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DEVOLOPING STUDENT'S BOTH PROVING AND CREATIVE SKILLS USING SIEVE OF EROTOSPHENE

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ANNOTATION:

This article presents the remarkable possibilities and advantages of sieve of Erotostphenes in the teaching of mathematics. It has been shown to have a positive effect on students 'perfect understanding of the rules of division.

Key words: prime, composite ,sieve,even,odd,division,remainder,divisibility sign.

INTRODUCTION:

As We know, determining the prime or complexity of a number is also an important issue. We will find prime numbers easily in natural numbers from 1 to n If we know the sieve of Erotostphenes. We find prime numbers faster by slightly altering this sieve.

We place the numbers in the following 10-column table 1.

I. 25 odd numbers in the first 100 numbers	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47	48	49	50
	51	52	53	54	55	56	57	58	59	60
	61	62	63	64	65	66	67	68	69	70
	71	72	73	74	75	76	77	78	79	80
	81	82	83	84	85	86	87	88	89	90
	91	92	93	94	95	96	97	98	99	100
II. 21 odd numbers in the second 100 numbers	101	102	103	104	105	106	107	108	109	110
	111	112	113	114	115	116	117	118	119	120
	121	122	123	124	125	126	127	128	129	130
	131	132	133	134	135	136	137	138	139	140
	141	142	143	144	145	146	147	148	149	150
	151	152	153	154	155	156	157	158	159	160
	161	162	163	164	165	166	167	168	169	170
	171	172	173	174	175	176	177	178	179	180
	181	182	183	184	185	186	187	188	189	190
	191	192	193	194	195	196	197	198	199	200

III. 16 odd numbers in the third 100 numbers	201	202	203	204	205	206	207	208	209	210
	211	212	213	214	215	216	217	218	219	220
	221	222	223	224	225	226	227	228	229	230
	231	232	233	234	235	236	237	238	239	240
	241	242	243	244	245	246	247	248	249	250
	251	252	253	254	255	256	257	258	259	260
	261	262	263	264	265	266	267	268	269	270
	271	272	273	274	275	276	277	278	279	280
	281	282	283	284	285	286	287	288	289	290
	291	292	293	294	295	296	297	298	299	300

We can come to the following conclusions by following the table.

1) All numbers in an even-numbered column are even numbers, so all are complex numbers except 2.

2) Column 5 is all multiples of 5, so everything is complex expect 5.

3) You will find prime numbers in the columns that have not been deleted.

4) It is enough to divide the inside numbers of the first hundred into 3 and 7

5)In numbers of the second hundred, it is enough to divide the numbers up to 169 as 3,7, 11, 13, and the next ones as 17.

From the above it follows that there is a need to develop signs for dividing numbers by prime numbers.

The signs of division into 2 and 5 are very simple

1) 2: If the last digit of number is an even number, this number is divisible by 2

2) 5: If the last digit of number is 0 or 5, the number is divisible by 5.

3) 3: If the sum of the digits is divided by 3, the number is divide by 3

If the last digit of the number with the sum of digits of the remainder of this number is divisible by 3, that number is divisible by 3.

4. Divisiblity sign of 7 :

If $\overline{a_1a_2\dots a_{n-1}} - 2a_n = 7k$, $\overline{a_1a_2\dots a_n}$ this number is divisible by 7.

Proof:

$\overline{a_1a_2\dots a_n} = 10\cdot\overline{a_1a_2\dots a_{n-1}} + a_n = 10\cdot(7k+2a_n) + a_n = 70k + 21a_n$,this expression is divisible by 7.

5. Divisiblity sign of 11 :

If $\overline{a_1a_2\dots a_{n-1}} - a_n = 11k$,in that case this number is divisible by 11 that is $\overline{a_1a_2\dots a_n}$

Proof :

$\overline{a_1a_2\dots a_n} = 10\cdot\overline{a_1a_2\dots a_{n-1}} + a_n = 10\cdot(11k+a_n) + a_n = 110k + 11a_n$, this expression is divisible by 11.

6. Divisiblity sign of 13

If $\overline{a_1a_2\dots a_{n-1}} + 4a_n = 13k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 13.

Proof.

$\overline{a_1a_2\dots a_n} = 10\cdot\overline{a_1a_2\dots a_{n-1}} + a_n = 10\cdot(13k-4a_n) + a_n = 130k - 39a_n$ number is divisible by 13.

7. Divisiblity sign of 17

If $\overline{a_1a_2\dots a_{n-1}} - 5a_n = 17k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 17 .Proof.

$\overline{a_1a_2\dots a_n} = 10\cdot\overline{a_1a_2\dots a_{n-1}} + a_n = 10\cdot(17k+5a_n) + a_n = 170k + 51a_n$ number is divisible by 17 .

8. Divisiblity sign of 19

If $\overline{a_1a_2 \dots a_{n-1}} + 2a_n = 19k$, $\overline{a_1a_2 \dots a_n}$ number is divisible by 19.

Proof.

$\overline{a_1a_2 \dots a_n} = 10 \cdot \overline{a_1a_2 \dots a_{n-1}} + a_n = 10 \cdot (19k - 2a_n) + a_n = 190k - 19a_n$ number is divisible by 19.

9. Divisiblity sign of 23:

If $\overline{a_1a_2 \dots a_{n-1}} + 7a_n = 23k$, $\overline{a_1a_2 \dots a_n}$ number is divisible by 23.

Proof.

$\overline{a_1a_2 \dots a_n} = 10 \cdot \overline{a_1a_2 \dots a_{n-1}} + a_n = 10 \cdot (23k - 7a_n) + a_n = 230k - 69a_n$ this number is divisible by 23 .

10. Divisiblity sign of 29

If $\overline{a_1a_2 \dots a_{n-1}} + 3a_n = 29k$, $\overline{a_1a_2 \dots a_n}$ number is divisible by 29.

Proof:

$\overline{a_1a_2 \dots a_n} = 10 \cdot \overline{a_1a_2 \dots a_{n-1}} + a_n = 10 \cdot (29k - 3a_n) + a_n = 290k - 29a_n$ number is divisible by 29.

11. Divisiblity sign of 31 :

If $\overline{a_1a_2 \dots a_{n-1}} - 3a_n = 31k$, $\overline{a_1a_2 \dots a_n}$ number is divisible by 31.

Proof:

$\overline{a_1a_2 \dots a_n} = 10 \cdot \overline{a_1a_2 \dots a_{n-1}} + a_n = 10 \cdot (31k + 3a_n) + a_n = 310k + 31a_n$ number is divisible by 31.

12. Divisiblity sign of 41

If $\overline{a_1a_2 \dots a_{n-1}} - 4a_n = 41k$, $\overline{a_1a_2 \dots a_n}$ number is divisible 41

Proof:

$\overline{a_1a_2 \dots a_n} = 10 \cdot \overline{a_1a_2 \dots a_{n-1}} + a_n = 10 \cdot (41k + 4a_n) + a_n = 410k + 41a_n$ this expression is divisible by 41 .

13. Divisiblity sign of 37 .

If $\overline{a_1a_2 \dots a_{n-1}} - 11a_n = 37k$, $\overline{a_1a_2 \dots a_n}$ number is divisible by 37 .

Proof.

$\overline{a_1a_2 \dots a_n} = 10 \cdot \overline{a_1a_2 \dots a_{n-1}} + a_n = 10 \cdot (37k + 11a_n) + a_n = 370k + 111a_n$ this number is divisible by 37 .

14. Divisiblity sign of 43.

If $\overline{a_1a_2 \dots a_{n-1}} + 13a_n = 43k$, $\overline{a_1a_2 \dots a_n}$ number is divisible by 43.

Proof.

$\overline{a_1a_2 \dots a_n} = 10 \cdot \overline{a_1a_2 \dots a_{n-1}} + a_n = 10 \cdot (43k - 13a_n) + a_n = 430k - 129a_n$ this number is divisible by 43.

15. Divisiblity sign of 47.

If $\overline{a_1a_2 \dots a_{n-1}} - 14a_n = 31k$, $\overline{a_1a_2 \dots a_n}$ number is divisible by 47.

Proof.

$\overline{a_1a_2 \dots a_n} = 10 \cdot \overline{a_1a_2 \dots a_{n-1}} + a_n = 10 \cdot (47k + 14a_n) + a_n = 470k + 141a_n$ This expression is divisible by 47.

16. Divisiblity sign of 53.

If $\overline{a_1a_2 \dots a_{n-1}} + 16a_n = 53k$, $\overline{a_1a_2 \dots a_n}$ number is divisible by 53.

Proof :

If $\overline{a_1a_2 \dots a_n} = 10 \cdot \overline{a_1a_2 \dots a_{n-1}} + a_n = 10 \cdot (53k - 16a_n) + a_n = 530k - 159a_n$,in that case this expression is divisible by 53.

17. Divisiblity sign of 59

If $\overline{a_1a_2 \dots a_{n-1}} + 6a_n = 59k$, $\overline{a_1a_2 \dots a_n}$ number is divisible by 59 .

18. Divisiblity sign of 61

If $\overline{a_1a_2\dots a_{n-1}} - 6a_n = 61k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 61.

19. Divisiblity sign of 67 .

If $\overline{a_1a_2\dots a_{n-1}} - 20a_n = 67k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 67.

20. Divisiblity sign of 71

If $\overline{a_1a_2\dots a_{n-1}} - 7a_n = 71k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 71.

21. Divisiblity sign of 73:

If $\overline{a_1a_2\dots a_{n-1}} + 22a_n = 73k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 73 .

22. Divisiblity sign of 79.

If $\overline{a_1a_2\dots a_{n-1}} + 8a_n = 79k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 79.

23. Divisiblity sign of 83

If $\overline{a_1a_2\dots a_{n-1}} + 25a_n = 83k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 83.

24. Divisiblity sign of 89 :

If $\overline{a_1a_2\dots a_{n-1}} + 9a_n = 89k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 89.

25. Divisiblity sign of 97:

If $\overline{a_1a_2\dots a_{n-1}} - 29a_n = 97k$, $\overline{a_1a_2\dots a_n}$ number is divisible by 97 .

Is 8051 number prime or composite ?

This number is not divisible by $2, 3, 5, \dots$,79. But it is divisible by 83, chunki 805+25;1=830 ,this number is divisible by 83, in that case 8051 is composite number .

Table 2

Prime numbers	2	3	5	7	11	13	17	19	23	29	31	37	41	43	47	53	57	61	67	71	73	79	83	89	97
The rule for sign of division	The last even number	+1	The end of the number is 0 or 5	-2	-1	-1	-5	+2	+7	+3	-3	-11	-4	+13	-14	+16	+6	-6	-20	-7	+22	+8	+25	+9	-29

CONCLUSION:

The use sieve of erotosphenes in the study of mathematics has a number of positive effects. is a great tool for improving the quality of education, especially for exploration, and visualization. Increases students 'mathematical skills such as mathematical proofing and develops students' thinking skills.

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