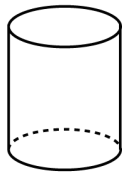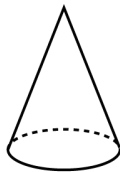# Mathematica Centrum

Together, let's shape the mathematicians of the future

BYRON-GERMAIN PREPARATORY TEST 2017
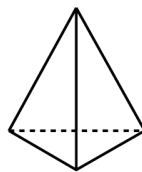**DETAILED SOLUTIONS**

1. 3 + 1 + 6 = 10

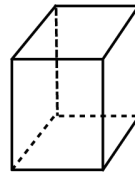2. The solid that has 4 flat faces, 6 edges and 4 vertices is C.

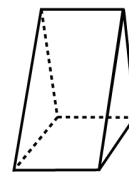A   B   C   D   E

3. The product that has the smallest ones digit is 3 x 4 x 5. Its ones digit is 0.

4. 20 ÷ (7 - 5) = 20 ÷ 2 = 10.

5. There are 5 odd numbers (21, 23, 25, 27, and 29) between 19 and 31.

6. The value of X in the equation: 512 = 317 + X is (512 - 317) 195.

7. The answer is 200.

8. 10 nickels = 50¢ = 2 quarters.

9. Andrea counted backwards from 30 by 3's. Andrea counted 30, <u>27</u>, 24, <u>21</u>, 18, 15, <u>12</u>, 9, … . The numbers that were not counted by Andrea are 8 and 14.

10. An answering machine can store 10 minutes or (10 x 60) 600 seconds of messages. It could store (600 ÷ 20) thirty 20 second messages.

11. 77 - 7 = 70. 70 ÷ 7 = 10 and 10 - 1 = 9. There are 9 natural numbers between 7 and 77 that are multiples of 7.

12. The square is composed of 8 identical triangles. Two are shaded. Two out of 8 triangles are shaded. This represents 1/4 of the figure.
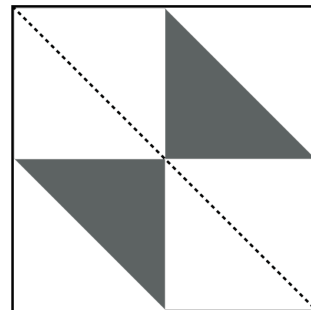
13. Figures III and IV are 180° rotation images of each other. When a figure is turned 180°, everything is reversed. The top becomes the bottom, the left becomes the right and vice versa. For example, look at the + symbol in figure III. It is at the bottom of the rectangle and on the left side. In figure IV, the + symbol is at the top of the rectangle and on the right side.

− X	...... −	...... −	X ...... +	X ......
+	X ...... +	+ X	−	− ...... +
I	II	III	IV	V
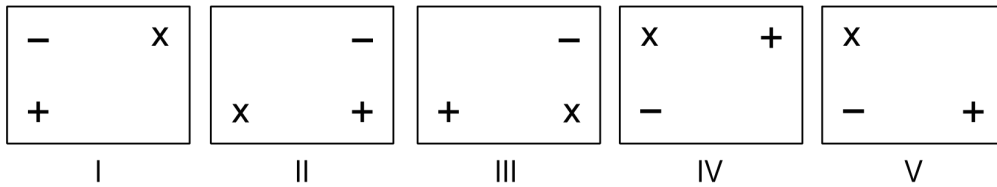
14. 1 dm + 2 cm = 10 cm + 2 cm = 12 cm.

15. The second, the fourth and the fifth figures all have a perimeter of 12.
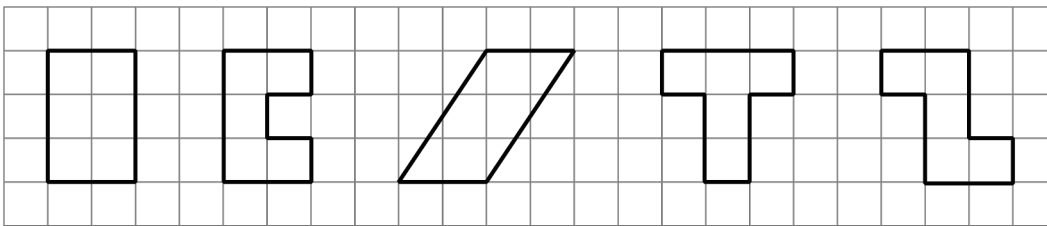
16. The number of lines of symmetry (6) shown in fig.1 plus the number of diagonals (9) shown in fig.2 is equal to 15.

fig. 1   fig. 2
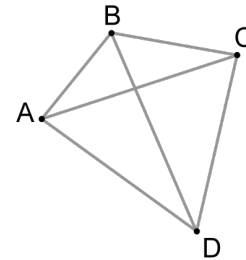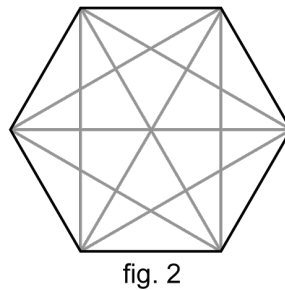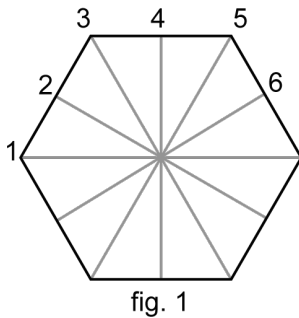
17. There are six 4-digit natural numbers between 1 000 and 2 000. These are 1 234, 1 243, 1 324, 1 342, 1 432, and 1 423. By symmetry, we know that there are 6 between 2 000 and 3 000 and 6 more between 3 000 and 4 000. In all, there are 18 such numbers.

18. Using point A, you can draw 3 line segments: AB, AC, and AD. Using point B, you can draw only 2 line segments: BC and BD (line segment BA is already drawn). Using point C, you can draw only 1 line segment: CD. Using the 4 points in the diagram, you can draw (3 + 2 + 1) 6 line segments.

19. The clock shown in the diagram has just lost its minute hand. It lost it at approximately 10:30, because the hour hand is half way between the 10 and the 11. If it were 10:00, the hour hand would be right on the 10. If it were 10:05, the hour hand would be very close to the 10. If it were 10:22, the hour hand would be approximately 1/3 of the way between the 10 and the 11, and if it were 10:45, the hour hand would be 3/4 of the way between the 10 and the 11.