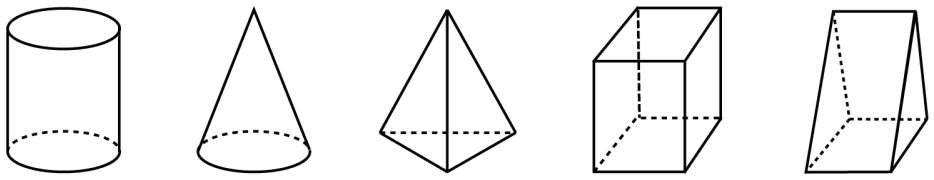
Mathematica Centrum

Together, let's shape the mathematicians of the future

FIBONACCI 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.



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 11 000.

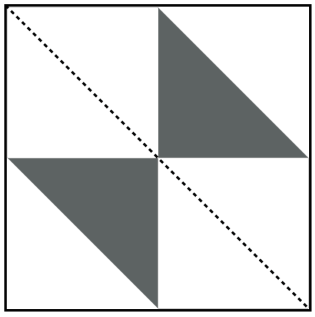
8. 10 nickels = 50¢ = 2 quarters.

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

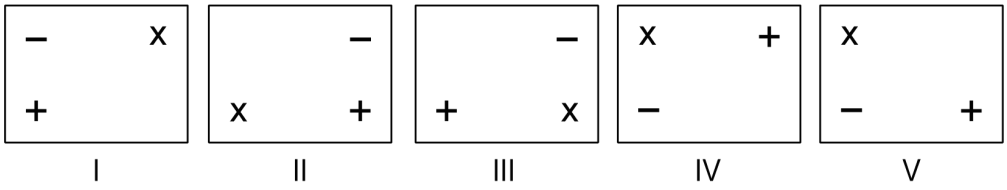
10. An answering machine can store 10 minutes or (10 x 60) 600 seconds of messages. It could store (600 ÷ 20) thirty 20 second messages.

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.

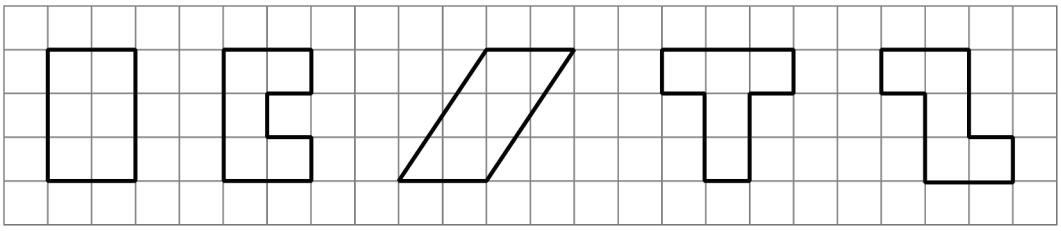


13. Figures III and IV are 180º rotation images of each other. When a figure is turned 180º, everything is reversed. The top becomes the bottom, the left becomes the right and vice versa. For example, look at the + symbol in figure III. It is at the bottom of the rectangle and on the left side. In figure IV, the + symbol is at the top of the rectangle and on the right side.



14. 1 dm + 20 mm = 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.

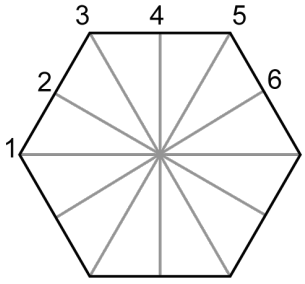


fig. 1

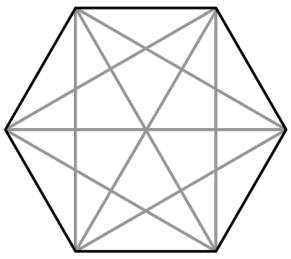
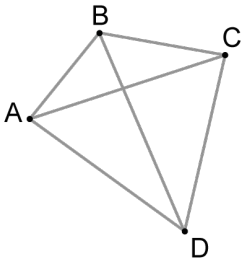


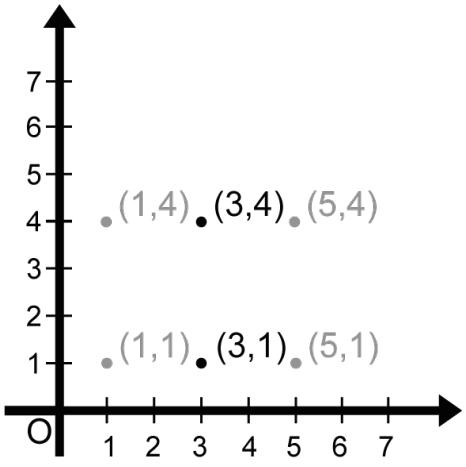
fig. 2



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 coordinates of the other two vertices of the rectangle could be (1 , 1), (1 , 4), (5 , 1), and (5 , 4). The coordinates could not be (2 , 3).

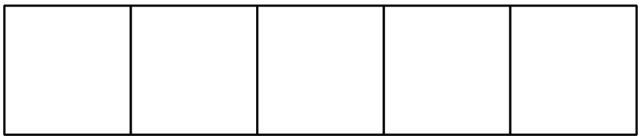


20. Each term of the second series: 9 + 18 + 27 + 36 + 45 + … + 900 is (9/3) 3 times larger thAn the corresponding term of the first series: 3 + 6 + 9 + 12 + 15 + …+ 300. The second series is equal to (15 150 x 3) 45 450.

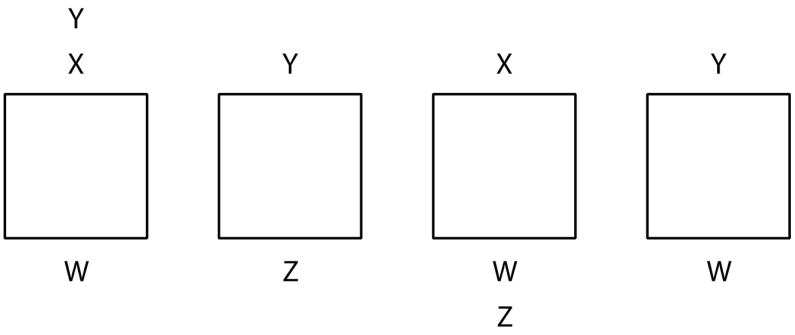
21. You can form (1 x 24, 2 x 12, 3 x 8, and 4 x 6) 4 different rectangles whose areas are 24 cm^2.

22. If 1 tic = 3 tocs and 1 toc = 3 tacs, then 3 tics are equal to (3 x 3 tocs) 9 tocs and 9 tocs are equal to (9 x 3 tacs) 27 tacs.

23. A square table can sit 4 people. If you line up 5 square tables, as shown in the diagram, you can sit 12 people. If 100 square tables were lined up in the same manner, you could sit (100 x 2 + 2) 202 people.



24. Four friends W, X, Y, and Z are walking in a straight line. Y is not second. X is right behind Y. Z is right behind W, who is not third. Taking into account all of these constraints, we can draw the diagram below. We can see in this diagram, that only Y or Z can be third. Z cannot be third because the constraints of the problem are not respected. Indeed if Z were third, X could not be right behind Y because W would have to be second. Y must be third. This hypothesis does take into account the constraints of the problem.



25. 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.