



FEMSSISA MATHEMATICS OLYMPIAD

GRADE 8-11: ROUND ONE 2019

ANSWERS

GRADE 8		GRADE 9		GRADE 10		GRADE 11	
No		No		No		No	
1	E	1	C	1	D	1	C
2	C	2	A	2	E	2	D
3	A	3	E	3	A	3	A
4	D	4	D	4	B	4	B
5	D	5	B	5	A	5	E
6	A	6	C	6	E	6	A
7	B	7	B	7	C	7	A
8	E	8	E	8	D	8	D
9	D	9	C	9	D	9	B
10	A	10	C	10	E	10	C
11	C	11	B	11	B	11	C
12	B	12	D	12	A	12	D
13	E*	13	A	13	C	13	B
14	D	14	C	14	D	14	E
15	B	15	E	15	E	15	D
16	A*	16	B	16	A	16	A
17	C	17	C	17	C	17	E*
18	D	18	D	18	E	18	D
19	A	19	A	19	C	19	B
20	D	20	E	20	A	20	C

Refer below for *

First 15: $15 \times 1 = 15$

$5 \times 2 = 10$

Total = 25

To qualify for Final Round you need 7.

Explanations for *

1. Grade 8 mark these right

13. The last numbers of each row

$$L_1 = 1^2 + 0 = 1$$

$$L_2 = 2^2 + 1 = 5$$

$$L_3 = 3^2 + 2 = 11$$

.....

$$L_{21} = 21^2 + 20 = 461$$

$$L_n = n^2 + n - 1$$

$$5^{\text{th}} \text{ number of } 22^{\text{nd}} \text{ row} = 461 + 10 = 471$$

Mark 461 and 471 right

16. In any triangle the sum of 2 sides is greater than the 3rd side

Divide 27 by 2 is your starting point

You translate to 13 and 14 sum of 2 sides = 14

7 combinations (13;13;1); (13;12;2); (13;11;3); (13;10;4); (13;9;5); (13;8;6); (13;7;7)

5 combinations: (12;12;3).....

4 combinations : (11;11;5).....

2 combinations : (10;10;7).....

1 combination: (9;9;9)

Mark 7 or 19 right

Good investigation problem

Apologies for this oversight

2. Grade 11

17. Reflection and translation

The reflection of $y = -x^2 + 6x - 5$ about the X axis is $y = x^2 - 6x + 5$ signs change

The translation 2 units to the left gives you the coordinates (-1; 0); (3;0) and turning point (1;-4)

New defining equation is $y = x^2 - 2x - 3$

(E) is typographical error – apologies

Mark both right

Another beautiful problem for investigation

PS* There are very few cubic functions that work

This is a strategy you can use to create many cubic functions.

Translate horizontally.