

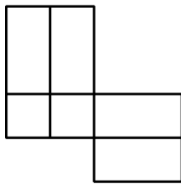
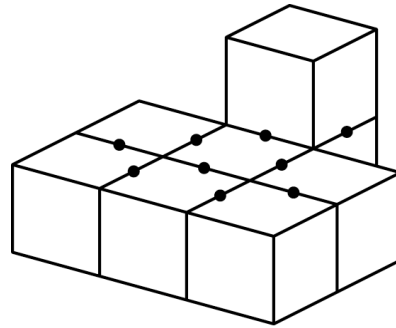
Mathematica

Let's shape together the mathematicians of the future

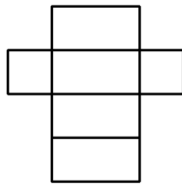
PREPARATORY TEST 2008 DETAILED SOLUTIONS

THALES (3rd) – BYRON-GERMAIN (4th) – FIBONACCI (5th) – PYTHAGORAS (6th)

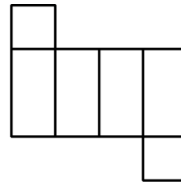
1. The number of edges of a cube (12) plus the number of faces of a cube (6) is equal to 18.
2. The number is equal to $(12 \div 4) \cdot 3$. This same number subtracted from 5 ($5 - 3$) gives 2.
3. The product of $1 \times 2 \times 3$ is 6.
4. The number that is 10 less than 40 is $(40 - 10) = 30$. The number that is 5 more than 30 is $(30 + 5) = 35$.
5. The 27th day after tomorrow will come in 28 days (4 weeks). In 2 weeks, it will be (April 16 + 7 + 7) April 30. Two weeks later, it will be (April 30 + 7 + 7) May 14.
6. $(7 \times 4) + (2 \times 5) = 28 + 10 = 38$.
7. Each dot in the diagram accounts for 2 glued faces. In all, there are $(9 \times 2) = 18$ faces that have glue on them.
8. The product of $10 \times 10 \times 0.1 = 10 \times 1 = 10$.
9. The even numbers **between** 0 and 100 are 2, 4, 6, 8, 10, ... 98. These numbers can be written as $1 \times 2 = 2$, $2 \times 2 = 4$, $3 \times 2 = 6$, ... $49 \times 2 = 98$. Altogether, there are 49 even numbers between 0 and 100.
10. 25 hundreds = $25 \times 100 = 2\,500$, 25 tens = $25 \times 10 = 250$. The quotient of $2\,500 \div 250$ is 10.
11. A rectangular prism has 3 pairs of opposite faces. Of course, these opposite faces cannot have common edges because they are opposite and disjoint. The only net that cannot form a prism is therefore net I (the two squares touch each other). The other nets can form a rectangular prism.



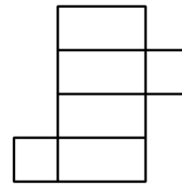
I



II

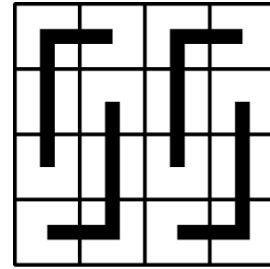


III



IV

12. Evidently, the 2-square tile and the 4-square tile (the one with a square shape) can individually cover the square floor. The 3-square tile cannot perfectly cover the floor because 16 is not divisible by 3. As shown in the diagram, the L-tile can perfectly cover the floor



13. Mathew can choose 3 combinations (1-2, 1-3, 2-3) of 2 cards.

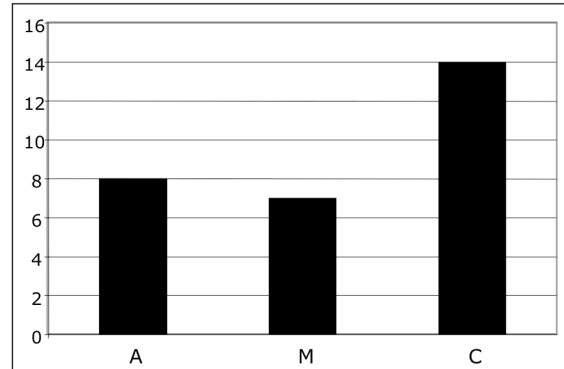
14. Let's write the sequence in the following way: **1, 3, 9, 27, 81, 243, 729, 2 187, ...** . Now let us write the sequence of the units digits: 1, 3, 9, 7, 1, 3, 9, 7, We can see that the 4th, 8th, 12th, ... the 100th units digit in this sequence is a 7. The units digit of the 99th number in the sequence: 1, 3, 9, 27, ... is a 9 (the digit that precedes the 7).

15. Andrea drank $(14 - 8)$ 6 fewer glasses of juice than Carol did.

16. The number of sides of a rhombus (4) plus the number of angles (4) gives a total of 8.

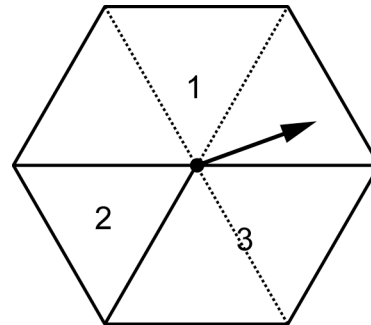
17. A measure of 80 cm is equal to (80×10) 800 mm.

18. The area containing the 2 represents (see diagram) $1/6$ of the hexagonal spinner. We could expect her (this is a probability, not a certainty) to get a 2 approximately $(1/6 \text{ of } 36)$ 6 times.



19. The number of obtuse angles in a rectangle is 0.

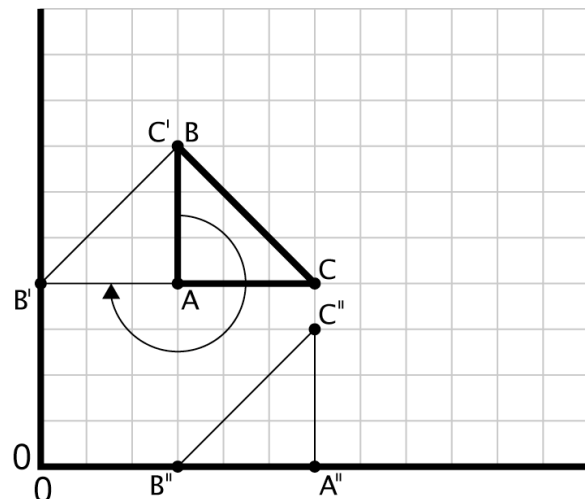
20. The sum of these numbers is $(2 + 3 + 7 + 8 + 14 + 20)$ 54. The average of these numbers is $(54 \div 6)$ 9.



21. $65\% = 65/100 = 13/20$.

22. There are (2, 3, 5, 7, 11, and 13) 6 prime numbers between 1 and 15.

23. As shown in the diagram, after the rotation of triangle ABC, point A is still at (3, 4), point B is at (0, 4), and point C is at (3, 7). After the triangle is moved to the right and down, the image of point A is located at point (6, 0).



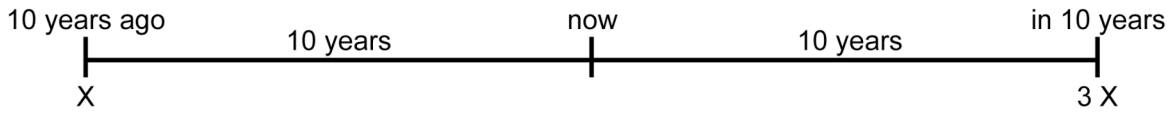
24. $67 \div 5 = 13 \text{ R } 2$ and $67 \div 4 = 16 \text{ R } 3$. The number could be 67.

25. If 2 hens lay 12 eggs in 3 days, 1 hen would lay 6 eggs in 3 days, and it would lay 3 eggs in $1 \frac{1}{2}$ days.

26. The number that is equal to twice the product of its digits $(2 \times 3 \times 6)$ is 36.

27. The product of $10 \times 10 \times 10$ is equal to $(10 \times 10 \times 10 = 100 \times 10 = 1\,000)$ one thousand.

28. $81 \text{ cm}^2 \div 9 = 9 \text{ cm}^2$. The side of the small square is $(\sqrt{9 \text{ cm}^2})$ 3 cm. Its perimeter is $(4 \times 3 \text{ cm})$ 12 cm.
29. If X represents Mathew's age 10 years ago, then in 10 years he will be 3 X years old (three times X). Between the time he was X years old and the time he will be 3 X years old, 20 years will have passed. Between these two times, $(3 X - X)$ 2 X years will have passed. Therefore $2 X = 20$ years and $X = 10$ years. Now, Mathew is 10 years older than he was then. Therefore he is $(10 + 10)$ 20 years old.



30. I can climb up a flight of 3 stairs in 3 different ways (1 - 1 - 1, 1 - 2, and 2 - 1). The diagram below shows the 3 ways in which it can be done.

