Logic and Maths Puzzles # 74 September 2018

1. What is two fifths squared as a decimal?

2. What is the value of three to the power of nought?

3. This grid has four shaded rows and four shaded columns. Each square within the grid is either pink, yellow, green or blue. Each colour represents a numerical value.

				35
				26
				36
				34
29	26	45	?	

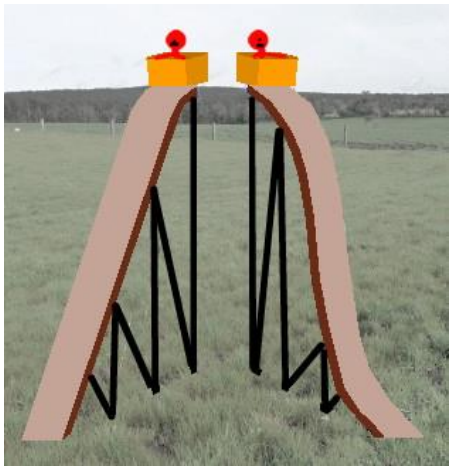
The totals for each row and each column (except for column 4) are provided at the end of that row or column.

For example, Row 1: 2 pink squares plus one yellow square plus one blue square have a total value of 35
Column 1: one pink square plus one green square plus one yellow square plus another pink square have a total value of 29

Calculate the numerical value of each colour square and hence the total for column 4

4. What is the next number in this sequence? **27, 125, 343, …**

5.



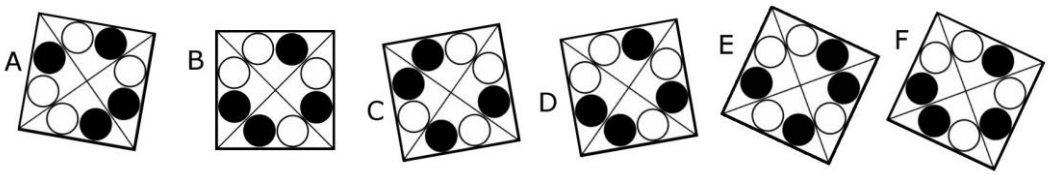
Alec and Bob each decide to construct a roller coaster in the form of a ramp.

They agree to make the vertical drop and the amount of horizontal displacement between the top and the bottom the same for both roller coasters. However, Alec decides to have a straight slope whereas Bob has a curved slope as shown.

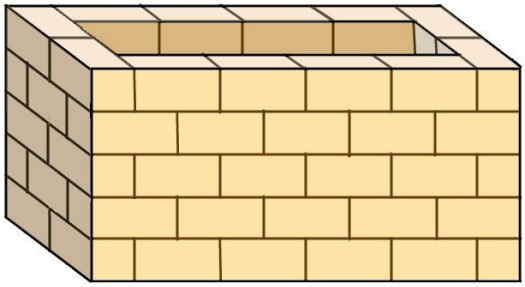
If they launch at the same time, what will happen?

A. Alec will reach the bottom first
B. Bob will reach the bottom first
C. They will reach the bottom at the same time.

6. Which one of these six designs is different to the other five?

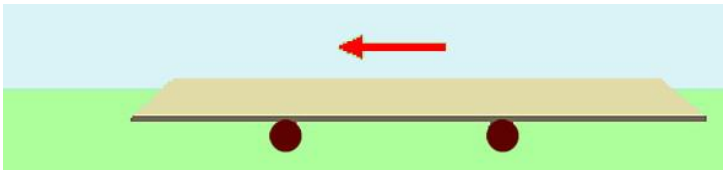


7.



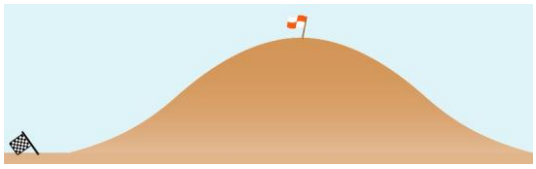
If the chimney shown here is complete on all four sides, and built from identical bricks, how many bricks are in the complete structure?

8. The diagram shows a horizontal plank being supported off the ground by two rubber rollers.



When the plank is pushed in the direction of the arrow, the rollers move in the same direction.
If the plank moves 1 metre, how far does each roller travel in the same direction?

9.



An automobile club's time trial event requires the competitor to drive from the starting line to the top of a hill and return at an overall average speed of 60 km / h.
One competitor, averaging 90 km / h reaches the summit in 10 minutes. He then sits at the summit for two minutes before embarking on the return leg. What should his average return speed be in km / h if he wishes to cross the start/finish line at exactly the prescribed time?

10. What year is represented by the Roman numerals **MCMXCIX?**

ANSWERS:

1. 0.16

Method 1: $(\frac{2}{5})^2 = \frac{2}{5} \text{ X } \frac{2}{5} = \frac{2 \text{ X } 2}{5 \text{ X } 5} = \frac{4}{25} = \frac{16}{100}$ or 0.16

Method 2: $\frac{2}{5} = \frac{4}{10}$ or 0.4

$(0.4)^2 = 0.4 \text{ X } 0.4 = 0.16$

2. 1

Any number raised to the power of 0 has a value of 1.

3. Pink squares are worth 7, yellow squares are worth 12, blue squares are worth 9 and green squares are worth 3. The total for column 4 is 31.

Let the value of pink squares = p, yellow squares = y, blue squares = b and green squares = g.

From row 1 and row 2:

$2p + b + y = 35$ [equation 1]

$2p + b + g = 26$ [equation 2]

Subtracting equation 2 from equation 1 gives

$y - g = 9$

From row 3 and row 4:

$2y + g + b = 36$ [equation 3]

$2y + g + p = 34$ [equation 4]

Subtracting equation 4 from equation 3 gives

$b - p = 2$

From column 1 and column 2:

$2p + g + y = 29$ [equation 5]

$2p + g + b = 26$ [equation 6]

Subtracting equation 5 from equation 6 gives

$y - b - 3$

From column 3:

$3y + b = 45$

But $b = y - 3$

So $3y + y - 3 = 45$

$4y = 48$

$\mathbf{y = 12}$

$b = y - 3$

$\mathbf{b = 9}$

$g = y - 9$

g = 3

p = b – 2

p = 7

Value of column 4 = b + g + p + y

= 9 + 3 + 7 + 12

= **31**

4. 729

The sequence is composed of cubes of consecutive odd numbers.

$27 = 3^3$; $125 = 5^3$; $343 = 7^3$; $729 = 9^3$

5. B. Bob will reach the bottom first

Bob will have a greater initial acceleration than Alec and therefore his speed will be greater throughout the journey.

6. E is different; (A, B, C, D and F are the same design rotated. E is a reflection)

7. 60 bricks

The simplest method is to note from the drawing that each brick's length is twice width; therefore only whole bricks are required in laying any row, and that the number of bricks in each row must be the same. The top row clearly contains 12 bricks. The five rows in the chimney will therefore contain 60 bricks in total.

8. 0.5 m or 50 cm or 500 mm

9. 50 km / h

Total distance = 30 km

Speed = distance/time

Time x speed = distance

Time = distance / speed

= 30/60 = half hour = 30 minutes

Time remaining for return journey = 18 min

Speed = 15 / 18 km / min

= 15 x 60 /18 km / h

= 50 km / h

10. 1999

M by itself signifies 1000

C by itself signifies 100

X by itself signifies 10

I by itself signifies 1.

However, "CM" means "100 less than 1000" or 900

"XC" means "10 less than 100" or 90

"IX" means "1 less than 10" or 9

MCMXCIX

Is read as [M] + [CM] + [XC] + [IX]

= 1000 + 900 + 90 + 9

= 1999