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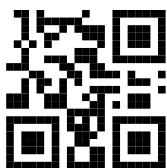
Grade \_\_\_\_\_

School \_\_\_\_\_

1.  $12 + 12 =$  \_\_\_\_\_
2. The tens digit of 70476 is \_\_\_\_\_
3.  $293 + 128 =$  \_\_\_\_\_
4.  $4 + 7 \times 4 =$  \_\_\_\_\_
5.  $514 - 318 =$  \_\_\_\_\_
6.  $13 \times 20 =$  \_\_\_\_\_
7. The remainder of  $63 \div 5$  is \_\_\_\_\_
8.  $17 + 43 + 43 + 17 =$  \_\_\_\_\_
9.  $65 \div 13 =$  \_\_\_\_\_
10. (estimate)  $126 + 231 + 273 =$  \_\_\_\_\_
11.  $314 - 109 - 106 =$  \_\_\_\_\_
12.  $12^2 =$  \_\_\_\_\_
13. The remainder of  $134 \div 9$  is \_\_\_\_\_
14.  $11 \times 34 =$  \_\_\_\_\_
15.  $8 \times 5 \times 7 =$  \_\_\_\_\_
16. CCLVI in Arabic numerals is \_\_\_\_\_
17.  $22 \times 18 =$  \_\_\_\_\_
18.  $26 + 39 + 65 =$  \_\_\_\_\_
19.  $18 \times 35 =$  \_\_\_\_\_
20. (estimate)  $102 \times 299 =$  \_\_\_\_\_
21.  $25 \times 28 =$  \_\_\_\_\_
22. The GCD of 8 and 18 is \_\_\_\_\_
23. If 1 gallon is equal to 4 quarts, then 12 quarts is equal to \_\_\_\_\_ gallons.
24.  $12 \times 15 \div 20 =$  \_\_\_\_\_
25.  $22^2 =$  \_\_\_\_\_
26.  $527 \div 17 =$  \_\_\_\_\_
27. The greater of  $\frac{3}{5}$  and  $\frac{5}{8}$  is \_\_\_\_\_ (fraction).
28.  $18 + 24 + 30 + 36 + 42 =$  \_\_\_\_\_
29.  $\frac{1}{3} + \frac{2}{21} =$  \_\_\_\_\_ (fraction).
30. (estimate)  $29 \times 30 \times 31 =$  \_\_\_\_\_
31.  $\frac{1}{2} =$  \_\_\_\_\_ %.
32.  $16 \times 99 =$  \_\_\_\_\_
33. The perimeter of a rectangle with length 8 and width 6 is \_\_\_\_\_
34. 10% of 120 is \_\_\_\_\_
35.  $45^2 =$  \_\_\_\_\_
36. The number of odd whole numbers between 8 and 28 is \_\_\_\_\_
37.  $34 \times 36 =$  \_\_\_\_\_
38. The LCM of 8 and 18 is \_\_\_\_\_
39. 180 minutes is \_\_\_\_\_ hours.
40. (estimate)  $23456 \div 112 =$  \_\_\_\_\_

41. The remainder of  $221 \div 11$  is \_\_\_\_\_.
42.  $8 \times 12 + 4 \times 16 =$  \_\_\_\_\_.
43. The perimeter of a regular octagon with a side length of 14 is \_\_\_\_\_.
44.  $96 \times 16 =$  \_\_\_\_\_.
45. The eighth term in the arithmetic sequence 5, 10, 15, ... is \_\_\_\_\_.
46.  $41^2 - 31^2 =$  \_\_\_\_\_.
47.  $101 \times 21 =$  \_\_\_\_\_.
48.  $3^5 =$  \_\_\_\_\_.
49.  $63_9$  in base 10 is \_\_\_\_\_.
50. (estimate)  $539 \times 333 =$  \_\_\_\_\_.
51.  $8\frac{1}{3}\%$  = \_\_\_\_\_ (fraction).
52.  $103 \times 105 =$  \_\_\_\_\_.
53. The sum of the terms of the arithmetic sequence 4, 8, 12, ..., 40 is \_\_\_\_\_.
54.  $110001_2$  in base 8 is \_\_\_\_\_  $_8$ .
55.  $9^3 =$  \_\_\_\_\_.
56. The measure of an interior angle in an equilateral triangle is \_\_\_\_\_  $^\circ$ .
57.  $\sqrt{2116} =$  \_\_\_\_\_.
58. The mode of the list 1, 2, 2, 3, 3, 3, 4 is \_\_\_\_\_.
59.  $125 \times 17 =$  \_\_\_\_\_.
60. (estimate)  $142857 \times 14 =$  \_\_\_\_\_.
61. Two fair dice are rolled. The probability the sum of the numbers shown is 3 is \_\_\_\_\_ (fraction).
62.  $5\frac{1}{2} \times 5\frac{1}{2} =$  \_\_\_\_\_ (mixed number).
63.  $111 \times 207 =$  \_\_\_\_\_.
64.  $0.\bar{6} =$  \_\_\_\_\_ (fraction).
65. If  $v = 8$ , then  $v^2 + 8v + 16 =$  \_\_\_\_\_.
66. The area of a right triangle with a leg of length 6 and a hypotenuse of length 10 is \_\_\_\_\_.
67.  $9 \times 99 \times 11 =$  \_\_\_\_\_.
68.  $79^2 =$  \_\_\_\_\_.
69. The number 66 written in base 4 is \_\_\_\_\_  $_4$ .
70. (estimate)  $17^4 =$  \_\_\_\_\_.
71. The sum of the prime divisors of 1001 is \_\_\_\_\_.
72.  $1002 \times 1003 =$  \_\_\_\_\_.
73. The number of positive whole number divisors of 30 is \_\_\_\_\_.
74. If  $2^x = \frac{1}{2}$ , then  $2^{3-x} =$  \_\_\_\_\_.
75.  $\sqrt{18} \times \sqrt{8} =$  \_\_\_\_\_.
76. The sum of the lengths of the edges of a  $4 \times 8 \times 11$  right rectangular prism is \_\_\_\_\_.
77.  $48 \times 25 \times 18 =$  \_\_\_\_\_.
78.  $\frac{1}{3}$  of 25 is  $\frac{5}{6}$  of \_\_\_\_\_.
79. The sum of the terms of the infinite geometric sequence  $\frac{2}{3}, \frac{2}{9}, \frac{2}{27}, \dots$  is \_\_\_\_\_.
80. (estimate)  $2.1^6 =$  \_\_\_\_\_.

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|-----|---------------------|-----|---------------------|-----|---------------------|
| 1.  | (A) (B) (C) (D) (E) | 11. | (A) (B) (C) (D) (E) | 21. | (A) (B) (C) (D) (E) |
| 2.  | (A) (B) (C) (D) (E) | 12. | (A) (B) (C) (D) (E) | 22. | (A) (B) (C) (D) (E) |
| 3.  | (A) (B) (C) (D) (E) | 13. | (A) (B) (C) (D) (E) | 23. | (A) (B) (C) (D) (E) |
| 4.  | (A) (B) (C) (D) (E) | 14. | (A) (B) (C) (D) (E) | 24. | (A) (B) (C) (D) (E) |
| 5.  | (A) (B) (C) (D) (E) | 15. | (A) (B) (C) (D) (E) | 25. | (A) (B) (C) (D) (E) |
| 6.  | (A) (B) (C) (D) (E) | 16. | (A) (B) (C) (D) (E) | 26. | (A) (B) (C) (D) (E) |
| 7.  | (A) (B) (C) (D) (E) | 17. | (A) (B) (C) (D) (E) | 27. | (A) (B) (C) (D) (E) |
| 8.  | (A) (B) (C) (D) (E) | 18. | (A) (B) (C) (D) (E) | 28. | (A) (B) (C) (D) (E) |
| 9.  | (A) (B) (C) (D) (E) | 19. | (A) (B) (C) (D) (E) | 29. | (A) (B) (C) (D) (E) |
| 10. | (A) (B) (C) (D) (E) | 20. | (A) (B) (C) (D) (E) | 30. | (A) (B) (C) (D) (E) |

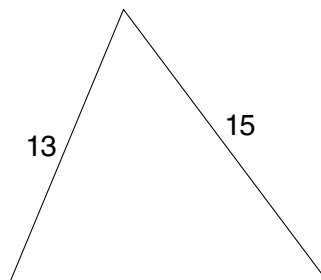
1. In the cafeteria, drinks cost \$1 each, and lunches cost \$2 each. Samantha purchases three drinks and two lunches for herself and a friend. What is the total cost, in dollars, of Samantha's purchase?

- (A) \$5                      (B) \$8                      (C) \$6                      (D) \$7                      (E) \$4

2. What is the value of  $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19$ ?

- (A) 120                      (B) 144                      (C) 64                      (D) 100                      (E) 125

3. Maxim bent a wire of length 42 inches into a triangle. One side of the triangle had length 13 inches. Another side of the triangle had length 15 inches. What was the length of the third side of Maxim's triangle, in inches?



- (A) 10                      (B) 14                      (C) 12                      (D) 13                      (E) 11

4. Daniel is doing a trade with a merchant, where for every 5 gold blocks Daniel gives, the merchant will give 2 diamond blocks to Daniel. Daniel has 45 gold blocks. If he trades all of them to the merchant, how many diamond blocks will Daniel receive from the merchant?

- (A) 12                      (B) 15                      (C) 10                      (D) 18                      (E) 9

5. Jeremiah spends \$2.50 to play five rounds of an arcade game. At the same price per arcade round, how much would seven rounds cost?

- (A) \$2.50                      (B) \$0.50                      (C) \$2.10                      (D) \$3.50                      (E) \$4.20

6. April calculated the value of 36 divided by 3, and Melcka calculated the value of 39 divided by 13. What is the product of April's result and Melcka's result?

- (A) 32                      (B) 28                      (C) 24                      (D) 40                      (E) 36

7. This past week, Ellen spent 15 minutes starting an essay on Monday. Each day after Monday, she spent 15 more minutes working on the essay than she did the day before. After she finished her essay on Thursday, how many total minutes had she spent doing the essay?

- (A) 135                      (B) 60                      (C) 225                      (D) 150                      (E) 120

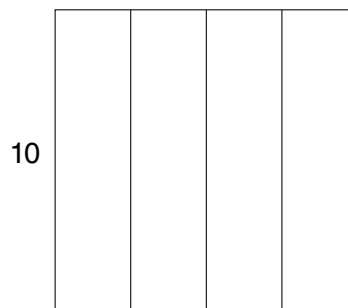
8. What is the hundreds digit of  $56 \times 99$ ?

- (A) 6                      (B) 4                      (C) 5                      (D) 8                      (E) 7

9. A whole number greater than 680 and less than 687 is a multiple of 4. What is the units digit of that number?

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

10. As shown below, a square of side length 10 is split into four rectangles by three line segments parallel to two sides of the square. What is the total length of all the segments in the figure?



- (A) 70                      (B) 60                      (C) 80                      (D) 100                      (E) 110

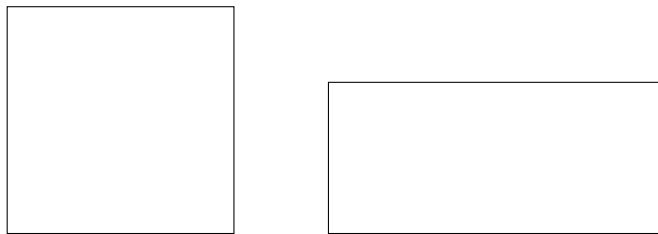
11. Juliet prepared a pancake and decided to cut some slices. She cut one piece that was 25% and two slices that were each 20% of the pancake. The final piece was the remainder of the pancake. What fraction of the pancake was the final piece?

- (A)  $\frac{11}{14}$                       (B)  $\frac{7}{20}$                       (C)  $\frac{11}{20}$                       (D)  $\frac{13}{20}$                       (E)  $\frac{3}{14}$

12. How many minutes pass from noon on December 6th until noon on December 14th?

- (A) 11400                      (B) 11640                      (C) 11520                      (D) 11340                      (E) 11280

13. A rectangle with whole number side lengths has the same area as a square with a perimeter of 48. If the shorter side of the rectangle has a length that differs by 4 from the side length of the square, then what is the perimeter of the rectangle?



- (A) 52                      (B) 50                      (C) 58                      (D) 54                      (E) 56

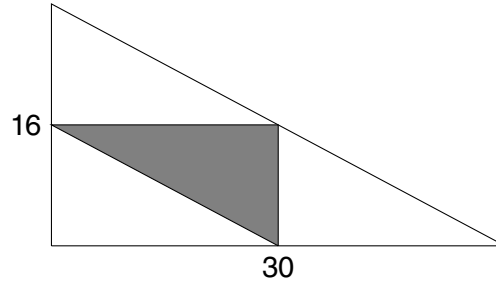
14. Justin writes all possible arrangements of four letters that contain the letters *M*, *E*, *T*, and *A* exactly once. For example, two of the possible arrangements are *META* and *TEAM*. How many arrangements that Justin wrote do not have the *M* and *T* next to each other?

- (A) 2                      (B) 12                      (C) 6                      (D) 4                      (E) 8

15. Charlotte is managing a factory that produces boots. The factory produces boots 10 at a time and finishes all of them at the same time, and it takes 15 minutes to finish all 10 boots. However, every 30 minutes, one boot has to get discarded. How long, in minutes, will it take Charlotte to have 190 boots available?

- (A) 285                      (B) 225                      (C) 200                      (D) 150                      (E) 300

16. The right triangle shown below has legs of length 16 and 30. The smaller gray triangle is formed by connecting the midpoints of the right triangle. What fraction of the total area is not gray?

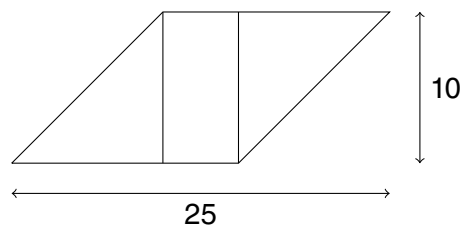


- (A)  $\frac{1}{3}$                       (B)  $\frac{1}{2}$                       (C)  $\frac{1}{4}$                       (D)  $\frac{2}{3}$                       (E)  $\frac{3}{4}$
17. Charlie averaged a score of 95 on three quizzes. On two of the quizzes, he had the same score. On the third quiz, he scored a 91. What was the range of Charlie's scores on the three quizzes?
- (A) 5                      (B) 6                      (C) 3                      (D) 4                      (E) 7
18. Daisy calculated the value of  $\frac{1}{0.1} + \frac{11}{0.01} + \frac{10}{0.001}$  and then summed the digits of her result. What was Daisy's sum?
- (A) 4                      (B) 5                      (C) 7                      (D) 6                      (E) 3
19. How many positive whole numbers evenly divide 72 but do not evenly divide 80?
- (A) 6                      (B) 4                      (C) 8                      (D) 3                      (E) 2
20. If  $a \heartsuit b = a^2 - 2ab + b^2$ , then what is the value of  $(66 \heartsuit 12) - (36 \heartsuit 12)$ ?
- (A) 2400                      (B) 2310                      (C) 2280                      (D) 2340                      (E) 2370

21. Christine has at least 3 each of jump stickers, hammer stickers, and flower stickers. Stickers of the same type are considered the same, but stickers of different types are considered different. She wants to select 5 stickers (without regard to order) such that she selects at least 1 jump sticker, 1 hammer sticker, and 1 flower sticker. How many different ways can Christine select 5 stickers? For example, one such possibility is 2 jump stickers, 2 hammer stickers, and 1 flower sticker.

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

22. A rectangular piece of paper measures 10 inches on the shorter side and 25 inches on the longer side. Opposite corners of the piece of paper are folded until they meet at opposite edges, and the folded over portions are then cut off and removed. To the nearest whole number, in inches, what is the perimeter of the resulting piece of paper?



- (A) 64                      (B) 58                      (C) 62                      (D) 56                      (E) 60

23. Mabel and Ann each chose a positive whole number. Twice Mabel's number plus Ann's number summed to 110. Twice Ann's number plus Mabel's number summed to 115. What is the product of Mabel's number and Ann's number?

- (A) 1200                      (B) 1050                      (C) 1400                      (D) 1575                      (E) 1800

24. Ashley is observing some bugs in one area of the laboratory. In the area, every bug is either a stag beetle or a single-horned beetle, and every bug is either shiny or not shiny. There are 69 bugs in the area. There are 15 more single-horned beetles than there are stag beetles, and there are 55 more non-shiny bugs than there are shiny bugs. Ashley observes that there are 25 non-shiny stag beetles in the area. How many shiny single-horned beetles are in the area?

- (A) 5                      (B) 37                      (C) 27                      (D) 2                      (E) 42



25. Emma's team took part in a soccer league along with three other teams. During the season, every team played every other team in the league twice, and none of the games ended in a tie. The standings of teams in the league are calculated using a point system where a win is worth 2 points and a loss is worth 0 points. At the end of the season, Emma's team got first place while the other three teams got 4 points each. How many points did Emma's team get?

- (A) 8                      (B) 12                      (C) 10                      (D) 6                      (E) 14

26. From least to greatest, what is the order of  $5^{21}$ ,  $2^{42}$ , and  $11^{14}$ ?

- (A)  $2^{42} < 5^{21} < 11^{14}$       (B)  $2^{42} < 11^{14} < 5^{21}$       (C)  $11^{14} < 2^{42} < 5^{21}$       (D)  $5^{21} < 2^{42} < 11^{14}$       (E)  $5^{21} < 11^{14} < 2^{42}$

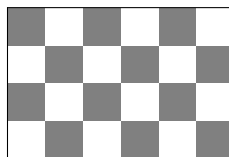
27. How many positive even whole numbers divide  $10!$ ?

- (A) 128                      (B) 270                      (C) 64                      (D) 240                      (E) 120

28. Farmer John has a field with some grass, and the grass grows at a constant rate. He wants to feed some of his cows on this field. All of his cows consume the same amount of grass per day. If Farmer John places 180 cows in the field, the field will be bare in twelve weeks. If Farmer John places 200 cows in the field, the field will be bare in ten weeks. If Farmer John only needs to feed cows in the field for four weeks, then what is the greatest number of cows he can place in the field?

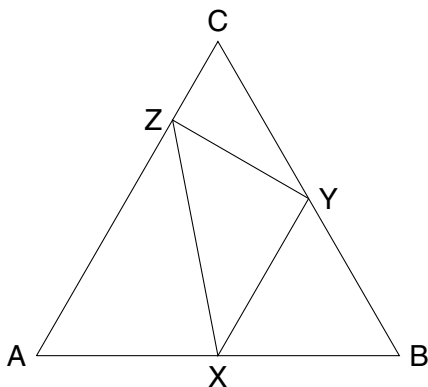
- (A) 380                      (B) 305                      (C) 300                      (D) 375                      (E) 400

29. A  $6 \times 4$  checkerboard is shown below. A number of rectangles exist on this board, with boundaries of each rectangle that are boundaries of the small squares or boundaries of the board. A single small square is one such rectangle, and the entire board is another such rectangle. One of these rectangles is randomly chosen. The probability that it is a square can be expressed as a common fraction. What is the sum of the numerator and denominator of that fraction?



- (A) 87                      (B) 6                      (C) 253                      (D) 26                      (E) 49

30. In equilateral triangle  $ABC$ , shown below, points  $X$  and  $Y$  are the midpoints of sides  $AB$  and  $BC$ , respectively. Additionally, point  $Z$  lies on side  $AC$  such that the length of  $AZ$  is three times the length of  $CZ$ . What is the ratio of the area of triangle  $XYZ$  to the area of triangle  $ABC$ ?



- (A)  $\frac{1}{3}$                       (B)  $\frac{1}{4}$                       (C)  $\frac{7}{24}$                       (D)  $\frac{1}{2}$                       (E)  $\frac{\sqrt{3}}{6}$



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Problems 1 & 2

1. Paige summed all of the whole numbers greater than 5 and less than 25 that are not even and also do not have a units digit of five. What is the value of Paige's sum?

1.

2. A four-digit number is odd, a multiple of 5, and a multiple of 11. The hundreds digit of the number is a 3, and the thousands digit is the same value as the tens digit. What is the four-digit number?

2.



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Problems 3 & 4

3. Marian's birthday is March 15th. In the year 2022, the month of January has 31 days, and the month of February has 28 days. How many days in 2022 occur before Marian's birthday (not including the exact day itself)?

3.

4. Silver studs are worth 10 points and gold studs are worth 100 points. Chase has 5 more silver studs than gold studs, and the total value of Chase's silver and gold studs is 1700 points. What is the total number of silver and gold studs that Chase has?

4.



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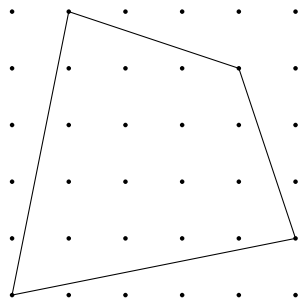
Problems 5 &amp; 6

5. Jeff does roll call by counting all the positive whole numbers from 1 to 30 inclusive, but any time a number is a multiple of 7 or has a digit that is equal to 7, Jeff says “buzz” instead. How many times does Jeff say “buzz” in the count?

5.

6. In the figure below, dots are in a square grid so that each dot has a horizontal and vertical distance of 1 unit from neighboring dots, and the area of the entire grid is  $5 \times 5 = 25$ . What is the area of the quadrilateral shown?

6.



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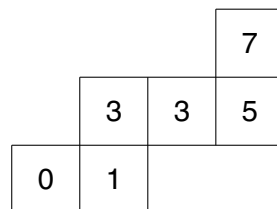
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Problems 7 &amp; 8

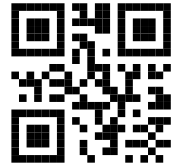
7. Becca cuts out the figure below and folds it into a cube, with the squares shown becoming faces of the cube. Becca writes down the number on the side opposite the face numbered 0, and she writes down the number on the face opposite the face numbered 1. What is the product of the two numbers Becca wrote down?



7.

8. Lindsey has three fair dice. Each die is a cube that has either red or blue faces. One cube has exactly 1 face that is red, one cube has exactly 3 faces that are red, and one cube has exactly 5 faces that are red. Lindsey rolls all three dice. What is the probability that exactly one die shows a red face? Express your answer as a common fraction.

8.



School or Team

Name \_\_\_\_\_

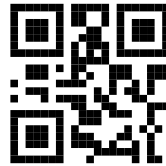
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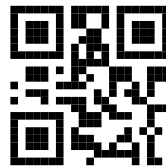
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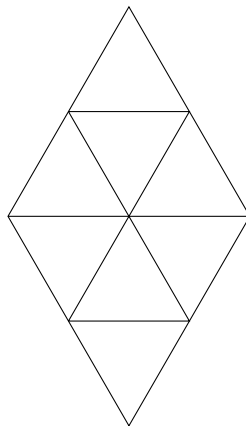
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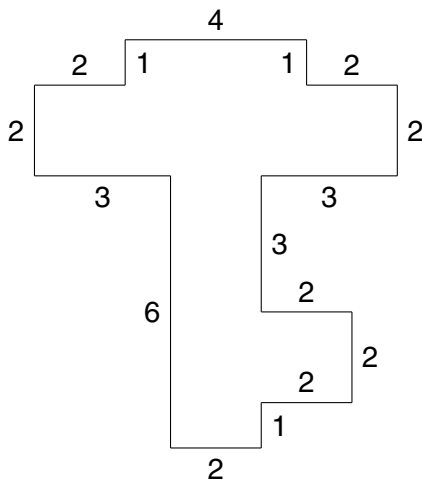
1. Patrick started watching a TV episode about a yellow sponge. The episode started at 1:46 PM and finished at 2:00 PM. How many minutes long was the episode?
2. At an amusement park, tickets cost \$60 for children who are under 13 years old and \$75 for everyone else. Andrew, Reagan, and Brandon are planning on attending the theme park. Andrew is 14 years old, Reagan is 13 years old, and Brandon is 11 years old. How many dollars do the three of them have to pay for all of them to attend the amusement park?
3. The figure below shows a rhombus partitioned into smaller identical equilateral triangles. How many equilateral triangles, of any size, exist in the figure?



4. In the stock market, the Sigma stock falls by 15 points every month, while the X stock increases by 12 points every month. This month, the Sigma stock and X stock each have 120 points. Three months ago, what was the sum of the point values of the Sigma stock and the X stock?
5. When Nariyaki measured his height on his 8th birthday, he was 51 inches tall. When Nariyaki measured his height on his 12th birthday, he was 62 inches tall. On average, how many inches per year did Nariyaki grow between these two measurements? Express your answer as a mixed number.



6. In the figure below, all angles are right angles, and side lengths are as shown. What is the total area enclosed by the figure?



7. Three bells on a clocktower ring at precise times. The north bell rings every four hours. The east bell rings every six hours. The south bell rings every eight hours. If all three bells ring at the same time at 12 : 00 PM on a Monday, then how many times over the next 42 hours will exactly two of the bells ring at the same time?
8. Manuel and Eric live three miles away from each other. Eric leaves his house walking towards Manuel's house at a speed of 3 miles per hour. Manuel leaves his house for Eric's house at the same time, but he is riding his skateboard at a speed that is three times as fast as Eric's walking speed. When Manuel and Eric meet, how many miles more has Manuel travelled than Eric walked? Express your answer as a mixed number.
9. Tomi prepared a number of chemical solutions that were a mixture of hydrochloric acid and distilled water. Each solution measured 25 milliliters. One particular solution used  $\frac{1}{4}$  of the total hydrochloric acid she used for all solutions and  $\frac{1}{6}$  of the total distilled water she used for all solutions. How many solutions did Tomi prepare?

10. A rectangular piece of paper measuring 70 by 98 is folded along its diagonal. After folding, what is the area of the region where the paper has double its original thickness?

