Mathematica Centrum

Together, let's shape the mathematicians of the future

A. <u>You will need</u>:

1. A **blank response** form with the title "Mathematica", identical (except for the title) to the ones which are used for the Contests. Download this form and make as many copies as you need, so that your students can write the preparatory test and learn how to properly fill out a response form. (Remember that these copies cannot be used for the Contests. Your students will use the response forms that will be sent to you. Each student registered for a contest will receive a response form corresponding to the contest that he is writing. The only reason you are doing these copies is to show your students how to properly fill out a response form).

2. The **preparatory test** (this document), which your students can write to become familiar with multiple choice questions. Download this test and make as many copies as you need. (Remember that you are doing this to explain to your students the purpose of the preparatory test. The preparatory test defines the type of problems that appear in the actual contest.)

3. The **answer key**. Download the answer key and make as many copies as you need.

B. <u>How to fill out a response form properly</u>:

Use an **<u>HB pencil</u>** for coding all parts of the form. Do not use a ball point pen or felt-tip marker.

In the box at the top part of the form, tell your students to **PRINT** their school's name in full as well as their city/town and province. To the right of the box, tell them to **PRINT** their date of birth and sign their name to certify that the answers given represent their own work.

In the box on the mid-left of the form, tell your students to **PRINT** their last and first names. Tell them to code each letter by filling in the appropriate circle under each letter. (If your last name is Mathews, first you code the letter M by filling in the circle containing the M right under the letter M of Mathews, then you code the A by filling in the circle containing the A right under the letter A of Mathews. Do this for every other letter of your last name and for each letter of your first name). If the last name of a student is hyphenated, for example Jones-Smith, or if his/her first name is hyphenated, like Carol-Ann, inform the student to simply write Jones Smith and Carol Ann.

The mid-right part of the form outlines important instructions which are a reminder of what to do to code the response form correctly. The lower part of this box shows examples of incorrect coding. Remind your students to **completely** fill in each circle.

The box at the bottom of the form is made of circles which your students will fill in to record their answers to the questions. Again, tell them to fill each circle completely!

C. <u>Problems</u>:

Allow your students to write the preparatory test to be sure that they understand how to properly fill out the response form and to prepare them as to the type of problems that appear in the actual contests. It is important that your students do the problems intended for them :

Pythagoras : all of the problems from # 1 to # 33
Fibonacci : all of the problems from #1 to # 25 and # 31, 32, 33
Byron-Germain : all of the problems from # 1 to # 17 and # 32, 33
Thales : all of the problems from # 1 to # 14 and # 32, 33

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PREPARATORY TEST 2009

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

1. The number of faces plus the number of edges of a triangular prism is equal to

A) 11 B) 12 C) 13 D) 14 E) 15

2. A natural number is multiplied by 8. The result could not be

A) 24 B) 56 C) 63 D) 48 E) 16

3. The double of one half of 20 is equal to

A) 20 B) 40 C) 80 D) 18 E) 10

4. Round 5 426 to the nearest hundred. The answer is

A) 5 000 B) 5 400 C) 5 500 D) 5 530 E) 5 600

5. The number of sides of a trapezium plus the number of vertices of a cube minus the number of lines of symmetry of a square is equal to

A) 3 B) 6 C) 5 D) 7 E) 8

6. The number of minutes in 3 hours is

A) 90 B) 180 C) 60 D) 10 800 E) 300

7. Which of the 5 numbers listed below is the largest?

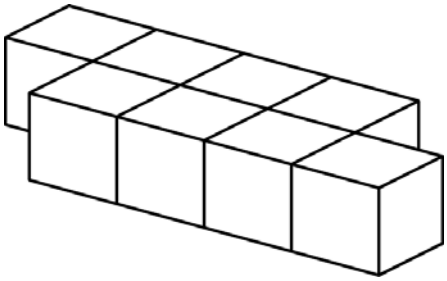
A) 12.027 B) 12.043 C) 12.067 D) 12.08 E) 12.010

8. 10 ones plus 3 hundreds plus 13 tens is equal to

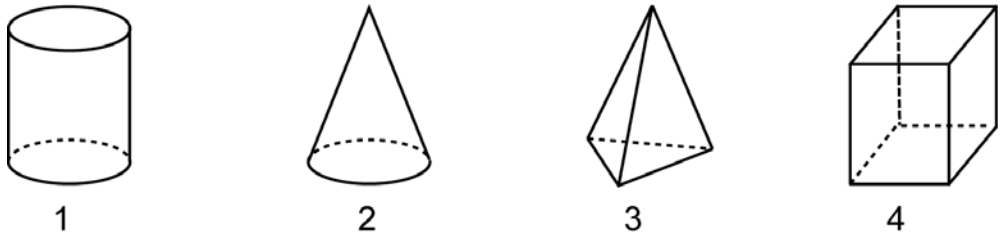
A) 440 B) 430 C) 431
D) 421 E) 340

9. Eight blocks have been glued together. How many faces of these blocks have glue on them?

A) 20 B) 18 C) 21
D) 17 E) 19



10. Which of the following solids can slide but cannot roll?



A) 1 and 4 B) 2 and 3 C) 3 and 4 D) 4 and 2 E) none

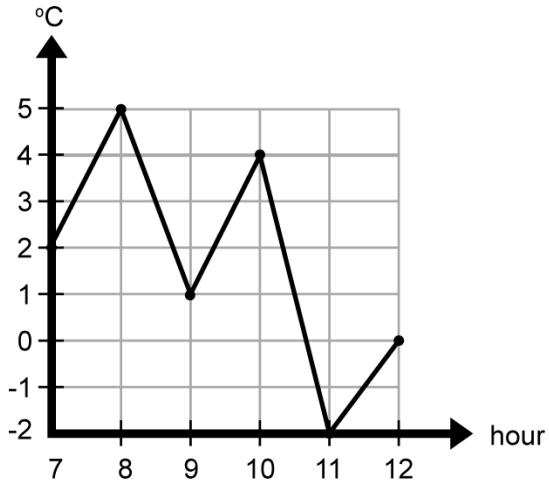
11. How many natural numbers between 1 and 30 are divisible by 3?

A) 9 B) 7 C) 6 D) 8 E) 10

12. The next group of letters in the sequence: ABCD, BCDE, CDEF, ... is

A) DEGF B) DEFG C) DEGH
D) DFGH E) DEFD

13. A scientist has recorded the temperature in degrees Celsius (°C) every hour from 7 A.M. to 12 A.M. The diagram on the right represents the data recorded. What is the difference between the temperature recorded at 8 A.M. and the one recorded at 9 A.M.?



A) 6 B) 4 C) 8
D) 5 E) 7

14. What is the length of the side of a square if its perimeter measures 100 m?

A) 26 m B) 27 m C) 25 m
D) 20 m E) 50 m

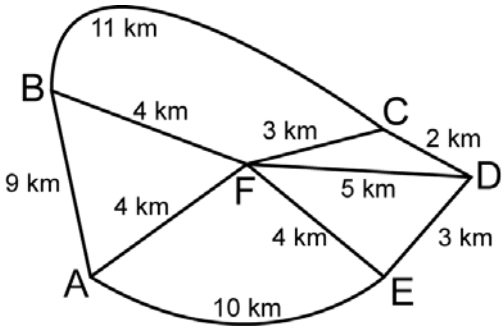
15. The 6 faces of two die are numbered from 1 to 6. Mathew throws the two die and adds the two numbers that appear on the top face of each dice. Of all the possible combinations, how many will give a sum that is greater than 10?

A) 4 B) 6 C) 5 D) 7 E) 3

16. What number must be added to the following set: {2, 4, 4, 6, 6, 9, 11} so that the mode and the average are represented by the same number?

A) 6 B) 2 C) 4 D) 9 E) 11

17. Six towns (A, B, C, D, E, and F) are joined as shown in the diagram. Starting from A, a salesman wants to go to all the other towns without coming back to A. He wants to take the path of the shortest distance so that he can save time and money. How many kilometres will he have to drive?

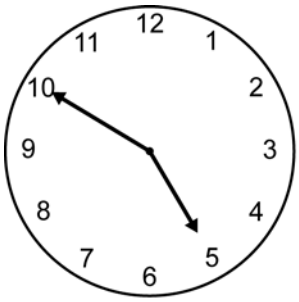


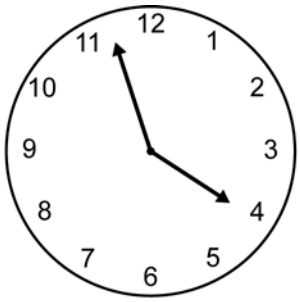
A) 23 km B) 21 km C) 22 km
D) 20 km E) 19 km

18. Mathew has scored an average of 32 goals during his last 4 seasons of soccer. What is the minimum number of goals that he must score this season if he wants to keep an average that is equal to or greater than 28 goals per season for the 5 seasons?

A) 14 B) 18 C) 12 D) 20 E) 10

19. It is 4:51. Which of the following clocks shows the right time?


A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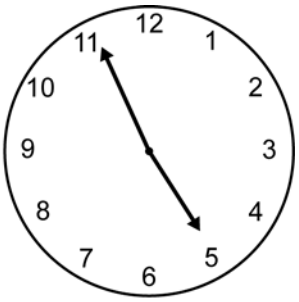
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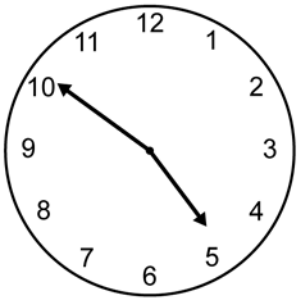
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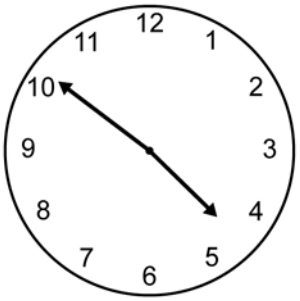

E

20. Mathilda obtained a grade of 64% on a test of 25 questions. How many correct answers did she get?

A) 15 B) 16 C) 17 D) 18 E) 19

21. Which of the following is false?

A) 1/2 < 5/8 B) 2/3 = 14/21 C) 9/13 > 3/5 D) 3/5 = 0.6 E) 1/4 < 0.24

22. The value of N in the equation: 7 x 5 x 9 ÷ N = 7 x 9 is

A) 5 B) 63 C) 35 D) 45 E) 25

23. The product of all the factors of 10 is equal to

A) 17 B) 100 C) 50 D) 200 E) 10

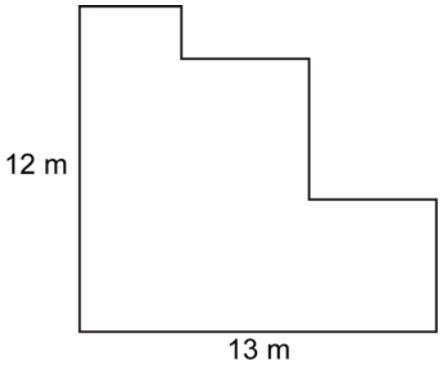
24. The 6 faces of a dice are numbered from 1 to 6. If you throw the dice 66 times, how many times could you expect to get an even number?

A) 46 B) 37 C) 44 D) 33 E) 51

25. How many numbers between 1 and 10 are prime?

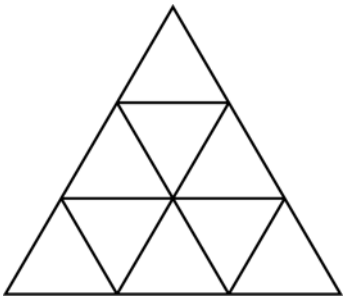
A) 2 B) 5 C) 4
D) 6 E) 3

26. The perimeter of the figure on the right is equal to



A) 52 m B) 54 m C) 48 m
D) 50 m E) 56 m

27. How many equilateral triangles can you count in the diagram below?



A) 26 B) 12 C) 13
D) 10 E) 11

28. $1 + 10 + 10^2 + 10^3 = ?$

A) 1 111 B) 11 111 C) 1 110
D) 1 010 E) 10 111

29. Which of the following numbers is the cube of a natural number?

A) 333 B) 900 C) 66 D) 36 E) 216

30. How many natural numbers between 1 and 10 can be represented as the product of two or more prime factors?

A) 1 B) 5 C) 2 D) 4 E) 3

31. Olive lists all the natural numbers from 1 to 50. She then erases 20 even numbers from this list. What fraction of the numbers left are even numbers?

A) 1/2 B) 5/6 C) 2/7 D) 1/6 E) 3/8

32. A number divided by 3 gives 6. The same number subtracted from 24 gives

A) 6 B) 7 C) 13 D) 22 E) 8

33. Which of the following has 31 days?

A) September B) June C) April D) February E) January