

Raising A Mathematician Foundation

THE DEEPER YOU GO, THE MORE YOU GROW!

I PROBLEMS for $\sqrt[3]{\text{CUBE ROOTS}}$ (Std 5th & 6th)

1. A snake grows in this pattern:



How many *triangles* (including the red one) will the *snake have on Day 100*? _____.

2. Below is the image of a 4×4 magic square made up of numbers from 1 to 16.

All the numbers from 1 to 16 need to be placed in the *cells* in *such a way* that no number repeats and the *sum of every row, column and diagonal* gives the *total 34*.

As you can see, *some numbers are missing*.

6		1	
3	A	8	
	5	B	2
9			7

Using the given information, the *sum* of *A* and *B*, is _____.

3. Every day at *noon* a *camel* travels straight from *point A* to *point B* and *vice-versa*.

The *travel* takes *7 days* and *7 nights* in *either direction*.



How many *camels* will a camel leaving *point A* today pass by the time it reaches *point B*? _____.

(Note: If a *camel* meets another camel at the *starting/ending point*, then they are *not* 'passing' each other. To 'pass' each other, they have to *literally cross each other*.)

4. The 4 button on a calculator does not work.

If any number which has the digit 4 is entered, the calculator ignores the 4 and continues to operate with the remaining digits.

Also, digits 4 as a part of the result will not be displayed.

Few examples:

- 2×14 can be entered as 2×1 and the result displays as 2.
- 3×18 if entered displays the result as 5 only.
- 7×7 if entered displays the result as 9 only.
- 37×12 if entered displays no result (blank) only.

The result which it outputs is 1.

How many possible combinations of the one digit and two digit number can output this as the result? _____.

5. A sequence starts with number 2021.

The following cyclic operations are performed again and again in this order to generate the next terms of the sequence:

- Multiply by 2, Add 2, Divide by 2, Subtract 2 ;
- Again: Multiply by 2, Add 2, Divide by 2, Subtract 2 ;
- Again: Multiply by 2, Add 2, Divide by 2, Subtract 2 ; and so on...

The sequence will be:

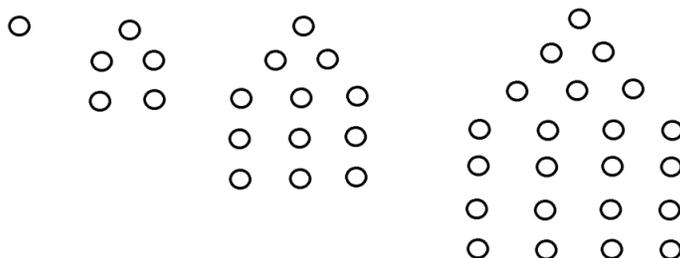
2021, 4042, 4044, 2022, 2020, 4040, 4042, ...

The sequence stops with 0 finally, once it (zero) is reached.

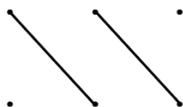
The total number of terms in this sequence will be _____.

II PROBLEMS for $\sqrt{\text{SQUARE ROOTS}}$ (Std 7th & 8th)

6. In the figure below, what will be the number of circles in the 50th figure if the pattern continues in the same way? _____.



7. The cold tap in your bath lets the water in at the rate of 15 litres per minute.
The hot tap fills the bath at the rate of 10 litres per minute.
The plug hole lets the water out of the bath at the rate of 12 litres per minute.
The bath holds a maximum of 520 litres. You turn both taps on, but forget to put the plug in. How many minutes does it take for the bath to overflow? _____.
8. A, B, C, D and E play a game in which each one is either a dog or a mouse.
A dog's statement is always false while a mouse's statement is always true.
 A says that B is a mouse. C says that D is a dog.
 E says that A is not a dog. B says that C is not a mouse.
 D says that E and A are different kinds of animals. How many play dogs? _____.
9. Here is a rectangular arrangement of 6 points in 2 rows and 3 columns.
One should draw exactly two line segments which are not intersecting, as shown.



Four different points should be used as the ends of these two line segments.
How many such frames (including the given examples) are possible? _____.

10. In a *coach of a train* there are 72 *seats numbered* from 1 to 72 in *groups of 8*, as follows.

↑	⋮	⋮	↑
16	14	13	12
15	11	10	9
8	6	5	4
7	3	2	1

In every group,

- Every 1st *seat* is exactly opposite to 4th *seat*.
- Every 2nd *seat* is exactly opposite to 5th *seat*.
- Every 3rd *seat* is exactly opposite to 6th *seat*.
- Every 7th *seat* is exactly opposite to 8th *seat*.

The sum of all the composite seat numbers which are *opposite to seat numbers* that are *multiples of 10*, will be _____.