

“Math is Cool” Masters -- 2024-25

4th Grade

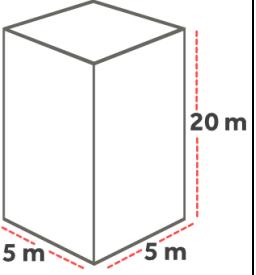
Mental Math Solutions

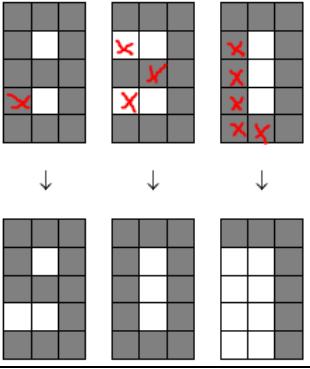
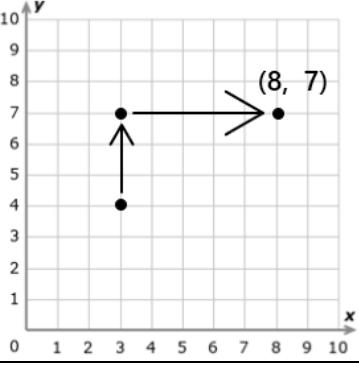
	Answer	Solution
1	12 [sq inches]	In square inches, what is the area of a right triangle with leg lengths three and eight inches? $A = \frac{1}{2}bh = \frac{1}{2}(3)(8) = 12$
2	9	Two integers have a sum of fourteen and a product of forty-five. What is the larger of the two integers? $9 + 5 = 14$ $9 \times 5 = 45$
3	27 [yards]	How many yards are in eighty-one feet? $81/3 = 27$
4	8 [is not a factor]	Which of the following numbers is not a factor of thirty-six? Three, twelve, one, eight, two, eighteen, six 8 is not a factor of 36
5	5 [= median]	What is the median of the following data set? Five, nine, six, four, five 4, 5, 5, 6, 9 Median is in the middle.
6	9	What number tripled is half of 54? $9 \times 3 = 27$ $27 \times 2 = 54$
7	26 [green marbles]	Macy has two yellow, two red and two green marbles. One red marble is worth three yellow marbles. One yellow marble is worth three green marbles. Macy converts all of her marbles to green marbles. How many green marbles does she have? $2r = 6y = 18g$ $2y = 6g$ $18 + 6 + 2 = 26$
8	18 [integers]	Using only the digits one, two or three, how many odd three-digit positive integers can be made assuming that digits can be used more than once? The number must end in 1 or 3, such as: __ 1. There are 3 ways to choose each of the other 2 digits, so $3 \times 3 = 9$, then $\times 2$ for numbers ending in 3.

"Math is Cool" Masters -- 2024-25

4th Grade

Individual Test Solutions

	Answer	Solution
1	17	Evaluate: $15 - 4 \div 4 + 3$ $15 - 4 \div 4 + 3 = 17$
2	12 [feet]	Aubrey's bedroom is 4 yards long. How many feet long is Aubrey's bedroom? $4 \times 3 = 12$
3	500 [cubic meters]	What is the volume of this rectangular prism in cubic meters? All side lengths are shown in meters. $20 \times 5 \times 5 = 500$ 
4	14	What is the next number in this sequence? 30, 26, 22, 18, __ Pattern is -4
5	280 [square feet]	The playground at Orchard Elementary School is made up of four rectangular lots that are each 10 feet by 7 feet. What is the total area of the playground in square feet? $10 \times 7 \times 4 = 280$
6	45	As an integer, what is $32\frac{3}{4} + 12\frac{1}{4}$? $32 + 12 + 1 = 45$
7	40	Royee wrote a number sequence using the rule "subtract 4" each time. The first two numbers in the sequence were 56 and 52. Which of the following numbers is part of the sequence? 38, 40, 41, 42, 43 $52 - 4 = 48$ $48 - 4 = 44$ $44 - 4 = 40$
8	17	Evaluate the following expression when $y = 4$: $3y + 5$ $3(4) + 5 = 12 + 5 = 17$

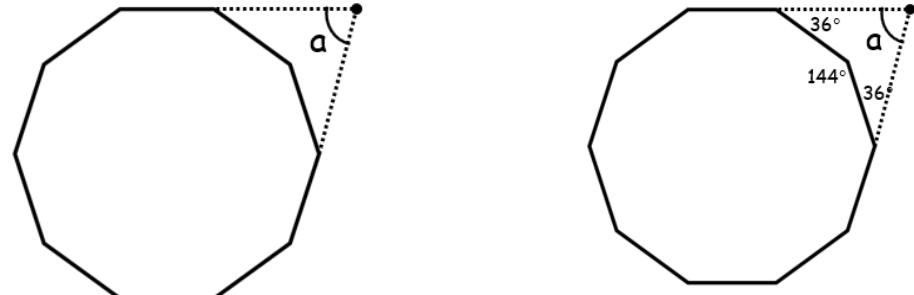
9	9 [squares]	<p>The diagram shows the number 830 being turned into the number 907, with each digit being transformed to the digit below it. How many of the small squares have to change color in order to make this change?</p>	
10	18 [full boxes]	<p>Ivy makes 109 cupcakes for the school bake sale, and packages them into boxes of 6. How many full boxes will she have? $109/6 = 18 \text{ r } 1$</p>	
11	25	<p>There are two 2-digit whole numbers that are each equal to their units digit squared. What is the smaller of the 2-digit numbers? $25 = 5^2$</p>	
12	3 [pandas]	<p>In a line of baby pandas, there are two pandas in front of a panda, two pandas behind a panda, and one panda between two pandas. What is the minimum number of pandas?</p> <p>1 2 3 #1 in front of 2 and 3. #2 and 3 behind 1. #2 between 1 and 3.</p>	
13	15 [= $x + y$]	<p>Starting at the point (3, 4), as shown on the coordinate plane, the circle moves up 3 units and then to the right 5 units, ending at a new point (x, y). What is $x + y$?</p> <p>$8 + 7 = 15$</p>	
14	64 [minutes]	<p>Anika started watching Netflix at 2:35 p.m., and finished watching at 4:14 pm the same day. Her sister Daphne watched with her for the first 35 minutes. How many minutes did Anika watch Netflix alone?</p> <p>$2:35 + 35 \text{ minutes} = 3:10$ $4:14 - 3:10 = 1 \text{ hour and } 4 \text{ minutes, or } 64 \text{ minutes}$</p>	
15	12 [= sum]	<p>When the following number is written in numeric form, what is the sum of its digits?</p> <p>Five thousand two hundred thirty-two 5232 $5+2+3+2 = 12$</p>	

16	6 [red gumballs]	Madhavi has 22 gumballs. Five of them are blue, and the rest are either red or green. If one gumball is randomly selected, the probability that it is green is 50%. How many of the gumballs are red? If $P(\text{green}) = 50\%$, then 11 of the gumballs are green. $22 - 11 - 5 = 6$
17	7	If $\odot = 6$, what is the value of the following expression? $\odot + \odot - 5$ $6 + 6 - 5 = 12 - 5 = 7$
18	40 [whole numbers]	How many whole numbers are between $5\frac{3}{7}$ and 45.39? Count 6, 7, ..., 45, or $45 - 5 = 40$
19	8 [faces]	Remy has a triangular block of cheese with a triangular hole cut out of the middle. How many faces does the block of cheese have? 3 outer faces, 3 inner faces, 2 faces on the sides
20	177 [\$, dollars]	Stanley water bottles cost \$28.00 each, plus an additional \$1.50 each to add a personalized logo. As an integer, how many dollars will it cost to buy six water bottles with a logo on each? $29.5 * 6 = 177$
21	4 [times more]	There are 14 cats and 56 dogs at a pet daycare. How many times more dogs are there than cats? $56/14 = 4$
22	21 [= median]	Find the median of the following data set: 16, 43, 32, 21, 14, 35, 0 In order: 0, 14, 16, 21, 32, 35, 43 Median is middle number = 21
23	416 [= 6 th term]	The first three terms of a geometric sequence are given. What is the 6 th term? 13, 26, 52, ... The pattern is x2. 13, 26, 52, 104, 208, 416
24	12 [tablespoons]	Victoria's recipe for salad dressing calls for 2 tablespoons of oil for every 3 tablespoons of vinegar. To make a total of 20 tablespoons of salad dressing, how many tablespoons of vinegar will she need? $2:3 = 8:12 = 12$ tablespoons of vinegar

25	30	<p>All tick marks are evenly spaced on the number line shown here. What number goes in the box with the question mark?</p> <p>$75/5 = 15$, so each tick mark represents 15 units. From 0 to ? is 2 tick marks which equals 30 units.</p>
26	14	<p>Simplify: $10 + \frac{2^2}{(7-6^1)}$</p> $10 + \frac{2^2}{(7 - 6^1)} = 10 + \frac{4}{1} = 14$
27	60 [%]	<p>Hot Mess Burgers keeps track of how their customers pay for their orders. In the last week, 49 customers paid cash, 120 customers used a credit card, and 31 customers used Apple Pay. Based on these results, what is the probability as a percent that the next customer will pay using a credit card?</p> $49 + 120 + 31 = 200$ $120/200 = 60/100 = 60\%$
28	2213	<p>Base 10 blocks can be used to represent whole numbers. In this example, the blocks can be combined to represent the number 1111.</p> <p>Combining all of the blocks shown below will result in what number?</p> <p>$2 \times 1000 + 2 \times 100 + 1 \times 10 + 3 \times 1 = 2213$</p>
29	12 [cups]	<p>A recipe for trail mix calls for cashews, chocolate chips and raisins in a ratio of 2:7:3. How many cup of cashews will Tatyana need to make 72 cups of trail mix?</p> <p>Total cups per part = $2 + 7 + 3 = 12$. $12 \times 6 = 72$.</p> <p>$2 \times 6 = 12$ cups cashews.</p>

30	44 [%]	<p>Mrs. Stephenson collects data from her Statistics students every quarter to perform data analysis. For the class of students shown in this dot plot, what percentage of the students are less than 66 inches tall?</p> <p style="text-align: center;">Height of Mrs. Stephenson's students</p> <p style="text-align: center;">Height (inches)</p> <p>22 students out of 50 are less than 66 inches tall. $22/50 = 44/100 = 44\%$</p>
31	96 [= A - B]	<p>Albert starts at a positive whole number A and counts up by fours until he reaches exactly 150. Beckett starts at a different positive whole number B and counts up by sixes until he hits exactly 150. It takes Albert exactly half as many steps to reach 150 as it takes Beckett. What is the largest possible value of $A - B$?</p> <p>The smallest positive integer that Bailey could have started at was 6, because $150 - 24(6) = 6 = B$. That is exactly 24 steps, so Aditya took 12 steps. $150 - 12(4) = 102 = A$.</p> $B - A = 102 - 6 = 96.$
32	43 [3s] [times]	<p>At McCarty Hall dormitory on the UW campus in Seattle, the room numbers are all 3 digit whole numbers. The first digit indicates the floor number, and the last two digits indicate the room number. For example, room 226 is on the 2nd floor, room number 26. There are 5 floors (numbered 1 to 5), and each floor has 28 rooms (numbered 1 to 28). How many times does the digit 3 occur in all of the room numbers of the dormitory?</p> <p>For the 100, 200, 400 and 500 floors, the digit '3' occurs 3 times each, i.e. 103, 113, 123. For the 300 floor, '3' occurs the same 3 times, plus an additional 28 times as the leading digit for each room number.</p>
33	48 [square units]	<p>In quadrilateral $WXYZ$ shown here, $WX = 7$ units, $XY = 9$ units, $YZ = 3$ units, and $WZ = 11$ units. Angles X and Z measure 90 degrees each. In square units, what is the area of the quadrilateral $WXYZ$?</p> <p>It can be split into 2 triangles. $\text{Area} = \frac{1}{2}(9 \times 7) + \frac{1}{2}(3 \times 11) = 31.5 + 16.5 = 48$</p>

34	92 [white tiles]	<p>Gilbert makes a pattern out of white tiles. The first three steps of the pattern are shown. How many white tiles are needed to make Step 10 of the pattern?</p> <p>The first three steps have the following numbers of white tiles: 20, 28, 36, so the pattern is +8.</p> $\begin{aligned} 20, 28, 36, 44, 52, 60, 68, 76, 84, 92. \end{aligned}$ <p style="text-align: center;">Step 1 Step 2 Step 3</p>
35	6840 [ways] [codes]	<p>A lock on a suitcase has a 3-number code, where each number is an integer from 1 to 20 inclusive (including 1 and 20), and none of the numbers are repeated. How many different ways can the 3-number code be chosen?</p> $20 \times 19 \times 18 = 6840$
36	3 [values of N]	<p>Let N be a positive integer. For how many values of N do N^2 and N^3 have the same number of digits as each other?</p> <p>True for $N = 1, 2$ and 4.</p>
37	-4 [= sum]	<p>Triangle ABC has vertices at points A (-4, 0), B (-5, -3), and C (-3, -5). The triangle is rotated 90° counter-clockwise around the origin. What is the sum of all of six of the x- and y-coordinates of the new vertices after the given transformation?</p> <p> $A' (0, -4)$ $B' (3, -5)$ $C' (5, -3)$ Sum of all = -4 </p>
38	17300 [\$, dollars]	<p>Royee bought a used car in the year 2020 for \$24,500. For each year after that, the value of the car depreciated (dropped) by 11%. As an integer, how much is the car worth in the year 2023, rounded to the nearest hundred dollars?</p> <p>Multiply by 0.89 each time.</p> <p> $2021: 24500(0.89) = 21805$ $2022: 21805(0.89) = 19406.45$ $2023: 19406(0.89) = 17271$, round to 17300 </p>

39	72 [°]	<p>The following figure shows a regular decagon, where 2 sides have been extended until they intersect. What is the measure of angle a in degrees?</p>  <p>Each interior angle of a regular decagon = 144°, and each exterior angle is $360/10 = 36^\circ$. The angle opposite the 144° angle is $360 - 144 = 216^\circ$. The sum of the angles of a quadrilateral is 360, so angle $a = 360 - 216 - 36 - 36 = 72$.</p>
40	3 [true statements]	<p>The numbers 1, 2, 3, 4, 5, 6, 7 and 8 are divided among two boxes A and B. The sum of the numbers in each box is the same. There are exactly three numbers in box A. How many of the following statements are <u>definitely</u> true?</p> <ul style="list-style-type: none"> • The sum of the numbers in box B is 18. • There are 6 numbers in box B. • The 8 is definitely in box A. • The 1 is definitely in box A. • The 2 is definitely in box B. • The 6 is either in box A or box B. • There are exactly 2 even numbers in box A. <p>The sum of the numbers in box B is 18 - TRUE, the total sum of the numbers = 36, so the sum in each box = 18.</p> <p>There are 6 cards in box B - FALSE, there are 3 numbers in A, therefore 5 numbers in B.</p> <p>The 8 is definitely in box A - FALSE, the 8 can be either in A or B. Example: A(8, 7, 3) and B(1, 2, 4, 5, 6), or A(5, 6, 7) and B(1, 2, 3, 4, 8).</p> <p>The 1 is definitely in box A - FALSE, the 1 cannot be in box A, because that would not allow a sum of 18.</p> <p>The 2 is definitely in box B - TRUE, both the 1 and 2 must be in box B, because either a 1 or 2 in box A would not allow a sum of 18.</p> <p>The 6 is either in box A or box B - TRUE, no proof needed, it is definitely in one of those boxes.</p> <p>There are exactly 2 even numbers in box A - FALSE, that would give E + E + O = odd, no way to get a sum of 18.</p>

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4th Grade

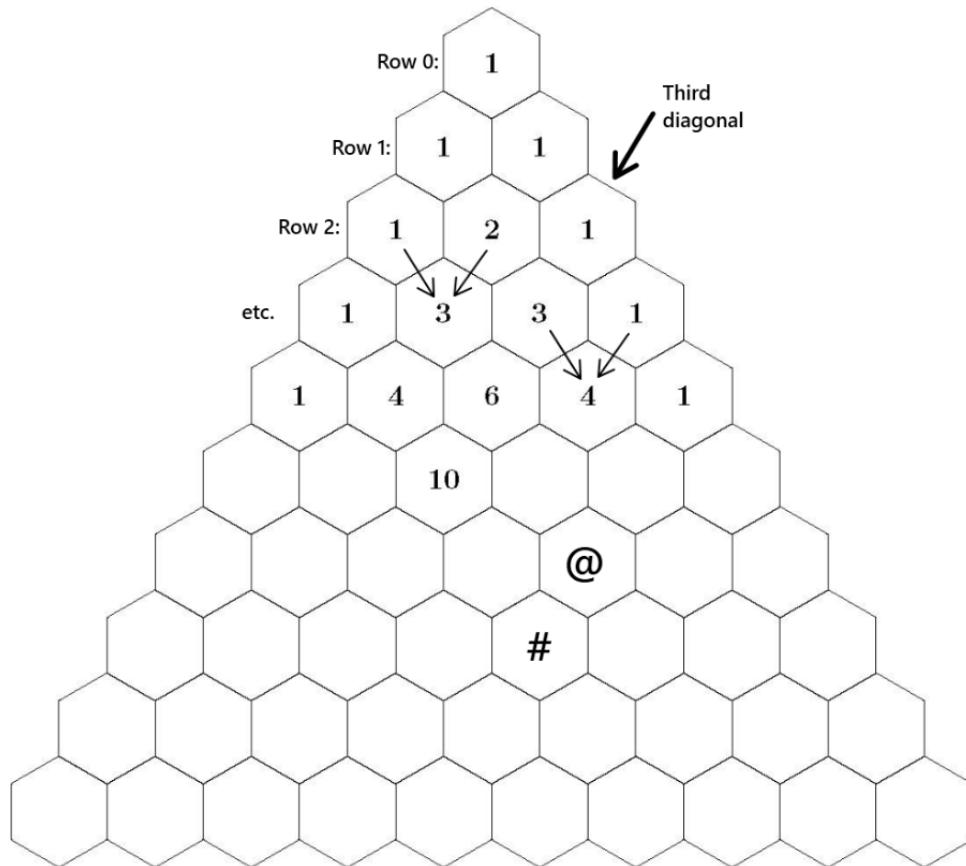
Multiple Choice Solutions

	Answer	Solution
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USE THE FOLLOWING MAP AND KEY TO SOLVE PROBLEMS #1 THROUGH #4.

A very famous triangular arrangement of numbers is called Pascal's Triangle. The first few rows of the pattern are shown here, and the pattern continues infinitely. The top Row is called Row 0, followed by Row 1, Row 2, and so on.

Row 0 consists of a single 1. The diagonals from the top down to the left and down to the right all contain the number 1. Every other number on the inside is the sum of the two numbers above it. For example, $1 + 2 = 3$, and $3 + 1 = 4$, as indicated by the arrows.



Pascal's Triangle is known to contain many interesting number patterns!

1 C	<p>What number goes in the cell marked with the @ symbol?</p> <p>A) 6 B) 10 C) 15 D) 21 E) Answer not given.</p>
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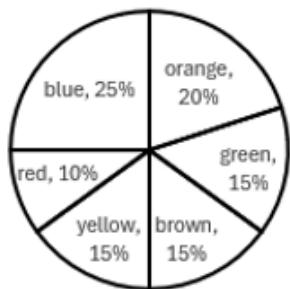
2	B	<p>What is the greatest number that appears in Row 6 of Pascal's Triangle?</p> <p>A) 10 B) 20 C) 35 D) 70 E) Answer not given.</p>
3	A	<p>The third diagonal (indicated on figure) contains an interesting sequence of numbers, beginning with 1, 3, 6, 10, and so on. What is the 6th term in the sequence?</p> <p>A) 21 B) 28 C) 36 D) 56 E) Answer not given.</p> <p>These are the Triangular Numbers, and the pattern is +2, +3, +4, etc. Therefore, $10+5 = 15$, and $15+6 = 21$.</p>
4	C	<p>The sums of the numbers in each Row also have an interesting pattern. What is the sum of all of the numbers in Row 8 of Pascal's Triangle?</p> <p>A) 128 B) 212 C) 256 D) 284 E) Answer not given.</p> <p>The sums of each row are equal to power of 2. Starting with Row 0: $2^0 = 1$, in Row 1: $2^1 = 2$, and so on. Therefore, the sum of the numbers in row 'n' is 2^n. $2^8 = 256$.</p>

USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #5 THROUGH #8.

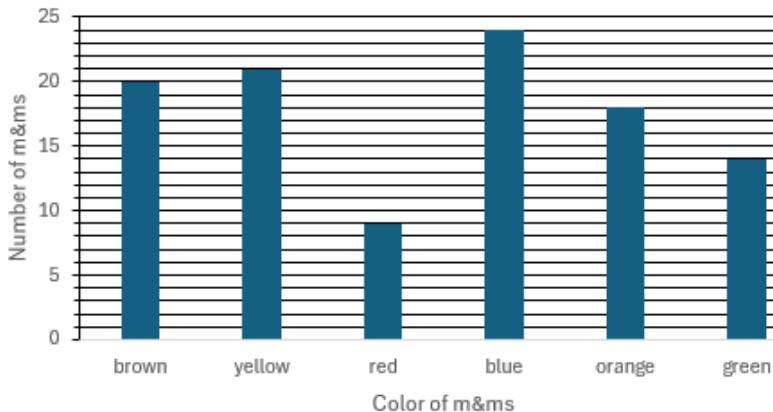
The Mars Candy company has a certain set percentage for the colors of plain m&ms that are manufactured, as shown in the pie chart. While these percentages are maintained during the manufacturing process, the actual contents of individual bags of m&ms can vary.

Mike decided to test the claims of the manufacturer by counting the m&ms in a single "Share Size" package of m&ms. He counted a total of 106 m&ms, and the count of each color is shown in the bar chart.

Manufacturing Color Distributions
of plain m&ms



Mike's m&ms Data Collection Experiment



5	D	If a package of m&ms contained exactly 100 m&ms, how many of them are expected to be blue, according to the manufacturing specifications? A) 10 B) 15 C) 20 D) 25 E) Answer not given. The pie chart shows that 25% are expected to be blue. 25% of 100 = 25.
6	C	How many orange m&ms did Mike have in his package? A) 15 B) 17 C) 18 D) 19 E) Answer not given. According to the bar chart, he had 18 orange m&ms.
7	A	Mike gives his friend Ron 1/2 of his brown m&ms, 1/3 of his yellow m&ms, and 3/4 of his blue m&ms. How many m&ms does Mike have left? A) 71 B) 79 C) 83 D) 90 E) Answer not given. He gives Ron $\frac{1}{2}(20) = 10$ brown, $\frac{1}{3}(21) = 7$ yellow, $\frac{3}{4}(24) = 18$ blue. His total remaining is $106 - 10 - 7 - 18 = 71$
8	D	If Mike had randomly selected one m&m out of his full package of m&ms, what is the probability to the nearest percent that it was either orange or green? A) 18% B) 20% C) 24% D) 30% E) Answer not given. His total of orange + green = $18 + 14 = 32$. $32/106$ is about 0.30, or 30%.

USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #9 THROUGH #10.

Each symbol in the table is worth a different value. Each row shows the total sum of the symbols in that row.

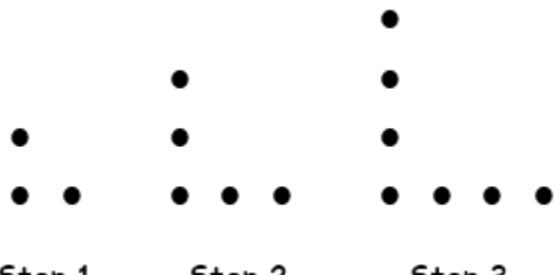
\star	+	\heartsuit	+	\star	+	\circlearrowright	= 19
\heartsuit	+	\heartsuit	+	\heartsuit	+	\heartsuit	= 20
\circlearrowright	+	\circlearrowright	+	\circlearrowright	+	\heartsuit	= 23
\star	+	\star	+	\smiley	+	\smiley	= 24

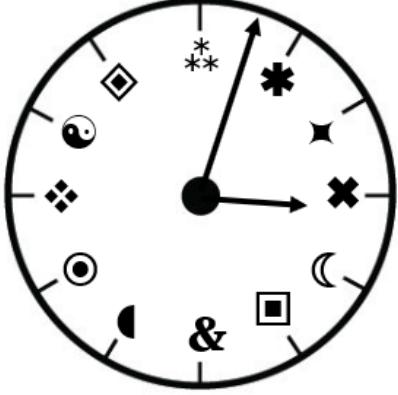
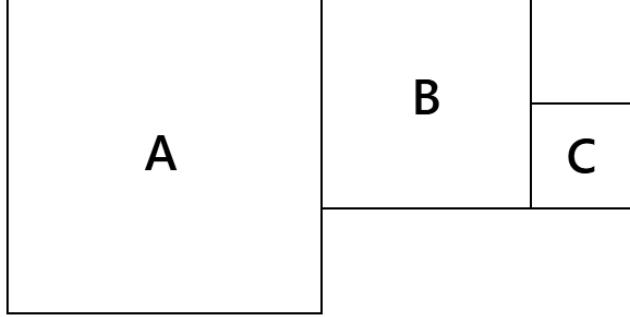
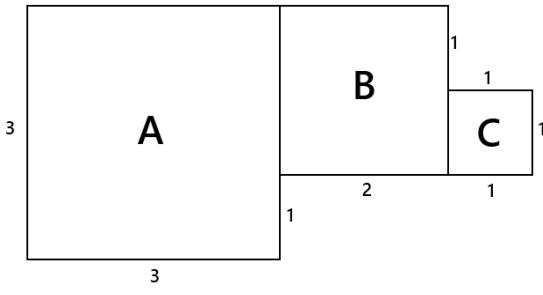
9	B	What is the value of one heart (\heartsuit)? A) 4 B) 5 C) 10 D) 20 E) Answer not given. From Row 2: $20/4 = 5$
10	B	What is the value of two targets (\circlearrowright) minus the value of one star (\star)? A) 6 B) 8 C) 10 D) 14 E) Answer not given. From Question 9, $\heartsuit = 5$. From Row 3, $3\circlearrowright = 23 - 5 = 18$. $\circlearrowright = 18/3 = 6$. From Row 1, $2\star = 19 - 5 - 6 = 8$, therefore $\star = 4$. $2\circlearrowright - \star = 2(6) - 4 = 8$.

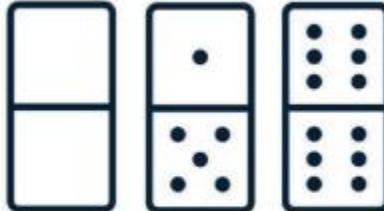
"Math is Cool" Masters -- 2024-25

4th Grade

Team Test Solutions

	Answer	Solution
1	11 [dots]	If the following pattern of dots continues, how many dots will be in Step 5?  Step 1 Step 2 Step 3 The pattern starts with 3, 5, 7, so adding 2 each time. $3, 5, 7, 9, 11$
2	36 [cherries]	Sharanam is making banana splits. Each banana split gets 3 cherries on top. How many cherries are needed to make 12 banana splits? $12 \times 3 = 36$
3	276 [minutes]	Four hours and 36 minutes is equal to how many minutes? $4 \times 60 + 36 = 240 + 36 = 276$
4	66 [pencils]	Annabel has 3 times as many pencils as Kaydn. Kaydn has twice as many pencils as Raegan. If Raegan has fewer than 12 pencils, then what is the greatest number of pencils that Annabel can have? The most Raegan has is 11. Kaydn has $2 \times 11 = 22$. Annabel has $3 \times 22 = 66$.

5	17	<p>The clocks at Wingding Elementary have symbols instead of numbers on their faces. As an integer, what is the solution to the following equation?</p> $\begin{aligned} ** + \odot - \circ - * \\ = ? \end{aligned}$ <p>$12 + 10 - 4 - 1 = 17$</p> 
6	18 [units]	<p>Squares A, B and C have side lengths of 3 units, 2 units, and 1 unit, respectively. In units, what is the outer perimeter of the combined shape?</p>  
7	14 [cards]	<p>Charles has a deck of 25 cards. Each card is numbered either 4 or 5. The total value of all of the numbers on the cards is 114. How many cards are labeled with a 5?</p> <p>$11x4 + 14x5 = 114$</p> <p>Could solve algebraically or using guess and check.</p>

8	28 [dominos]	<p>A set of dominos consists of a certain number of tiles that each contain 2 integers, from 0 (represented by a blank) up to 6. All possible number pairs are represented once, from 0-0 to 6-6. The order of the numbers does not matter, for example 1-5 is the same as 5-1. How many total dominos are in a set?</p> <p>Examples:</p>  <p>0 - 0 1 - 5 or 5 - 1 6 - 6</p> <p>Can list them:</p> <p>00 01 02 03 04 05 06 11 12 13 14 15 16 22 23 24 25 26 33 34 35 36 44 45 46 55 56 66</p>
9	20 [more minutes]	<p>The express train from Chicago to Oak Brook travels for 18 miles at a speed of 72 miles per hour. The local train travels from Chicago to Oak Brook at an average speed of 54 miles per hour, and makes 6 stops along the way for 2.5 minutes each time. How many more minutes does the local train take for the trip compared to the express train?</p> <p>Express: $18 \text{ miles} / 72 \text{ mph} = \frac{1}{4} \text{ hour} = 15 \text{ minutes}$</p> <p>Local: $18 \text{ miles} / 54 \text{ mph} = 1/3 \text{ hour} = 20 \text{ minutes}$, $+ 6 \times 2.5 = 15 \text{ minutes of stops} = 35 \text{ minutes total.}$</p> <p>$35 - 15 = 20$</p>

10 60 [%]

Biff randomly chooses one of the positive integer divisors of 16, and Eho randomly chooses one of the positive integer divisors of 48. As a percentage, what is the probability that Biff's number is a factor of Eho's number?

Divisors of 16: 1, 2, 4, 8, 16 (5 of them)

Divisors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48 (10 of them)

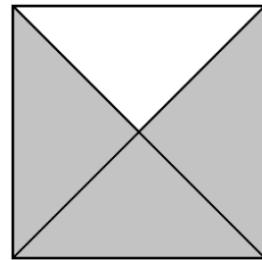
There are $5 \times 10 = 50$ ways for them to each choose a number. Biff's number is a factor of Eho's number if $\text{Eho}/\text{Biff} = \text{integer}$, see table. There are 30 cases that result in an integer. $30/50 = 60/100 = 60\%$.

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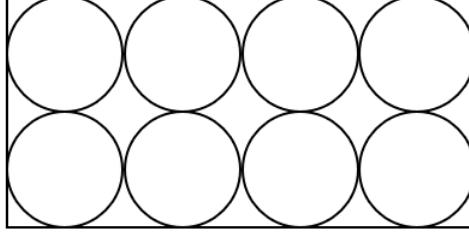
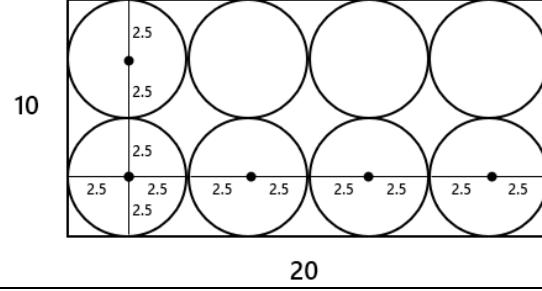
4th Grade

Linda Moore Triple Jump Solutions

	Answer	Solution
1	8 [pieces of rope]	A rope is 120 inches long. It is cut into pieces which are 15 inches long each. How many pieces of rope are there? $120/15 = 8$
2	72 [in^2]	In the following square, the area of the shaded region is 54 in^2 . What is the area in square inches of the entire square? $54/3 = 18 \text{ in}^2$ per triangle. $18*4 = 72 \text{ in}^2$
3	1851292	Deja and Annabel write a secret code, where the number 26 = A, 25 = B, 24 = C, 23 = D, and so on all the way down to 1 = Z. They use the code to write words as integers. For example, Deja writes her name as the integer 23221726. What integer would they write to represent their friend, whose name is Ivory? $I = 18, V = 5, O = 12, R = 9, Y = 2$
4	15 [bagels]	Some Bagels in Kennewick sells fresh bagels for \$1.20 each, and day-old bagels for 80¢ each. If Maksim, has \$18, what is the maximum number of fresh bagels he can buy? $18/1.20 = 15$



5	28 [more clovers]	<p>How many more clovers (♣) than stars (★) are in the following figure?</p> <p>There are 26 stars, and 54 clovers. $54 - 26 = 28$</p>
6	5201 [= N]	<p>N is the largest 4-digit whole number with the following features:</p> <ol style="list-style-type: none"> 1. N is an odd number. 2. The sum of the digits in N is 8. 3. Each digit of N is different. <p>What does N equal?</p> <p>The largest digit we can use in the first position is 5, to meet the other requirements. Put a 1 at the end to make it odd. Put the 2 in the 2nd position.</p>

7	200 [square centimeters]	<p>All of the circles are just touching each other and are also just touching the surrounding rectangle. Each circle has a radius of 2.5 centimeters. In square centimeters, what is the area of the rectangle?</p>  <p>The diameter of each circle = 5 cm, making the height = 10 cm and the length = 20 cm. Area = $10 \times 20 = 200$</p> 
8	4 [= 1 st term]	<p>In a sequence, each term after the first term is four more than three times the previous term. If the fifth term is 484, what is the first term?</p> <p>First term = a_1 2^{nd} term = $3a_1 + 4$ 3^{rd} term = $3[3a_1 + 4] + 4$ 4^{th} term = $3[3[3a_1 + 4] + 4] + 4$ 5^{th} term = $3[3[3[3a_1 + 4] + 4] + 4] + 4 = 484$ Solve for $a_1 = 4$</p>

9	31 [%]	<p>The cafeteria at Rosa Parks E.S. has apples, grapes, and bananas available with lunch. Each student may take at most one of each fruit. A total of 57 students got fruit with lunch. Five students got only an apple and 7 got only grapes. Out of the 14 students who got an apple and grapes, the 17 students who got grapes and a banana, and the 18 students who got an apple and a banana, 6 students got all three fruits. As a percent, how much of the fruit taken by the students was apples?</p> <p>The total number of fruit served was: $5 + 7 + 8 + 2(8 + 11 + 12) + 3(6) = 100$.</p> <p>The total number of apples was: $5 + 8 + 6 + 12 = 31$.</p> <p>$31/100 = 31\%$</p> <pre> graph TD A((Apples)) --- AG(()) G((Grapes)) --- AG B((Bananas)) --- AG A --- Aonly[5] G --- Gonly[7] B --- Bonly[8] A --- AG12[12] G --- AG11[11] B --- AB6[6] AG --- AG6[6] </pre>
10	31 [= range]	<p>A set of six positive integers has a mean of 11, a median of 8 and a unique mode of 4. What is the largest possible value of the range of the six numbers?</p> <p>The numbers could be: 1, 4, 4, 12, 13, 32, to give the largest possible range of $32 - 1 = 31$.</p>

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4th Grade

College Bowl Round #1 Solutions

	Answer	Solution
1	100,000 [one hundred thousand]	As an integer, what is ten raised to the fifth power? $10^5 = 100,000$
2	96 [ounces]	How many ounces are in six pounds? $6 \times 16 = 96$
3	4 [rectangular prisms]	Jasper is building a rectangular prism using one hundred twenty unit cubes. The prism will be four units tall, and he wants the width to be shorter than the length. How many rectangular prisms with different dimensions can Jasper make? $120/4 = 30 = L \times W$ 30x1 15x2 10x3 6x5
4	6 [boxes]	Eggs are packed in boxes of six and twelve. What is the smallest number of boxes needed to pack exactly sixty-six eggs? $5 \times 12 = 60 + 1 \times 6 = 66$
5	21 [people]	At a birthday party, two cakes were cut into four pieces each. Each of those pieces was then cut into three pieces. Each person ate one piece, and there were three pieces left over. How many people were at the party? $2 \text{ cakes} \times 4 \text{ pieces} \times 3 \text{ pieces} = 24 \text{ pieces} - 3 \text{ leftover} = 21.$
6	2034 [= next year]	The year right now is two thousand twenty-five, and the sum of the digits in that year is nine. What is the next year where the sum of the digits will be nine? $2 + 0 + 2 + 5 = 9$ $2 + 0 + 3 + 4 = 9$
7	6 [ounces]	If one hundred sheets of paper weigh four ounces, how many ounces do one hundred fifty sheets of paper weigh? $4/100 = x/150$ $x = 4(150/100) = 4 \times 1.5 = 6$
8	28	What is seven times eight divided by two? $7 \times 8 / 2 = 28$

9	3 [numbers are prime]	How many of the following numbers are prime? One, two, three, four, eleven, twenty-one 1, 2, 3, 4, 11, 21 2, 3, and 11 are prime
10	100	Three hundred thirty-three divided by what number equals three point three three? $333/100 = 3.33$

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College Bowl Round #2 Solutions

	Answer	Solution
1	600,000 [six hundred thousand]	Eight hundred million plus eight thousand plus what number equals eight hundred million six hundred and eight thousand? $800,000,000 + 600,000 + 8000 = 800,608,000$
2	130 [cm]	One point three meters is equal to how many centimeters? $1.3 \times 100 = 130$
3	48 [cubic units]	Julia built a rectangular prism out of unit cubes that is eight units long, three units wide and four units tall. What is the volume in cubic units of Kevin's rectangular prism, which is made out of half as many units cubes as Julia's? Julia: $8 \times 3 \times 4 = 96$ Kevin: $96 / 2 = 48$
4	6 [\$. \$ cheaper]	In a restaurant, when ordering items separately the soup costs six dollars and fifty cents, the main course costs fifteen dollars, and the dessert costs three dollars and fifty cents. When ordered together as a meal, the cost for all three is nineteen dollars. How many dollars cheaper is it to order the meal? $6.5 + 15 + 3.5 = 25$ $25 - 19 = 6$
5	-11	What number comes next in the following sequence? Four, three, one, negative two, negative six, and so on. Pattern is -1, -2, -3, ... 4, 3, 1, -2, -6, -11
6	54 [sq centimeters]	How many square centimeters are in the surface area of a cube that has an edge length of three centimeters? 1 face = $3 \times 3 = 9$ $6 \times 9 = 54$
7	9,000,000 [9 million]	What is the positive difference between one million and ten million? $10,000,000 - 1,000,000 = 9,000,000$
8	200	What is the value of two cubed times five squared? $2^3 \times 5^2 = 8 \times 25 = 200$

9	4 [factors of 36]	How many of the following numbers are factors of thirty-six? One, four, six, eighteen and twenty-four 1, 4, 6, 18, 24 All are factors except for 24
10	3	As an integer, what is one-third plus four-thirds plus four-thirds? $1/3 + 4/3 + 4/3 = 9/3 = 3$

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College Bowl Round #3 Solutions

	Answer	Solution
1	5000	What number is ten times greater than five hundred? $500 \times 10 = 5000$
2	126 [inches]	How many inches are in three and one-half yards? $3.5 \times 36 = 126$
3	117 [cubic units]	Tessa builds a cube of side length 5 units out of unit cubes, then removes one unit cube from each corner. What is the volume in cubic units of the remaining cube that she built? $5 \times 5 \times 5 = 125$ $125 - 8 = 117$
4	52 [= value of smaller number]	The sum of two numbers is two hundred and eight. One of the numbers is three times the other number. What is the value of the smaller number? $x + 3x = 208$ $4x = 208$ $x = 52$
5	9 [= A]	A circular pizza with radius six inches is cut into four equal pieces. The area of each piece is A times pi square inches. What is the value of A? $\text{Area} = \pi r^2 = 36\pi$ $36\pi/4 = 9\pi$ $A = 9$
6	4 [4 th position]	Ten runners are in a running race. At the finish, there are three more runners behind Alison than there are in front of her. As an integer, in which position number did Alison finish? There were 3 ahead of her, and 6 behind her, so she was 4 th .
7	16 [= twice the number]	One-half of a number is four. What is twice the number? $\frac{1}{2}(n) = 4, n = 8$ $2(8) = 16$
8	2880 [square inches]	How many square inches are in a rectangle that measures four feet by five feet? $(4 \times 12) \times (5 \times 12) = 48 \times 60 = 2880$
9	35 [= LCM]	What is the least common multiple of seven and five? $7 \times 5 = 35$

1035 [=
largest
sum]

What is the largest sum that can be made by adding exactly two of the following numbers?
Eleven, nine, four, twenty-four, ten
 $24 + 11 = 35$

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College Bowl Round #4 Solutions

	Answer	Solution
1	6	Six plus eleven plus one equals eight plus four plus what number? $6 + 11 + 1 = 18$ $8 + 4 + 6 = 18$
2	61 [days]	How many days are in the months of June and July combined? $30 + 31 = 61$
3	8 [cm]	A rectangular prism with dimensions of eight, twelve and two centimeters has the same volume as a rectangular prism with dimension of six, four and how many centimeters? $8 \times 12 \times 2 = 192$ $192 / (6 \times 4) = 8$
4	33 [= mean]	The sum of three numbers is ninety. One of the numbers is twenty-four. What is the mean of the other two numbers? $90 - 24 = 66$ = the sum of the other 2 numbers. $66 / 2 = 33$
5	12 [square feet]	The longest side of a right triangle is five feet, and the shortest side is three feet. In square feet, what is the area of the triangle times two? It is a 3-4-5 right triangle, area = $\frac{1}{2} (3)(4) = 6$. Twice that = 12.
6	16 [= 11 th number]	The mean of ten numbers is seven point two. When an eleventh number is added, the mean becomes eight. What is the eleventh number? $7.2 \times 10 = 72$, sum of 10 numbers Sum of 11 numbers = $8 \times 11 = 88$ $88 - 72 = 16$
7	3 [= remainder]	What is the remainder when the sum of the first three prime numbers is divided by the fourth prime number? $2+3+5 = 10$ $10 / 7 = 1 \text{ r } 3$
8	11 [hours]	How many hours will it take Eli to drive four hundred ninety-five miles at forty-five miles per hour? $495 / 45 = 11$
9	3 [numbers are divisible by 9]	How many of the following numbers are divisible by nine? Nine, twenty-four, fifty-four, ninety-two, one-hundred seventeen 9, 24, 54, 92, 117 9, 54 and 117 are divisible by 9

10

104

What is seven hundred twenty-eight divided by seven?

$$728/7 = 104$$

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College Bowl Round #5 Solutions

	Answer	Solution
1	524001 [five hundred twenty-four thousand and one]	What number do you get by reversing the digits of one hundred thousand four hundred twenty-five? $100425 \rightarrow 524001$
2	1320 [grams]	One kilogram plus three hundred twenty grams equals how many grams? $1\text{ kg} = 1000\text{ g}$ $1000 + 320 = 1320$
3	42 [sq meters]	In square meters, what is the area of a rectangle with a length of three and one-half meters and a width of twelve meters? $3\frac{1}{2} \times 12 = \frac{7}{2} \times 12 = 42$
4	360 [stamps]	Zane collected eighteen thousand stamps over a fifty-week period. What is the mean number of stamps that he collected each week? $18000/50 = 360$
5	5 [= number F has]	A, B, C, D, E and F each randomly pick a different integer from one to six. A's number is twice as big as B's, and three times as big as C's. D's number is four times as big as E's. What number does F have? A = 6 B = 3 C = 2 D = 4 E = 1 F = 5
6	30 [%]	An integer from one to ten inclusive is randomly selected. As a percentage, what is the probability that it is a perfect square? $1^2 = 1, 2^2 = 4, 3^2 = 9$ $2/10 = 20\%$
7	7 [coins]	What is the minimum number of US coins needed to make exactly forty-four cents? $QDNPPPP = 7\text{ coins}$

8	26 [degrees]	How many degrees are in the complement of a sixty-four degree angle? $90 - 64 = 26$
9	42 [= largest factor]	What is the largest factor of eighty-four that is not eighty-four? $84/2 = 42$, which will be the next biggest factor.
10	36 [= 4 th term]	The first number in a sequence is forty-eight, and the rule is to subtract four each time. What is the fourth term in the sequence? 48, 44, 40, 36

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College Bowl Round #6 Solutions

	Answer	Solution
1	1400 [fourteen hundred, or one thousand four hundred]	Forty-three thousand seven hundred fifty-two minus what number equals forty-two thousand three hundred fifty-two? $43,752 - 1400 = 42,353$
2	13 [feet]	Four and one-third yards equals how many feet? 1 yard = 3 feet, 4 yards = 12 feet, $\frac{1}{3}$ yard = 1 foot $12 + 1 = 13$
3	56 [sq inches]	In square inches, how much bigger is the area of a rectangle with side lengths eight and nine inches compared to a square with a side length of four inches? $8 \times 9 = 72$ $4 \times 4 = 16$ $72 - 16 = 56$
4	17 [thirds]	How many thirds are in five and two-thirds? $5 \times 3 = 15$ thirds in 5 $15 + 2 = 17$ thirds total
5	330 [seats]	Each row of Moore Theater has thirty seats. Rows ten through twenty are reserved for a field trip. How many seats are reserved for the field trip? $10 \text{ through } 20 = 11 \text{ rows}$ $11 \times 30 = 330$
6	7 [integers]	How many integers that contain only the digits one, two or three are larger than ten and smaller than thirty-two? $11, 12, 13, 21, 22, 23, 31$
7	15 [miles]	Eleven flags are placed along a race course, with one flag at the beginning and one flag at the end. All flags are spaced equally, with one point five miles between each flag. In miles, what is the total length of the race course? The 11 flags divide the course into 10 sections. $10 \times 1.5 = 15$

8	29 [= sum]	What is the sum of the next two terms in the sequence that begins as follows: one, four, seven, ten, and so on Pattern is +3. $10+3 = 13$; $13+3=16$ $13+16=29$
9	125 [= smallest perfect cube]	What is the smallest perfect cube that is greater than one hundred? $5^3 = 125$
10	230	What is two-thousand three hundred times zero point one? $2300 \times 0.1 = 230$

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College Bowl EXTRA

	Answer	Solution
1	15 [minutes]	<p>It takes Stella five minutes to walk one-quarter of the way home from baseball practice. At the same rate, how many minutes does it take her to walk the rest of the way home?</p> <p>$5 \text{ minutes} = \frac{1}{4}$, therefore $3 \times 5 = 15 \text{ minutes left.}$</p>
2	9	<p>What is the value of the number of square inches in one square yard divided by the number of square inches in one square foot?</p> <p>A square yard = 9 square feet, so the ratio of the square inches will also be 9.</p>
3	14 [= 4*5]	<p>If A star B equals A + two B, then what is the value of four star five?</p> $A * B = A + 2B$ $4 * 5 = 4 + 2 \times 5 = 14$
4	1 [degree C]	<p>On five consecutive days in Eagle River Wisconsin, the low temperatures were two, negative nine, nine, seven and negative four degrees Celsius. What was the mean low temperature in degrees Celsius?</p> $2 + (-9) + 9 + 7 + (-4) = 5$ $5/5 = 1$
5	40 [feet]	<p>The area of a right triangle is six hundred square feet, and the length of the base is thirty feet. In feet, what is the height?</p> $A = \frac{1}{2} bh$ $600 = \frac{1}{2}(30)h$ $h = 40$
6	1	<p>What is one-half percent of two hundred?</p> <p>$1\% \text{ of } 200 = 2$, so $\frac{1}{2}\% = 1$</p>
7	6	<p>What number tripled is half of thirty-six?</p> <p>$6 \times 3 = 18$</p> <p>18 is half of 36</p>
8	3 [nickels]	<p>Eight U.S. coins are worth a total of thirty-eight cents. How many of the coins are nickels?</p> <p>DDNNNNPPPP</p>
9	18 [= sum]	<p>What is the sum of the number of faces and edges of a cube?</p> <p>6 faces + 12 edges = 18</p>

10

2 [= x]

Four cubed plus six squared equals ten raised to the X. What is X?
 $4^3 + 6^2 = 10^x$
 $64 + 36 = 100 = 10^2$