

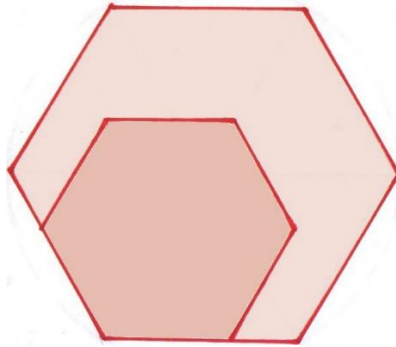
SPECIAL July 2020 – PUZZLES No 15

Logic & Maths (With Solutions)

1. What number is thirty percent of five dozen?
2. What number of equal size circles fit exactly around another circle of the same size so that each is in contact with two other circles?
3. In Australia, most commercial transactions are subject to a **Goods and Services Tax** (GST) of 10% applied at the point of sale. If an object cost \$368.50 GST included, what was the object's **base price** (price before GST)?
4. In a throw of two dice, what is the chance of throwing
(a) any double?
(b) a score of 9?



5. The diagram shows two regular hexagons.



The length of each side of the smaller hexagon is two-thirds the length of each side of the larger hexagon. What fraction of the area of the larger hexagon is the smaller one?

6. Write the next two numbers in this arithmetic sequence:

1, 2, 3, 5, 8, __, __

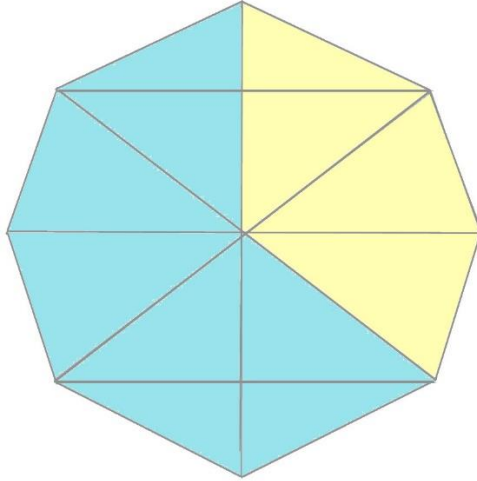
7. The only fruit Abby likes are strawberries, blueberries, and apples.



She has a "lucky dip" into a basket containing 30 fruit; 6 bananas, 4 apples, 9 oranges, 5 cherries, and the rest blueberries.

What is Abby's chance of picking out a fruit that she likes on her first try?

8. a. How many yellow triangles are in this figure in total?
b. How many triangles are in this figure (yellow, blue and yellow-and-blue) in total?



9. If I start with \$162 in a bank account, and the amount of money in this account decreases by two thirds each year, how much money will be in the account after four years?

10. Using Australian banknotes, [\$5, \$10, \$20, \$50, \$100]:



how many different ways can you make up \$100 so that at least one of the notes in each case has a denomination of \$50 or more?

Solutions:

1. 18

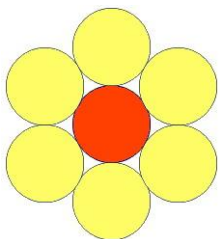
30% of 5 dozen

$$= \frac{30}{100} \times (5 \times 12)$$

$$= \frac{1800}{100}$$

$$= 18$$

2. 6



3. \$335

If the object cost \$368.50 GST included; and the GST is 10% of the base price (price less GST)

Then the price with GST included is 110% or $\frac{11}{10}$ of the base price:

or to put it another way, the base price is $\frac{10}{11}$ of the price including GST

$$\frac{10}{11} \text{ of } 368.50 = 335$$

4. (a) One in six, $\frac{1}{6}$ or 5:1

		Dice 1					
		1	2	3	4	5	6
Dice 2	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

6 possible outcome out of 36 = 1 in 6

(b) 1 in 9, $\frac{1}{9}$ or 8:1

		Dice 1					
		1	2	3	4	5	6
Dice 2	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

4 possible outcomes out of 36 = 1 in 9

5. Four ninths or $\frac{4}{9}$

The shape of the figures doesn't really matter; you have two plane figures which are SIMILAR (same shape, different size).

Each dimension is a **length**. The **area** of each figure will be given by a formula which involves **multiplying** two lengths measured at **right angles** to each other (e.g. base and altitude). As the figures are similar, the other terms in the formula are the same.

The smaller hexagon will therefore have $\frac{2}{3} \times \frac{2}{3}$ or $\frac{4}{9}$ the area of the large one

6. 13 and 21

Each number is the sum of the previous two numbers in the sequence (1+2=3, 2+3=5, 3+5=8, 8+5=13, 13 + 8 = 21)

7. 10 in 30 or 1 in 3 or $\frac{1}{3}$

There are 30 fruit in all. None of them are strawberries.

There are 4 apples

There are 30 - (6 + 4 + 9 + 5)

= 30 - 24

= 6 blueberries

So Abby has (4 + 6) = 10 chances of selecting a fruit that she likes out of a possible 30

8. a. 5 b. 20

9. \$2

If the balance in the account decreases by $\frac{2}{3}$ each year, then $\frac{1}{3}$ of the balance remains.

End of Year 1; balance = $\frac{1}{3}$ of \$162 = \$54

End of year 2: balance = $\frac{1}{3}$ of \$54 = \$18

End of year 3: balance = $\frac{1}{3}$ of \$18 = \$6

End of year 4: balance = $\frac{1}{3}$ of \$6 = \$2

This could also be done in a single calculation: the balance at the end of four successive years is

$$\frac{162}{3 \times 3 \times 3 \times 3}$$

10. 14 ways

		\$100s	\$50s	\$20s	\$10s	\$5s
Possible combinations adding up to \$100	1	1	0	0	0	0
	2	0	2	0	0	0
	3	0	1	2	1	0
	4	0	1	2	0	2
	5	0	1	1	3	0
	6	0	1	1	2	2
	7	0	1	1	1	4
	8	0	1	1	0	6
	9	0	1	0	5	0
	10	0	1	0	4	2
	11	0	1	0	3	4
	12	0	1	0	2	6
	13	0	1	0	1	8
	14	0	1	0	0	10