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.

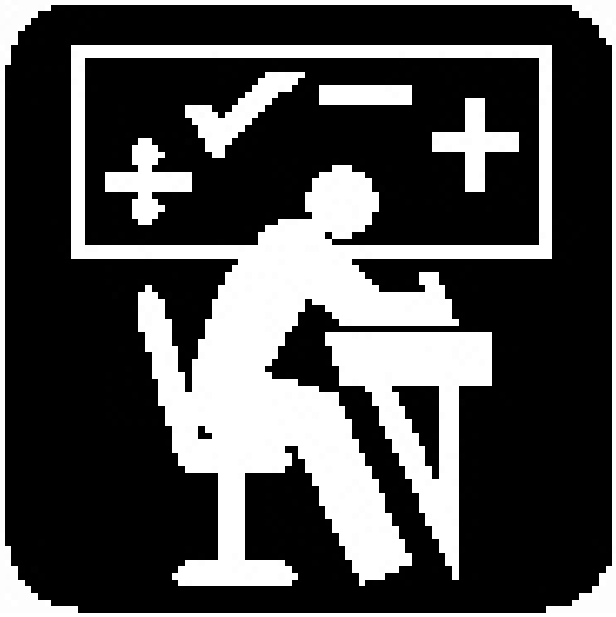
Circle Grade Level: 6 7 8

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 2022-2023

A+ ACADEMICS

University Interscholastic League



Mathematics

DO NOT OPEN TEST
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2022 – 2023 University Interscholastic League JH/MS Mathematics Contest A

(1) Evaluate: $36^{-0.5} - \frac{1}{4} + 2 \div 3$.

A) $\frac{7}{12}$ B) $\frac{5}{6}$ C) $\frac{23}{36}$ D) $-5\frac{7}{12}$ E) $1\frac{2}{3}$

(2) $1 - 2 + 3 - 4 + 5 - 6 + 7 - 8 + 9 - 10 =$

A) 25 B) -5 C) 5 D) 30 E) None of these

(3) Beth has $\frac{3}{4}$ pound of blueberries to make smoothies. She made the first batch with $\frac{1}{8}$ pound of the blueberries. How many pounds of blueberries were left?

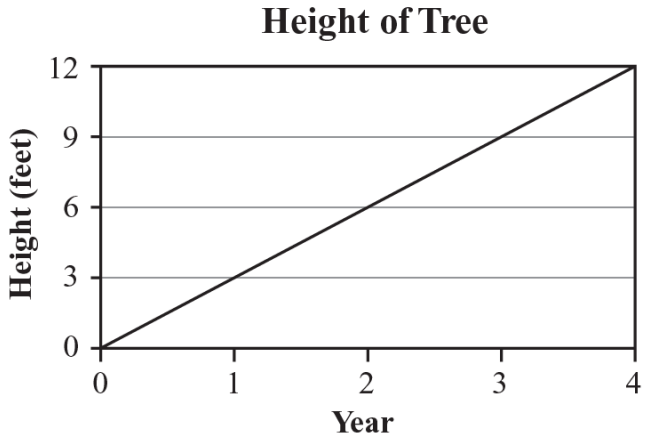
A) $\frac{3}{32}$ B) $\frac{5}{8}$ C) $\frac{3}{4}$ D) $\frac{7}{8}$ E) $\frac{1}{2}$

(4) If the equation below is true, which of the following must also be true?

A – B = C

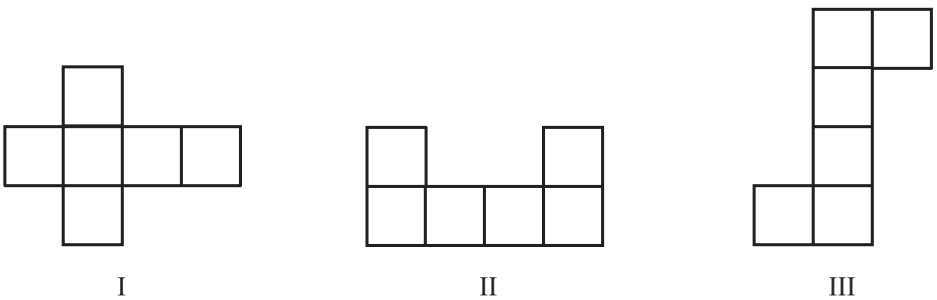
A) **A – C = B** B) **C + A = B** C) **B – A = C** D) **A + C = B** E) **C – B = A**

(5) Genny planted a tree in her yard 4 years ago. She has recorded the height each year, which is shown in the line graph below. Based on the graph, how tall will the tree be in the 6th year?



A) 13 feet B) 15 feet C) 16 feet D) 18 feet E) 20 feet

(6) Which of these nets below, when folded, can produce a cube with no overlapping sides?



A) I only B) II only C) I and III D) II and III E) All of them

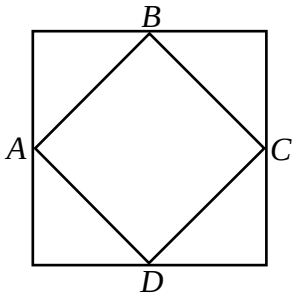
(7) Four tenths plus two hundredths plus six thousandths equals what decimal?

A) 0.012 B) 0.066 C) 0.12 D) 0.24 E) 0.426

(8) $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \frac{6}{5} \ldots \times \frac{2022}{2021} = ?$

A) 1 B) 1010 C) 1011 D) 2021 E) 2022

(9) Points *A*, *B*, *C* and *D* are midpoints of the sides of the larger square shown below. If the larger square has area 60, what is the area of the smaller square?



A) 15 B) 20 C) 24 D) 30 E) 40

(10) $\frac{1}{10} + \frac{2}{10} + \frac{3}{10} + \ldots + 1 = ?$

A) $4\frac{3}{5}$ B) $5\frac{1}{2}$ C) $5\frac{3}{4}$ D) 6 E) 10

(11) $12^4 \div 5$ has a remainder of

A) 0 B) 1 C) 2 D) 3 E) 4

(12) 29 % of what is equal to $7\frac{1}{4} \times 16\%$?

A) 16 B) 8 C) 4 D) 2 E) 1

(13) How many two-digit numbers less than 50 have digits whose sum is a perfect square?

A) 12 B) 11 C) 10 D) 9 E) 8

(14) If two numbers differ by 4 and their sum is 14, what is the product of the two numbers?

A) 9 B) 45 C) 36 D) 56 E) 70

(15) The mean of 13, 25, 30, and 36 is

A) 24 B) 25 C) 26 D) $26\frac{1}{4}$ E) 27

(16) What is the sum of the prime integers between 11 and 20?

A) 32 B) 39 C) 42 D) 47 E) 49

(17) If $x - y = 3$ and $x + y = 12$, then $x^2 - y^2 =$

A) 15 B) 9 C) 81 D) 36 E) 72

(18) $98^2 - 4 =$

A) 9600 B) 1960 C) 9984 D) 9216 E) None of these

(19) What is the slope of the straight line $\frac{2}{3}x - 4y = 1$?

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

(20) 4 gallons + 12 pints = _____quarts.

A) 18 B) 20 C) 22 D) 24 E) 30

(21) If one dozen peaches cost \$12.84, then 4 peaches would cost

A) \$3.76 B) \$3.88 C) \$4.18 D) \$4.24 E) None of these

(22) 11101 (base 2) = _____(base 8).

A) 15 B) 40 C) 31 D) 35 E) 41

(23) What is the largest number that will divide evenly (no remainder) into the three numbers: 24, 40 and 64?

A) 2 B) 4 C) 8 D) 12 E) 16

(24) 267419 divided by 11 has a remainder of

A) 2 B) 5 C) 6 D) 10 E) None of these

(25) When a fair six-sided die is tossed on a tabletop, the bottom face cannot be seen. What is the probability that the product of the numbers on the five faces that can be seen is divisible by 6?

A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{5}{6}$ E) 1

(26) If 20% of a number is 12, what is 30% of the same number?

A) 15 B) 18 C) 20 D) 24 E) 30

(27) What is the greatest common factor (GCF) of the two terms below?

$3x^2y$ and $12xy^2$

A) $3x^2y^2$ B) $3xy$ C) $12xy$ D) $12x^2y^2$ E) $12x^3y^3$

(28) Find the smallest positive integral value for $\boldsymbol{k}$ such that $374\boldsymbol{k}$ is divisible by 6.

A) 0 B) 1 C) 2 D) 3 E) 4

(29) What is the unit's digits for 13^7?

A) 3 B) 7 C) 9 D) 5 E) 1

(30) MDII + CX = _____ Arabic Numeral.

A) 1,216 B) 1,521 C) 1,110 D) 1,612 E) 1,608

(31) If $2x + 9 = 7 + 4x$, then $4x - 1 =$

A) 3 B) 5 C) 2 D) 4 E) None of these

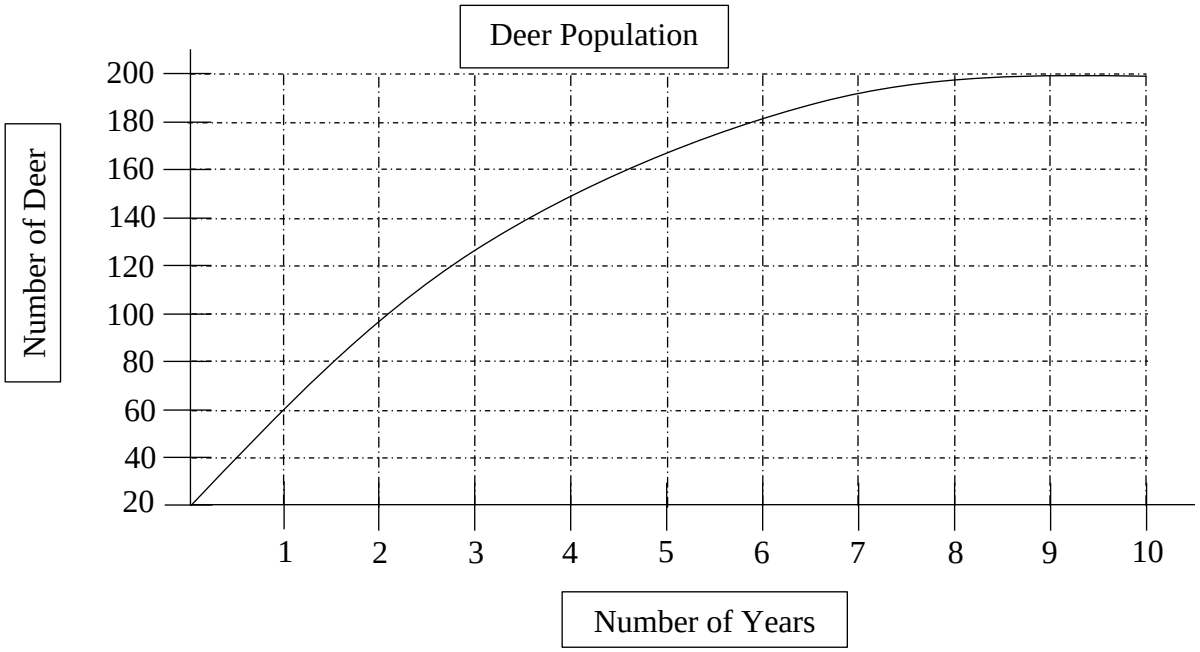
(32) $(2.6)^2 \div (1.3)^2 \times (2.5)^2 =$

A) 5 B) 10 C) 12.5 D) 15 E) 25

(33) 1.181818 . . . = _____(common fraction)

A) $\frac{13}{11}$ B) $\frac{2}{13}$ C) $\frac{2}{11}$ D) $\frac{6}{5}$ E) $\frac{5}{6}$

Twenty deer of both sexes were relocated to a high-fenced 100-acre property that contained enough forage to support 200 deer. Dan kept track of the number of deer and created a graph of the total deer population over a 10-year period. Answer questions 34 – 38 based on this graph.



(34) During what year did the population of deer grow the least?

A) year 10 B) year 1 C) year 3 D) year 9 E) year 2

(35) During the first year, by what percentage did the population of deer grow?

A) 40% B) 60% C) 200% D) 300% E) 600%

(36) The deer population grew approximately by how many during the 5^{th} year?

A) 10 deer B) 20 deer C) 30 deer D) 170 deer E) 180 deer

(37) What is the slope of the graph during the first year?

A) 60 B) $\frac{1}{60}$ C) 40 D) $\frac{1}{40}$ E) $\frac{1}{20}$

(38) How many more deer were there at the end of the 9^{th} year than there were at the end of the 1^{st} year?

A) 200 B) 180 C) 160 D) 140 E) 120

(39) 345 (base 6) – 154 (base 6) = _____(base 6).

A) 151 B) 251 C) 161 D) 261 E) 211

(40) What is the twelfth triangular number?

A) 144 B) 78 C) 12 D) 156 E) None of these

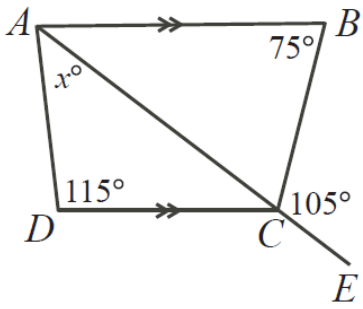
(41) $0.41666\ldots - 0.1666\ldots =$

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

(42) Distinct points are placed on a circle. Each pair of points is joined with a line segment. An example with 4 points and six line segments is shown below. If 8 distinct points are placed on a circle, how many line segments would there be?

A) 21 B) 27 C) 28 D) 36 E) 56

(43) In the diagram below, *AB* is parallel to *DC* and *ACE* is a straight line. What is the value of *x*?



A) 30° B) 35° C) 40° D) 45° E) 50°

(44) A bicycle travels at a constant speed of 15 km/h. A bus starts 195 km behind the bicycle and catches up to the bicycle in 3 hours. What is the average speed of the bus in km/h?

A) 50 km/h B) 60 km/h C) 65 km/h D) 70 km/h E) 80 km/h

(45) Mackenzie lists the numbers 3, 4, 5, 6, 7, 8, and 9. In her list, what is the ratio of the number of prime numbers to the number of composite numbers?

A) 3 : 4 B) 5 : 2 C) 2 : 5 D) 3 : 7 E) 1 : 6

(46) The mean (average) of a set of six numbers is 10. If the number 25 is removed from the set, what is the mean of the remaining numbers?

A) 6 B) 7 C) 8 D) 9 E) 10

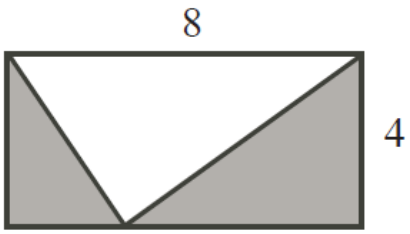
(47) Two 5-digit positive integers are formed using each of the digits from 0 through 9 once. What is the smallest possible positive difference between the two integers?

A) 229 B) 247 C) 249 D) 269 E) 469

(48) If a pyramid has a square base, how many edges does the pyramid have?

A) 3 B) 5 C) 6 D) 8 E) 12

(49) The rectangle shown below has side lengths of 8 and 4. What is the area of the shaded part?



A) 4 B) 12 C) 16 D) 32 E) 64

(50) A pizza parlor prepared 39 pizzas to deliver. The first person delivered 7 pizzas and placed the rest of the pizza boxes on 4 shelves equally. Which equation could be used to find ***n***, the total number of pizza boxes she put onto each shelf?

A) $n = (39 + 7) \div 3$

B) $n = 39 - 7 \div 4$

C) $n = 39 + (7 \times 4)$

D) $n = (39 - 7) \div 4$

E) $n = -39 - (7 \times 4)$

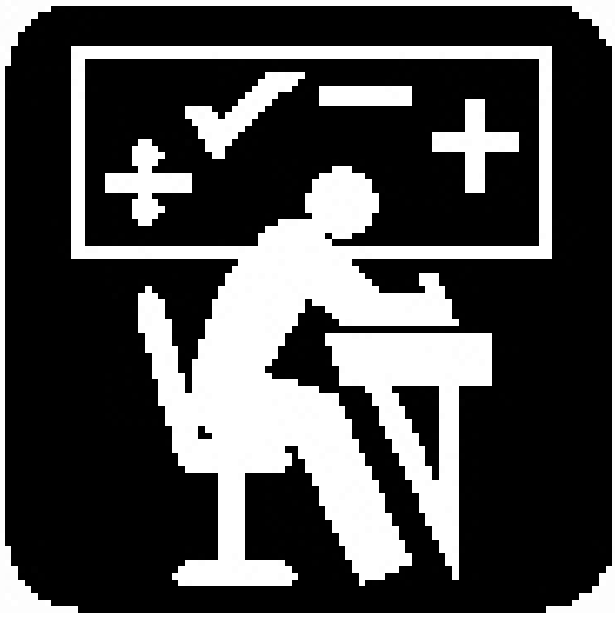
2022 – 2023 University Interscholastic League JH/MS Mathematics Contest A – Key

(1) A
(2) B
(3) B
(4) A
(5) D
(6) C
(7) E
(8) C
(9) D
(10) B
(11) B
(12) C
(13) D
(14) B
(15) C
(16) E
(17) D
(18) A
(19) C
(20) C
(21) E ($4.28)
(22) D
(23) C
(24) E (9)
(25) E
(26) B
(27) B
(28) E
(29) B
(30) D
(31) A
(32) E
(33) A
(34) A
(35) C
(36) B
(37) C
(38) D
(39) A
(40) B
(41) A
(42) C
(43) B
(44) E
(45) A
(46) B
(47) B
(48) D
(49) C
(50) D

FALL/WINTER DISTRICT 2022-2023

A+ ACADEMICS

University Interscholastic League



Mathematics

DO NOT OPEN TEST
UNTIL TOLD TO DO SO

2022 – 2023 University Interscholastic League JH/MS Mathematics Contest B

(1) Evaluate: $12 \times (0.5)^{-1} \div 4$.

A) 24 B) $1\frac{1}{2}$ C) $1\frac{1}{4}$ D) -6 E) 6

(2) $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} =$

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

(3) 0.25% =_____ (common fraction)

A) $\frac{1}{250}$ B) $\frac{1}{25}$ C) $\frac{1}{4}$ D) $\frac{1}{400}$ E) $\frac{1}{40}$

(4) Which of the statements below is an example of the associative property?

A) X + Y = Y + X

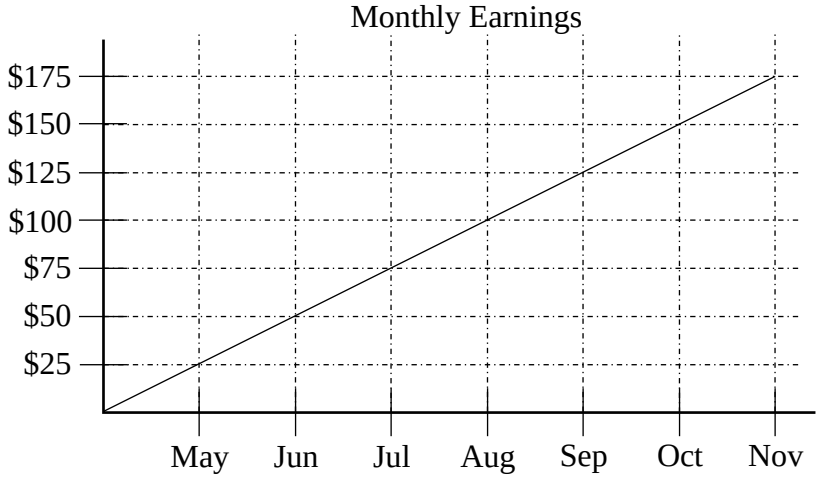
B) 2(X + Y) = 2X + 2Y

C) $X^{-1} = \frac{1}{X}$

D) X + (Y + Z) = (X + Y) + Z

E) $X \times \frac{1}{X} = 1$

(5) Each month Noah saved the money he earned for doing different jobs in his piggy bank every time he got paid. Based on the graph below, how much should he earn total for June, July, and August?



A) $50 B) $125 C) $225 D) $250 E) $275

(6) What is 6050.287 rounded to the nearest ten?

A) 6050 B) 6100 C) 650.29 D) 650.3 E) None of these

(7) What is 40% of 250?

A) 50 B) 100 C) 150 D) 200 E) 1,000

(8) $6\frac{1}{4} \times 16 =$

A) 100 B) 96 C) 116 D) 98 E) 112

(9) Javier buys 5 pounds of apples at 75¢ per pound and uses a 20% off coupon when he purchases the apples. What is the total amount he paid for the apples?

A) $3.75 B) $7.50 C) $4.50 D) $2.75 E) $3.00

(10) $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \frac{6}{5} \ldots \times \frac{2024}{2023} = ?$

A) 1,012 B) 2,012 C) 1,101 D) 2,201 E) 2,022

(11) What value for *w* makes this equation true?

$$\mathbf{5 \times \mathit{w} = (5 \times 20) + (5 \times 3)}$$

A) 3 B) 20 C) 23 D) 27 E) 203

(12) $\frac{1}{10} + \frac{3}{10} + \frac{1}{2} + \frac{7}{10} \ldots + \frac{13}{10} = ?$

A) $3\frac{3}{5}$ B) $4\frac{9}{10}$ C) $4\frac{3}{5}$ D) $\frac{3}{5}$ E) $3\frac{9}{10}$

(13) $10^7 \div 7$ has a remainder of

A) 1 B) 2 C) 3 D) 4 E) 5

(14) $33\frac{1}{4}\%$ of 28 is equal to $16\frac{5}{8}\%$ of what?

A) 56 B) 36 C) 14 D) 2 E) 1

(15) What is the sum of the unique prime factors of 24?

A) 5 B) 6 C) 7 D) 9 E) 10

(16) A whole number squared times itself is 216. What is the number?

A) 4 B) 5 C) 6 D) 16 E) 36

(17) The median of 13, 25, 29, and 36 is

A) $25\frac{3}{4}$ B) 26 C) $26\frac{1}{4}$ D) $26\frac{3}{4}$ E) 27

(18) What is the largest prime number less that 40?

A) 23 B) 29 C) 31 D) 37 E) 39

(19) If $x = 21$, then $x^2 - 26x + 169 =$

A) 64 B) 56 C) 49 D) 42 E) 36

(20) $98^2 + 14^2 =$

A) 9,600 B) 1,960 C) 9,604 D) 1,120 E) None of these

(21) 65 (base 10) = _____ (base 3).

A) 212 B) 2012 C) 2102 D) 21 remainder 3 E) 23

(22) What is the smallest number that the three numbers: 12, 24 and 16, can divide evenly into?

A) 2 B) 48 C) 8 D) 72 E) 192

(23) What is the slope of the straight line $\frac{2}{3}x - 6y = 12$?

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

(24) Paige has 5 classical CDs, 4 jazz CDs, and 11 rock CDs. If she randomly selects one CD from her collection to play, what is the probability that it is a classical CD?

A) 0.20 B) 0.44 C) 0.55 D) 0.80 E) 0.25

(25) In how many ways can you arrange 5 books on a shelf?

A) 5 B) 10 C) 25 D) 125 E) None of these

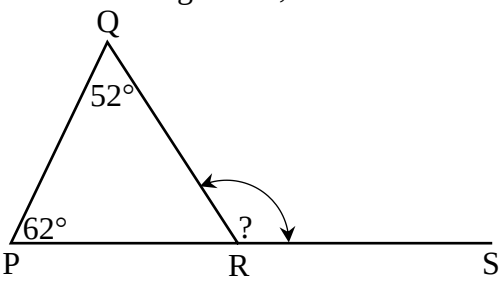
(26) What is the remainder when 3857596 is divided by 11?

A) 2 B) 5 C) 6 D) 8 E) 9

(27) Genny's candy jar contains 6 peppermint candies, 3 spearmint candies, and 3 wintergreen candies. The first candy she randomly picks from the jar is wintergreen. If it is not replaced, what is the probability the second candy she randomly picks from the jar will also be wintergreen?

A) $\frac{1}{12}$ B) $\frac{1}{6}$ C) $\frac{1}{3}$ D) $\frac{1}{11}$ E) $\frac{2}{11}$

(28) Based on the angles given in the drawing below, what is the measure of ∠QRS?



A) 118° B) 114° C) 112° D) 66° E) 57°

(29) What is the least common Multiple (LCM) for the two terms below?

$8x^2y$ and $12x^3y^2$

A) $2x^2y^2$ B) $2xy$ C) $12xy$ D) $2x^3y^2$ E) $24x^3y^2$

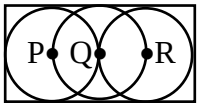
(30) Find the smallest positive integral value for ***k*** such that 574***k***2is divisible by 4.

A) 9 B) 7 C) 5 D) 3 E) 1

(31) What is the unit's digits for 15^6?

A) 1 B) 7 C) 9 D) 5 E) 0

(32) Three congruent circles with centers P, Q and R are tangent to the sides of rectangle as shown below. The circle centered at Q has diameter 4 and passes through points P and R. What is the area of the rectangle?



A) 16 B) 24 C) 32 D) 64 E) 128

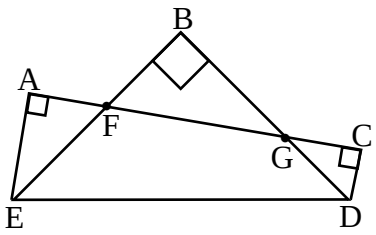
(33) If $2x + y = 6$ and $3x - y = 14$, then $xy =$

A) -8 B) -6 C) 8 D) 6 E) None of these

(34) $(9.0)^2 \div (1.8)^2 \times (1.2)^2 =$

A) 2.4 B) 36 C) 6 D) 24 E) 300

(35) In the figure below ∠A, ∠B, and ∠C are each right angles. If ∠AEB is 40° and ∠BED = ∠BDE, then what does ∠CDE equal?



A) 75° B) 80° C) 85° D) 90° E) 95°

(36) 1.41666 . . . = _____(common fraction)

A) $\frac{7}{12}$ B) $\frac{5}{12}$ C) $\frac{17}{12}$ D) $\frac{16}{9}$ E) $\frac{17}{9}$

(37) 33 (base 4) + 44 (base 5) + 55 (base 6) = _____(base 10).

A) 132 B) 131 C) 39 D) 74 E) 75

(38) What is the sum of the seventh and eighth triangular numbers?

A) 15 B) 225 C) 56 D) 64 E) None of these

(39) What is the 100^{th} digit to the right of the decimal point in the decimal form of $\frac{4}{37}$?

A) 0 B) 1 C) 3 D) 8 E) 9

(40) Students from three middle schools worked on a summer project.

Seven students from Obama Middle School worked for 3 days.
Four students from Lincoln Middle School worked for 5 days.
Five students from Richards Middle School worked for 9 days.

The total amount paid for the students' work was $774. Assuming each student received the same amount for a day's work, how much did the students from Lincoln Middle School earn altogether?

A) $9.00 B) $48.38 C) $180.00 C) $193.50 E) $258.00

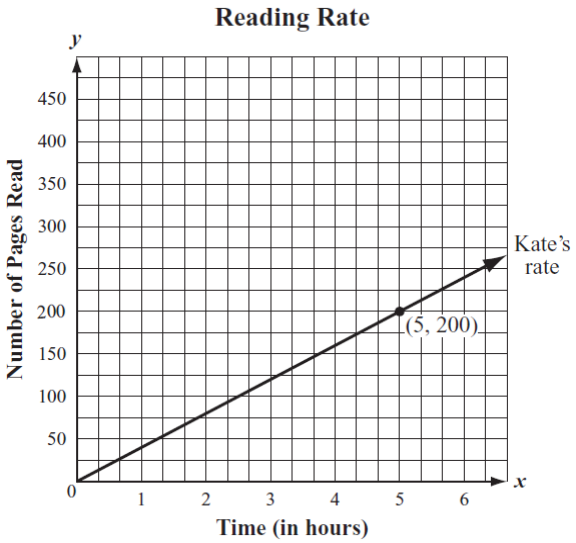
(41) Suppose a new operation, ♥, is defined so that $a♥b = a + b^2$. What is $(2♥3)♥4$ equal?

A) 27 B) 9 C) 21 D) 41 E) 29

(42) Which of the following statements is false?

A) Every number that is odd has a factor of 3.
B) Every prime number has exactly two factors.
C) Every perfect square has an odd number of factors.
D) Every number that has 8 as a factor also has 4 as a factor.
E) Every composite number can be written as the product of prime numbers.

Kate is reading a 500-page book. The graph below represents the relationship between the number of hours Kate has spent reading and the number of pages she has read. Please use this information plus the graph to answer questions 43 – 46.



(43) At what rate, in pages per hour (Pgs/hr), is Kate reading?

A) $\frac{1}{4}$ Pg/hr B) 50 Pgs/hr C) 4 Pgs/hr D) 40 Pgs/hr E) 75 Pgs/hr

(44) What is the total amount of time, in hours, it will take Kate to read the entire 500-page book?

A) 11 hrs. 20 min. B) 12 hrs. C) 12 hrs. 30 min. D) 12 hrs. 45 min. E) 14 hrs.

(45) At her reading rate, how long does it take Kate to read a single page?

A) 90 seconds B) 30 seconds C) 20 seconds D) 15 seconds E) 10 seconds

(46) Maryanne decides to read the same book later. If she can read at a rate that is 25% greater than Kate, how long should it take her to finish reading the book?

A) 10 hours B) 11 hours C) 11 hrs. 15 min. D) 12 hours E) 12 hrs. 25 min.

(47) Four ping pong balls numbered 1, 2, 3, and 4 are placed in a bag and two are drawn at random without replacement. What is the probability that their sum is an odd number?

A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{7}{10}$ E) $\frac{4}{5}$

(48) If $x - y = 18$ and $x^2 - y^2 = 396$, then $xy =$

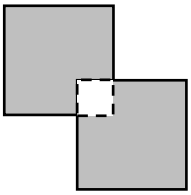
A) 2 B) 20 C) 21 D) 22 E) 40

(49) A box contains 14 disks, each colored red, blue or green. There are twice as many red disks as green disks, and half as many blue as green. How many disks are green?

A) 2 B) 4 C) 6 D) 8 E) 10

(50) Two identical squares, each with side length 5-cm, overlap as shown to the right. The shape of their overlap is a square, which has an area of 4-cm^2. What is the perimeter, in centimeters, of the shaded figure?

A) 24 cm
B) 32 cm
C) 40 cm
D) 42 cm
E) 50 cm



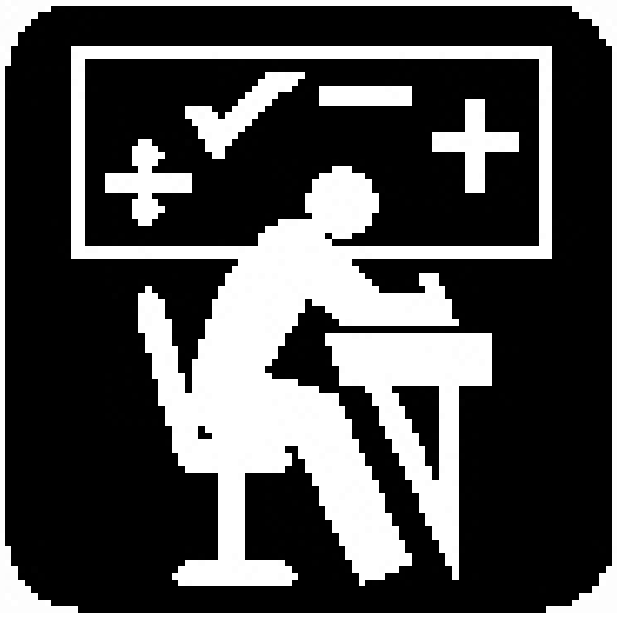
2022 – 2023 University Interscholastic League JH/MS Mathematics Contest B – Key

(1) E
(2) C
(3) D
(4) D
(5) C
(6) A
(7) B
(8) A
(9) E
(10) A
(11) C
(12) B
(13) C
(14) A
(15) A
(16) C
(17) E
(18) D
(19) A
(20) E (9800)
(21) C
(22) B
(23) A
(24) E
(25) E (120)
(26) C
(27) E
(28) B
(29) E
(30) E
(31) D
(32) C
(33) A
(34) B
(35) E
(36) C
(37) D
(38) D
(39) B
(40) C
(41) A
(42) A
(43) D
(44) C
(45) A
(46) A
(47) C
(48) E
(49) B
(50) B

SPRING DISTRICT 2022-2023

A+ ACADEMICS

University Interscholastic League



Mathematics

DO NOT OPEN TEST
UNTIL TOLD TO DO SO

2022 – 2023 University Interscholastic League JH/MS Mathematics Contest C

(1) Evaluate: $12^{-1} \times (0.5)^{-1} \times 60$.

A) 24 B) $1\frac{1}{2}$ C) 5 D) $2\frac{1}{2}$ E) None of these

(2) $\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} =$

A) $\frac{1}{6}$ B) $\frac{1}{3}$ C) $\frac{2}{5}$ D) $\frac{1}{4}$ E) 1

(3) 4.4% =_____ (common fraction)

A) $\frac{11}{250}$ B) $\frac{44}{25}$ C) $\frac{1}{44}$ D) $\frac{1}{440}$ E) $\frac{1}{40}$

(4) Which of the statements below is an example of the distributive property?

A) X + Y = Y + X

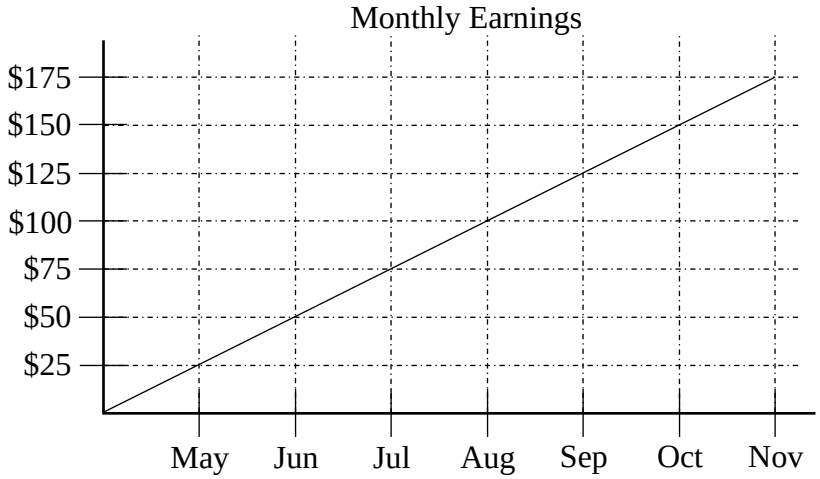
B) 2(X + Y) = 2X + 2Y

C) $X^{-1} = \frac{1}{X}$

D) X + (Y + Z) = (X + Y) + Z

E) $X \times \frac{1}{X} = 1$

(5) Each month Wesley saved the money he earned for doing different jobs in his piggy bank every time he got paid. Based on the graph below, how much how should he earn total for May, June, and July?



A) $150 B) $125 C) $225 D) $250 E) $275

(6) What is 6050.287 rounded to the nearest tenth?

A) 6,050 B) 6,100 C) 6,050.29 D) 6,050.3 E) 6,051

(7) What is 80% of 250?

A) 50 B) 100 C) 150 D) 200 E) 1,000

(8) $6\frac{1}{4} \times 40 =$

A) 240 B) 10 C) 280 D) 28 E) 250

(9) Javier buys 5 pounds of apples at 60¢ per pound and uses a 20% off coupon when he purchases the apples. What is the total amount he paid for the apples?

A) $3.00 B) $3.60 C) $2.60 D) $2.40 E) $4.00

(10) $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \frac{6}{5} \ldots \times \frac{1980}{1979} = ?$

A) 3,960 B) 989.5 C) 495 D) 1,981 E) 990

(11) What value for *w* makes this equation true?

$$\mathbf{8 \times w = (8 \times 20) - (8 \times 4)}$$

A) 24 B) 16 C) 22 D) 20 E) 128

(12) $\frac{2}{10} + \frac{4}{10} + \frac{6}{10} + \frac{8}{10} + \ldots + \frac{14}{10} = ?$

A) $4\frac{3}{5}$ B) $4\frac{2}{5}$ C) $3\frac{3}{5}$ D) $5\frac{3}{5}$ E) $3\frac{9}{10}$

(13) $4^{10} \div 11$ has a remainder of

A) 1 B) 2 C) 3 D) 4 E) 5

(14) $18\frac{2}{3}\%$ of 15 is equal to 56% of what?

A) 75 B) 60 C) 45 D) 25 E) 5

(15) What is the sum of the unique prime factors of 70?

A) 7 B) 14 C) 12 D) 21 E) 15

(16) A whole number squared times itself is 343. What is the number?

A) 3 B) 5 C) 6 D) 7 E) 49

(17) What is the median of 12, 24, 36, and 28?

A) 25 B) 26 C) $25\frac{1}{4}$ D) $25\frac{3}{4}$ E) 27

(18) What is the smallest prime number greater that 70?

A) 73 B) 77 C) 78 D) 79 E) None of these

(19) If $x = 17$, then $x^2 + 26x + 169 =$

A) 30 B) 90 C) 900 D) 1,032 E) 1,690

(20) $13^2 + 26^2 =$

A) 845 B) 676 C) 689 D) 1,352 E) 1,521

(21) 59 (base 10) = _____ (base 3).

A) 192 B) 2012 C) 212 D) 19 remainder 2 E) 2102

(22) What is the smallest number that the three numbers: 18, 12 and 24, can divide evenly into?

A) 2 B) 4 C) 6 D) 48 E) 72

(23) What is the slope of the straight line $\frac{3}{4}x - 6y = 12$?

A) -8 B) $\frac{3}{4}$ C) $-\frac{1}{8}$ D) $\frac{1}{8}$ E) $\frac{-3}{4}$

(24) Paige has 8 classical CDs, 7 jazz CDs, and 5 rock CDs. If she randomly selects one CD from her collection to play, what is the probability that it is a rock CD?

A) 0.05 B) 0.50 C) 0.25 D) 0.20 E) 0.16

(25) In how many ways can you arrange 6 books on a shelf?

A) 720 B) 360 C) 250 D) 36 E) 30

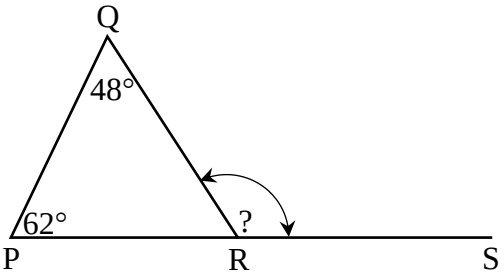
(26) What is the remainder when 1234567 is divided by 11?

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

(27) Genny's candy jar contains 6 peppermint candies, 3 spearmint candies, and 3 wintergreen candies. The first candy she randomly picks from the jar is peppermint. If it is not replaced, what is the probability the second candy she randomly picks from the jar will also be peppermint?

A) $\frac{1}{3}$ B) $\frac{5}{11}$ C) $\frac{1}{2}$ D) $\frac{5}{12}$ E) $\frac{1}{6}$

(28) Based on the angles given in the drawing below, what is the measure of ∠QRS?



A) 110° B) 128° C) 112° D) 62° E) 42°

(29) What is the least common Multiple (LCM) for the two terms below?

$16x^2y^3$ and $12x^3y^2$

A) $2x^2y^2$ B) $4xy$ C) $4x^2y^2$ D) $48x^3y^3$ E) $24x^3y^3$

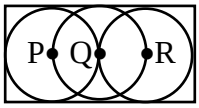
(30) Find the smallest positive integral value for ***k*** such that 772***k***5is divisible by 3.

A) 0 B) 1 C) 3 D) 6 E) 9

(31) What is the unit's digits for 12^8?

A) 1 B) 2 C) 4 D) 5 E) 6

(32) Three congruent circles with centers P, Q and R are tangent to the sides of rectangle as shown below. The circle centered at Q has diameter 6 and passes through points P and R. What is the area of the rectangle?



A) 12 B) 24 C) 36 D) 64 E) 72

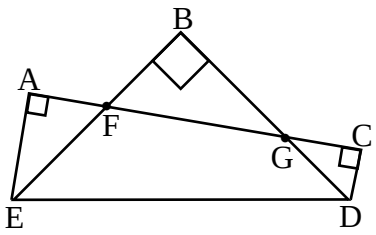
(33) If $2x + y = 11$ and $3x - y = 14$, then $xy =$

A) -5 B) -6 C) 5 D) 6 E) None of these

(34) $(1.5)^2 \div (4.5)^2 \times (1.8)^2 =$

A) 2.4 B) 3.6 C) 0.02 D) 0.36 E) 0.04

(35) In the figure below ∠A, ∠B, and ∠C are each right angles. If ∠AEB is 35° and ∠BED = ∠BDE, then what is ∠CDE equal?



A) 75° B) 100° C) 30° D) 80° E) 120°

(36) 1.1333 . . . = _____(common fraction)

A) $\frac{2}{15}$ B) $\frac{17}{15}$ C) $\frac{7}{15}$ D) $\frac{13}{9}$ E) $\frac{13}{15}$

(37) 44 (base 5) + 55 (base 6) + 66 (base 7) = _____(base 10).

A) 107 B) 165 C) 156 D) 83 E) 104

(38) What is the sum of the ninth and tenth triangular numbers?

A) 100 B) 90 C) 81 D) 19 E) None of these

(39) What is the 100^{th} digit to the right of the decimal point in the decimal form of $\frac{11}{37}$?

A) 0 B) 1 C) 2 D) 7 E) 9

(40) Students from three middle schools worked on a summer project.

Seven students from Obama Middle School worked for 3 days.
Four students from Lincoln Middle School worked for 5 days.
Five students from Richards Middle School worked for 9 days.

The total amount paid for the students' work was $774. Assuming each student received the same amount for a day's work, how much did the students from Richards Middle School earn altogether?

A) $45.00 B) $405.00 C) $180.00 C) $81.00 E) $181.00

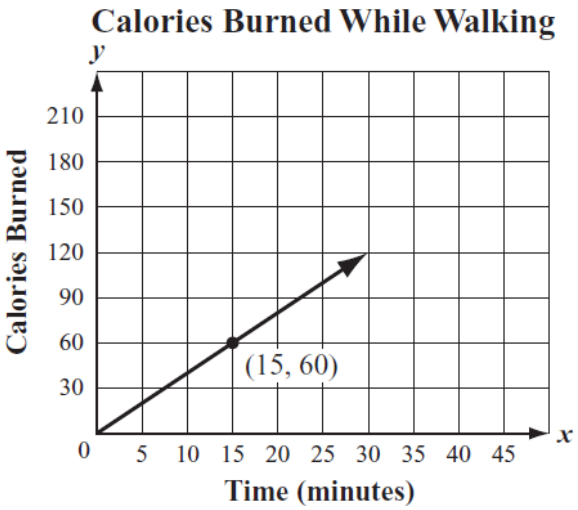
(41) Suppose a new operation, ♥, is defined so that $a♥b = a^2 - b^2$. What is $(2♥3)♥4$ equal?

A) -9 B) 9 C) 4 D) 25 E) 32

(42) Which of the following statements is false?

A) Every number that is odd has a factor of 1.
B) Every prime number has exactly two factors.
C) Every perfect square has an even number of factors.
D) Every number that has 8 as a factor also has 4 as a factor.
E) Every composite number can be written as the product of prime numbers.

The graph below shows the number of Calories Matthew will burn over time while walking at a constant rate. Please use this information plus the graph to answer questions 43 – 46.



(43) At what rate, in calories per minute (Cal/min), is Matthew burning?

A) $\frac{1}{4}$ Cal/min B) 75 Cal/min C) 4 Cal/min D) 40 Cal/min E) 0.4 Cal/min

(44) What is the number of Calories Matthew will burn after walking at a constant rate for 42 minutes?

A) 168 Calories B) 210 Calories C) 132 Calories D) 162 Calories E) 630 Calories

(45) At his Calorie burning rate, how long does it take Matthew to burn a single Calorie?

A) 2.5 seconds B) 4 seconds C) 6.6 seconds D) 15 seconds E) 25 seconds

(46) Mike, Matthew's older brother, decides to exercise by walking as well. If he can walk at a rate that burns 25% more Calories per minute than Matthew, how long should it take him to burn 100 Calories?

A) 4 minutes B) 5 minutes C) 6 minutes D) 20 minutes E) 25 minutes

(47) Four ping pong balls numbered 1, 2, 3, and 4 are placed in a bag and two are drawn at random without replacement. What is the probability that their sum is an even number?

A) $\frac{7}{10}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{1}{3}$ E) $\frac{4}{5}$

(48) If $x - y = 18$ and $x^2 - y^2 = 216$, then $xy =$

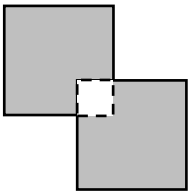
A) 15 B) 45 C) 30 D) -30 E) -45

(49) A box contains 21 disks, each colored red, blue or green. There are twice as many red disks as green disks, and half as many blue as green. How many disks are green?

A) 2 B) 4 C) 6 D) 8 E) 10

(50) Two identical squares, each with side length 8-cm, overlap as shown to the right. The shape of their overlap is a square, which has an area of 9-cm^2. What is the perimeter, in centimeters, of the shaded figure?

A) 20 cm
B) 32 cm
C) 42 cm
D) 52 cm
E) 55 cm



2022 – 2023 University Interscholastic League JH/MS Mathematics Contest C – Key

(1) E (10)
(2) B
(3) A
(4) B
(5) A
(6) D
(7) D
(8) E
(9) D
(10) E
(11) B
(12) D
(13) A
(14) E
(15) B
(16) D
(17) B
(18) E (71)
(19) C
(20) A
(21) B
(22) E
(23) D
(24) C
(25) A
(26) D
(27) B
(28) A
(29) D
(30) A
(31) E
(32) E
(33) C
(34) D
(35) B
(36) B
(37) A
(38) A
(39) C
(40) B
(41) B
(42) C
(43) C
(44) A
(45) D
(46) D
(47) D
(48) E
(49) C
(50) D