1. What is the value of
$$2^2 + 0 + 2^2 + 1^1?$$
(A) 5 **(B)** 6 **(C)** 7 **(D)** 8 **(E)** 9

2. What is two times 20% of 45?
(A) 9 **(B)** 12 **(C)** 15 **(D)** 18 **(E)** 21

3. Milo has two \$1 coins, five 50 cent coins, four 10 cent coins and one 5 cent coin. He wants to spend all of his money to buy cans of oolong tea which costs \$1 each. What is the greatest number of cans of oolong tea he could buy?
(A) 4 **(B)** 5 **(C)** 6 **(D)** 7 **(E)** 8

4. Shari has to reach the bus bay in 1 minute. Luckily, she has a list of distances from various points in the school to the bus bay and finds out she is 108 meters away from the bus bay. What speed in meters per second does she have to move on average in order to make it to the bus bay in exactly 1 minute?
(A) 1 **(B)** 1.2 **(C)** 1.4 **(D)** 1.6 **(E)** 1.8

5. The Leibniz formula is a formula to calculate π. It states that
$$1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \cdots = \frac{\pi}{4}$$
In other words, subtracting the sum of all fractions with a 1 in the numerator and a positive number 1 less than a multiple of 4 in the denominator from the sum of all fractions with a 1 in the numerator and a positive number 1 more than a multiple of 4 in the denominator gives the value of $\frac{\pi}{4}$. What is the value of $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9}$?
(A) $\frac{263}{315}$ **(B)** $\frac{113}{135}$ **(C)** $\frac{793}{945}$ **(D)** $\frac{794}{945}$ **(E)** $\frac{796}{945}$

6. Lord Mountbatten was the president of the UWC movement from 1967 to 1978 and under his personal involvement, UWCSEA Dover was founded. He was also an Admiral for the British Navy in WW2 and was involved in Project Habakkuk, a project to create a giant aircraft carrier made out of ice mixed with wood pulp. If the design were to be approximated as a cuboid which is 3.2km long, 0.09km wide and 0.06km tall, which of the following is the closest to its volume, measured in km^3?
(A) 0.02 **(B)** 0.03 **(C)** 0.04 **(D)** 0.05 **(E)** 0.06

7. Let x follow these conditions:
   - x is an integer.
   - $\pi < x < \pi^2$.
   - x is a multiple of 3.

   What is the sum of all possible values of x?
(A) 6 **(B)** 9 **(C)** 12 **(D)** 15 **(E)** 18

8. A twin prime is a prime number such that another prime number can be obtained by adding or subtracting 2. Which of the following numbers proves the following statement false?
"Every odd prime number is a twin prime."
(A) 2 **(B)** 5 **(C)** 13 **(D)** 23 **(E)** 29

9. There is a bank that provides simple interest at the rate of 5% per annum at any principal amount deposited by the customer. Customer A deposits \$1000 and decides to take out his money when the value of the money becomes \$2000. Customer B deposits \$2000 and decides to take out his money when the value of the money becomes \$3000. What is the difference between the number of years that each of the customers will have to wait before they take out their money?
(A) 5 **(B)** 10 **(C)** 15 **(D)** 20 **(E)** 25

10. Thad the Golden Retriever, our newest member of the Dover Counselling and Wellness Team, brought some two-legged and four-legged friends over to the Counselling and Wellness Centre one day for a party. Ms. Robinson peeked outside from the top and counted 20 heads in total. Then she peeked from the bottom and counted 50 legs in total. If Thad only invited humans and dogs, how many humans were in the Centre?
(A) 3 **(B)** 5 **(C)** 10 **(D)** 15 **(E)** 17

11. A group of seagulls wanted to land on a tree. They soon realized that if they were to land on every branch in pairs, there would be one extra seagull; if they were to land on every branch in triples, there would be one extra branch. How many seagulls and branches were there? The answer is in the format (a, b) where a is the number of branches and b is the number of seagulls.

(A) $(1, 3)$ **(B)** $(2, 6)$ **(C)** $(4, 9)$ **(D)** $(5, 13)$ **(E)** $(7, 20)$

12. $P(a, b)$, $Q(0, -b)$ and $R(2a, -b)$ are three points on a coordinate plane, where $a \neq 0$ and $b \neq 0$. What is the most probable shape of PQR?

(A) Isosceles triangle **(B)** Scalene triangle **(C)** Equilateral triangle
(D) Right triangle **(E)** Line segment

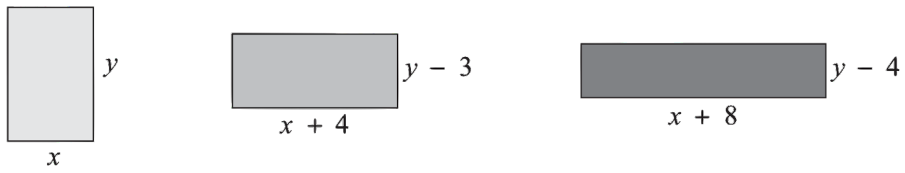
13. Jack loves to play a game called "Count Your Fingers". He starts on his thumb, labelling it 1, then moves to his index finger, labelling it 2. He keeps doing so until he reaches his pinky, labelling it 5, before moving down to his ring finger again, labelling it 6. When he reaches his thumb at 9, he moves up to his index finger again, labelling it 10. If he keeps doing this because he's bored, which finger will be labelled 2021?

(A) Thumb **(B)** Index finger **(C)** Middle finger **(D)** Ring finger **(E)** Pinky

14. A math competition has 25 problems. 6 points are awarded for each correct answer, 1.5 for each problem left unanswered, and no points for each incorrect answer. If Kitty got 135 points in total, how many problems did she get wrong?

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

15. These 3 rectangles all have the exact same area. What is $x + y$?



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

16. Mx. Smith is a teacher at UWCSEA, and they drive to school every morning. One day, they wake up and realise they are late, so they drive to school faster than they normally do, at 70km/h. On the way home, they drive at their normal rate, at 50km/h. Their drive home takes 12 minutes longer than their drive to school did. How far away from school, in km, does Mx. Smith live?

(A) 20 **(B)** 25 **(C)** 30 **(D)** 35 **(E)** 40

17. Chloe and Zoe are both students in a math class. Last night they each solved half of the problems in their homework assignment alone and the other half together. Chloe had correct answers to only 80% of the problems she solved alone, but overall 88% of her answers were correct. Zoe had correct answers to 90% of the problems she solved alone. What is Zoe's overall percentage of correct answers?

(A) 88 **(B)** 89 **(C)** 91 **(D)** 93 **(E)** 96

18. Jay and her sister Alice started walking towards each other from two opposite ends of the Tent Plaza. Jay walks at 3 meters per second, and Alice 2. Alice brought their dog, Charlie, who runs at 5 meters per second. Charlie started running at the same time as Alice. When Charlie met Jay, he turned around immediately and started for Alice. When he met Alice, he turned around again and ran towards Jay. He kept doing this until Jay and Alice met each other. If the side length of the plaza is 50 meters, how far, in meters, did Charlie run?

(A) 30 **(B)** 50 **(C)** 70 **(D)** 100 **(E)** 120

19. A circle with a radius of $\frac{1}{2}$cm starts at one vertex of an equilateral triangle with a side length of 2cm and continuously rolls around the triangle's perimeter in one direction only until it reaches the vertex which it started at. The circle is outside of the triangle. How many times does the circle spin?

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

20. The shape bounded by the x axis, the y axis and the line $y = -ax + 6$ on a coordinate plane has an area of 30, and the shape bounded by the y axis, the line $y = -ax + 6$ and the line $y = -bx + c$ has an area of 40, where a, b and c are positive numbers. What is the value of $a + b + c$?

(A) 15 **(B)** $\frac{76}{5}$ **(C)** $\frac{78}{5}$ **(D)** 16 **(E)** $\frac{82}{5}$

21. Which of the following numbers is **NOT** a perfect square?

    (A) $4,072,324$ **(B)** $4,076,361$ **(C)** $4,080,402$ **(D)** $4,084,441$ **(E)** $4,088,484$

22. Which of the following numbers is the greatest?

    (A) $\frac{999}{1000}$ **(B)** $\frac{2998}{3000}$ **(C)** $\frac{3549}{3552}$ **(D)** $\frac{4321}{4325}$ **(E)** $\frac{5745}{5750}$

23. The head of languages has nine different language books lined up on a bookshelf: two Spanish, three Chinese and four French. How many ways are there to arrange the nine books on the shelf keeping the Spanish books together and keeping the French books together?

    (A) 2880 **(B)** 5760 **(C)** 12284 **(D)** 48760 **(E)** 128360

24. The first two terms of the Fibonacci sequence are 1. Any terms after the second term are found by adding up the previous two terms. What is the sum of the first 30 terms of the Fibonacci sequence? Note that the 30^{th} term of the Fibonacci sequence is 832040 and the 31^{st} term is 1346269.

    (A) 1346268 **(B)** 1568748 **(C)** 1896218 **(D)** 2178308 **(E)** 3524577

25. Niko has ten metal rods of odd lengths, 1cm to 19cm inclusive. Niko wants to choose three metal rods such that the three metal rods could form a triangle with a positive area. For example, the rods of length 5cm, 7cm and 9cm form a triangle with a positive area while the rods of length 5cm, 9cm and 19cm do not. Assuming that the thickness of the metal rods are negligible and the order in which Niko picks the rod does not matter, how many triples of rods could be chosen such that they form a triangle of a positive area?

    (A) 59 **(B)** 60 **(C)** 61 **(D)** 62 **(E)** 63