This booklet contains problems to be used in the Countdown Round.
1. ________ (minutes) How many minutes after 12:34 p.m. will it first be 1:30 p.m.?

2. ________ (cm²) A sector of a circle with a radius of 6 cm has a central angle of 90°. What is the area of the sector, in square centimeters? Express your answer in terms of π.

3. ________ If 5x – 4 = 26, what is the value of x?

4. ________ (pounds) The average weight of a rock in a pile containing eight rocks is 15 pounds. Another rock is added, and the average weight of a rock in the pile increases to 16 pounds. What is the weight, in pounds, of the added rock?

5. ________ (degrees) In one day, through how many degrees does the hour hand of a clock rotate from 2:00 p.m. to 7:00 p.m.?

6. ________ What is the 2014th digit to the right of the decimal point in the decimal representation of $\frac{13}{990}$?

7. ________ (dollars) The number of juice boxes sold at the PTA Movie Night was three times the number of bags of popcorn sold. A bag of popcorn costs $\frac{1}{2}$ as much as a juice box. If the PTA collected $120 for selling 120 juice boxes, how much did the PTA collect for the bags of popcorn sold?

8. ________ (units) The diagram shows a circle of radius 6 units and a line segment of length 8 units tangent to the circle at one of its endpoints. What is the distance from the other endpoint of the segment to the closest point on the circle, in units?

9. ________ (percent) The rectangle shown is divided into 10 congruent sections, three of which are white. What percent of the rectangle is gray?

10. ________ If $a + b = 3$ and $c + w = 4$, what is the value of $ac + bw + aw + bc$?

11. ________ (books) Evan was born on January 1, 2004. If Evan reads one book every three days starting on his 8th birthday, what is the greatest possible number of books he could read before his 12th birthday?
12. ____________  What is the probability that a randomly selected factor of 36 is divisible by 3? Express your answer as a common fraction.

13. ____________  (zeros)  How many zeros are after the last nonzero digit of 125!?

14. ____________  (sides)  What is the number of sides in a regular polygon when the measure of each interior angle is 162°?

15. ____________  (cubes)  There are 15 red, 11 blue and 13 green cubes in a bag. All cubes are identical, except for color. How many cubes must be randomly selected to ensure that at least one pair of each color has been removed from the bag?

16. ____________  What is $0 \cdot 1 + \frac{0}{1} + 0^1 + 1^0$?

17. ____________  (dollars)  Chris has twice as much money as Ivan. Tae has $4.00 less than Ivan. If Tae has $8.00, what is the total amount Chris, Tae and Ivan have all together?

18. ____________  (cm²)  Square P’Q’R’S’, shown here, is the image of square PQRS when it is rotated clockwise 90° about the midpoint T of segment PS. If the area of square PQRS is 64 cm², how many square centimeters are in the gray region?

19. ____________  What is the least positive integer greater than 20 that has exactly three positive factors?

20. ____________  What is the mean of the integers in the arithmetic sequence 33, 43, 53, …, 213, 223?

21. ____________  (inches)  The length of one piece of rope is 4 inches more than twice the length of a shorter piece. If the length of the longer piece is 26 inches, what is the length, in inches, of the shorter piece?

22. ____________  What common fraction is equivalent to $1 \frac{1}{2} + \frac{6}{5} - 0.25$?

23. ____________  What is the greatest integer $x$ such that $\sqrt{x^2} \neq x$?
24. __________ (votes) In the primary election, Ms. Eli Fant received twice as many votes as her opponent. If she received 3248 votes, how many votes did her opponent receive?

25. __________ If \( a \bigtriangleup b = 3a - 4b \), then \( 1 \bigtriangleup 4 = 3(1) - 4(4) = -13 \). What is the value of \( 5 \bigtriangleup (2 \bigtriangleup 3) \)?

26. __________ (pounds) There were 1304 people who participated in an egg-and-spoon race. If each person carried a two-ounce egg, what was the total weight, in pounds, of the eggs carried?

27. __________ (campers) At a certain camp, the counselor-to-camper ratio is 2 to 9. If the camp has 18 counselors, how many campers does it have?

28. __________ (integers) The probability of selecting an even integer at random from a list of 30 integers is \( \frac{7}{10} \). How many odd integers are in the list?

29. __________ The distance between two points is \( 5\sqrt{2} \) units. The coordinates are \((-1, 1)\) and \((p, 6)\), where \( p \) is a positive number. What is the value of \( p \)?

30. __________ What is the value of the greatest of the following expressions:

\[
7 \div \frac{1}{3}, \quad 6 \div \frac{1}{4}, \quad 5 \div \frac{1}{5}, \quad 4 \div \frac{1}{6}, \quad 3 \div \frac{1}{7}
\]

31. __________ What is the least positive integer \( n \) for which \( 165 \cdot 513 + 10n \) is a multiple of 9?

32. __________ If \( x^{3y} = 27 \), what is the value of \( x^y \)?

33. __________ What is the least positive integer \( n \) such that the value of \( \frac{2014!}{n!} \) does not have a units digit of zero?

34. __________ Given \( \frac{1}{4} > \frac{x}{9} > \frac{1}{5} \), what is the only possible integer value of \( x \)?

35. __________ What is the value of \( 4 \times (50 + 7) \)?

36. __________ What is the value of \( \left( \frac{2}{3} \right)^4 \cdot \left( \frac{3}{8} \right)^2 \)? Express your answer as a common fraction.
37. _______ (miles) Jessica hikes east for 9 miles, then turns and hikes south for 12 miles. What is the distance, in miles, of the shortest route back to her starting location?

38. ___________ What is the largest six-digit number with an odd number of positive factors?

39. ___________ If $6x + px = 14x$ and $x \neq 0$, what is the value of $p$?

40. _______ (pieces) Jose has 120 pieces of candy. If he divides the candy evenly between himself and 14 friends, how many pieces of candy does each person get?

41. _______ (years old) Ten years from now Simon will be twice as old as he was 10 years ago. How old is Simon now?

42. _______ (sets) How many sets of distinct odd positive integers have a sum of 16?

43. _______ (units) In this pattern, $n$ squares are added at stage $n$, as shown. If the pattern continues, what will be the perimeter, in units, of the figure at stage 19?

44. _______ (pounds) If three woodchucks could chuck 600 pounds of wood in 5 days, how many pounds of wood could a woodchuck chuck in one day?

45. ___________ In a stack of 40 cards, each number 1 to 10 is used four times with one number on each card. What is the probability of choosing a prime number from this stack of 40 cards? Express your answer as a common fraction.

46. ___________ The six-digit number 357,abc has six distinct digits and is divisible by each of 3, 5 and 7. What is the smallest possible value of $a + b + c$?

47. _______ (multiples) Using each of the four digits 2, 4, 6 and 8 exactly once, how many four-digit multiples of 4 can be formed?

48. _______ (integers) How many three-digit positive integers can be written using only odd digits?
49. _____ (customers) In a random sample of 400 customers at a local fast food restaurant, it was determined that 152 customers ordered French fries. Based on this sample, if the restaurant typically serves 4500 customers a day, how many customers would be expected to order French fries?

50. ___________ What is the value of \( \sqrt{3! \cdot 4!} \)?

51. ( , ) Triangle ABC has vertices A(−1, 1), B(5, 1) and C(6, 4). Point D is on segment AB such that the area of \( \triangle ACD \) equals the area of \( \triangle BCD \). What are the coordinates of point D? Express your answer as an ordered pair.

52. ___________ If \( a \) and \( b \) are positive integers such that \( a! + b! = (a + b)! \), what is the value of \( a + b \)?

53. ____ (degrees) What is the degree measure of the smaller angle between the minute and hour hands of an analog clock at 8:20?

54. ____ (cheerleaders) Among the 65 cheerleaders at an Austin middle school, 25 were Cowboys fans, 42 were Texans fans, and 6 were not fans of either team. How many cheerleaders were fans of both teams?

55. ___________ What is the greatest possible value of \( (x^y)^z \), when \( x, y \) and \( z \) are distinct positive integers less than five?

56. ____ (values) If \( n \geq 3 \), for how many values of \( n \) is the measure of an interior angle of a regular \( n \)-gon less than the measure of an exterior angle?

57. ____ (integers) How many integers greater than 99 and less than 1000 have 0 as at least one of their digits?

58. ____ (questions) Connie scored 84% on a 25-question math test. How many questions did she get correct?

59. ____ (units²) In square units, what is the area of the gray triangle?
The sum $S_n$ of the first $n$ terms of a certain sequence satisfies $S_n = n^2 + 2^n - 1$. What is the sixth term of the sequence?

If $ab = 12$ and $ab^2 = 48$, what is the value of $a$?

In a sequence, the first term is 2 and the product of any two consecutive terms is $-1$. What is the product of the first seven terms of the sequence?

A square pyramid has a base area of 27 units$^2$ and a height of 36 units. In cubic units, what is the volume of this pyramid?

Segment XY is parallel to side AC and divides equilateral triangle ABC such that the ratio of the areas of equilateral triangles XBY and ABC is 1:4. If AC = 6 units, what is the length of segment XY, in units?

How many positive integers are less than and relatively prime to 24?

A bag contains 10 tiles numbered 1 through 10. If two numbers are randomly drawn from the bag without replacement, what is the probability that their sum is even? Express your answer as a common fraction.

Given the points A (3, 2) and B (−5, −3), what is the product of the coordinates of the midpoint of AB? Express your answer as a common fraction.

The square root of $x$ is equal to the square of $y$, for $x \geq 0$. If $y = 3$, what is the value of $x$?

What is the largest possible sum of two positive integers whose product is 100?

If $27^a = 9$, and $9^b = 27$, what is the value of $ab$?

What is the sum of the three prime factors of 2014?

How many minutes are in a 24-hour day?
73. __________ What is $111_5 - 111_4$ as a base-ten number?

74. __________ If $f(x) = \sqrt{x} - 1$ for all real numbers $x$ where $x \geq 1$, what is the value of $f(100)$?

75. _______ (integers) How many two-digit integers contain at least one 9?

76. _______ (dollars) A controller and a jump drive cost $106 together. If the controller costs $100 more than the jump drive, how much does the jump drive cost?

77. _______ (intercepts) If the graph shown is reflected about the $x$-axis, what is the total number of $x$- and $y$-intercepts in the reflected image?

78. _______ (locations) Marty the Mailman needs to deliver at least one package on each of the 11 roads shown on this map. He must travel down each road at least once, starting and finishing at the post office. Not counting the post office, how many of the other eight locations must Marty visit more than once?

79. _______ (cookies) A bag contains some cookies. The cookies can be divided evenly among four, five or seven people. What is the least number of cookies that can be in the bag?

80. __________ What is the value of $(10 - 5)^2 + 12 \div 4$?