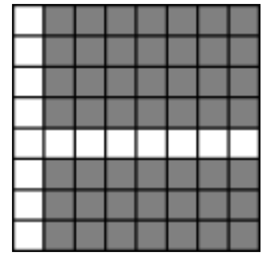
1. In the diagram, how many 1×1 squares are shaded in the 8×8 grid?



(A) 53 (B) 51 (C) 47 (D) 45 (E) 49

2. Five students play chess matches against each other. Each student plays three matches against each of the other students. How many matches are played in total?

(A) 15 (B) 8 (C) 30 (D) 60 (E) 16

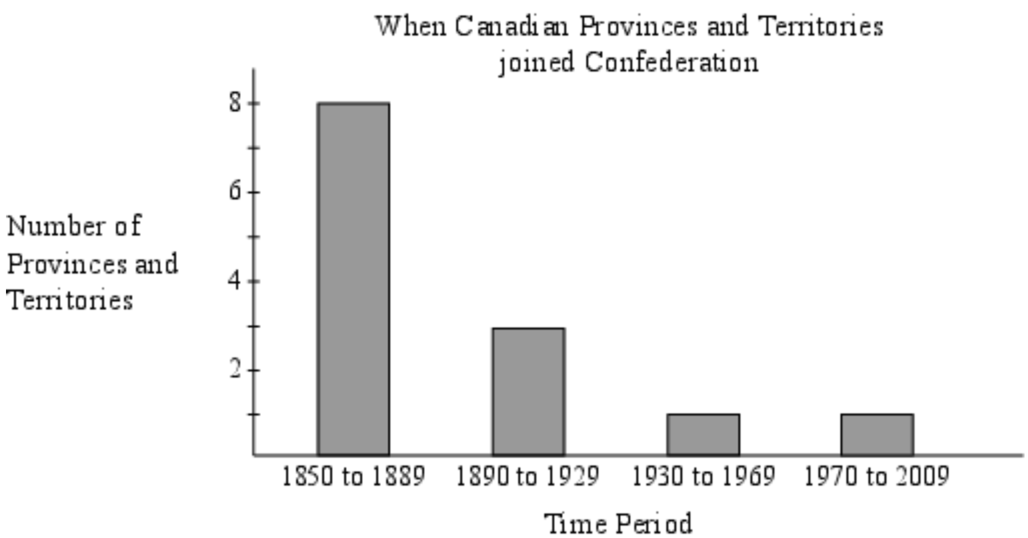
3. Gavin has a collection of 50 songs that are each 3 minutes in length and 50 songs that are each 5 minutes in length. What is the maximum number of songs from his collection that he can play in 3 hours?

(A) 100 (B) 36 (C) 56 (D) 60 (E) 45

4. A class of 30 students was asked what they did on their winter holiday. 20 students said that they went skating. 9 students said that they went skiing. Exactly 5 students said that they went skating and went skiing. How many students did not go skating and did not go skiing?

(A) 1 (B) 6 (C) 11 (D) 19 (E) 4

5. The bar graph shows the number of provinces and territories that joined Canadian Confederation during each of four 40 year time periods.



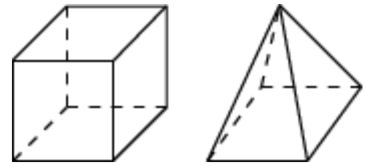
If one of the 13 provinces or territories is chosen at random, what is the probability that it joined Canadian Confederation between 1890 and 1969?

(A) $\frac{12}{13}$ (B) $\frac{4}{13}$ (C) $\frac{5}{13}$ (D) $\frac{3}{13}$ (E) $\frac{2}{13}$

6. When three consecutive integers are added, the total is 27. When the same three integers are multiplied, the result is

(A) 504 (B) 81 (C) 720 (D) 729 (E) 990

7. A cube has 12 edges, as shown. How many edges does a square-based pyramid have?



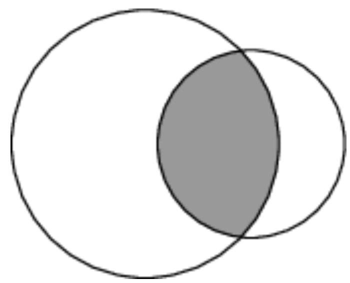
(A) 6 (B) 12 (C) 8
(D) 4 (E) 10

8. A bag contains 5 red, 6 green, 7 yellow, and 8 blue jelly beans. A jelly bean is selected at random. What is the probability that it is blue?
(A) $\frac{5}{26}$ (B) $\frac{3}{13}$ (C) $\frac{7}{26}$ (D) $\frac{4}{13}$ (E) $\frac{6}{13}$

9. At Barker High School, a total of 36 students are on either the baseball team, the hockey team, or both. If there are 25 students on the baseball team and 19 students on the hockey team, how many students play both sports?
(A) 7 (B) 8 (C) 9 (D) 10 (E) 11

10. A multiple choice test has 10 questions on it. Each question answered correctly is worth 5 points, each unanswered question is worth 1 point, and each question answered incorrectly is worth 0 points. How many of the integers between 30 and 50, inclusive, are *not* possible total scores?
(A) 2 (B) 3 (C) 4 (D) 6 (E) 5

11. In the diagram, two circles overlap. The area of the overlapped region is $\frac{3}{5}$ of the area of the small circle and $\frac{6}{25}$ of the area of the large circle. The ratio of the area of the small circle to the area of the large circle is

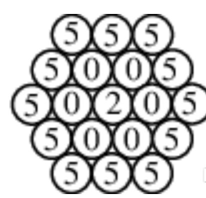


(A) $18 : 125$ (B) $1 : 3$ (C) $5 : 12$
(D) $2 : 5$ (E) $1 : 4$

12. A bank teller has some stacks of bills. The total value of the bills in each stack is \$1000. Every stack contains at least one \$20 bill, at least one \$50 bill, and no other types of bills. If no two stacks have the same number of \$20 bills, what is the maximum possible number of stacks that the teller could have?
(A) 9 (B) 10 (C) 11 (D) 4 (E) 8

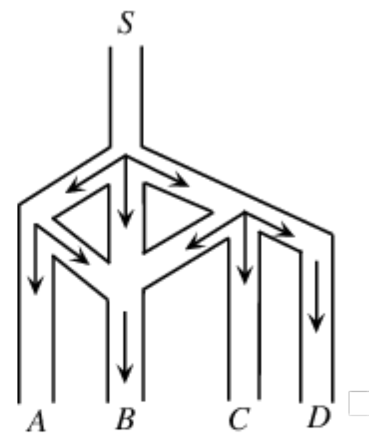
13. How many ordered pairs (a, b) of positive integers satisfy $a^2 + b^2 = 50$?
(A) 0 (B) 1 (C) 3 (D) 5 (E) 7

14. Starting with the 2 in the centre, the number 2005 can be formed by moving from circle to circle only if the two circles are touching. How many different paths can be followed to form 2005?



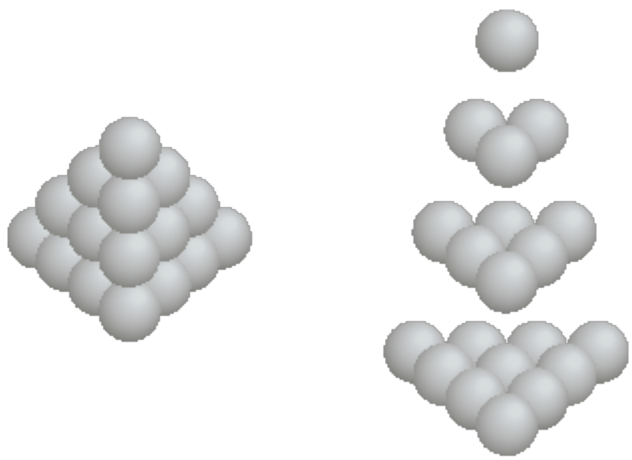
(A) 36 (B) 24 (C) 12
(D) 18 (E) 6

15. Harry the Hamster is put in a maze, and he starts at point S. The paths are such that Harry can move forward only in the direction of the arrows. At any junction, he is equally likely to choose any of the forward paths. What is the probability that Harry ends up at B?



(A) $\frac{2}{3}$ (B) $\frac{13}{18}$ (C) $\frac{11}{18}$
(D) $\frac{1}{3}$ (E) $\frac{1}{4}$

16. Spheres can be stacked to form a tetrahedron by using triangular layers of spheres. Each sphere touches the three spheres below it. The diagrams show a tetrahedron with four layers and the layers of such a tetrahedron. An *internal sphere* in the tetrahedron is a sphere that touches exactly three spheres in the layer above. For example, there is one internal sphere in the fourth layer, but no internal spheres in the first three layers.



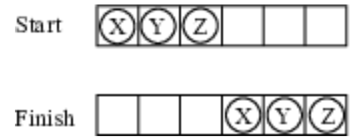
A tetrahedron of spheres is formed with thirteen layers and each sphere has a number written on it. The top sphere has a 1 written on it and each of the other spheres has written on it the number equal to the sum of the numbers on the spheres in the layer above with which it is in contact. For the whole thirteen layer tetrahedron, the sum of the numbers on all of the internal spheres is

(A) 772 588 (B) 772 566 (C) 772 156 (D) 772 538 (E) 772 626

17. Four numbers w, x, y, z satisfy $w < x < y < z$. Each of the six possible pairs of distinct numbers has a different sum. The four smallest sums are $1, 2, 3$, and 4. What is the sum of all possible values of z?

(A) 4 (B) $\frac{13}{2}$ (C) $\frac{17}{2}$ (D) $\frac{15}{2}$ (E) 7

18. Three coins are placed in the first three of six squares, as shown. A move consists of moving one coin one space to the right, assuming that this space is empty. (No coin can jump over another coin, so the order of the coins will never change.) How many different sequences of moves can be used to move the three coins from the first three squares to the last three squares?



(A) 44 (B) 40 (C) 42
(D) 48 (E) 50

19. The number 8 is the sum and product of the numbers in the collection of four positive integers $\{1,1,2,4\}$, since $1+1+2+4=8$ and $1\times1\times2\times4=8$. The number 2007 can be made up from a collection of n positive integers that multiply to 2007 and add to 2007. What is the smallest value of n with $n>1$?
(A) 1171 (B) 1337 (C) 1551 (D) 1777 (E) 1781

20. Five positive integers are listed in increasing order. The difference between any two consecutive numbers in the list is three. The fifth number is a multiple of the first number. How many different such lists of five integers are there?
(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

21. For how many odd integers k between 0 and 100 does the equation

$$2^{4m^2}+2^{m^2-n^2+4}=2^{k+4}+2^{3m^2+n^2+k}$$

have exactly two pairs of positive integers (m,n) that are solutions?
(A) 17 (B) 20 (C) 19 (D) 18 (E) 21

22. Wayne has 3 green buckets, 3 red buckets, 3 blue buckets, and 3 yellow buckets. He randomly distributes 4 hockey pucks among the green buckets, with each puck equally likely to be put in each bucket. Similarly, he distributes 3 pucks among the red buckets, 2 pucks among the blue buckets, and 1 puck among the yellow buckets. Once he is finished, what is the probability that a green bucket contains more pucks than each of the other 11 buckets?
(A) $\frac{97}{243}$ (B) $\frac{89}{243}$ (C) $\frac{93}{243}$ (D) $\frac{95}{243}$ (E) $\frac{91}{243}$

23. There are N sequences with 15 terms and the following properties:
- each term is an integer,
- at least one term is between -16 and 16, inclusive,
- the 15 terms have at most two different values,
- the sum of every six consecutive terms is positive, and
- the sum of every eleven consecutive terms is negative.

The value of N is
(A) 48 (B) 72 (C) 64 (D) 80 (E) 56

24. How many points (x,y), with x and y both integers, are on the line with equation $y=4x+3$ and inside the region bounded by $x=25$, $x=75$, $y=120$, and $y=250$?
(A) 44 (B) 36 (C) 40 (D) 32 (E) 48

25. Box 1 contains one gold marble and one black marble. Box 2 contains one gold marble and two black marbles. Box 3 contains one gold marble and three black marbles. Whenever a marble is chosen randomly from one of the boxes, each marble in that box is equally likely to be chosen. A marble is randomly chosen from Box 1 and placed in Box 2. Then a marble is randomly chosen from Box 2 and placed in Box 3. Finally, a marble is randomly chosen from Box 3. What is the probability that the marble chosen from Box 3 is gold?

(A) $\frac{11}{40}$ (B) $\frac{3}{10}$ (C) $\frac{13}{40}$ (D) $\frac{7}{20}$ (E) $\frac{3}{8}$