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
Fibonacci : problems #1 to #23, and #28
Byron-Germain : problems #1 to #16, and #28
**Thales** : problems #1 to #15, and #28

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PREPARATORY TEST 2011

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

1. The number of edges of a cylinder plus the number of sides of a rectangle is equal to

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

2. The value of X in the equation: X + 2 = 10 is

   A) 7   B) 8   C) 9   D) 10   E) 11

3. The value of the unknown number in the equation: 12 x ? = 14 + 10 is

   A) 1   B) 2   C) 3   D) 4   E) 6

4. Approximately how many hours does a person sleep in one month?

   A) 100   B) 120   C) 150   D) 240   E) 330

5. 400 nickels = ? dimes

   A) 25   B) 150   C) 100   D) 50   E) 200

6. 6 ÷ 2 + 5 x 2 = ?

   A) 13   B) 14   C) 15
   D) 16   E) 18

7. How many elements of the set shown on the right are divisors of 24?

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

   18• 2• 24• 8• 6•

8. Mathilda is 4 years younger than Mathew. Mathew is 2 years older than Melissa. The sum of their ages is 18 years. How old is Melissa?

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

9. 10 hundreds - 70 ones + 27 tens = ?

   A) 990   B) 1 110   C) 1 200   D) 1 230   E) 1 260
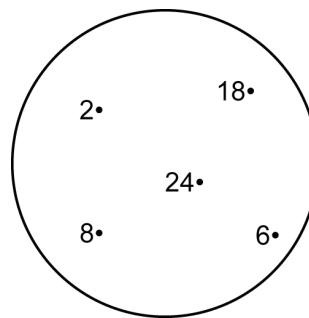
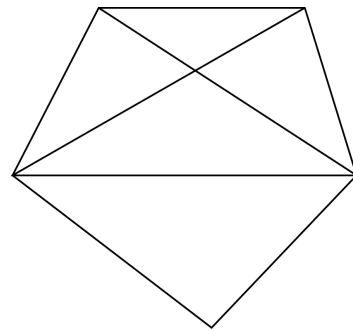**10.** What is the largest natural number that, when multiplied by 7, gives a result smaller than 143?

A) 21   B) 22   C) 18   D) 19   E) 20

11. Which spinner should you choose to increase your chances of getting a 3 or a 2?

A   B   C   D   E
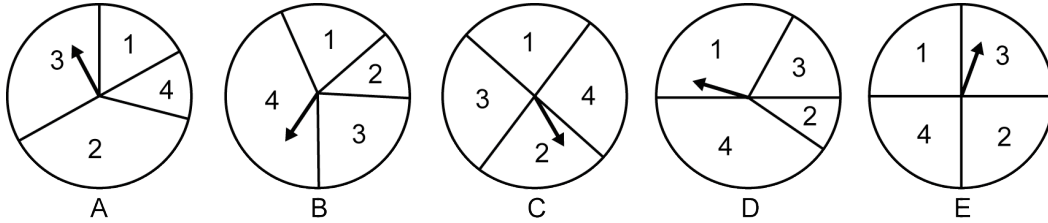
12. How many triangles can you count in the diagram shown?

A) 7   B) 8   C) 9
D) 10   E) 11

13. The value of (1 + 2 + 3 + ... + 20) is 210. What is the value of (2 + 4 + 6 + ... + 40)?

A) 315   B) 360   C) 400
D) 410   E) 420

14. If 3 x 37 = 111, then 27 x 37 = ?
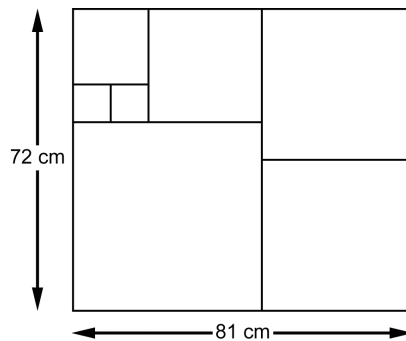
A) 1 111   B) 999   C) 1 119   D) 1 009   E) 777

15. The sum of 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 is not divisible by

A) 2   B) 4   C) 9   D) 7   E) 12

16. Tim has used square tiles to completely cover a rectangular surface of 81 cm x 72 cm. What is the length of the side of the smallest tile he has used?

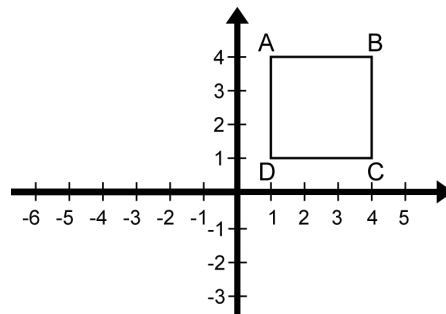A) 7 cm   B) 8 cm
C) 9 cm   D) 10 cm
E) 11 cm

17. The GCF of 12, 36, and 72 is

A) 12   B) 16   C) 24
D) 4   E) 6

18. ABCD is a square. What are the coordinates of the image of vertex D, if the square is slid (translation) 5 units to the left?

A) (-5 , 1)   B) (-1 , 4)   C) (-4 , 2)
D) (-1 , 1)   E) (-4 , 1)

19. How many prime numbers are there between 57 and 69?

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

20. Starting at 59 on the number line, how many times must you subtract 7 to get to -11?

A) 9 times   B) 10 times
C) 11 times   D) 12 times
E) 13 times

21. The pile shown is made of cubes that have been glued together. How many of the 64 cubes of this pile are completely hidden (not even one of their faces can be seen) even if we turn the pile?
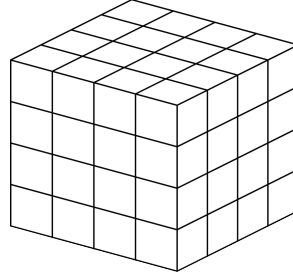
A) 5   B) 6   C) 7
D) 8   E) 9

22. How many prime numbers between 1 and 1 000 have a one's digit that is a 2?

A) 0   B) 1   C) 2   D) 8   E) 10

23. The second largest factor of 36 is
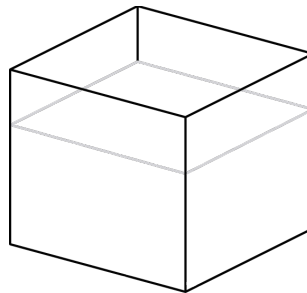
A) 18   B) 12   C) 6   D) 9   E) 36

24. If N/M = 0.3, then 7N/3M = ?

A) 0.3   B) 0.4   C) 0.5   D) 0.6   E) 0.7

25. The one's digit of the sum of all the natural numbers from 0 to 11 is
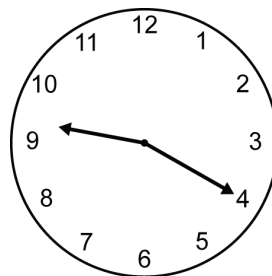
A) 0   B) 1
C) 3   D) 6
E) 9

26. A cubic tank 20 cm x 20 cm x 20 cm is 3/4 full. What volume of water has to be poured into the tank so that it is 7/8 full?

A) 1 000 cm^3 B) 900 cm^3
C) 500 cm^3 D) 1 150 cm^3
E) 1 200 cm^3

27. What is the measure of the angle formed by the hour hand and the minute hand when it is 9:20?

A) 135°   B) 140°
C) 145°   D) 150°
E) 160°

28. Only one of the following months has 31 days. Which one is it?

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

29. Mathew has completed a 200 m race. He ran the first 60 metres at a speed of 10 m/s and the rest of the race at a speed of 7 m/s. Mathew finished the race in

A) 24 s   B) 25 s   C) 26 s
D) 27 s   E) 28 s

$$\begin{array}{r} A\ B\ C \\ +\quad D\ B\ C \\ \hline E\ B\ F\ G \end{array}$$

30. A, B, C, D, E, F, and G represent 7 different digits. We know that zero is not one of these 7 digits. We also know that C is even, that G is greater than 4, that A is greater than D and finally, that F is odd and greater than 5. What is the value of B?

A) 8   B) 7   C) 1   D) 3   E) 6

31. Three brothers were born on the same day of the year (October 20). On their birthday they were 2, 5, and 7 years old. If they were to live for ever, how many times in the next 1 000 years (on their birthday) would their ages be represented again by 3 prime numbers?

A) 0   B) 1   C) 5   D) 8   E) 29