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1. $23 + 32 =$ _____.

2. The tens digit of 1232 is _____.

3. $218 + 286 =$ _____.

4. $543 - 397 =$ _____.

5. The remainder of $142 \div 5$ is _____.

6. $11 + 29 + 42 + 18 =$ _____.

7. $4 + 4 \times 9 =$ _____.

8. The product of 6 and 13 is _____.

9. $34 \times 20 =$ _____.

10. (estimate) $111 + 333 + 777 =$ _____.

11. $51 \times 11 =$ _____.

12. $242 - 98 - 34 =$ _____.

13. $13^2 =$ _____.

14. $15 \times 24 =$ _____.

15. The remainder of $181 \div 9$ is _____.

16. $8 \times 9 \times 5 =$ _____.

17. *LXVII* in Arabic numerals is _____.

18. $999 + 1999 =$ _____.

19. $21 \times 19 =$ _____.

20. (estimate) $199 \times 202 =$ _____.

21. $36 \times 25 =$ _____.

22. If 12 inches is equal to 1 foot, then 48 inches is equal to _____ feet.

23. $24^2 =$ _____.

24. The GCD of 16 and 20 is _____.

25. $13 + 16 + 19 + 22 + 25 =$ _____.

26. The greater of $\frac{2}{3}$ and $\frac{3}{4}$ is _____ (fraction).

27. $403 \div 13 =$ _____.

28. $44 + 132 + 264 =$ _____.

29. $7 \times 15 \div 35 =$ _____.

30. (estimate) $29 \times 30 \times 31 =$ _____.

31. The perimeter of a square with area 9 is _____.

32. $99 \times 27 =$ _____.

33. 10% of 150 is _____.

34. 180 minutes is _____ hours.

35. $35^2 =$ _____.

36. The number of multiples of 5 between 21 and 51 is _____.

37. $12 \times 6 \times 15 =$ _____.

38. The LCM of 16 and 20 is _____.

39. $27 \times 23 =$ _____.

40. (estimate) $189591 \div 94 =$ _____.

41. $31^2 - 21^2 =$ _____.

42. The greatest prime divisor of 42 is _____.

43. $4 \times 11 + 22 \times 8 =$ _____.

44. The remainder of $982 \div 11$ is _____.

45. $2^8 =$ _____.

46. The tenth term of the arithmetic sequence $7, 13, 19, \ldots$ is _____.

47. $101 \times 23 =$ _____.

48. The area of a right triangle with legs of length 35 and 12 is _____.

49. $23 \times 83 =$ _____.

50. (estimate) The area of a circle with radius 10 is _____.

51. $104 \times 103 =$ _____.

52. The measure of the third exterior angle of a triangle with two exterior angles measuring $100°$ and $140°$ is _____ $°$.

53. $8\frac{1}{3}\%$ of 72 is _____.

54. 32_4 in base 2 is _____ $_2$.

55. If $x + 2 = 9$, then $3x - 1 =$ _____.

56. $98 \times 94 =$ _____.

57. The sum of the terms of the arithmetic sequence $1, 2, 3, \ldots, 19$ is _____.

58. $88 \times 125 =$ _____.

59. The length of the hypotenuse of a right triangle with legs of length 9 and 12 is _____.

60. (estimate) $142857 \times 14 =$ _____.

61. $41^2 =$ _____.

62. Two standard dice are rolled. The probability the sum of the numbers shown is 11 is _____ (fraction).

63. $4\frac{1}{3} \times 4\frac{2}{3} =$ _____ (mixed number).

64. If $y = 8$, then $y^2 + 6y + 9 =$ _____.

65. $0.\overline{18} =$ _____ (fraction).

66. The area of a rhombus with diagonals of length 24 and 18 is _____.

67. $11 \times 9 \times 7 \times 14 =$ _____.

68. The number 56 in base 6 is _____ $_6$.

69. $314 \times 111 =$ _____.

70. (estimate) The length of the diagonal of a square with side length 50 is _____.

71. $512 \times 999 =$ _____.

72. The surface area of a cube with volume 729 is _____.

73. $16^{1.75} =$ _____.

74. The number of positive whole number divisors of 30 is _____.

75. $\sqrt{17689} =$ _____.

76. The arithmetic mean of four 16's and three 9's is _____.

77. $\sqrt{18} \times \sqrt{8} =$ _____.

78. The sum of the terms of the infinite geometric sequence $2, 1, \frac{1}{2}, \ldots$ is _____.

79. $60 \times 75 \times 45 =$ _____.

80. (estimate) $2.3^6 =$ _____.

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1. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   11. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   21. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

2. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   12. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   22. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

3. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   13. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   23. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

4. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   14. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   24. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

5. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   15. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   25. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

6. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   16. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   26. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

7. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   17. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   27. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

8. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   18. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   28. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

9. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   19. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   29. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

10. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   20. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   30. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

1. Which of the following sums is even?

   (A) $5 + 8$ (B) $6 + 7$ (C) $2 + 3$ (D) $9 + 9$ (E) $1 + 4$

2. What is the value of $1 + 4 + 9 + 16 + 25 + 36 + 49$?
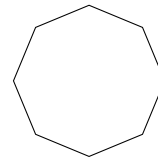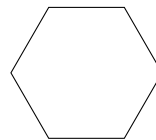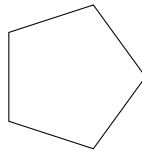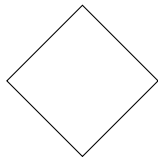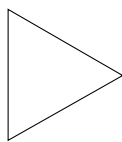
   (A) 110   (B) 140   (C) 150   (D) 130   (E) 120

3. A triangle, a square, a pentagon, a hexagon, and an octagon are shown below. How many sides do the shapes have altogether?

   (A) 29   (B) 26   (C) 27   (D) 30   (E) 33

4. A tower-stacking competition is 25 minutes long and began at 2:55 PM. At what time did the competition end?

   (A) 3:30 AM   (B) 2:30 PM   (C) 3:20 AM   (D) 3:30 PM   (E) 3:20 PM

5. At a junk shop, each energy canteen costs 700 yen, and each hyper cartridge costs 3000 yen. Barbara plans to buy two energy canteens and five hyper cartridges. How many yen would Barbara need to pay?

   (A) 15140   (B) 2900   (C) 14150   (D) 16400   (E) 15500

6. Maxim wants to exchange one $500 bill for the same amount using only bills less than $500. So far, he has gotten back four $100 bills, one $50 bill, two $20 bills, and one $5 bill. How many $1 bills does Maxim still need to get?
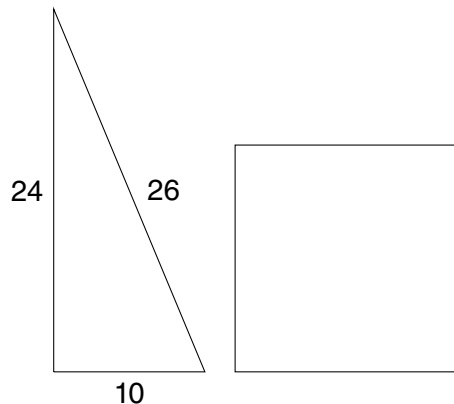
   (A) 5   (B) 20   (C) 10   (D) 15   (E) 25

7. The length of the serpent road is 10000 miles. If Cat flies at 625 miles per hour, then how many hours will it take Cat to fly through the entire path of the serpent road?

(A) 14   (B) 12   (C) 8   (D) 16   (E) 10

8. A triangle has side lengths of 10, 24, and 26. A square has the same perimeter as the triangle. What is the area of the square?

(A) 225   (B) 200   (C) 120   (D) 100   (E) 60

9. The year 2022 has 365 days. The months of October and December each have 31 days, and the month of November has 30 days. If December 31st is day 365 of the year 2022, then what day of the year is October 31, 2022?

(A) 306   (B) 304   (C) 305   (D) 303   (E) 302

10. Kaycee is selling lemonade. She has five gallons of lemonade and is selling the lemonade at a price of $2 per cup. If there are four cups in one quart and four quarts in one gallon, then how many dollars will Kaycee receive for selling all of her lemonade?

(A) 160   (B) 80   (C) 100   (D) 128   (E) 64

11. What is the remainder when $11 \times 13 \times 17 \times 19$ is divided by 5?

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

12. Daniel, Spencer, and Kai are lining up to swing at a home-run derby. If Daniel does not want to swing at the home-run derby at any time after Spencer, how many ways can the three line up to swing at the home-run derby?

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

13. Sarah sold tickets for the school band concert on the weekend. The number of tickets sold each day is displayed in the bar graph below. Which of the following is closest to the average number of tickets sold per day?
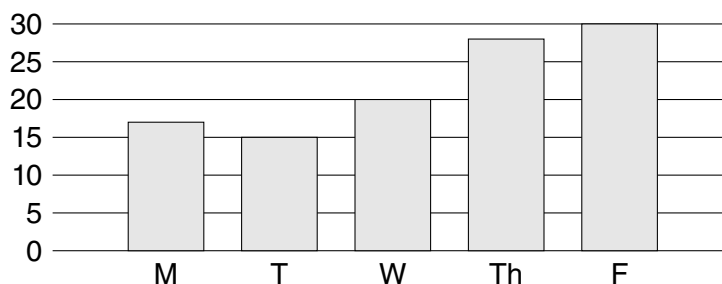
(A) 22   (B) 24   (C) 20   (D) 18   (E) 26

14. A prime number is a whole number that is both greater than 1 and is only evenly disible by 1 and itself. For example, since 5 is only divisible by 1 and 5, the number 5 is a prime number. Of the answer choices, which number is prime?

(A) 101   (B) 121   (C) 91   (D) 111   (E) 81

15. Aaron, Manuel, and Phil are going on a three day road trip on a car that has a driver seat, a side seat, and a back seat. The three agreed to sit in different seats on each of the three days. Aaron sits in the back seat on the first day, and Manuel sits in the side seat on the second day. Using the letter *A* to represent Aaron, the letter *M* to represent Manuel, and the letter *P* to represent Phil, in what order, from the first day to the third day, did the three sit in the driver seat?

(A) P, M, A   (B) M, A, P   (C) A, P, M   (D) P, A, M   (E) M, P, A

16. A square of side length 7 is divided into a smaller shaded quadrilateral as well as four right triangles each with legs of length 3 and 4 as shown in the below diagram. What is the area of the shaded quadrilateral?


4

3
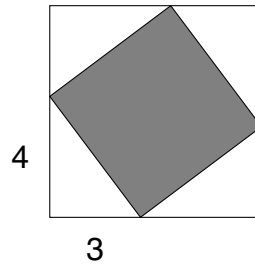
   (A) 30   (B) 16   (C) 20   (D) 25   (E) 24

17. Which of the following fractions is greater than $\frac{3}{5}$ and less than $\frac{9}{14}$?

   (A) $\frac{22}{37}$ (B) $\frac{2}{3}$ (C) $\frac{23}{35}$ (D) $\frac{4}{7}$ (E) $\frac{22}{35}$

18. Alex gets paid for helping with writing and editing problems, where he is paid per minute at a rate of $15 per hour. On Monday, Alex helped for two hours. On Wednesday, Alex helped for 80 minutes. On Friday, Alex helped from 3:50 PM to 5:10 PM. Alex records the three activities in his timesheet that week. How many dollars would Alex earn from that timesheet?

   (A) 105   (B) 90   (C) 42   (D) 70   (E) 84

19. How many whole numbers greater than 1 and less than 10 evenly divide 210?

   (A) 5   (B) 8   (C) 7   (D) 6   (E) 9

20. Rebecca has 7 cards, Ellen has 8 cards, and Calvin has 9 cards. On each turn, one of the three discards a card. What is the minimum number of turns needed to guarantee that each player discards at least one card?

   (A) 15   (B) 14   (C) 16   (D) 18   (E) 17

21. Anthony's class has 30 students, where 60% of the students play golf. Michael's class has 20 students, where 40% of the students play golf. One day, Anthony and Michael teach together with all 50 students from the combined two classes in the classroom. What percent of the students do *not* play golf?

   (A) 51%   (B) 49%   (C) 52%   (D) 48%   (E) 50%

22. The figure below shows a square, with one diagonal of the square drawn. A second square is formed by connecting the midpoints of the sides of the original square, with both diagonals of that smaller square drawn as well. If the area of the original square is 64, then what is the total area of the shaded regions?
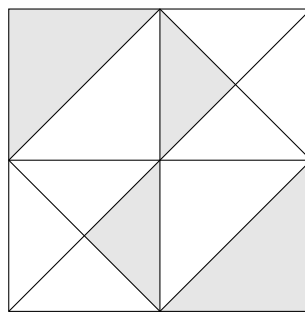
   (A) 12   (B) 24   (C) 28   (D) 16   (E) 20

23. Wentinn fired a chip to a number on the number line. The distance between the chip and 21 was twice the distance between the chip and 12. What is the sum of all possible numbers that the chip could be at?
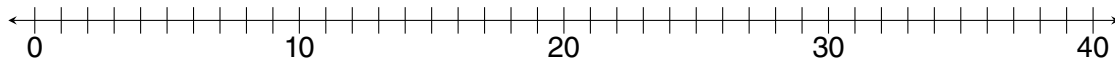

   (A) 18   (B) 20   (C) 22   (D) 24   (E) 16

24. In a list of four whole numbers, the unique mode is 8, the mean, or average, is 10, and the range is 5. What is the greatest number in the list?

   (A) 13   (B) 14   (C) 11   (D) 15   (E) 12

25. Jada is doing a sketch of a city. In her sketch, she draws squares with side length 1 inch to represent buildings, and the squares have a border of 0.25 inches around each square, including around the outside of the outer edge of squares. One corner of her sketch is shown below. If the completed sketch has 7 rows, with each row having 7 squares that are all equally spaced apart, then how many square inches is the total area of Jada's sketch?
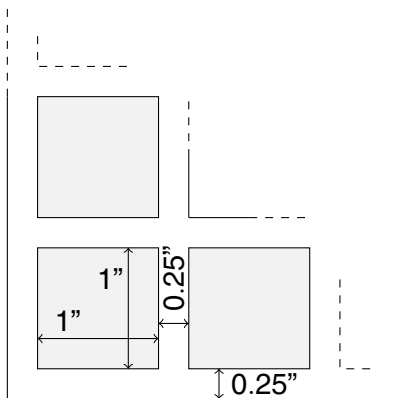
(A) 81   (B) 49   (C) 63   (D) 64   (E) 56

26. In the 3×3 grid of squares below, each of the whole numbers from 1 through 9 is placed into one of the nine squares of the grid so that the sum of the numbers in any row or column of the grid is odd. Five of the squares already have numbers. In how many different ways can the remaining four numbers be placed into the remaining four squares?


(A) 4   (B) 2   (C) 8   (D) 6   (E) 0

27. Once every four years in the Dream Kingdom, a single lead knight is chosen to serve for the next four years. If each chosen lead knight must complete their full four years as lead knight, and there is only one lead knight at a time, what is the greatest number of different lead knights that can serve at some time between April 27, 1992 and April 27, 2022?

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

28. Brendan has a collection of creatures that are either grass type, fire type, or water type. The ratio of water creatures to fire creatures is 4 : 5. The ratio of water creatures to grass creatures is 3 : 5. After Brendan got an additional two dozen water creatures to his collection, the ratio of water creatures to fire creatures became 8 : 5, and the ratio of water creatures to grass creatures became 6 : 5. How many creatures in Brendan's collection are not water type?

    (A) 48   (B) 54   (C) 88   (D) 64   (E) 70

29. Points A, B, C, and D lie on a circle with center O. Chord $\overline{BD}$ and diameter $\overline{AC}$ intersect at point P. The length of segment $\overline{OP}$ is 15, the length of segment $\overline{OC}$ is 27, the length of segment $\overline{BC}$ is 42, and the length of segment $\overline{PB}$ is 28. What is the square of the length of segment $\overline{CD}$?
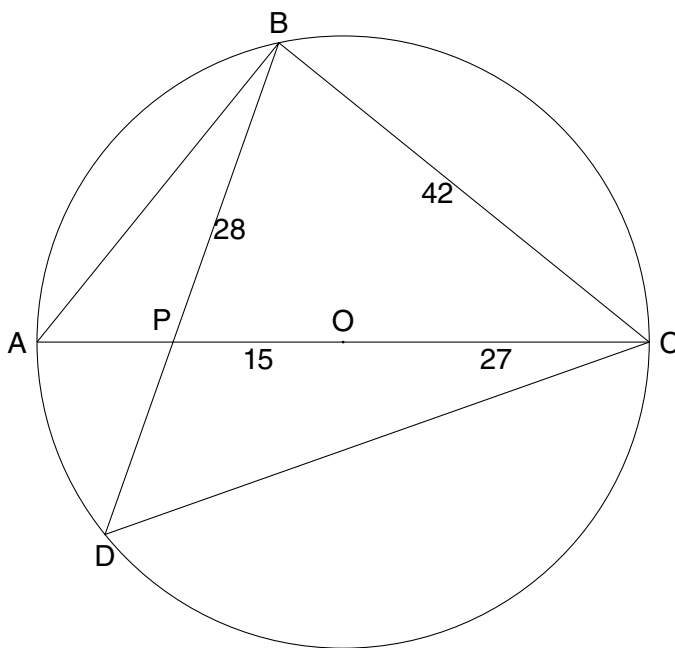
    (A) 1296   (B) 1152   (C) 2304   (D) 3072   (E) 2592

30. Alecsis and Bettina each chose a rational number. The sum of Alecsis's number and the reciprocal of Bettina's number is 2. The sum of Bettina's number and the reciprocal of Alecsis's number is $\frac{9}{4}$. The least possible value of the product of Alecsis's number and Bettina's number is a common fraction. What is the sum of the numerator and denominator of that fraction?

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

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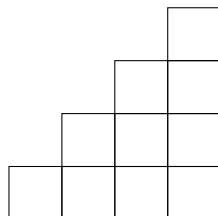Inside This Box

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Problems 1 & 2

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1. Becca, Nicole, and Sophie are making friendship bracelets. Becca made 15 friendship bracelets, which is nine fewer than the number of bracelets Nicole made. Additionally, Sophie made half as many bracelets as Nicole. How many friendship bracelets did Becca, Nicole, and Sophie make altogether?

1.

2. The figure below is made up of ten identical squares. Each square has a side length of 5. What is the perimeter of the figure?

2.

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Problems 3 & 4

3. Bryce leads 20 scouts in a camping trip. Three scouts did not swim or hike in the trip. A total of 13 scouts swam, and a total of 12 scouts hiked. How many scouts both swam and hiked?

3.

4. Lois is playing a taiko drum mini game at an arcade. The normal stages earn her 6 coins, while the hard stages earn her 10 coins. So far, Lois has played 3 normal stages and 2 hard stages. What is the fewest number of additional stages that Lois needs to play so that she would have exactly 100 coins to buy a prize?

4.

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Problems 5 & 6

5. The product of the tens and units digit of a three-digit whole number is 4. The product of the tens and hundreds digits of the same three-digit whole number is 12. What is the greatest possible value of the three-digit whole number?

5.

6. The mean, or average, of a list of five different positive whole numbers is also a whole number. If four of the numbers are 2, 10, 21, and 23, then what is the sum of all possible values of the median, or middle number, of the list?

6.

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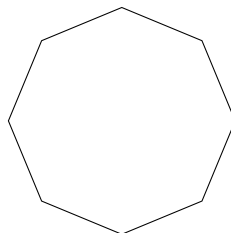Inside This Box

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Problems 7 & 8

7. Lily is swimming laps in a swimming pool of length 50 meters, where one lap is the length of the swimming pool. This week, Lily swam 2 laps on Monday. Each day after Monday, she swam two more laps compared to the previous day. From Monday through Friday of this week, how many meters did Lily swim altogether?

7.

8. A regular octagon is shown below. How many different triangles have vertices that are also vertices of the octagon, and share at least one side with the octagon?
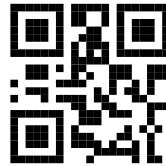
8.

School or Team

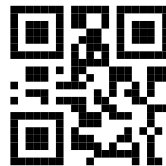Name _____

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1.

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10.

1. What is the sum of the odd whole numbers that are greater than 0 and less than 20?

2. For Amanda's eighteenth birthday party, she went to see a western play with five of her friends. Some of her friends are younger than 18 years old, and some of her friends are 18 years old. The below table lists the prices of the tickets as well as the age range for those who can buy those tickets. The total cost of the six tickets for Amanda and her friends was $42. How many of those tickets were adult tickets?

Ticket	Age Range	Price
Youth	0 to 17	$5
Adult	18 and up	$8

3. An art teacher is passing out colored pencils from a bag. The teacher gives half of the pencils to Bella. The teacher then gives three pencils to Kay. After that, the teacher gives half of the remaining pencils to Kendall. After this, the art teacher has three colored pencils left in the bag. How many colored pencils were originally in the bag?

4. Ian went to a sleepover that started at 10:15 PM and ended at 8:30 AM the next morning. How many minutes long was the sleepover?

5. Ethan can buy 3 red balloons for 7 banana coins or 7 red balloons for 15 banana coins. He wants to buy at least 48 red balloons for a monkey. What is the fewest number of banana coins that Ethan will need in order to do so?

6. Two rectangular strips of paper, each measuring 3 inches by 15 inches, are placed on a table as shown. One strip is placed perfectly vertical, and the other strip is perfectly horizontal. What is the total number of square inches in the part of the table covered by the strips of paper?
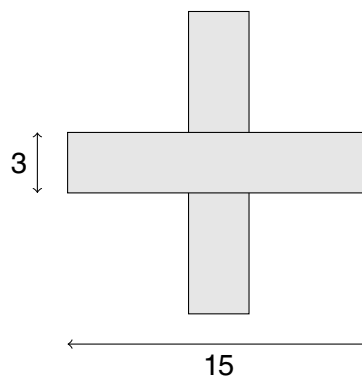
7. Darin is trying to divide some number of players into teams that each have the same number of players. If Darin had one more player, then the players could be divided into seven teams. If Darin had one fewer player, then the players could be divided into eight teams. What is the fewest possible number of players?

8. Using only segments in the figure below as sides of the triangle, how many different triangles can be formed?
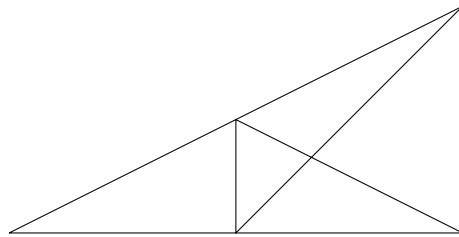
9. A shipping clerk got a new scale and four new boxes of differing weights that are each less than 10 pounds, and the clerk has to weigh the boxes in pairs in order to figure out their weights. The shipping clerk weighed every possible pair of boxes, and the scale showed weights, in pounds, of 11, 12, 13, 14, 15, and 16. Using these results, the clerk was able to determine the weight of each of the five boxes, which each weigh a whole number of pounds. How many pounds does the lightest box weigh?

10. The figure below shows a small circle of radius 10 tangent to a larger circle of radius 40. Segment $\overline{AB}$ is tangent to the smaller circle at A as well as the larger circle. Segment $\overline{CD}$ has the same length as $\overline{AB}$ and is tangent to the smaller circle at D as well as the larger circle. Segment $\overline{BC}$ passes through the center of the larger circle. What is the area of quadrilateral $ABCD$?