

Question One

The sum of two positive integers is five times their difference.

What is the ratio of the larger number to the smaller number?

- (A) 5 : 4 (B) 3 : 2 (C) 9 : 5 (D) 2 : 1 (E) 5 : 2
-

Question Two

If n is an odd number, how many of the following expressions would also be odd?

$2n + 3$

$n^2 + 1$

$(n + 2)^2$

n^3

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

Question Three

Miss Skinner asked five of her students how many out of the five of them had studied the day before. Joel said none, Kharl said only one, Lynda said exactly two, Misa said exactly three and Nikhita said exactly four.

Miss Skinner knew that those students who had **not** studied were **not** telling the truth, but those who had studied were telling the truth. How many of these students had studied the day before?

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

Question Four

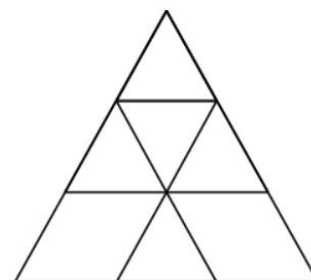
A palindrome, such as 23532, is a number which remains the same when the order of its digits are reversed. The numbers x and $x + 32$ are three-digit and four-digit palindromes respectively. What is the sum of the digits of x ?

- (A) 20 (B) 21 (C) 22 (D) 23 (E) 24
-

Question Five

An isosceles trapezium has one pair of parallel sides, with the other two sides being the same length.

How many isosceles trapeziums (*of any size*) are in this diagram?



- (A) 7 (B) 8 (C) 9 (D) 10 (E) 11
-

Question Six

If the operations $a@b$ and $a\#b$ are defined as $a@b = ab - b^2$ and $a\#b = a + b - ab^2$, calculate $\frac{6@2}{6\#2}$.

- (A) $-\frac{1}{2}$ (B) $-\frac{1}{4}$ (C) $\frac{1}{8}$ (D) $\frac{1}{4}$ (E) $\frac{1}{2}$
-

Question Seven

How many ways can the 54 be written as the sum of two different primes? (Ignoring the order they are added.)

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

Question Eight

A teacher gave a test to a class, in which 90% of the students are Year 9, and 10% are Year 10.

The mean score for the class was 84, and the mean score for just the Year 9s was 83.

If all of the Year 10s got the same score on the test, what was it?

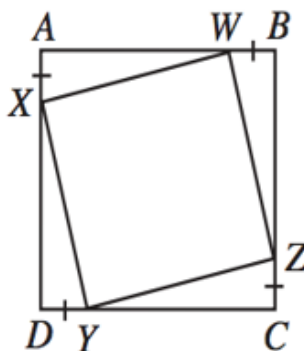
- (A) 85 (B) 88 (C) 93 (D) 94 (E) 98
-

Question Nine

The perimeter of square ABCD is 64m.

The ratio of AW to WB is 3:1.

What is the area of square WXYZ?



- (A) 40m^2 (B) 64m^2 (C) 144m^2 (D) 160m^2 (E) 232m^2
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Question Ten

Four distinctive whole numbers are randomly selected between 1 and 2019 inclusive. The differences between each possible pair of numbers are calculated. What is the chance that at least one of these differences is a multiple of 3?

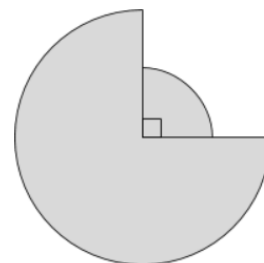
- (A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) 1 (D) $\frac{1}{3}$ (E) $\frac{3}{4}$
-

Question Eleven

The two circles shown have the same centre.

The radius of the smaller circle is 1 unit, and the radius of the larger circle is 2 units.

What is the total shaded area in terms of π ?



- (A) $\frac{7\pi}{4}$ (B) $\frac{11\pi}{4}$ (C) $\frac{13\pi}{4}$ (D) $\frac{15\pi}{4}$ (E) 5π
-

Question Twelve

Which of the following does **not** result in an even number **or** a square number?

- (A) 6^{2019} (B) 7^{2019} (C) 8^{2019} (D) 9^{2019} (E) 10^{2019}
-

Question Thirteen

There are 283 students in Year 10 at Calculus College. For their maths exam they needed a ruler and a calculator.

145 students brought just one of these two items. 203 students remembered to bring a calculator. 32 students

forgot both items. How many students only brought a ruler?

- (A) 47 (B) 48 (C) 58 (D) 106 (E) 153
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Question Fourteen

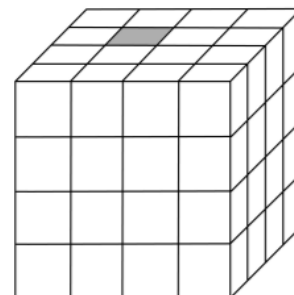
What is the 2019th digit after the decimal point of $\frac{1}{41}$?

- (A) 0 (B) 2 (C) 3 (D) 4 (E) 9
-

Question Fifteen

The cube shown is divided into 64 small cubes. Exactly one of the cubes is grey.

On the first day, the grey cube changes all its neighbouring cubes to grey (*two cubes are neighbours if they have a common face*). On the second day, all the grey cubes do the same thing. How many grey cubes are there at the end of the second day?



- (A) 16 (B) 9 (C) 18 (D) 41 (E) 17
-

Question Sixteen

There are two bags, each of which hold 3 black balls and 3 white balls. With her eyes closed, Eloise takes 3 random balls out of the first bag and puts them into the second bag. She then starts taking balls randomly out of the second bag to put back into the first bag. What is the smallest number of balls she would need to take to be *absolutely sure* that the first bag has *at least* 2 black balls *and at least* 2 white balls when she had finished?

- (A) 1 (B) 2 (C) 4 (D) 5 (E) 9
-

Question Seventeen

What is the value of $1 - 2 + 3 - 4 + 5 - 6 + \dots + 2017 - 2018 + 2019$?

- (A) **-1010** (B) **-1009** (C) **0** (D) **1009** (E) **1010**
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Question Eighteen

On a trip to the beach, Amish travelled 60 kilometres on a main road and 12 kilometres on a gravel road. He drove three times as fast on average on the main road as on the gravel road. If Amish spent 30 minutes driving on the gravel road, how many minutes did his entire trip take?

- (A) **50** (B) **72** (C) **80** (D) **120** (E) **150**
-

Question Nineteen

The clock in Steven's car, which is not accurate, gains time at a constant rate. One day, as he begins shopping, he notes that his car clock and his watch (*which is accurate*) both say 1:00pm. When he is done shopping, his watch says 1:30 and his car clock says 1:35. Later that day, Steven loses his watch. He looks at his car clock and it says 8:00. What is the actual time?

- (A) **6:50** (B) **7:00** (C) **7:30** (D) **7:55** (E) **8:10**
-

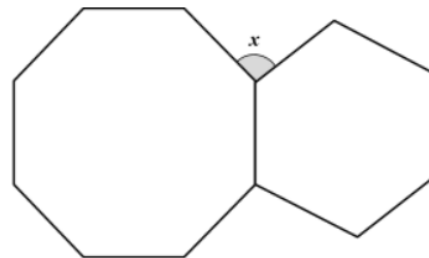
Question Twenty

The longest side of a right-angled, isosceles triangle is 37cm. What is its area?

- (A) **171.1cm²** (B) **242.0cm²** (C) **342.3cm²** (D) **484.0cm²** (E) **684.5cm²**
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Question Twenty-one

The diagram shows a regular hexagon and regular octagon.
What size would the angle marked x be?



- (A) 90° (B) 100° (C) 105° (D) 110° (E) 120°
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Question Twenty-two

The digits 1, 2, 3 and 4 are used to make a 4-digit number.
Not all of these digits need to be used, and repeats of digits are allowed.
What proportion of all of the possible numbers created would use each digit only once?

- (A) $\frac{1}{4}$ (B) $\frac{3}{32}$ (C) $\frac{1}{6}$ (D) $\frac{1}{64}$ (E) $\frac{5}{8}$
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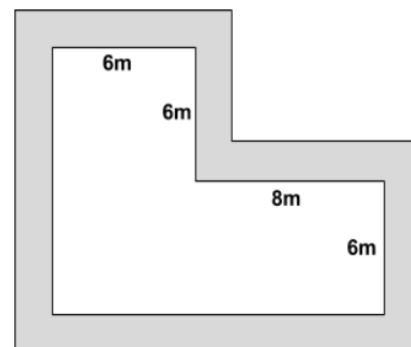
Question Twenty-three

Solve this equation to find x : $2^x \times 4 = 8^x \div 2$

- (A) $x = 0$ (B) $x = 0.5$ (C) $x = 1$ (D) $x = 1.5$ (E) $x = 2$
-

Question Twenty-four

An L-shaped pool has dimensions as indicated (*shown in white*).
A path is to be built around the pool (*shown in grey*) so that the path has the same width all the way around.
What width should the path be so that the area of the path is the exact same as the area of the pool?



- (A) 1m (B) 1.5m (C) 2m (D) 2.5m (E) 3m
-

Question Twenty-five

If $x < 0$, which of the following must **always** be positive?

- (A) $5x$ (B) $x + 5$ (C) x^5 (D) $(x - 5)^2$ (E) $x^2 - 5$
-

Question Twenty-six

Frank wants to visit Allan after school, but he has forgotten his house number. Allan tells him, "My house number has two digits, and exactly three of the following four statements about it are true."

- (1) It is prime. (2) It is even. (3) It is divisible by 7. (4) One of its digits is 9.

This information allows Frank to determine Allan's house number. What is its units/ones digit?

- (A) 4 (B) 6 (C) 7 (D) 8 (E) 9
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Question Twenty-seven

A square-shaped floor is covered with identical square tiles.

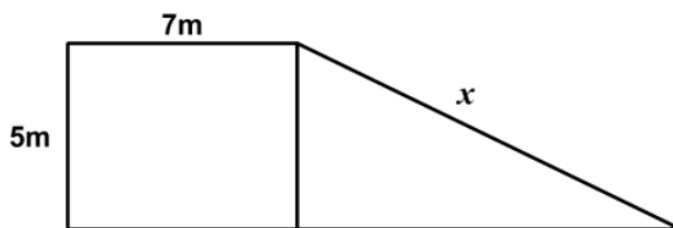
If the total number of tiles that lie on the two diagonals is 37, how many tiles cover the floor?

- (A) 148 (B) 324 (C) 361 (D) 1296 (E) 1369
-

Question Twenty-eight

The rectangle and triangle shown have the same area.

What would the length x be?



- (A) 12 m (B) $\sqrt{35}$ m (C) $\sqrt{59}$ m (D) $\sqrt{74}$ m (E) $\sqrt{221}$ m
-

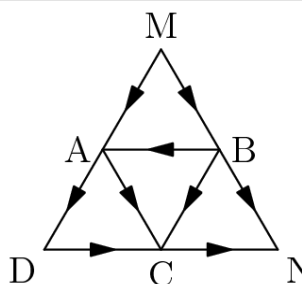
Question Twenty-nine

The 7-digit numbers **74A52B1** and **326AB4C** are each multiples of 3. Which of the following could be the value of **C**?

- (A) 1 (B) 2 (C) 3 (D) 5 (E) 8
-

Question Thirty

Using only the paths and the directions shown, how many different routes are there from **M** to **N**?



- (A) 4 (B) 6 (C) 7 (D) 8 (E) 9
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