The Department of Mathematics at NDSU is happy to announce the start of the annual North Dakota Mathematics Talent Search.The Talent Search poses sets of challenging mathematical problems throughout the year which will be posted on our website at

https://www.ndsu.edu/math/outreach/nd_talent_search/

Interested students are strongly encouraged to send in solutions even if they only solve one problem in a set; **finding a good solution to a problem is always an achievement**. The problems do not require advanced mathematical knowledge – just creativity and a feeling or taste for problem solving.

The students who submit a significant number of mathematically sound solutions for each of the three rounds will be rewarded with various prizes.

Please upload and submit your solutions by March 31, 2026, using the form on the website. Alternatively, solutions may be sent by regular mail to:

Talent Search
c/o Maria Alfonseca
Mathematics NDSU Dept.# 2750
PO BOX 6050
Fargo, ND 58108-6050

Please do not forget to include your name, postal address, school, and e-mail address.

Here is the **third set** of problems:

1. Find all polynomials $x^3 - ax^2 + bx - c$ which factor as $(x-a)(x-b)(x-c)$.

2. On one of the pans of a balance scale we place 3 weighs: $\frac{1}{8}, \frac{1}{9}, \frac{1}{10}$. Is it possible to balance the scale by placing on the other pan two weighs of the form $\frac{1}{a}, \frac{1}{b}$, where a, b are integers?

3. We paint each face of a tetrahedron in a different color. How many different configurations can we obtain? (We consider two tetrahedra to have the same configuration if we can rotate one of them in space and obtain the other one).

4. Give a geometric proof of the fact that the circle with diameter T_1T_2 (not pictured) is tangent to the line joining O_1O_2.
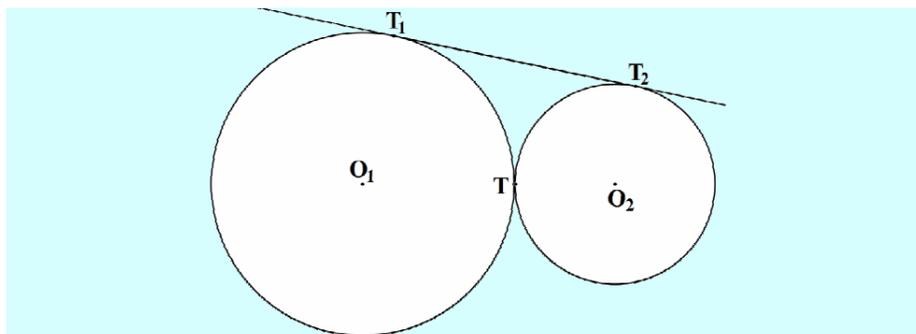
5. The square on the picture on the next page is a code to encrypt messages. If we want to encrypt the message "ARRIVE AT TWO", we first substitute each letter by two numbers according to their row and column on the square:

$A = 22, R = 42, I = 12$,, etc. Notice that I,J are both encoded by 12. Thus, ARRIVE AT TWO becomes 2242421251252244445215.

Next, we write this string of numbers in two rows of the same length:

22424212512

52244445215

Now we group the numbers by columns: $25, 22, 42, 24, 44, 24, 14, 25, 52, 11, 25$, and we substitute them by the corresponding letters:

EARCTCLEWDE is the encrypted message.

Can you decipher the following message?

BWNXBVAPZQMSBMADLFC

*	1	2	3	4	5
1	D	I/J	P	L	O
2	M	A	B	C	E
3	F	G	H	K	N
4	Q	R	S	T	U
5	V	W	X	Y	Z