are parallel to one another and cut by transversals *s* and *t*. What is the value of angle *x*?

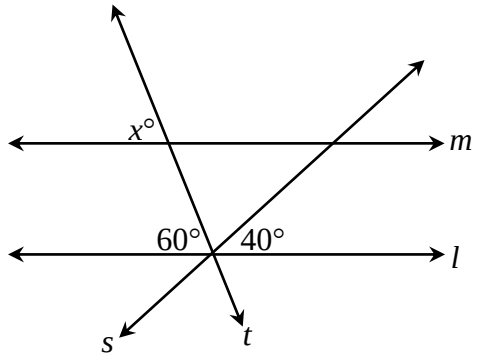
A) 60°

B) 70°

C) 80°

D) 120°

E) 140°



Problem #50

2024 – 2025 University Interscholastic League JH/MS Mathematics Contest C – Key

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