Mathematica Centrum

Together, let's shape the mathematicians of the future

PYTHAGORAS PREPARATORY TEST 2014
DETAILED SOLUTIONS

1. The number of vertices (8) plus the number of edges (12) of a cube is equal to 20.

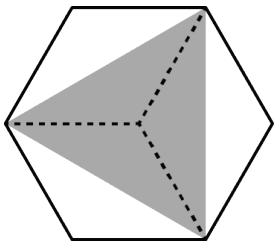
2. Only 24 (6 x 4) is a multiple of 4.

3. Three quarters = 75¢. Ten dimes = 100¢. The difference which is 25¢ is equal to 5 quarters.

4. (5 x 100) + (5 x 10) - (5 x 0.1) = 500 + 50 – 0.5 = 549.5.

5. The missing number in the equation: 10 x 2 ÷ 4 = ? ÷ 4 is (20 ÷ 4 = 5 and 5 is = 20 ÷ 4) 20.

6. The number of sides of a rectangle (4) multiplied by the number of faces of a cube (6) is equal to 24.



7. When 9 999 is rounded to the nearest hundred, the answer is 10 000.

8. Three times a number minus 3 is equal to 21.
The number is (21 + 3 ÷ 3) 8.

9. The fraction of the regular hexagon which is shaded is 1/2.

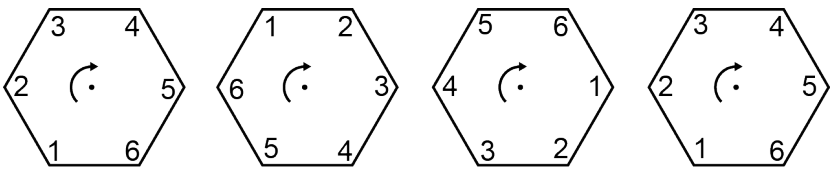
10. The value of n in the equation: 2 x n = n + 3 is 3.

$$\frac{78A}{B} = 1C7$$

11. Mathew talked for 150 seconds. He talked for (120 + 30 seconds) or 2 minutes + 1/2 minute or 2 ½ min.

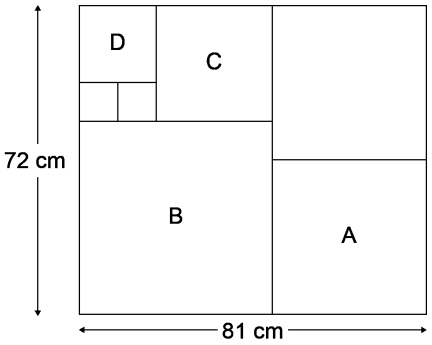
12. By trial and error and a bit of logic, we can find easily that A = 8, B = 4, and C = 9.
The sum of A + B + C that will yield the right result is (8 + 4 + 9) 21.

13. If you compare angle 1 of the first figure to angle 1 of the second figure in the diagram, you will notice that it has turned over 2 out of 6 sides. The rotation is thus 2/6 of a turn.



14. There are 5 intervals between the 0 and the 30 on this line and consequently each interval is equal to 6 units. Considering that there are 9 intervals between points M and N, the length of segment MN is therefore (9 x 6) 54.

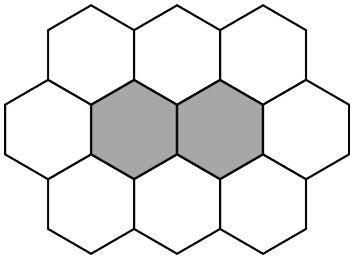
15. The length of the side of tile A is (72 ÷ 2) 36 cm and that of B is (81 - 36) 45 cm. The side of C is 27 cm and (72 - 45) that of D is (45 -27) 18 cm. The length of the side of the smallest tile is therefore (18 ÷ 2) 9 cm.



16. The number of hexagons that must be drawn to completely surround the 2 shaded hexagons is 8.

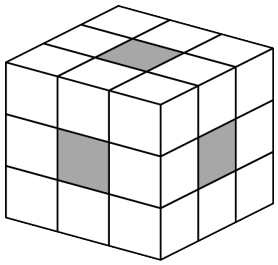
17. The prime number that is a factor of 10 (2 x 5) and of 25 (5 x 5) is 5. Multiplied by myself (5 x 5), I give a product of 25.

18. If the fourth day of a month is a Monday, the 25th day of this month is also a Monday. The 28th day of this month is a Thursday (minimum number of days in a month), the 29th would be a Friday, the 30th would be a Saturday and the 31st, a Sunday (maximum number of days in a month). The last day of this month cannot be a Wednesday, nor a Tuesday, nor a Monday.



19. The natural numbers between 10 and 60 which have at least one digit that is a ‘’3’’ are 13, 23, 30, 31, …39, 43 and 53. In all, there are 14 natural numbers between 10 and 60 that have at least one digit which is a 3.

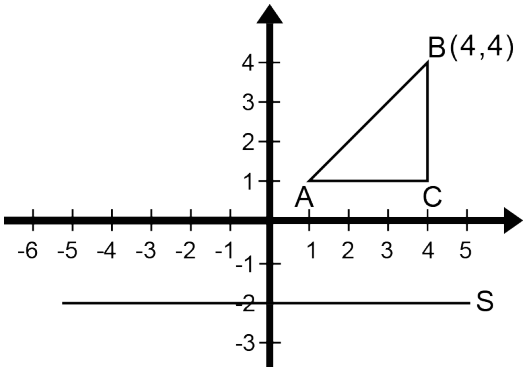
20. The 3 small cubes with the exterior face that is shaded have only one face that is covered with paint. Since a cube has 6 faces, there are 6 small cubes that have only one face that is covered with paint.



21. Number 49 could be one of them because 49 is a multiple of 7 (49 = 7 x 7) and when divided by by 2 or by 3 (49 ÷ 2 = 24 R1 and 49 ÷ 3 = 16 R1), it gives a remainder of 1.

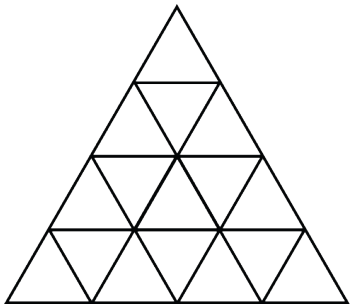
22. The product of all the factors of 35 (1, 5, 7, and 35) is equal to (1 x 5 x 7 x 35 o5 35 x 35) 1 225.

23. Vertex A lies 3 units above the flip line. The image of vertex A must lie 3 units below flip line S. The coordinates of the flipped image of A are (1 , -5).



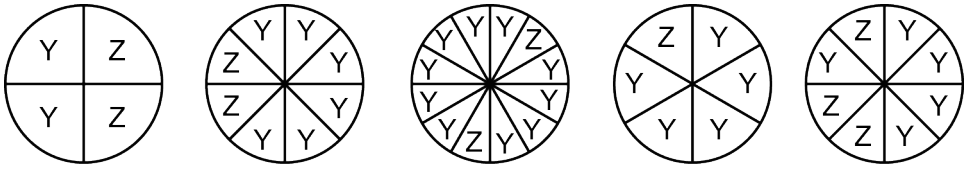
24. Mathew had a score of 6 out of 10 on his first test and 10 out of 10 on his second test. The average for the two tests is (6 + 10 = 16 and 16 ÷ 2 = 8) 8/10 or 80/100. His average for the two tests is therefore 80%.

25. Mathusalem has a weird watch. At 5:56, his watch, which was running 4 minutes fast, showed a time of 6:00. After one hour, it showed a time of 7:02. After 2 hours, it showed 8:04, … after 4 hours, it showed 10:08. After an other 30 minutes, it showed 10:39 (gaining 1 minute). After 4h 30min, his watch has gained 9 extra minutes and is now running (9 + 4) 13 minutes fast. When his watch shows a time of 10:39, the right time is (10:39 - 13 minutes) 10:26.



26. In the diagram, there are 16 small triangles. There are also 7 triangles, each one made of 4 small triangles, 3 other triangles, each one made of 9 small triangles, and 1 last one which is made of 16 small triangles. In all, we can count (16 + 7 + 3 + 1) 27 different triangles.

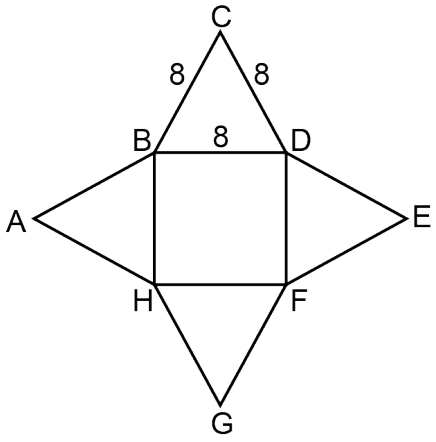
27. The probability of getting a Z for the 3rd and the 4th spinner is respectively 2 out of 12 and 1 out of 6, which is1/6.



28. The side of the octagon is (64 ÷ 8) 8 cm. The side of the square is also 8 cm and its area is (8 cm x 8 cm) 64 cm^2.

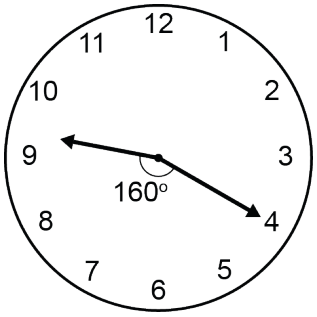
29. The equivalent fraction of 1/6 is 4/24. The equivalent fraction of 1/4 is 6/24. The fraction which lies between 1/6 and 1/4 is 5/24.

30. The minute hand turns 360° when it does a full revolution around the clock. Each interval of one hour represents (360° ÷ 12) 30°. Furthermore, when the minute hand does a third of a turn or 120°, the hour hand moves a third of 30°. The measure of the angle formed by the hour and minute hands when it is 9:20 is equal to (5 x 30° + one third of 30°) 160°.



31. If 10% of a number is equal to 11, then 100% of the number (therefore the number) is equal to 110 and 20% of half the same number (110 ÷ 2 = 55) is also equal to (20% x 55) 11.

32. Tim has always had trouble with arithmetic. Every time he multiplies two numbers, he makes the same mistake. For Tim, 3 x 10 = 45 and 3 x 8 = 36. Tim's mistake is that he always adds 50% more to the right product. In reality, 3 x 10 = 30, but for Tim, the product is 30 + 50% of 30 = 45 and 3 x 8 = 24 + 50% of 24 = 36. For Tim, the product of 5 x 10 is equal to (50 + 50% of 50) 75.



33. The number 105 is the product of 3 x 5 x 7. In reality, it is the product of the prime factors of 105.

34. Mathilda has lived 10 million seconds more than Mathew. Since, in a day, there are (24 x 60 x 60) 86 400 seconds, she has lived approximately (10 000 000 ÷ 86 400) 116 days more than Mathew.