Hello and welcome to SchoolNova 2020-2021!

The important information for this class will all always be posted in the Google Classroom. You can find, in an announcement there, all useful links relevant to the class, including links to class meeting spaces and links to homework assignments.

You should also be prepared to take notes in class, though we will spend some time discussing this in class.

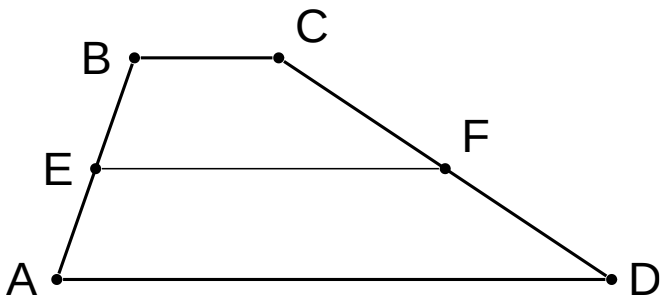
Below is a collection of Math 9 placement tests from previous years. Some of these problems are repeats between different years, and some are also repeated in the classworks. **You do not need to do any problem more than once –** if you have already done a problem during class from the classwork, or if a problem repeats in the exams, you can skip that problem.

Math 9 placement test 2020

1. Open brackets and expand the following expressions
   a. $(a+b)^2 =$
   b. $(a-b)^3 =$
2. Factor the following expressions
   a. $a^2 - b^2 =$
   b. $a^3 - b^3 =$
   c. $a^3 + b^3 =$
   d. $1 + a + a^2 + a^3 =$
3. Find the coefficient of x^7 in the polynomial $(1+2x)^9$.
4. Let x_1, x_2 be roots of the equation $x^2 = x + 1$. Find $\frac{1}{x_1} + \frac{1}{x_2}$.
5. Find the remainder upon division of 2^{2019} by 7.
6. Compute $\frac{(1+2i)}{(1-2i)}$
7. Find all real numbers x for which it is true that $\frac{625^{\cos^2 x}}{25^{\cos x}} < 1$

Math 9 placement test 2019

8. Factor the following expressions
   a. $a^2 - b^2 =$
   b. $a^3 - b^3 =$
   c. $a^3 + b^3 =$
   d. $1 + a + a^2 + a^3 =$
9. Find the coefficient of x^7 in the polynomial $(1 + 2x)^9$.
10. Let x_1, x_2 be roots of the equation $x^2 = x + 1$. Find $\frac{1}{x_1} + \frac{1}{x_2}$.
11. Find the remainder upon division of 2^{2019} by 7.
12. Compute $(1 + i)^{16}$.
13. Let $ABCD$ be a trapezoid, with bases AD and BC, and let E, F be midpoints of sides AB, CD respectively. If $BC = 2\ cm, AD = 6\ cm$, then what is EF? Can you prove your answer?



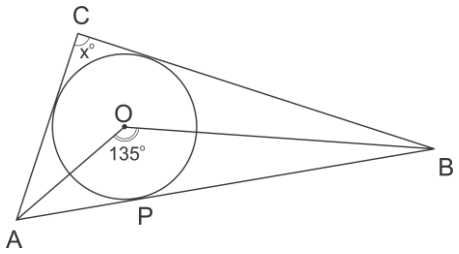
14. Solve the following inequality. Write your answer as a set of possible values for x.
$$\frac{(x+2)^2(x-7)}{x+3} \leq 0$$
15. It is known that one of the roots of polynomial $p(x) = x^3 + 5x^2 + 7x + 3$ is $x_1 = -1$. Find the other roots.
16. Poker is played with a deck of 52 cards: four suites (spades, clubs, hearts, and diamonds), each containing 13 cards: 2,. . . , 9, 10, 9, Jack, Queen, King, and Ace. If you are randomly dealt a hand (5 cards) from a freshly shuffled full deck, what is the probability of getting:
   a. 5 hearts
   b. Four of a kind (i.e., four cards with the same value, e.g. four Aces, or four threes) plus one more card of different value
17. For each of the following equations, determine if it has integer solutions. If yes, find at least one solution. If no, explain why.
   a. $6x + 15y = 13$
   b. $6x + 15y = 33$

Math 9 placement test 2018

18. Open brackets and expand the following expressions
    a. $(a+b)^2 =$
    b. $(a-b)^3 =$
19. Factor the following expressions
    a. $a^2 - b^2 =$
    b. $a^3 - b^3 =$
    c. $a^3 + b^3 =$
    d. $1 + a + a^2 + a^3 =$
20. Solve the following inequality. Write your answer as a set of possible values for x.

$$\frac{(x+2)^2(x-7)}{x+3} \leq 0$$

21. Find the remainder of 2^{2019} upon division by 7.
22. Let x_1, x_2 be roots of the equation $x^2 = x + 1$. Find $\frac{1}{x_1} + \frac{1}{x_2}$.
23. Find the remainder upon division of 2^{2019} by 7.
24. O is the center of the inscribed circle in triangle ABC. The angle AOB is 135 degrees. Find the angle ACB.



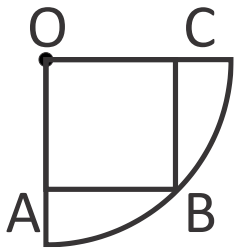
Math 9 placement test 2017

1. Open brackets and expand the following expressions
   a. $(a+b)^2 =$
   b. $(a-b)^3 =$
2. Factor the following expressions
   a. $a^2 - b^2 =$
   b. $a^3 - b^3 =$
   c. $a^3 + b^3 =$
   d. $1 + a + a^2 + a^3 =$
3. Find the remainder of 3^{2017} upon division by 4.
4. Solve the equation

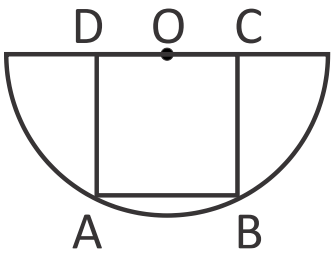
$$x + \frac{1}{x} = 7\frac{1}{7}$$

5. Eight teams have reached the quarter-finals of the soccer World Cup.
   a. How many ways are there for these teams to be paired to play the quarter-final games?
   b. How many different outcomes of which team wins which medal (gold, silver, bronze) are possible?
6. Find the area of a square inscribed in

   a. a quarter circle of radius r, as shown in the Figure below,



   b. a semicircle circle of radius r as shown in the Figure below.



Math 9 placement test 2016

1. Solve the equation

$$\frac{x^2+1}{x} - \frac{2x}{x^2+1} = 1$$