Problem 1

In one year, Marie will be twice as old as she was three years ago. In how many years will she be three times as old as she is now?

A 8 **B** 9 **C** 12 **D** 14 **E** 16

Problem 2

How many perfect squares divide 2025 evenly?

A 2 **B** 3 **C** 4 **D** 5 **E** 6

Problem 3

Anna tries do decide what to wear. She has four shirts (one white, one red, one green, and one blue), two pairs of pants (one black and one blue), and three pairs of shoes (one white, one red, and one black). She does not want to wear pants the same colour as either the shirt or her shoes. How many different outfits can she put together?

A 15 **B** 17 **C** 19 **D** 23 **E** 24

Problem 4

If $10a + 6b = -4$ and $21b + 9c = 5$, then $27c - 105a$ equals

A -37 **B** -27 **C** 7 **D** 17 **E** 57

Problem 5

If a is an even number and b is divisible by 6, which of the following numbers must necessarily be divisible by 4?

A $a + b$ **B** $a - b$ **C** $ab - a$ **D** $ab + b^2$ **E** $a - b^2$

Problem 6

Draw line segments from the corner C to A and D, respectively, in a regular pentagon $ABCDE$. How large is the angle between two segments?

A 18° **B** 36° **C** 54° **D** 72° **E** 90°

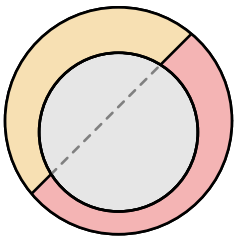
Problem 7

In an infinite sequence of numbers p, 5, q, r, 3, ..., each term equals the sum of the next two terms in the sequence. What is the value of $p + q + r$?

A 3 **B** 5 **C** 8 **D** 14 **E** 18

Problem 8

A circle lies within another circle, and a straight line divides the area between the two circles in two parts, each having the same area as the innermost circle.



What is the ratio between the radius of the outer circle and the radius of the inner circle?

A 3 **B** $\frac{\pi}{2}$ **C** $\sqrt{3}$ **D** $\frac{3}{\sqrt{\pi}}$ **E** Impossible to decide

Problem 9

The sequence $a_0, a_1, a_2, \ldots$ has $a_0 = 0$ and $a_n = n - a_{n-1}$ for all $n \geq 1$.

What is the value of a_{2025} ?

A 2026 **B** 2025 **C** 1014 **D** 1013 **E** 1012

Problem 10

Which one of the following numbers is furthest away from the nearest perfect square?

A 600 **B** 650 **C** 810 **D** 999 **E** 2000

Problem 11

How many three digit numbers have the sum of their digits equal to 20?

A 18 **B** 24 **C** 36 **D** 37 **E** 72

Problem 12

Sunniva writes down the square of every integer, starting with 1 and ending with 100. Then she counts up how many times each of the digits appears as the last digit among the numbers she has written. Which one of the digits 1, 4, 5, 6, and 9 appear the fewest number of times?

A 1 **B** 4 **C** 5 **D** 6 **E** 9

Problem 13

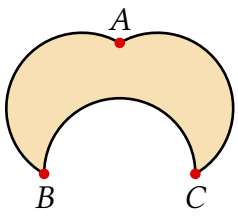
Nils and Henrik plan to paint a fence. If Nils were to do it alone, he would be done in one hour, while if Henrik were to do it alone, he would need an hour and 15 minutes. How long does it take if they work simultaneously, starting from opposite ends?

A 26 minutes and 40 seconds
B 33 minutes and 20 seconds
C 33 minutes and 45 seconds
D 37 minutes and 30 seconds
E 2 hours and 15 minutes

Problem 14

Each pair of points A, B, and C in the figure is connected via a semicircle of diameter 2.

How large is the area of the coloured region?



A $\sqrt{3}+\frac{\pi}{2}$ **B** $\frac{\sqrt{3}+4\pi}{4}$ **C** $\frac{1+2\pi}{2}$ **D** $\frac{\sqrt{3}+\pi}{2}$ **E** $\frac{\sqrt{3}+2\pi}{4}$

Problem 15

The angles in a convex pentagon form an arithmetic sequence. One of the angles equals 53°. How large is the largest angle of the pentagon?

A 127° **B** 160° **C** 163° **D** 179° **E** Impossible to determine

Problem 16

How many integers $n \geq 1$ are such that $\frac{20n+25}{2n+25}$ is an integer too?

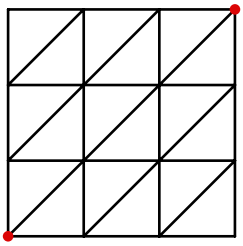
A 1 **B** 2 **C** 3 **D** 4 **E** Neither 1, 2, 3, nor 4

Problem 17

A triangle and a quadrilateral have the same circumference. If R is the area of the triangle divided by the area of the quadrilateral, which of the alternatives is necessarily true?

A $R < \frac{3}{4}$ **B** $\frac{3}{4} \leq R < 1$ **C** $R = 1$ **D** $1 < R$
E Neither of the other alternatives

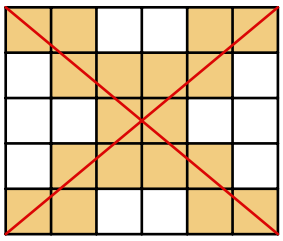
Problem 18



How many paths exist from the lower left hand corner to the upper right hand corner in the figure, given that you can only move up, to the right, or along a diagonal up and to the right?

A 27 **B** 63 **C** 64 **D** 81 **E** 127

Problem 19



Let us say that a square in a mesh *lies on a diagonal* if an inner point of the square – so not only a corner – lies on a diagonal. The figure shows a 6×5 mesh. The 18 shaded squares lie on a diagonal.

How many of the squares of a 4862×3276 mesh lie on a diagonal?

A 16224 **B** 16236 **C** 16248 **D** 16272 **E** 16276

Problem 20

As a matter of fact, $3^{20} + 4^9 + 6^{10} = pq$, where p and q are prime numbers.

What is the last digit of $p + q$?

A 2 **B** 4 **C** 6 **D** 7 **E** 8