"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Sponsored by: Columbia Basin College

GENERAL INSTRUCTIONS applying to all tests:

- *Good sportsmanship is expected throughout the competition by all involved (competitors and observers). Display of poor sportsmanship will result in disqualification.*
- *Competitors may not use calculators or any other aids on any portion of this contest.*
- *Unless stated otherwise:*
  - *Express all rational, non-integer answers as common fractions, except in problems dealing with money, where you should give the answer as a decimal rounded to the nearest cent.*
  - *For 5th grade and up, all fractions and ratios must be reduced to simplest form, all radicals must be simplified, and all denominators must be rationalized.*
  - *Do not round or approximate answers. Leave answers in terms of π or other irrational quantities (e.g., √2), where applicable.*
- *Units are not necessary as part of your answer, unless it is a problem that deals with time, in which case, AM or PM is required. However, if you choose to use units, they must be correct.*
- *Record all answers on the colored cover sheets in the answer column only.*
- ***Be sure that the student name, school, team number, etc. has been filled out at the top of each answer sheet.***
- *Tests will be scored as a 0 if answers are not recorded correctly on the answer sheets.*
- *Blank answer sheets and answer sheets with no name will be scored as a 0.*

FINAL SCORES AND AWARDS

Individual awards are determined by both the Mental Math and Individual Test scores. Individual ties are broken based on the following, in this order: total scaled individual points, total number of correct answers on the Individual Test, Mental Math raw score, number of correct answers from Individual Test #31-40, number of correct answers from Individual Test #16-30, highest numbered question answered correctly on the Individual Test working backwards from #40.

Team (School) awards are based on the highest score from amongst each of the school's "teams of 4 students" in each event and is calculated as 2·(Sum of highest 3 Mental Math scores) + 2·(Multiple Choice) + 6·(Team) + 1·(Triple Jump) + 1·(College Bowl), for approximate weights of 25%, 20%, 30%, 15% and 10% respectively. Team ties are broken based on highest event score in order of the events, starting with Mental Math.

MENTAL MATH TEST - 30 sec./quest., 8 problems, ~8%/25% of individ./team scores

The proctor will read each question twice. You may not do any writing or talking while arriving at a solution. Record only your answer on your answer sheet. You may not change, cross out, erase, or write over an answer once you have written it down. The maximum wait time is 30 seconds after completion of the second reading of the question. Correct answers receive 1 point.

INDIVIDUAL TEST - 35 minutes, 40 problems, ~92% of individual score

When you are prompted to begin, tear off the colored answer sheet and begin testing. No talking during this individual test. You will be given a 5 minute time warning. Correct answers receive 2 points for problems 1-30 and 3 points for 31-40 (in the scaled score).

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Final Score *(out of 8)*

Room # **School Name** **Student Name** **Team #**

Mental Math – ~25% of team score & ~8% of individual score

All students in the room will concurrently be asked the same eight questions in this individual test. When it is time to begin, the proctor will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you. ***You may not change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, or crossed-out answers, they will be marked wrong.*** *Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his or her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before the next question is read. You may continue to work on a problem (in your head) while the next question is being read. The raw score is 1 point per correct answer.*

STUDENT: DO NOT WRITE IN SHADED REGIONS (or anywhere else, other than the answer box)

	Answer	Scorer 2 0 or 1	Scorer 1 0 or 1
1			
2			
3			
4			
5			
6			
7			
8			
7th Grade	**TOTAL:**		

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Key

Mental Math Contest – Answer Key

30 seconds per question – ~25% of team score & ~8% of individual score

SCORERS — Write-overs, Cross-outs, and Erasures Must be Marked Incorrect (0)
Bracketed items […] in the answer key are optional.

7th Grade

	Answer	
1	756	What is the positive difference between one thousand and six and two hundred and fifty?
2	6	What is the greatest common factor of eighteen and twenty-four?
3	2100	What is the product of the numbers five, six, seven, and ten?
4	5	As a reduced common fraction, the probability of flipping no heads when you flip a fair coin twice is A over B. What is the value of A plus B?
5	12	Solve for X in the equation two X plus four equals twenty-eight.
6	7	Sunday is one day after Saturday. How many letters are in the name of the day that is seventeen days after Saturday?
7	7	As a reduced common fraction, the slope of a line with points eight comma three and twelve comma six is A over B. What is the value of A + B?
8	45	As a decimal to the nearest hundredth, the number of square inches in the area of a square whose perimeter is eighteen inches is A point B, where A and B each represent two-digit integers. What is the value of A plus B?

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

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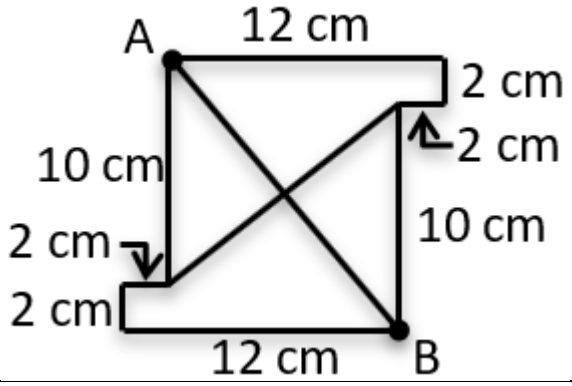
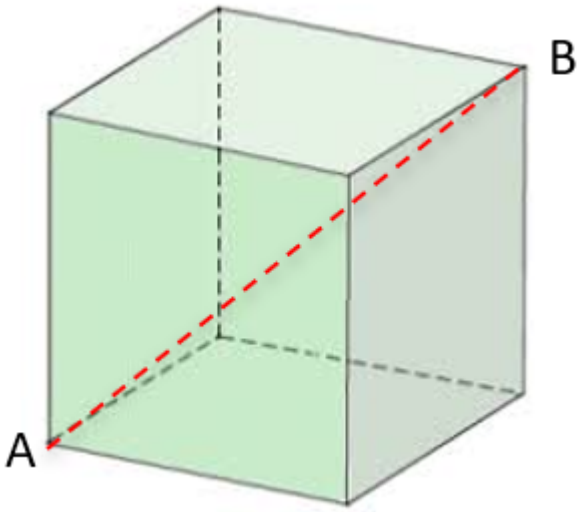
Individual Contest

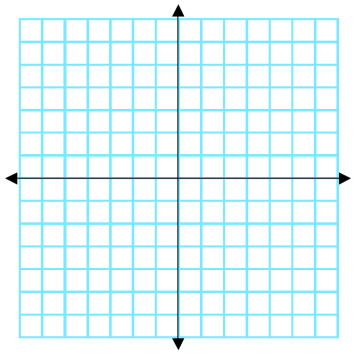
Record all answers on the colored cover sheet. 35 minutes, 40 problems, ~92% of individual score.
No talking during this individual test. A 5-minute time warning will be given.

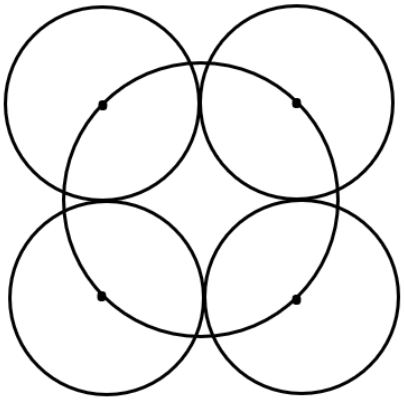
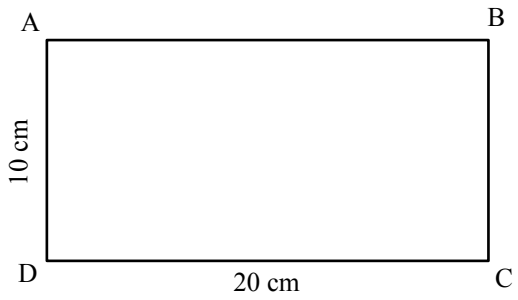
	Questions 1-30: 2 points each
1	What is the smallest positive odd 2-digit number?
2	As a reduced common fraction, the probability of drawing a red card from a standard deck of cards is A/B. What is the value of A + B?
3	How many white triangles are in the figure shown? 
4	The circumference of a circle is 20π feet. In terms of π, the number of square feet in the area of the circle is Aπ. What is the value of A?
5	A proper factor of a number is a factor that is not the number itself. The largest proper factor of 210 is 105. What is the first number greater than 210 that also has 105 as its largest proper factor?
6	Mitch eats half of a cake and Lindsey eats one-third of the same cake. The reduced common fraction representing the portion of the cake that has not been eaten yet is A/B. What is the value of A + B?
7	Evaluate and express as a whole number: $\frac{12}{37} \cdot \frac{37}{12}$
8	Reyna walks to her friend's house at an average rate of 1 mile per hour. It takes her 20 minutes to walk to her friend's house. As a reduced common fraction, the number of miles in the distance to her friend's house is A/B. What is the value of A + B?
9	The side length of a regular octagon is 123 miles. What is the number of miles in the perimeter of the octagon?
10	Riddesh has scores of 92, 86, 88, and 90 on his last four rounds of golf. What score must he get on the next round in order to lower his average for the five rounds to exactly 87?
11	Evaluate and express as an integer: $(2 - 6)^3 + (15 - 22)^2$
12	The length of the hypotenuse of a right triangle is 6 cm. One of the legs is $\sqrt{11}$ cm long. What is the number of centimeters in the length of the other leg?
13	An 18-foot rope is cut 5 times at regular intervals so that each of the resulting pieces are the same length. What is the number of feet in the length of each piece?

14	Solve for x: 30 – 7.5x = -105
15	Ten giants take ten days to build ten cities. How many days would it take five giants to build two cities?
16	The given expression can be rewritten in the form Ax(Bx – C), where A, B, and C are positive integers and B and C have no common factors other than 1. What is the value of A + B + C? $38x^2 - 95x$
17	Ahaan flips a nickel, a dime, and a quarter. As a reduced common fraction, the probability that the nickel is heads, the dime is heads, and the quarter is tails is A/B. What is the value of A + B?
18	What is the units digit of 7 to the power of 256?
19	Allison is holding 13 cards, Bella is holding 12 cards and Cam is holding 11 cards. Allison gives Bella and Cam 2 cards each. Bella gives Allison 1 card and Cam 3 cards. Cam gives Allison 3 cards and Bella 2 cards. After these trades, what is the number of cards held by the person holding the largest number of cards?
20	All the prime numbers are removed from the set of integers from 10 to 20, inclusive. What is the mean of the remaining numbers?
21	The following expression reduced to a common fraction is A/B. What is the value of A + B? $\frac{2^8 \cdot 3^{11} \cdot 5^3 \cdot 7^{13}}{2^7 \cdot 3^{13} \cdot 5^4 \cdot 7^{12}}$
22	In simplest radical form, the number of centimeters in the length of $\overline{AB}$ in the figure shown is $C\sqrt{D}$, where C and D are integers and D has no perfect square factors other than 1. What is the value of C + D? 
23	On a coordinate plane, point A (-10, 21) is translated 3 units to the right and down 13 units resulting in point A'. Then point A' is reflected over the y-axis resulting in point A''. What is the sum of the coordinates of A''?
24	What is the smallest possible perimeter in inches of a rectangle with sides of integer length in inches and an area of 600 square inches?
25	How many 5-character codes can be made if the first and last characters must be different letters of the alphabet, the three middle characters must be nonnegative single-digit integers that may repeat, and the third of the three integers must be odd?
26	Hero's Theorem states that the area of a triangle equals $\sqrt{s(s-a)(s-b)(s-c)}$, where s is the semi-perimeter (half of the perimeter) of the triangle, and a, b, and c are the three side lengths of the triangle. In simplest radical form, the number of square inches in the area of a triangle with side lengths of 5, 6, and 7 inches is $D\sqrt{E}$. What is the value of D + E?

27	The side length of the cube shown here is 7 meters. In simplest radical form, the number of meters in the length of $\overline{AB}$ is $C\sqrt{D}$. What is the value of C + D? 
28	How many ways are there to make a sum of 10 by adding together the digits 1, 3 and 7, or any combination of these digits?
29	An 80-gallon bathtub has a faucet and a drain. When the faucet is on and the drain is closed, it takes 15 minutes to fill the bathtub. When the bathtub is full, the faucet is off, and the drain is open, it takes 18 minutes to empty the bathtub. If the drain is open while the faucet is on, how long will it take to fill the bathtub?
30	As a reduced common fraction, the sum of $\frac{\frac{3}{5}}{7} + \frac{3}{\frac{5}{7}}$ is A/B. What is the value of A + B?

Challenge Questions: 3 points each	
31	Find the sum of all terms of the infinite geometric sequence beginning 4, 3, 9/4 . . .
32	A jar has four red marbles and some other marbles in it. When drawing two marbles out of the jar without replacement, the probability of getting one red and one blue marble is determined using the following calculation: $\left(\frac{4}{17}\right)\left(\frac{7}{16}\right)(2)$ Once the marbles are put back in the jar, as a reduced common fraction, the probability of drawing two blue marbles out of the jar with replacement is A/B, where A is a two-digit whole number and B is a three-digit whole number. What is the value of A + B?
33	A data set has ten distinct positive whole numbers and a mean of 50. As a decimal to the nearest tenth, the largest possible median of the set is A.B, where A is a two-digit whole number and B is a single digit. What is the value of A + B?
34	Let A = m/n, let B = p/q, and let m, n, p, and q be distinct single-digit positive whole numbers. If A + B = 12, what is the product of m and p?
35	Mike has the 13 hearts from a standard deck in his hand. Molly randomly chooses two cards from his hand. As a reduced common fraction, the probability that the two cards add up to 7 is A/B. What is the value of A + B? Note: the ace has a value of one and each of the face cards has a value of ten.
36	If x + y = 26 and xy = 50, what is the positive value of $\sqrt{x^2 + y^2}$?

37	A certain sport has three positions: forward, middle, and back, and during a game each team has five players on the field at one time. If the Redtown Raptors team has two forwards, four middles, and three backs on their roster, how many different five-player lineups can they use if there must always be at least one of each position on the field?
38	Kennard's favorite 6-digit number is 720,720. What is the sum of the distinct prime factors of Kennard's number?
39	Alexa is trying to break a piñata. She needs to hit it on at least four of her five attempts to break it, and she has a 60% chance of hitting it on each attempt. As a reduced common fraction, the probability that she breaks the piñata is A/B, where A and B are each four-digit integers. What is the value of A + B?
40	On a coordinate plane, every point on the line with equation $y = \frac{5}{2}x - 5$ is translated left three units and up two units to create a second line. The number of units in the distance between the original line and the translated line is $A/\sqrt{B}$, where A and B are both prime numbers. What is the value of A + B? 
IF taking Algebra or Geometry, continue to questions 41 – 42.	
41	The sum of a number and its reciprocal is 37. What is the sum of the number squared plus its reciprocal squared?
42	Alan, Brooklyn, and Carol are doing a project for school tomorrow. Alan and Brooklyn know they can finish the project by themselves in 2 hours. Brooklyn and Carol can finish in 3 hours, and Alan and Carol can finish in 4 hours. They start working at 5:00 PM, but Carol leaves at 6 PM, and she does not return. Beginning at 5:00 PM, how many total minutes will it take to complete the project?
IF taking Geometry, continue to questions 43 – 45.	
43	The area of rectangle ABCD is 20 cm^2, and the perimeter of rectangle ABEF is 20 cm. Both rectangles have side lengths that are whole numbers. What is the positive difference between the maximum and minimum area of the resulting figure when these two rectangles are combined? Hint: the rectangles may overlap and the side lengths of ABCD and ABEF in the maximum area arrangement can be different than the side lengths of the two rectangles in the minimum area arrangement.

44	In the drawing shown, the centers of each of the four smaller circles are on the larger circle and the radius of the larger circle is 10 centimeters. The four smaller circles are tangent to each other. The number of centimeters in the radius of one of the smaller circles can be written in the form $F\sqrt{G}$, where F and G are integers and G has no perfect square factors other than 1. What is the value of G + F?	
45	On rectangle ABCD, AD = 10 cm and DC = 20 cm. A point E is chosen along side $\overline{AB}$ to create ΔCDE. The positive difference between the number of centimeters in the longest and shortest possible perimeters of ΔCDE can be written in the form $M + N\sqrt{P} - Q\sqrt{R}$, where M, N, P, Q, and R are positive integers and neither P nor R have perfect square factors other than 1. What is the value of M + N + P + Q + R?	

"Math Is Cool" Masters – 2020-21

KEY

Individual Contest – Answer Key

SCORERS: Bracketed […] items in answer key are optional. Just mark the score as 0 or 1 and add up those values to reflect total correct. First Scorer – use the right-hand columns so 2nd scorer can do a blind scoring.

	Answer
1	11
2	[A + B =] 3
3	13 [triangles]
4	[A =] 100
5	315
6	[A + B =] 7
7	1
8	[A + B =] 4
9	984 [miles]
10	79
11	-15
12	5 [cm]
13	3 [ft]
14	[x =] 18
15	4 [days]

	Answer
16	[A + B + C =] 26
17	[A + B =] 9
18	1
19	13 [cards]
20	15
21	[A + B =] 59
22	[C + D =] 63
23	15
24	98 [inches]
25	325000 [codes]
26	[D + E =] 12
27	[C + D =] 10
28	6 [ways]
29	90 [minutes]
30	[A + B =] 37

	Answer
31	16
32	[A + B =] 338
33	[A + B =] 84
34	54
35	[A + B =] 27
36	24
37	98 [lineups]
38	41
39	[A + B =] 4178
40	[A + B =] 48
41	1367
42	115 [minutes]
43	25 [cm^2]
44	[G + F =] 7
45	[M + N + P + Q + R =] 47

"Math Is Cool" Masters – 2020-21

Total Correct (all columns)

Room # _____ SCHOOL NAME _____ STUDENT NAME _____ Team # _____

Individual Contest – Score Sheet

STUDENTS: DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
31-45 TOTAL:			

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

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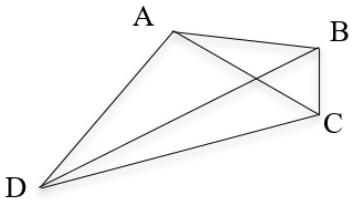
Team Multiple Choice Contest

REFER TO THE FOLLOWING INFORMATION FOR PROBLEMS #1 THROUGH #4.

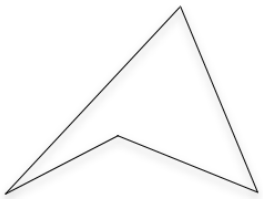
A "diagonal" is any segment that has two vertices of a polygon as endpoints, that is not also a side of the polygon. For example, $\overline{AC}$ is a diagonal in the convex quadrilateral shown to the right, while $\overline{AB}$ is not. The diagonals of a polygon divide the polygon into a certain number of non-overlapping polygonal regions. For example, the diagonals of a convex quadrilateral divide the quadrilateral into 4 triangular regions as shown.

Convex Quadrilateral



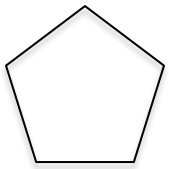
The word "convex" means that all the interior angles of the polygon are less than 180°, as shown in polygon ABCD above. The word "concave" means that at least one of the interior angles of a polygon is more than 180°, as shown in the unlabeled polygon here.

Concave Quadrilateral



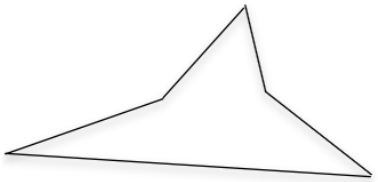
The word "regular" means that all the interior angles and all the sides of the polygon are congruent, as in, for example, a square. All regular polygons are convex.

1 What is the number of non-overlapping polygonal regions created by the five diagonals of a regular pentagon?



A) 10 B) 11 C) 12 D) 14 E) 15

2 Any pentagon, whether convex or concave, has five diagonals. In a concave pentagon, some of the diagonals are partly or entirely outside the original polygon. In the figure shown below, add only the three diagonals that can be drawn completely inside the polygon. What is the number of non-overlapping polygonal regions created as a result?



A) 1 B) 3 C) 5 D) 6 E) 7

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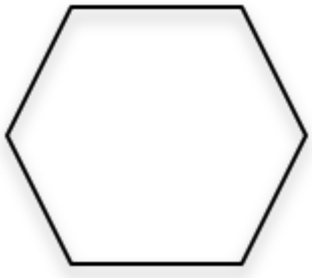
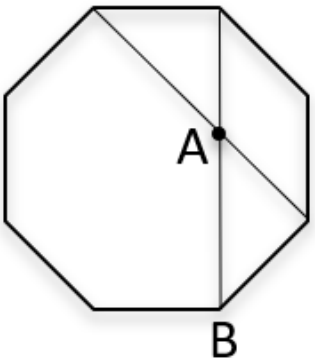
3	What is the ratio of non-overlapping triangular regions to non-overlapping quadrilateral regions created by all of the diagonals in a regular hexagon?  A) 1:2 B) 2:1 C) 5:2 D) 1:3 E) 3:1
4	The figure shown here is a regular octagon with a perimeter of 24 cm. What is the length of $\overline{AB}$?  A) $3\sqrt{2}$ cm B) 4 cm C) 4.3 cm D) $\sqrt{19}$ cm E) 4.5 cm

Continued on Next Page

	REFER TO THE FOLLOWING INFORMATION FOR PROBLEMS #5 THROUGH #7. A formula for adding together the terms of a finite arithmetic sequence is $\frac{n}{2}(a_1 + a_n)$, where n = the number of terms in the sequence, a_1 is the first term of the sequence and a_n is the last term of the sequence. This formula works because in an arithmetic sequence, the sum of the first and last terms is the same as the sum of the 2nd and the 2nd to last terms, and the same as the sum of the 3rd and 3rd to last terms, and so on. Also, if there are n terms in the sequence, there are $\frac{n}{2}$ pairs of terms each with the same sum. For example, the sum of the terms in the sequence {1, 2, 3, 4, 5, 6, 7, 8, 9} can be determined using this formula. The calculations would be $\left(\frac{9}{2}\right)(1 + 9)$ = (4.5)(10) = 45 and 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45. Note: when there is an odd number of terms in the sequence, then there is not a whole number of equal pairs, but the formula still works. In this example there are 4.5 pairs that add up to 10. The extra 0.5 of a pair is always equal to the median of the sequence, which must be the same as $\frac{(a_1+a_n)}{2}$, so you can also use the formula in the form $\frac{n}{2}(a_1 + a_n)$.
5	What is the sum of the terms in the given arithmetic sequence? {34, 39, 44, 49, 54, 59, 64, 69, 74, 79, 84} A) 649 B) 704 C) 1298 D) 1408 E) 15708
6	What is the sum of the terms in the given arithmetic sequence? {-1.3, 3.9, 9.1, . . . , 61.1, 66.3, 71.5} A) 263.25 B) 456.3 C) 491.4 D) 526.5 E) 561.6
7	Let A be the sum of all two-digit integers. Let B be the sum of all two-digit multiples of 10. Let C be the sum of all two-digit multiples of 10 that are also divisible by 3. What is A – (B – C) ? A) 4580.5 B) 4630.5 C) 4635 D) 4685 E) 5230

Continued on Next Page

USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #8 THROUGH #10.

Tides for Seattle (Madison St.), Elliott Bay on Saturday, April 18, 2020.

Day	High/Low	Tide Time	Height (ft)	Sunrise	Sunset
Sa 18	Highest	3:40 AM	10.9	6:13 AM	8:04 PM
Sa 18	Low	10:02 AM	4.2		
Sa 18	High	3:14 PM	8.4		
Sa 18	Low	9:12 PM	2.2		

Tides for Tacoma, Commencement Bay, Sitcum Waterway on April 18, 2020.

Day	High/Low	Tide Time	Height (ft)	Sunrise	Sunset
Sa 18	Highest	3:44 AM	11.3	6:14 AM	8:04 PM

Tides for Budd Inlet, Olympia Shoal on April 18, 2020.

Day	High/Low	Tide Time	Height (ft)	Sunrise	Sunset
Sa 18	Highest	4:23 AM	14.1	6:17 AM	8:05 PM

8 In feet, what was the average of the highest tide at each of the three locations on April 18, 2020?

A) $12.0\overline{6}$ ft B) 12.1 ft C) $12.1\overline{3}$ ft D) $12.1\overline{6}$ ft E) 12.2 ft

9 Let S equal the number of minutes from sunrise to sunset in Seattle. Let T equal the number of minutes from sunrise to sunset in Tacoma. Let O equal the number of minutes from sunrise to sunset in Olympia. What was S + T + O on April 18, 2020?

A) 2485 min B) 2487 min C) 2488 min D) 2489 min E) 2493 min

10 The surface area of Elliot Bay is calculated to be approximately 8.1 square miles. What was the number of cubic feet in the volume of water that flowed into Elliot Bay between the low tide at 10:02 AM and the high tide at 3:14 PM on April 18, 2020? Assume any change in the surface area of Elliot Bay during the changing tide levels is zero. (1 mile = 5280 feet)

A) 34.02 ft^3 B) 179625.6 ft^3 C) 948423168 ft^3
D) 5007674327040 ft^3 E) Answer not given.

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Key

Team Multiple Choice Contest – Answer Key

7th Grade

Correct responses are worth 2 points, incorrect responses are worth -1 point, and absence of a response is worth 0 points.

	Answer
1	B
2	C
3	E
4	A
5	A
6	D
7	C
8	B
9	D
10	C

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Final Score *(out of 20)*

Room # _____ **School Name** _____ **Team #**

Team Multiple Choice Contest – 15 minutes – ~20% of team score

This test is the only test where you will be penalized for incorrect responses. You will receive two points for a correct letter response, zero points for leaving it blank, and minus one point for an incorrect response. When you are prompted to begin, tear off the colored answer sheet, pass out a copy of the test to each team member, and begin testing. ***ONLY a letter response should be listed as an answer on this answer sheet.***

Correct responses are worth 2 points, incorrect responses are worth -1 point, and absence of a response is worth 0 points.

STUDENTS: DO NOT WRITE IN SHADED REGIONS

		Scorer 2	Scorer 1
Answer		-1, 0, or 2	-1, 0, or 2
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
7th Grade	**TOTAL:**		

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

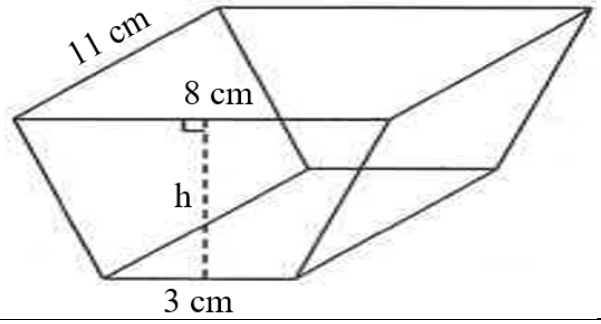
Sponsored by: Columbia Basin College

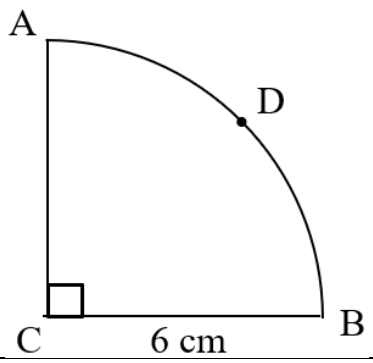
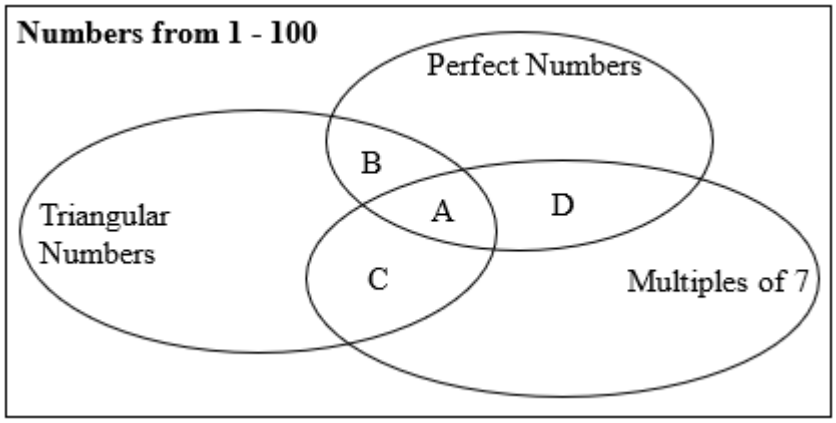
Team Contest

1	A rectangle is 32 inches long by 46 inches wide. What is the number of inches in the radius of the largest circle that can fit in its entirety inside the rectangle?
2	Elizabeth has 13 quarters, 11 dimes, 9 nickels, and 7 pennies. What is the number of cents in the value of Elizabeth's coins?
3	Aditri runs a mile in 370 seconds. Paola runs a mile in 90 percent of the time that it takes Aditri. As a decimal to the nearest tenth, Aditri takes A.B seconds longer than Paola to run two and a half miles, assuming they continue running at these rates. If A represents a two-digit integer and B represents a single digit, what is the value of A + B?
4	According to the data in the two-way table, as a reduced common fraction, the probability that a randomly selected student plays an instrument, but does not play a team sport is A/B. What is the value of A + B?

Middle School Music and Sports Survey

	Plays Team Sport	Does Not Play Team Sport	**Total**
Plays Instrument	8	3	11
Does Not Play Instrument	2	7	9
Total	10	10	20

5	As a decimal to the nearest thousandth, the value of y when x = 4 for the equation below is A.B, where A represents a 2-digit whole number and B represents a 3-digit whole number. What is the value of A + B? $y = \frac{3x^2}{2} + \frac{3x}{4} - \frac{3}{8}$
6	The volume of a trapezoidal prism is 242 cm^3. The height of the prism is 11 cm and the bases of the trapezoidal base are 3 cm and 8 cm as shown. What is the number of centimeters in the height of the trapezoidal base, h? 
7	What is the number of three-digit positive numbers whose tens digit equals the product of the ones and the hundreds digits?
8	For the equation $\frac{2}{3}x - \frac{3}{4}y = 3$, there are 6 ordered pair solutions, (x, y), when $-3 < x < 48$ and in which x and y are both integers. What is the total sum of all the x-values and y-values of these 6 solutions?

9	The figure shown is a quarter of a circle with a radius of 6 cm. A point D is placed exactly halfway between A and B along $\widehat{AB}$ as shown. In simplest radical form, the number of square centimeters in the area of ΔBCD is E$\sqrt{F}$. What is the value of E + F? 
10	A formula to derive Perfect Numbers is $2^{p-1}(2^p - 1)$, where p is any positive prime number. Triangular Numbers can be derived with the formula $\frac{n(n+1)}{2}$, where n is a positive whole number. According to the following Venn Diagram, as a reduced common fraction, the probability that a randomly drawn number from inside one of the three ovals is in one of the four regions labeled A, B, C, and D, is E/F. What is the value of E + F? 

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Key

Team Contest – Answer Key

7th Grade

	Answer
1	16 [inches]
2	487 cents
3	[A + B =] 97
4	[A + B =] 23
5	[A + B =] 651
6	4 [cm]
7	32 [three-digit numbers]
8	231
9	[E + F =] 11
10	[E + F =] 7

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Final Score *(out of 10)*

Room # **School Name** **Team #**

Team Contest – 15 minutes – ~30% of team score

When you are prompted to begin, tear off the colored answer sheet and give a copy of the test to each of your team members and begin testing. Each problem is scored as a 1 or 0. Record all answers on this colored answer sheet.

STUDENTS: DO NOT WRITE IN SHADED REGIONS

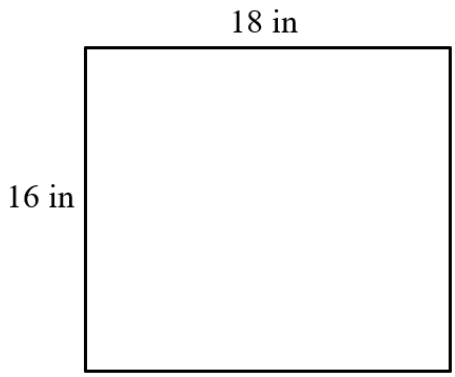
	Answer	Scorer 2 0 or 1	Scorer 1 0 or 1
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
7th Grade	**TOTAL:**		

"Math Is Cool" Masters — 2020-21

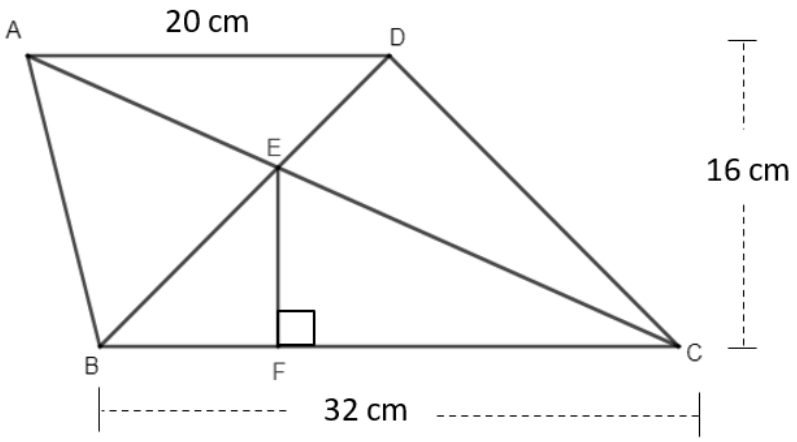
7th Grade — April 28, 2021

Sponsored by: Columbia Basin College

Linda Moore Triple Jump

1	What is the sum of the given sequence? 1 + 1 – 1 + 2 – 2 + 3 – 3 + 4 – 4 + 5 – 5 + 6 – 6 + 7?
2	What is the largest prime factor of 323?
3	What is the maximum number of 4 inch by 6 inch rectangles that will fit inside a 16 inch by 18 inch rectangle? 
4	A jar has 21 marbles and there are six different colors, including red. As a reduced common fraction, the probability that a randomly chosen marble is red is 3/7. How many red marbles are in the jar?
5	What is the positive difference between the largest three-digit multiple of 37 and the smallest three-digit multiple of 23?
6	For the following inequality, what is the largest integer solution? $7x \leq 5x + 113$
7	Let A and B each represent a whole number between 1 and 50, inclusive. It is possible for A and B to represent the same whole number. How many ordered pairs in the form (A, B) are there, such that A + B = 76?

Continued on next page.

8	Jen rides her bike to the grocery store and back along the same route. Her total travel time is 28 minutes. Because of hills, her average speed in miles per hour on the way to the store is 3/5 of her average speed in miles per hour on the way back home. The number of minutes it takes her to ride to the store is A.B, where A is a 2-digit number and B is a single digit. What is the value of A + B?
9	In Trapezoid ABCD, AD = 20 cm, BC = 32 cm, point E is the intersection of $\overline{AC}$ and $\overline{BD}$, and $\overline{EF} \perp \overline{\mathrm{BC}}$. The height of the trapezoid is 16 cm. As a reduced common fraction, the height of ΔBCE, $\overline{EF}$, is equal to G/H, where G is a three-digit integer and H is a two-digit integer. What is the value of G + H? 
10	Let A = $\left(\frac{-7}{4}\right)^2 + \frac{-29}{16}$, let B = $A^2 + \frac{-29}{16}$, let C = $B^2 + \frac{-29}{16}$, and so on through the 26 letters of the alphabet. As a reduced common fraction, Z = α/β. If α represents a negative integer, what is the value of $\alpha + \beta$?

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Key

Linda Moore Triple Jump – Answer Key

7th Grade

	Answer
1	8
2	19
3	12 [rectangles]
4	9 [marbles]
5	884
6	[x =] 56
7	25 [ordered pairs]
8	[A + B =] 22
9	[G + H =] 141
10	[$\alpha + \beta$ =] 3

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Final Score *(out of 10)*

Room # School Name Team #

Linda Moore Triple Jump – 15 minutes – ~30% of team score

When you are prompted to begin, tear off the colored answer sheet and give a copy of the test to each of your team members and begin testing. Each problem is scored as a 1 or 0. Record all answers on this colored answer sheet.

STUDENTS: DO NOT WRITE IN SHADED REGIONS

	Answer	Scorer 2 0 or 1	Scorer 1 0 or 1
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
7th Grade	**TOTAL:**		

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Room # **School Name** **Team #**

Total Score for Each Round

College Bowl #1 (10 Possible)	College Bowl #2 (10 Possible)	College Bowl #3 (10 Possible)

DO NOT USE TALLY MARKS ON THIS SHEET. WRITE THE TOTAL SCORE FOR EACH ROUND.

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Room # **School Name** **Team #**

Total Score for Each Round

College Bowl #1 (10 Possible)	College Bowl #2 (10 Possible)	College Bowl #3 (10 Possible)

DO NOT USE TALLY MARKS ON THIS SHEET. WRITE THE TOTAL SCORE FOR EACH ROUND.

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Sponsored by: Columbia Basin College

Proctor Copy

Mental Math Contest

MENTAL MATH – 30 seconds per question – ~25% of team score & ~8% of individual score

All students in the room will concurrently be asked the same eight questions in this individual test. When it is time to begin, the proctor will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you. ***You may not change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, or crossed-out answers, they will be marked wrong.*** *Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his or her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before the next question is read. You may continue to work on a problem (in your head) while the next question is being read. The raw score is 1 point per correct answer.*

1	What is the positive difference between one thousand and six and two hundred and fifty?	756
2	What is the greatest common factor of eighteen and twenty-four?	6
3	What is the product of the numbers five, six, seven, and ten?	2100
4	As a reduced common fraction, the probability of flipping no heads when you flip a fair coin twice is A over B. What is the value of A plus B?	5
5	Solve for X in the equation two X plus four equals twenty-eight.	12
6	Sunday is one day after Saturday. How many letters are in the name of the day that is seventeen days after Saturday?	7
7	As a reduced common fraction, the slope of a line with points eight comma three and twelve comma six is A over B. What is the value of A + B?	
8	As a decimal to the nearest hundredth, the number of square inches in the area of a square whose perimeter is eighteen inches is A point B, where A and B each represent two-digit integers. What is the value of A plus B?	45

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Sponsored by: Columbia Basin College

Key

COLLEGE BOWL ROUND #1

#	Problem	Answer
1	Prisha goes to the store and buys a thirty-two-pack of energy drinks. The case costs forty-eight dollars. How many cents does one energy drink cost?	150 [cents]
2	When a number, X, is multiplied by three, then by four, then by ten, the result is one thousand eight hundred. What is the value of X?	[x =] 15
3	Five people can do one job in eight days. How many days would it take twenty people to do two of the same job?	4 [days]
4	A line with the equation y = 3x + 4 is rotated one hundred eighty degrees around the origin on a coordinate plane. When the equation of the new line is written in y = mx + b form, what is the value of m + b?	[M + B =] -1
5	A bacteria population is one million. Every time Thanos snaps his fingers, the population is cut in half. How many times would he need to snap his fingers for the population to drop below ten thousand?	7 [snaps]
6	Row zero of Pascal's triangle is one. Row one is one-one. Row two is one-two-one. What is the sum of the numbers in the fifth row of Pascal's triangle?	32
7	Mei rolls three fair six-sided dice. As a reduced common fraction, the probability of getting the same number on all three dice is A over B. What is the value of A plus B?	[A + B =] 37
8	Abel has six cards, Bonita has seven cards, and Cherise has eight cards. Cherise gives half of her cards to Abel and half of her cards to Bonita. How many cards does Bonita now have?	11 [cards]
9	As a decimal, the mean of the two-digit numbers from thirty-one to thirty-eight inclusive is A.B, where A is a two-digit whole number and B is a single digit. What is the value of A plus B?	[A + B =] 39
10	Let seventy divided by twelve equal X. How many minutes are in X hours?	350 [min]

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

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Key

COLLEGE BOWL ROUND #2

#	Problem	Answer
1	A vine grows three centimeters every two days. How many centimeters will it grow in forty-eight days?	72 [centimeters]
2	As a decimal, one-fifth plus one-fourth is 0.A (zero point A), where A represents a two-digit whole number. What is the value of A?	[A =] 45
3	What is the number of square inches in the area of a rectangle if the length is twelve inches and the width is seven inches?	84 [in2]
4	Tony Stark was born on a Friday in nineteen seventy, a non-leap year. How many letters are in the day of the week of his first birthday?	8 [letters]
5	One set of numbers contains positive composite numbers less than twenty. A second set of numbers contains positive odd numbers less than twenty. How many numbers are members of both sets?	2 [numbers]
6	How many distinct ways are there to rearrange the letters in the word RAINING, spelled R-A-I-N-I-N-G?	1,260 [ways]
7	Solve for x: $\frac{5x-6}{x-3} = 8$	[x=] 6
8	A rectangle has dimensions of three feet by three yards. How many square feet are in its area?	27 [square feet]
9	Forty kids are loaded onto a bus and twenty percent of them forgot to put on their seatbelts. How many kids remembered to put their seatbelts on?	32 [kids]
10	Let A = 1 + 2 + 3 + 4 + 5 + 6 + 7. What is A squared?	784

"Math Is Cool" Masters — 2020-21

7th Grade — April 28, 2021

Sponsored by: Columbia Basin College

Key

COLLEGE BOWL ROUND #3

#	Problem	Answer
1	How many days are there from April eighteenth to June eighteenth inclusive?	62 [days]
2	In a certain four-digit number, the digit in the ones place is half the digit in the tens place, which is half the digit in the hundreds place, which is half the digit in the thousands place. What is this four-digit number?	8421
3	The area of a triangle is one hundred and twenty-four square inches. The base of the triangle is thirty-one inches. How many inches are in the height of the triangle?	8 [inches]
4	Let A/B and C/D represent two fractions. A, B, C, and D are each replaced with one of the digits from one through four (each digit is used only one time). What is the largest value of A/B times C/D?	6
5	A circle has an area of one hundred forty-four pi square centimeters. Its radius is increased by twenty-five percent to make a new circle. In terms of pi, the number of square centimeters in the area of the new circle is A times pi. What is the value of A?	[A =] 225
6	Fernand averaged thirty miles per hour driving to work. On his drive back home along the same route, he averaged twenty-five miles per hour, and it took two minutes longer than the drive to work. What was the total number of minutes spent driving to and from work?	22 [min]
7	How many positive seven-digit numbers are there?	9000000 [numbers]
8	The first positive odd number is one. What is the thirty-second positive odd number?	63
9	Two cards are drawn from a standard deck without replacement. As a reduced common fraction, the probability that both are hearts is A/B. What is the value of A plus B?	[A + B =] 18
10	How many minutes will Pavarotti sing if he sings for six and two-thirds hours?	400 [minutes]

Proctoring Overview

You will receive a room packet envelope with the schedule and College Bowl rotations on the front. Each room packet includes:

1) the proctor instructions and the general instructions that you will be reading,
2) the proctor question/answers packet (this needs to be carefully controlled), and
3) sets of Mental Math, Individual, Multiple Choice, Team, and Relay test materials. (If not in the room packet, the proctor supervisor will provide blank scratch paper.)

When you receive the room packet, count to ensure that you have the correct number of tests for each event (16 Mental Math & Individual, 4 of each of the team events).

Key Points

- Act professional; focus on what you are doing.
- Your job is to proctor the students; that is, you administer tests, give time warnings, & monitor students for proper test taking behavior to ensure competition integrity and avoid issues like failing to put answers on the answer sheet.
- The proctor packet has Mental Math, Relay, and College Bowl questions/answers. Keep the packet secure! Avoid opportunities for competitors to see the tests or answers.
- Student/school names and team numbers are critical on the answer sheets. Make sure that students fill out such identifying information.
- Keep track of time, and provide appropriate time warnings. Keep to the schedule as close as possible. Wait between events, if needed.
- Read & know the rules—competitors & spectators will, and they will call you on it.
- On questions that you read, read smoothly, enunciate clearly, and don't read too fast.
- You will score the Relays.
- If unsure of how to deal with an issue/question/concern, flag down the proctor supervisor and ask.
- Be respectful of your classroom — leave it tidy and arranged exactly as you found it. We don't want any displeased teachers!!
- Use the quick-reference guide on the next page for room setup and key information.

Schedule

Each of the 6 events includes about 5 minutes at the start for reading instructions or rearranging the room.

3:30 - 4:00	Coaches register (Library)	6:05 - 6:10	Relay #1
4:05 - 4:15	Orientation (Gym)		
4:15 - 4:20	Students go to testing rooms		
4:20 - 4:35	Mental Math		
4:35 - 5:15	Individual Test		
5:15 - 5:35	Team M.C. Test		
5:35 - 5:55	Team Test		
5:55 - 6:05	Relay Practice		

6:10 - 6:15	Relay #2
6:15 - 6:40	Proctors get dinner in proctor room
6:45 - 6:55	College Bowl #1
6:55 - 7:05	College Bowl #2
7:05 - 7:15	College Bowl #3
7:15 - 7:25	College Bowl #4
7:25 - 7:35	College Bowl #5
7:35 - 7:45	College Bowl #6
8:00 - 8:30	Awards Ceremony (Gym)

1. Mental Math

Configuration: Students at individual desks spread out in the classroom. Alternating desks, students not next to teammates.

Scheduled Time: 4:20-4:35 PM (read instructions & test)

Duration: 30 seconds per question maximum (beginning after the 2nd reading)

Give Time warning at: 5 seconds

Number of questions: 8 (all students do the same questions)

Proctor Actions: Read each question twice, reading clearly and not too fast. Start the 30 second clock after the 2nd reading.

Key Points: Start by reading "General Instructions" then Mental Math instructions. Make sure everyone writes their name, school & team number on the answer sheet. No talking allowed. Except for the answer, no is writing allowed. Collect answer sheets and organize by team number, then alphabetically by first name of competitor, & staple sheets for the same team together.

2. Individual Test

Configuration: Students at individual desks; same arrangement as for Mental Math.

Scheduled Time: 4:35 PM (read instructions), 4:40-5:15 (test)

Duration: 35 minutes

Give Time warning at: 5 minutes & 30 seconds

Number of questions: 40

Proctor Actions: Ensure appropriate test-taking behavior. Prep for next event (or furtively read College Bowl questions to yourself).

Key Points: Read "Individual Test" instructions. Make sure everyone writes their name, team number, school, proctor name, & room number down on the answer sheet. Collect answer sheets, organize by team, then alphabetically by first name of competitor, and staple sheets for same team together.

3. Team Multiple Choice Test

Configuration: Groups of 4 desks, with the groups spread out in the classroom.

Scheduled Time: 5:15 PM (read instructions), 5:20-5:35 PM (test)

Duration: 15 minutes

Give Time warning at: 5 minutes & 30 seconds

Number of questions: 10

Proctor Actions: Ensure appropriate test-taking behavior. Prepare for next event.

Key Points: Read Mult. Choice instructions. Students can talk quietly & work together.

4. Team Test

Configuration: Groups of 4 desks spread out in the classroom (same as Team Mult. Choice).

Scheduled Time: 5:35 PM (read instructions), 5:40-5:55 PM (test)

Duration: 15 minutes

Give Time warning at: 5 minutes & 30 seconds

Number of questions: 10

Proctor Actions: Ensure appropriate test-taking behavior. Prepare for next event.

Key Points: Read Team Test instructions. Need to have school & team number on answer sheet. Students can talk quietly & work together.

5. Relay Tests

Configuration: Columns of 4 desks, one behind the other.

Scheduled Time: 5:55 PM (read instructions), 6:00-6:15 PM (test)

Duration: 5 minutes per relay

Give Time warning at: 30 seconds

Number of questions: 4 total per relay (~1 per person/relay)

Proctor Actions: Ensure appropriate test-taking behavior. Score Relays #1 and #2 at the end of each Relay (without showing any answers to students).

Key Points: No talking allowed. Students may not turn around. Students may only pass the answer sheet back (no work or notes). Proctor: circle the point value earned for each answer (0 or 1 or 2). Teams of 3 sit in positions 2, 3, & 4.

6. College Bowl

Configuration: Row of 9 desks (side by side) at the front of the room (CBA device on center desk).

Scheduled Time: 6:45 PM (read instructions), 6:50-7:45 PM (test)

Duration: 45 seconds per question (30 seconds per question if there is only one team, who will be only going against the clock)

Give Time warning at: 5 seconds

Number of questions: 10 per round, 6 rounds total

Proctor Actions: Read each question twice, reading clearly and not too fast. Start 45 (or 30) second clock after the 2nd full reading. Mark tally on white board as questions are answered and transfer the numeric total to the score sheets.

Key Points: Event is collaborative, talking is allowed. For a wrong answer, just say, "That is incorrect." (no verbal/visual clues that could be interpreted by the other team to arrive at an answer).

Summary of MIC Proctoring

(for proctors to read to themselves)

Pass out materials (answer sheet/test packets, scratch paper) for the current event to individuals or teams (as appropriate) so they can fill in the name, school, and team number information (very important!). Tell students to not lift the cover sheet or turn over the paper until you give the signal to start. Read the general instructions as the first item at the beginning of the competition (before Mental Math). Read the event-specific instructions just prior to each event and ask if there are any relevant questions. After reading the instructions, you can signal students to begin. Make sure one proctor is watching the time and giving appropriate time warnings (e.g., "five minutes remaining"). At the end of the event, tell competitors to stop work. Collect, sort, & staple the answer sheets (as appropriate) and keep them secure until handed off to a runner.

For the Mental Math/Individual tests, arrange students scattered throughout the classroom with **no student next to another student from their own school**. For the team tests, students will be in groups of 4 desks. The Relay will require the desks arranged in columns (front to back). College Bowl will require a line of 9 desks side-by-side across the front of the classroom.

For College Bowl, place the College Bowl apparatus (CBA) on a central desk in the line of desks at the front (4 desks on either side of the central one). One proctor will likely need to hold the CBA in place during the College Bowl rounds. Turn the apparatus on by depressing the button or flipping the dip switch. Students may try out the CBA prior to the 1st question. Note: while one light is blinking, the other light is locked out. There is no need to "reset" the device, just let the light finish blinking and it is ready to go.

Keep Relay answers secure while you score the Relays because answers for all three Relays are on the same sheet. Do not read the answer for College Bowl when you read the question (they are both on the same page). In College Bowl, if an incorrect answer is given, simply say "That is incorrect" and do not give any other cues about the answer (e.g., don't say "sorry, you were close" or exhibit interpretable body language). If both teams fail to supply a correct answer, announce what the correct answer was.

If there is an irregularity (i.e., lack of honesty, poor sportsmanship), make a note of the circumstances, flag the answer sheet, and report the issue to the proctor supervisor.

At the end of the day, <u>return the desks to their original arrangement</u>, recycle any unwanted test materials & used scratch paper, erase any marks you made on the whiteboard, and generally make sure the classroom is tidied up. Return the CBA, the room packet envelope, the proctor instructions, the contest rules packet, the proctor packet of questions, extra scratch paper, and unused test material to the proctor supervisor.

Detailed Instructions for Proctors

Grades 4-8

NO CALCULATORS ALLOWED ON ANY TESTS!

1. Check to make sure you have everything in your packet.
   - A. ***Mental Math:***
     1. 16 - colored Mental Math answer sheets
     2. Mental Math questions with answers (in the Proctor Packet)
   - B. ***Individual Test:*** 16 individual tests, with colored answer sheets attached
   - C. ***Team Multiple Choice Test:*** 4 team multiple choice packets (stapled), each containing 4 tests plus one colored answer sheet on top
   - D. ***Team Test:*** 4 team test packets (stapled), each containing 4 tests plus one colored answer sheet on top
   - E. ***Relays:***
     1. 4 - blank Relay answer sheet packets (with cover sheet/instructions)
     2. 4 - Practice Relay test sets, 4 - Relay #1 test sets, and 4 – Relay #2 test sets (each set has 4 sheets for positions 1-4)
     3. Relay Answer Key (in the Proctor Packet)
   - F. **College Bowl:**
     1. 4 - College Bowl score sheets
     2. College Bowl questions – 6 rounds (in the Proctor Packet)
   - G. Scratch paper (to be handed out as needed, but try not to waste it)
   - H. Electronic College Bowl Apparatus (CBA; usually distributed at dinner break)

   ALL *COLORED* ANSWER SHEETS WILL BE COLLECTED BY YOU AND WILL BE TAKEN TO THE SCORING ROOM (by RUNNERS) AS SOON AS THEY ARE FILLED OUT BY COMPETITORS (AND PERHAPS GRADED BY YOU). COMPETITORS CAN KEEP ALL OF THE WHITE SHEETS, IF THEY WOULD LIKE (OTHEWISE COLLECT THEM FOR RECYCLE).

   If you are missing anything, you can go get it before the opening ceremony. After the opening ceremony, contact the proctor supervisor/scoring room.

2. Take a photo or draw a picture on the whiteboard of how the classroom is laid out (so that it can be returned to its original configuration following the competition). Then set up the classroom desks for the first event (Mental Math).

Respect the teacher whose room you are using. Do not touch their computer or other items. Do not erase anything on their board. Leave the room tidy & in the exact original layout.

Mental Math

3. Arrange desks in a configuration suitable for individual testing (rows/grid of desks all facing forward, students in separated/alternating desks).

4. Put the Mental Math answer sheets face up on the desks such that students are spread out. Wait for students to arrive. You can fill out the proctor name and room number (and perhaps team numbers) on all blank answer sheets, if you like. Read over the questions so you will be prepared to read them out loud.

5. After students sit down, check to make sure that no one from the same team is seated next to each other (i.e., "Team xxx, raise your hands."). Ask them to move, if needed.

6. **Check to make sure that students put their full name, school name, team number, and room number on their answer sheet and that the information is legible**.

7. Read the "GENERAL INSTRUCTIONS" (in the Proctor Packet) to the students. Then, read the "MENTAL MATH" instructions (in the Proctor Packet) to the students.

8. Begin the testing. Read each of the eight Mental Math questions to all of the students in the room, per the instructions.

9. At the conclusion of Mental Math, collect the answer sheets. Organize the answer sheets by team number, then alphabetically by first name of competitor. Staple each team's set of four answer sheets together. Promptly hand the packets of answer sheets to your runner for conveyance to the scoring room.

Individual Test

10. The seating configuration will remain unchanged (no swapping seats).

11. Hand out Individual Test packets with the colored blank answer sheet facing up. **Check to make sure that students put their full name, school name, team number, and room number on their answer sheet and that the information is legible**.

12. Read the "INDIVIDUAL TEST" instructions (in the Proctor Packet) to the students and begin the testing at the appointed time.

13. While students are taking the Individual Test, monitor the students for proper test-taking behavior and watch the time to provide 5-minute and 30-second warnings. Make sure students are writing answers on the answer sheet (not the test question pages). During this time you can also get the Individual Multiple Choice tests ready, read through the rules of subsequent events, and (carefully/secretively) look ahead to review the College Bowl questions (i.e., to avoid stumbling over the wording when it comes time to read the questions aloud). You will have observers in the room watching the College Bowl rounds, so make sure you understand the rules, how timing works, etc.

14. At the conclusion of Individual Test, collect the answer sheets. Organize the answer sheets by team number, then alphabetically by first name of competitor. Staple each team's set of four answer sheets together. Promptly hand the packets of answer sheets to your runner for conveyance to the scoring room. Students may keep or recycle their test question packets.

Team Multiple Choice

15. Change the room set-up to groups of 4 desks together so students can work as a team.
16. Hand out the tests and have teams fill out the top portion of the answer sheet. **Check answer sheets to make sure they are filled out correctly (school, team #, etc.).**
17. Read the "TEAM MULTIPLE CHOICE" instructions (in the Proctor Packet) to the students and begin the testing at the appointed time.
18. Monitor the students for proper test-taking behavior (talking is allowed), watch the time, and provide 5-minute and 30-second warnings. While students are taking the Team Multiple Choice test, get the Team Tests ready.
19. At the conclusion of the test, collect the answer sheets & hand them off to the runner.

Team Test

20. Keep the same seating arrangement in groups of four. Hand out the Team Test packets and have teams fill out the information at the top of the colored answer sheet. **Check the answer sheets to make sure they are filled out correctly (school, team #, etc.).**
21. Read the "TEAM TEST" instructions (in the Proctor Packet) to the students and begin the testing at the appointed time.
22. Monitor the students for proper test-taking behavior (talking is allowed), watch the time, and provide 5-minute and 30-second warnings. While students are taking the Team Test, get the Relay tests ready.
23. At the conclusion of the test, collect the answer sheets & hand them off to the runner.

Relay Tests

24. Arrange each team of four students so that their desks are right behind each other and all facing the front of the room. For example, person 1 will be at the front of the line facing the front of the room. Person 2 will be right behind person 1 so that they are facing the back of person 1's head, etc. Teams of three sit in positions 2, 3, and 4. Teams of two sit in positions 2 and 4.
25. Pass out the packet of answer sheets to person 1 of each team. Have them fill out the top of <u>all three</u> answer sheets. They will use these sheets to record **only their final answer** and will pass only this answer sheet back to the next person. There is NO TALKING during the Relays and students MAY NOT look behind them – they must always be facing forward. Students may not change positions, nor leave the room, between Relays.
26. Once the top of the answer sheets are filled out, you may pass out the practice Relay questions to the appropriate people. Make sure person 1 gets the "person 1" piece of paper, etc. The questions must remain face down until it is time to start.

27. Read the "RELAY" instructions (in the Proctor Packet) to the students and begin the testing at the appointed time.

28. Once the Relay begins, everyone from the team may turn their sheet over and start working. They can use their slip of paper for scratch paper and it must never be passed back to the next person. The time allotted for each Relay is 5 minutes, so be sure you keep track of the time. Position yourself behind person 4 and be ready to collect each team's answer sheet once they complete the Relay or the time is up.

29. PRACTICE RELAY — This round is being done to teach the students how to do the math Relays, so this round is **not** to be scored. Address any questions that arise and correct the students if they misunderstood the procedures. Practice Relay answer sheets may be recycled.

30. RELAY #1 — Make sure that you are passing out Relay #1. Make sure the question sheets are face down and that each person has the correct sheet (i.e., person 1 has the person 1 sheet, etc.).

    Scoring: Questions #1, #2, #3: 1 point if the answer is correct
    Question #4: 2 points if the answer is correct
    Total possible: 5 points for each Relay round

    Circle the points for each question and fill in the total on the answer sheet. Lay out all of the answer sheets from this Relay so you can pair up the Relay #2 sheets by team.

31. RELAY #2 — Repeat the same process as for Relay #1.

32. At the conclusion of Relay #2, release the students for their break. Staple the pairs of answer sheets for each team together and hand off the set of Relay answer sheets to the runner. If there is anything left (i.e., answer sheets) that should have been taken to the scoring room, give those to the runner or have a proctor take it to the scoring room now.

33. Set up your room for the College Bowl rounds and tidy up the room before you go to break. Set up a line of 9 desks side by side facing the front of the room. One team will be on each side (doesn't matter which) and the College Bowl apparatus will be stuck down on the desk in the middle. Another row of 8 desks should be set up in the middle of the room for the two teams not competing in a round. Other desks should be moved to the back of the room in an orderly fashion for the spectators.

34. Take your packet of College Bowl questions with you during break to keep them secure! Do not leave them in the room!

Dinner Break

35. AT BREAK — Eat dinner in the proctor room. Pick up your College Bowl apparatus (CBA) at this time. If you haven't already, you may want to read over the College Bowl questions to make sure you will be able to pronounce everything properly. Return to your room in time to place the CBA in position.

College Bowl Rounds

36. Place the CBA on the middle desk of the line at the front of the room (you may want to moisten the suction cups with a film of water). One proctor may need to hold the device down (and do timing). Do not press the button to "reset" the CBA (it's an on/off switch).
37. You will have the same teams that were previously in the room for the duration of all College Bowl rounds — if you have an extra/different team, they are in the wrong room and can be disqualified if they hear the questions! Help get them to the correct room.
38. Fill out the score sheets for each team in your room with their school name and team number. Call up the first 2 teams according to the sequence on the room envelope.
39. You will be reading Round #1 questions to two teams while the other two teams (and any spectators) wait in the back of the room out of line of sight of the competitors. Refer to the College Bowl schedule (on your room envelope) to see which two teams compete in each round. If a round only has one team, they will be competing against the clock and thus will have 30 seconds to answer, not 45 seconds. Record the final scores for each team on their score sheets (which you hold on to) after each round. Rounds 2-6 work the same way. Refer to the schedule to make sure the correct teams are competing at the correct time. Don't get ahead of schedule (or behind, for that matter!). If you finish a round early, please wait until the appointed time to start the next round. If you have any problems (including anyone questioning the rules or a decision made by a proctor) contact the proctor supervisor.
40. Who is keeping score? Who is keeping track of the time? YOU ARE !!!
41. Read the "COLLEGE BOWL" instructions (in the Proctor Packet) to all the students (just one time), then begin the testing for each round at the appointed times.
42. If you mis-read a question, replace it with one of the extra questions.
43. If a parent/coach/student protests an answer, make a note of the situation (the test, the problem number, who answered, what their answer was, etc.) and kindly state that the coach should bring up the issue with the contest director. Proceed as normal, scoring the question based on the answer key.
44. At the conclusion of all College Bowl rounds, get the score sheets promptly to the scoring room (either yourself or via a runner).
45. Release your group to the awards ceremony no earlier than 7:45 PM to avoid causing a disruption to other rooms. Have students help re-set the room.
46. At the end of the day, return the desks to their original arrangement, collect all scratch paper, erase any marks you made on the whiteboard, and generally make sure the classroom is tidied up. Return the College Bowl apparatus, proctoring envelope, and residual material to the proctor supervisor.

General Instructions

- Good sportsmanship is expected throughout the competition by all involved (competitors and observers). Display of poor sportsmanship will result in disqualification.
- Competitors may not use calculators or any other aids on any portion of this contest.
- Unless stated otherwise:
  - Express all rational, non-integer answers as common fractions, except in problems dealing with money, where you should give the answer as a decimal rounded to the nearest cent.
  - For fifth grade and up, all fractions and ratios must be reduced to simplest form, all radicals must be simplified, and all denominators must be rationalized.
  - Do not round or approximate answers. Leave answers in terms of π or other irrational quantities (e.g., $\sqrt{2}$), where applicable.
- Units are not necessary as part of your answer, unless it is a problem that deals with time, in which case, AM or PM is required. However, if you choose to use units, they must be correct.
- Record all answers on the colored cover sheets in the answer column only.
- **Be sure that the student name, school, team number, etc. has been filled out at the top of each answer sheet.**
- Tests will be scored as a 0 if answers are not recorded correctly on the answer sheets.
- Blank answer sheets and answer sheets with no name will be scored as a 0.

Mental Math Instructions

All students in the room will concurrently be asked the same eight questions in this individual test. When it is time to begin, the proctor will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you. **You may not change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, or crossed-out answers, they will be marked wrong.** Once all students have laid their pencils on the

desk, another question will be asked. If a student doesn't lay his or her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before the next question is read. You may continue to work on a problem (in your head) while the next question is being read. The raw score is 1 point per correct answer.

Individual Test Instructions

You will have 35 minutes to work on the Individual test, which consists of 40 questions. When you are prompted to begin, tear off the colored sheet and begin testing. Make sure your name and school are recorded on the answer sheet. The first 30 questions are worth two points each and questions 31-40 are worth 3 points each. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute warning.

Team Multiple Choice Instructions

You will have 15 minutes to answer 10 multiple choice questions as a team. This test is the only test where you will be penalized for incorrect responses. You will receive two points for a correct letter response, zero points for leaving it blank, and minus one point for an incorrect response. When you are prompted to begin, tear off the colored answer sheet, pass out a copy of the test to each team member, and begin testing. **ONLY a letter response should be listed as an answer on this answer sheet.**

Team Test Instructions

You will have 15 minutes to answer 10 questions as a team. When you are prompted to begin, tear off the colored answer sheet and give a copy of the test to each of your team members and begin testing. Each problem is scored as a 1 or 0. Record all answers on this colored answer sheet.

Relay Instructions

There is no talking during this event and you must always be facing forward.

Person #1 will be given answer sheets and will need to fill out the top portion of each. The proctor will hand out a strip of paper to each person. These need to be face down on your desk until it is time for the Relay to start. Once the Relay begins, everyone may turn over their strip of paper and begin working, but first make sure you have the right person number.

Person #1 receives a full problem to solve. Questions 2-4 will be missing a number and will show the acronym "TNYWG" (meaning "the number you will get") *[Proctor: write this on the board]* as a placeholder in the problem statement. The answer for the previous question (i.e., received from the teammate in front of you) should be inserted into the problem statement in place of "TNYWG."

Person #1 will have problem #1 on his/her paper. Person #2 will have problems #1 and #2 printed on his/her paper. Person #3 will have problems #2 and #3 on his/her paper and Person #4 will have problems #3 and #4 on his/her paper.

You may write on the strip of paper to come up with answers to the problems on your strip of paper. However, when person #1 figures out his/her problem, he/she will record ONLY his/her final answer on the answer sheet and pass only the answer sheet back (without turning around) to the person #2.

Person #2 has the option of changing Person #1's answer if he/she wants, by crossing it out and putting a new answer. Once Person #2 records at least an answer for problem #2 on the answer sheet, he/she passes only the answer sheet behind to Person #3. Repeat these steps until person #4 puts an answer on the answer sheet and gives it to the proctor.

Each teammate has the option of changing any answers on the answer sheet when they have it in their possession, but once it is passed back, they will not see the answer sheet again.

Teams with only three members can position themselves in positions 2, 3, and 4 to provide answers for all four problems. Teams of two can sit in positions 2 and 4.

The raw score will be 1 point for correct answers to problems 1-3 and 2 points for question 4. <u>Any non-answer text (i.e., scratch work or notes) on the answer sheet will result in a score of 0 for the entire Relay.</u>

College Bowl Instructions

Read these to the competitors before the first round:

To maintain the integrity of the competition, spectators must stay in this room during a round of College Bowl questions. Once all readings for a round have been completed, you may leave.

All competitors must be facing the front of the room in one row. Teams not competing in the current round need to be behind the front row and in front of the spectators. All spectators need to be behind the competitors at the back of the room.

A maximum of ten questions per round will be scored. It is OK for both teams to score the same number of points! The proctor will record the points earned on each team's score sheet, which is retained by the proctor.

You may use scratch paper and pencil. You may talk with your team members while arriving at a solution.

An Electronic College Bowl Apparatus (CBA) will be used to identify the team who is first to have an answer.

During these rounds, each question will be read twice and a maximum time of 45 seconds after the second reading of the question is completed will be allowed for a team to answer. If a team buzzes in after the second reading and gives an incorrect response, the other team has the remainder of the 45 seconds to respond. A team is allowed only one attempt at buzzing in and answering per question. You may interrupt (buzz in) while a question is being read, however, if you do, the proctor will stop reading, and an immediate response is needed. If the correct response is given, the proctor will proceed to the next question. Otherwise, the question will be re-read for the other team, making sure it has two full readings. If an immediate response is not given after a team buzzes in, their lack of an answer in a timely manner is considered incorrect. In the event that only one team is competing in a round (i.e., one team is absent), the team competing will have a maximum of 30 seconds after the completion of the second reading in which to buzz in. The proctor will give a 5-second time warning.

Wait to be acknowledged by the proctor before giving an answer. This avoids the situation of blurting out an answer when the other team buzzed in first.

If two students from the same team answer at the same time with different answers, the answer will be considered incorrect.

If a problem arises with one of the questions, an extra question will be asked to replace that question.

If the round finishes early, you need to stay in the room for the remaining time.

Mental Math Questions

Relay Answers

College Bowl Questions/Answers