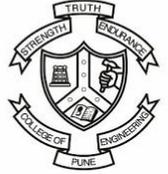# College of Engineering, Pune
MINDSPARK

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Genius Junior
Round 2

Time: 2 hours   **Max. Marks: 168**

Grade: 9th std

ANSWER KEY

Note : This Answer Key contains only one of the many correct answers to each question. Any suitable logically accurate answer is acceptable and marked correct.

MINDSPARK

SECTION 1: STRIKE IT ALL

Answer all 4 questions in this section correctly to triple the marks you obtain in this section. Can't solve all? Don't worry. Answer any 3 consecutive questions correctly to double the marks you obtain in this section.

That is if you answer 3 or 4 consecutive questions correctly:-

$$SECTION\ SCORE\ =\ (No\ of\ consecutive\ correct\ answers\ -\ 1) \times Section\ Marks$$

Section score: 13

1) You have 4 coconuts and know that only 2 of them are exactly of the same weight. Using a traditional 2 pan balance (taraju), what is the minimum number of weightings you need to perform to guarantee which 2 coconuts are identical in weight? **[3]**

Answer: 5

2) Seven pirates attacked the British ship and loot some rare gems from them. They decided to rest for some time and then divide the gems later. While everyone was resting two of the pirates wake up and planned to divide gems equally between the two, one gem is left. So they decide to wake the third pirate and decide to divide among three, but alas again one gem was left. They then decide to wake the fourth pirate to divide the gems and again one gem was left. The same happened again in the fifth and sixth. Finally, they woke up the 7th pirate and this time the gems were divided equally.
How many gems did they steal in total? **[4]**

Answer: 301

3) A Factorial of a number x (represented by $x!$) is defined as
$$x \times (x-1) \times (x-2) \times ...... \times 3 \times 2 \times 1.$$
E.g. $4! = 4 \times 3 \times 2 \times 1 = 24$
The number of minutes in February 2017 is a Factorial of which number? **[3]**

Answer: 8

4) Four metal rods of lengths 78 cm, 104 cm, 117 cm and 169 cm are to be cut into parts of equal length. The parts should have maximum length possible. What is the maximum number of pieces that can be cut? **[3]**

Answer: 36

SECTION 2: SIMPLETON

IT'S SIMPLE! Nothing fancy, but better if you have the "golden ticket"

Section score: 12

5) Messi claims that he proved somehow that there is theorem that is correct for the following 3 numbers:

x = 321,

y= 576,

z= 995

He announces these 3 numbers and calls for a press conference where he is going to present the value of n.

$$x^n + y^n = z^n$$

As the press conference starts, Ronaldo raises his hand and says that the respectable Messi has made a mistake and the theorem cannot hold for those 3 numbers. Messi checks his computer calculations and finds a bug.

How did the Ronaldo figure out that the Messi was wrong?

Hint: You do not need to compute powers of x, y and z. **[3]**

Answer: Any number ending in 1 raised to any power will always end in one. Ex: 11 square is 121 ends in 1. Similar property holds for 6 and 5. If we add the last digits of numbers on LHS i.e. 1 and 6 it doesn't add up to 5 which is the last digit of RHS.(similar idea expected)

6) Your doctor gives you three pills and tells you to take one every half hour. How much time will have passed by the time you've taken all three pills? **[2]**

Answer: 1 hour

7) Today, John has to transfer 50 euro to the bank account of a Dutch friend. He has written down the account number on a piece paper. But since he had forgotten to take out the paper from his trousers when he put them in the washing machine, one digit of the bank account number became unreadable. The note says: 3170?4847. The friend of John is climbing the Mount Everest at the moment, so it is impossible for John to call his friend. Suddenly he remembers that a for a valid Dutch bank account number it holds that the first digit times 9 + the second digit times 8 + the third digit times 7 + ... + the ninth digit times 1 should be divisible by 11. What should be the number? **[4]**

Answer: 3

8) A Japanese ship having a Japanese flag is on route back to the shore from the Atlantic Ocean. Seeing the silent waves, the captain decides to take a shower. He keeps his Rolex and diamond studded gold bracelet on the shelf and goes for a shower. When he returns back, he finds both the watch and bracelet missing. He immediately calls the four crew members and asks them what they were doing during that duration. Following are the answers:

1. French Guy, the Cook: I was in the kitchen, making bacon sandwiches for everybody.
2. Pakistani Guy, the engineer: I was in the generator room, checking the generator.
3. Sri Lankan Guy, the housekeeper: I saw that the flag hoisted on the ship was upside down, so I went to correct it.
4. Russian Guy, the second housekeeper: I was tired and taking a quick nap.

The captain immediately knew who the thief was. Can you tell?   **[3]**

Answer: The Japanese flag is designed in such a way that it looks the same upon inversion. Therefore, the Sri lankan guy is the thief as he is telling a lie.

SECTION 3: GOLDEN TICKET

A wise logician once said "Correct answer at the 11th hour will reward you with golden ticket". A golden ticket will award you 2 marks for each correct answer in "SIMPLETON".

Section score: 13

9) Two friends, Ram and Shyam, meet after a long time.
Ram: Hey, how are you man?
Shyam: Not bad, got married and I have three kids now.
Ram: That's awesome. How old are they?
Shyam: The product of their ages is 72 and the sum of their ages is 14.
Ram: Cool..But I still don't know.
Shyam: My eldest kid just started taking piano lessons.
Ram: Oh now I get it.

How old are Shyam's kids?   **[2]**

Answer: 8, 3, 3

10) Tom has three boxes with fruits in his barn: one box with apples, one box with pears, and one box with both apples and pears. The boxes have labels that describe the contents, but none of these labels is on the right box. How can Tom determine what each of the boxes contains, by taking only one piece of fruit from one box?   **[3]**

Answer: Tom takes a piece of fruit from the box with the labels 'Apples and Pears'. If it is an apple, then the label 'Apples' belongs to this box(As this box contains apples and 'Apples and Pears' is an incorrect label). Now, the box labelled 'Pears' cannot contain pears(otherwise the box would be labelled correctly). So, the box labelled 'Pears' contains apples and pears both. And finally, the box labelled 'Apples and Pears' contains pears only.
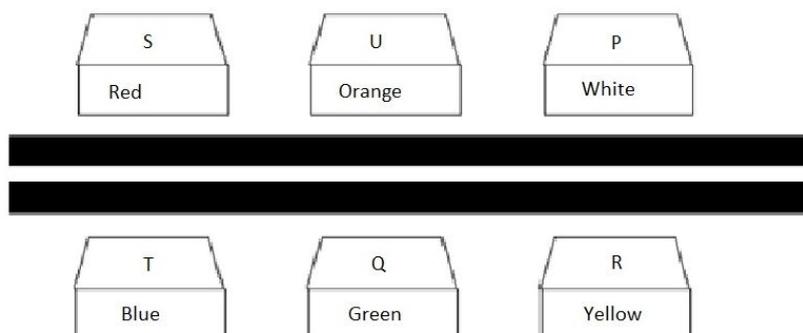
If Tom would have taken a pear, the reasoning would have been in a similar way. .

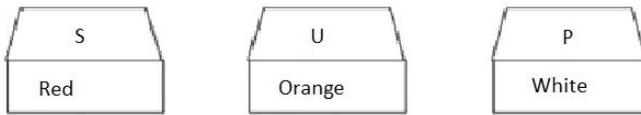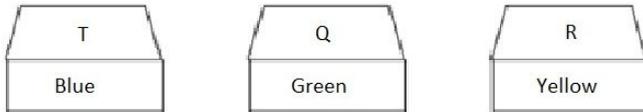**11)** Complete the table given below by interpreting the data

(i) There are three houses on each side of the road.

(ii) These six houses are labeled as P, Q, R, S, T and U.

(iii) The houses are of different colours, mainly, Red, Blue, Green, Orange, Yellow and White.

(iv) The houses are of different heights.

(v) T, the tallest house is exactly opposite to the Red coloured house.

(vi) The shortest house is exactly opposite to the Green coloured house.

(vii) U, the Orange coloured house, is located between P and S.

(viii) R, the Yellow coloured house, is exactly opposite to P.

(ix) Q, the Green coloured house, is exactly opposite to U.

(x) P, the White coloured house, is taller than R, but shorter than S and Q.   **[5]**
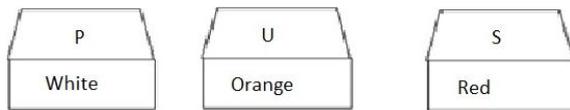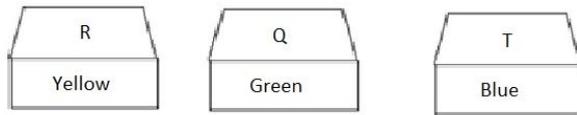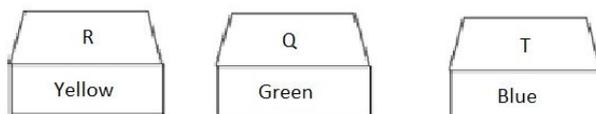
Answer:
ANSWER 1

ANSWER 2

T	Q	R
Blue	Green	Yellow

S	U	P
Red	Orange	White

ANSWER 3

R	Q	T
Yellow	Green	Blue

P	U	S
White	Orange	Red

ANSWER 4

P	U	S
White	Orange	Red

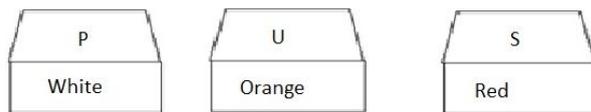| R	Q	T
Yellow	Green	Blue

12) You are given a set of scales and 12 marbles. The scales (Weighing scale or taraju) are of the old balance variety. That is, a small dish hangs from each end of a rod that is balanced in the middle. The device enables you to conclude either that the contents of the dishes weigh the same or that the dish that falls lower has heavier contents than the other. The 12 marbles appear to be identical. In fact, 11 of them are identical, and one weighs less than the others. Your task is to identify the unusual marble and discard it. You are allowed to use the scales three times if you wish, but no more.
What will be your method?   **[3]**

Answer: Divide the 12 marbles into three groups of 4 marbles each.

Weight any two groups. If the scale shows both groups weigh equal. Then, divide the remaining group of 4 marbles into 2 groups of 2 marbles each. Obviously, one group will weight less. Compare the marbles of these groups to find the unusual marble.

If one of the group(containing 4 marbles) weighs less, divide the marbles of this group into 2 groups of 2 marbles each and use the technique used above.

SECTION 2^2 : PERFECTLY SQUARED

The answers to the first three questions share a common property. Exploiting this property will help you solve the 4^2 question.

> *Section score: 12*

13) A man fills a basket with eggs in such a way that the number of eggs added on each successive day is the same as the number already present in the basket. This way the basket gets completely filled in 27 days. After how many days the basket was $1/4th$ full? **[2]**

Answer: 25

14) Four people need to cross a bridge in the middle of the night. The bridge can only hold two or less people at any time and the people need to cross the bridge under the torchlight or they may trip and fall off the bridge. They have only one torch between them so the two travelers/(traveler) crossing the bridge must travel together/(or alone). The torch can only travel with a person so every time it crosses the bridge someone must carry the torch back. Tom can cross in **1** minute, John can cross in **2** minutes, Sally can cross in **5** minutes, and Connor can cross in **9** minutes. If two people cross together they go as fast as the slower person.
What is minimum time in which they all can cross the bridge? **[3]**

Answer: 16

15) Mogambo and his team need to break the safe to unlock the missile code in exactly five minutes.
They got just one chance and five minutes to finish the job else the local police will be informed. He got following clues.
Clue 1 - 489: One number is correct and well placed
Clue 2 - 406: One number is correct but wrong place
Clue 3 - 914: Two numbers are correct but wrong places
Clue 4 - 708: Nothing is correct
Clue 5 - 871: One number is correct but wrong placed
What is the safe password? **[2]**

Answer: 169

4^2) There are 100 light bulbs lined up in a row in a long room. Each bulb has its own switch and is currently switched off. The room has an entry door and an exit door. There are 100 prisoners lined up outside the entry door. Each bulb is numbered consecutively from 1 to 100. So is each prisoner.

Prisoner No. 1 enters the room, switches on every bulb, and exits. Prisoner No. 2 enters and flips the switch on every second bulb (turning off bulbs 2, 4, 6...). Prisoner No. 3 enters and flips the switch on every third bulb (changing the state on bulbs 3, 6, 9...). This continues until all 100 prisoners have passed through the room.

Which light bulbs are illuminated after the 100th prisoner has passed through the room?   **[5]**

Answer: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Trick or Treat' 17

Are you ready to play the gamble?

Getting this question right will **double** your test score!

However getting this question wrong will **halve** your test score!

This question will be evaluated only on attempting at least 3 questions in all the 4 sections.

17) A lab scientist has nine bottles of wine. However, he used one of the bottles in an experiment and is currently poisoned. The poison is deadly and only one sip will make any living being die. Mice show effect of the poison after half an hour. So how can a lab scientist can find the poisoned wine bottle by using just two mice labs in minimum amount of time and minimum number of tests?

Answer: Any suitable logically accurate answer is correct.