15.11.17

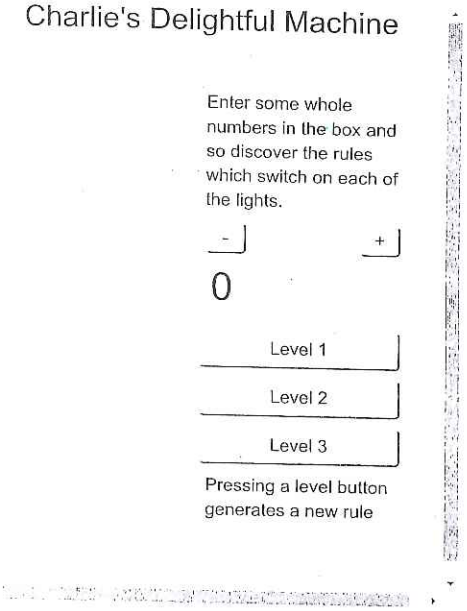
Charlie's Delightful Machine

Stage: 3 and 4 Challenge Level: ☆
You may wish to look at Shifting Times Tables /6713 before trying this problem.

Charlie's Delightful Machine has four coloured lights. Each light is controlled by a rule.
If you choose a number that satisfies the rule, the light will go on.
Some numbers may turn on more than one light!

Start by exploring Level 1. Type in some numbers and see which lights you can switch on.
To start again with a new set of rules, click the Level 1 button.

Can you develop a strategy to work out the rules controlling each light?



Once you have a strategy, challenge yourself to find some four-digit numbers that turn on each light.

Once you are confident that you can work out the rules for Level 1 lights, have a go at A Little Light Thinking /7016 , where you can explore how to turn on several lights at once.

You may also wish to explore the Level 2 and 3 lights (which use a different type of sequence) in the same way.

Level 1 Level 1

Adding or subtracting 3 starting from 0 is green.

Adding or subtracting 7 starting from 6 is yellow.

Adding or subtracting 8 starting from 4 is red and yellow.

0 = G
1 = O
2 = O
3 = G
4 = R + B
5 = O
6 = G + Y
7 = O
8 = O
9 = G
10 = O
11 = O
12 = R
13 = Y
14 = O
15 = G
16 = O
17 = O
18 = G
19 = O
20 = Y + R
21 = G
27 = G + Y
28 = R + B
36 = R + B
39 = G
41 = Y
132 = R +

Level 2

All square

Start with 2 for blue.

Adding or su

Start with

Level 3 -

All multiples

0 = G
1 = 0
2 = 0
3 = G
4 = R + B
5 = 0
6 = G + Y
7 = 0
8 = 0
9 = G
10 = 0
11 = 0
12 = R
13 = Y
14 = 0
15 = G
16 = 0
17 = 0
18 = G
19 = 0
20 = Y + R + B
21 = G
27 = G + Y
28 = R + B
36 = R + B + G
39 = G
41 = Y
132 = R + B + Y + G

Level 2

All square numbers are yellow.

Start with 5 and add eight and increase what you add every time by 2 for blue.

Adding or subtracting 10 starting from seven is green.

Start with 0 and add two, four, six etc... for ~~next~~ ✓ 16.11.17

VF An excellent start!

Level 3 -

All multiples of nine are ~~yellow~~ green.

For blue add odd numbers going 3 = 1, 3, 5 etc... starting from 5.

Starting from 3 add 4, 8, 12 etc... for red.

Starting from 0 add 4, 5, 6 etc... for yellow.

A little light thinking

Blue = Start on 7 add 10 every time.

Red = Start on 5 add 12 every time.

Yellow = Start on 2 add 10 every time

Green = Start on 5 add 7 every time.

Q1 = Impossible.

Q2 = Impossible.

Q3 = Nothing because it's always a mixture.

Q4 = Not always.

Red ~~and~~ and green both start on the same ~~thing~~ thing.

Blue and red have the same second term.

Look at the rules and find connections. Then find terms that fit in both rules.

Level 2

Red = Start on 3 add 1, 3, 5, 7 etc...

Blue = Start on 4 add 7, 9, 11 etc...

Yellow = Start on 0 add 8, 10, 12 etc...

Green = Start on 9 add 11 each time.

1. Of To rec

1.

a. 28%

b. 57%

c. 87.5%

d. 47.25

e. 4%

f. 4.5%

2.

a. 0.35

b. 0.358

c. 0.7

d. 0.07

e. 0.007

f. 0.055

3.

a. 87.5%

b. 31.25%

c. 32.5%

d. 85%

e. 56%

7.

Jamila = $\frac{18}{25}$ = 72% Diana $\frac{16}{20}$ = 80%

Diana got the higher percentage.

Level 3

Red = Start on 9 and add 18, 24, 30, 36, 42 etc...

Green = Start on 9 and add 2, 6, 10, 14, 18 22 etc...

Blue = Start on 5 and add 2, 6, 10, 14, 18 etc...

Yellow = Start on 6 and add 7 every time.