Raising A Mathematician Foundation

THE DEEPER YOU GO, THE MORE YOU GROW!

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

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:

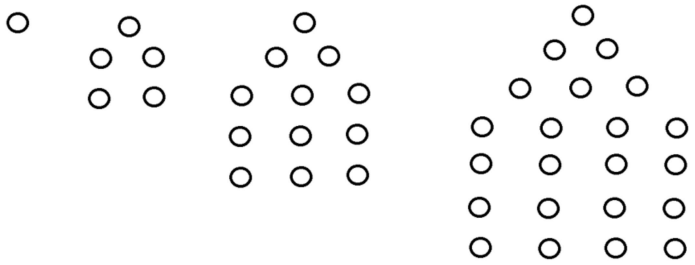
   2021, 4042, 4044, 2022, 2020, 4040, 4042, ...

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

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

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

6. In the *figure below*, what will be the *number of circles* in the 50^{th} *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.

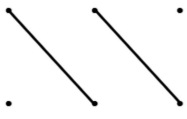
   A says that B is *a mouse.* C says that D is *a dog.*

   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.*

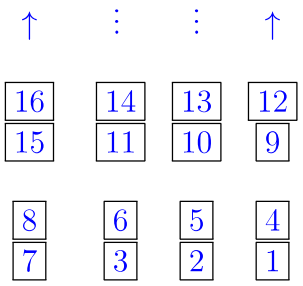
   One should draw exactly two line segments *which are not intersecting*, as shown.



   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.



In every group,

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

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