1. Evaluate $1 + 2 + 4 + 7$

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

2. Edward is trying to spell the word "CAT". He has an equal chance of spelling the word in any order of letters (i.e. TAC or TCA). What is the probability that he spells "CAT" incorrectly?

   (A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) $\frac{2}{3}$ (E) $\frac{5}{6}$

3. Solve for x if $4x + 1 = 37$.

   (A) 4 (B) 5 (C) 7 (D) 9 (E) 10

4. What is the positive difference between the sum of the first 5 positive even integers and the first 5 positive odd integers?

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

5. Some of the values produced by two functions, $f(x)$ and $g(x)$, are shown below. Find $f(g(3))$

x	1	3	5	7	9
$f(x)$	3	7	9	13	17
$g(x)$	54	9	25	19	44

   (A) 3 (B) 7 (C) 8 (D) 13 (E) 17

6. How many more hours are in 10 years than seconds in 1 day?

   (A) 1000 (B) 1100 (C) 1150 (D) 1200 (E) 1300

7. How many perfect squares are greater than 0 but less than or equal to 100?

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

8. The set of natural numbers are arranged as so:

$$\begin{array}{ccccccccc} & & & & 1 & & & & \\ & & & 2 & 3 & 4 & & & \\ & & 5 & 6 & 7 & 8 & 9 & & \\ & 10 & 11 & 12 & 13 & 14 & 15 & 16 & \\ 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 \\ & & & & \vdots & & & & \end{array}$$

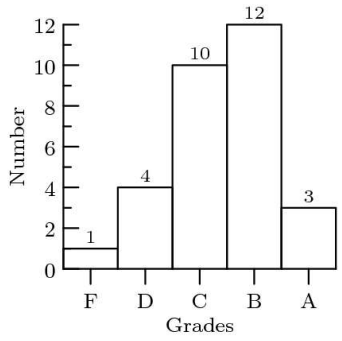
   so that each row has 2 more numbers in it, and the rows are centered. What is the number under 49?

   (A) 60 (B) 61 (C) 62 (D) 63 (E) 64

9. Define $f(x) = x^2 + 5$. Find the product of all x such that $f(x) = 14$.

   (A) -9 (B) -3 (C) 0 (D) 3 (E) 9

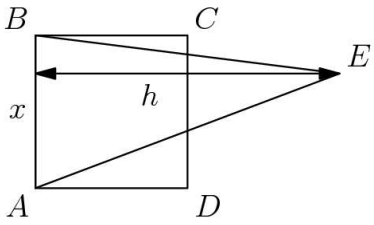
10. A survey was taken in Ms. Susan's class to see what grades the class received:



What percent of the class received an "A"?

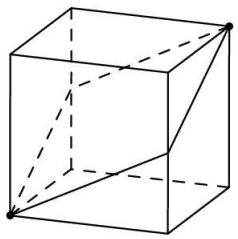
(A) 3% (B) 5% (C) 10% (D) 15% (E) 27%

11. Square $ABCD$ and triangle ABE have equal area. Square $ABCD$ has sidelength 4, while triangle ABE has height h and base 4. Find the value of h.



(A) $\frac{4}{3}$ (B) 2 (C) 4 (D) 6 (E) 8

12. A unit cube is sliced by a plane passing through two of its vertices and the midpoints of the edges it passes through. What is the area of the rhombus formed by this intersection?



(A) $\frac{\sqrt{6}}{2}$ (B) $\sqrt{2}$ (C) $\sqrt{3}$ (D) $\sqrt{6}$ (E) $2\sqrt{6}$

13. Find the sum of the 2 smallest prime factors of $2^{1024} - 1$.

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

14. How many integers between 80 and 100 are prime?

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

15. Gordon has the least number of coins (half-dollars, quarters, dimes, nickels, pennies) needed to make 99¢. He randomly chooses one. What is the probability that it is a penny?

(A) $\frac{1}{5}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) $\frac{2}{3}$ (E) $\frac{3}{4}$

16. A triangle with area 60 units^2 has vertices with coordinates of $(-15, x)$, $(0, x)$, and $(25, 0)$. Find the largest possible value of x.

(A) -8 (B) -4 (C) 4 (D) 8 (E) 16

17. Two standard six sided dice labeled with the numbers 1-6 are rolled, and the numbers that come up are multiplied. What is the probability that their product is a multiple of five?

(A) $\frac{1}{4}$ (B) $\frac{5}{18}$ (C) $\frac{11}{36}$ (D) $\frac{1}{3}$ (E) $\frac{4}{9}$

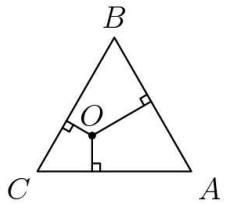
18. How many paths are there from A to B in the following diagram if only moves downward are allowed?

(A) 65 (B) 67 (C) 70 (D) 74 (E) 75

19. Rectangle $ABCD$, with integer sidelengths, has equal area and perimeter. What is the positive difference between the two possible areas of $ABCD$?

(A) 0 (B) 2 (C) 4 (D) 5 (E) 6

20. Point O is selected in equilateral $\triangle ABC$ such that the sum of the distances from O to each side of ABC is 15. Compute the area of ABC.



(A) $15\sqrt{3}$ (B) $30\sqrt{3}$ (C) $50\sqrt{3}$ (D) $75\sqrt{3}$ (E) $225\sqrt{3}$

21. Find the sum:

$$11 \times \binom{2}{0} + 10 \times \binom{3}{1} + 9 \times \binom{4}{2} + \cdots + 2 \times \binom{11}{9} + \binom{12}{10}$$

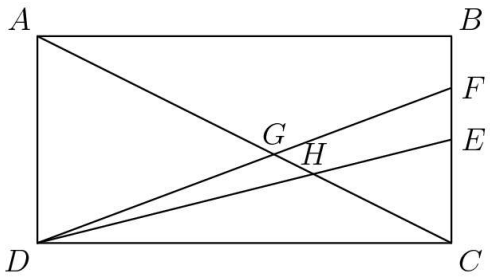
Where $\binom{n}{r}$ is combination function given by $\frac{n!}{r!(n-r)!}$

(A) 351 (B) 841 (C) 901 (D) 991 (E) 1001

22. Country A uses a currency known as the shell. The nation uses only two coins, each worth a whole number of shells. The largest amount of shell not obtainable using a combination of these two coins is 215. Find the number of possible pairs of values these two coins could have. (a value of 15 and 4 is the same as having a 4 and 15)

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

23. Diagonal AC is drawn in rectangle $ABCD$. Points E and F are placed on BC such that $CE : EF : FB = 2 : 1 : 1$. Let G be the intersection of DF with AC and H the intersection of DE with AC. Given that $AD = 4$ and $AB = 8$, find the length of GH. Express your answer as a common fraction in simplest radical form.

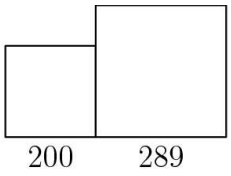


(A) $\frac{4\sqrt{5}}{21}$ (B) $\frac{8\sqrt{5}}{21}$ (C) $\frac{10\sqrt{5}}{21}$ (D) $\frac{4\sqrt{5}}{5}$ (E) $\sqrt{5}$

24. The sides of $\triangle ABC$ form an arithmetic sequence of integers. Incircle I is tangent to AB, BC, and CA at D, E, and F, respectively. Given that $DB = \frac{3}{2}$, $FA = \frac{1}{2}$, find the radius of I.

(A) $\frac{1}{2}$ (B) $\frac{\sqrt{15}}{7}$ (C) $\frac{\sqrt{15}}{6}$ (D) $\frac{2\sqrt{15}}{9}$ (E) $\frac{\sqrt{15}}{4}$

25. The figure below contains two squares which share an edge, one with sidelength 200 units and the other with sidelength 289 units. The figure is divided into a whole number of regions, each with an equal whole number area but not necessarily of the same shape. Given that there is more than one region and each region has an area greater than 1, find the sum of the number of regions and the area of each region.



(A) 704 (B) 874 (C) 924 (D) 978 (E) 1028