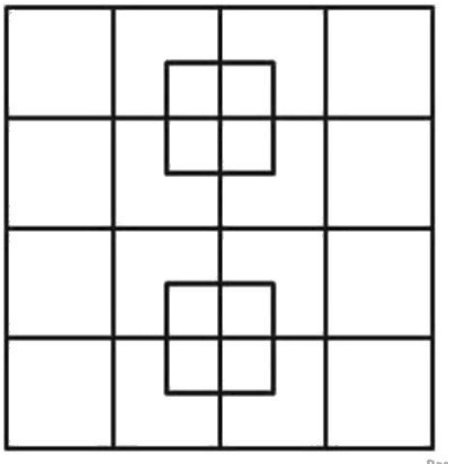
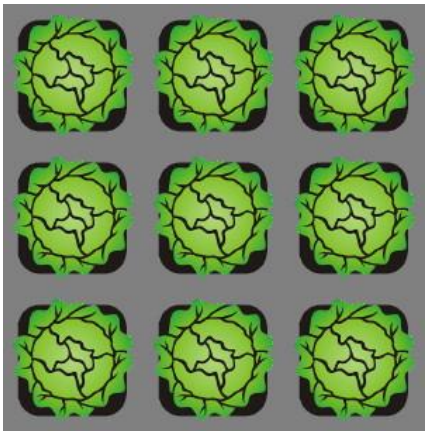
SPECIAL June 2020 – PUZZLES Number 10
Logic & Maths

1.



How many squares in total are in this diagram?

2.

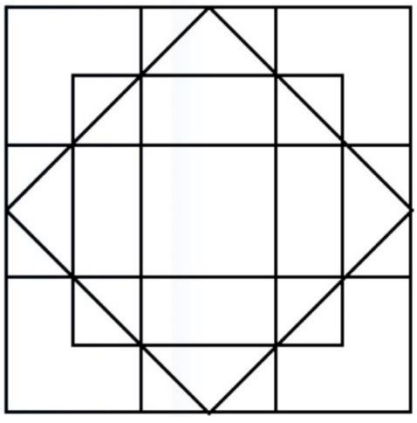


A farmer always grows his lettuces in square plots as shown.

In 2020 he plans to grow 76 more lettuces than he did in 2019.

(a) How many lettuces did he grow in 2019?

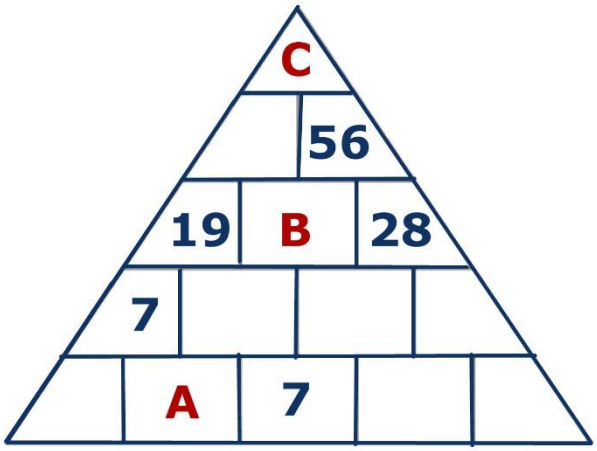
3.



How many squares are in this figure in total?

4. The Army, the Navy and the Air Force compete annually for two sporting trophies, one for cricket and one for football. How many different possible outcomes of the two competitions exist in any given year? (Example: one possible outcome is that the Army wins both trophies)

5.



Each number in the pyramid is the sum of the two numbers immediately below it.

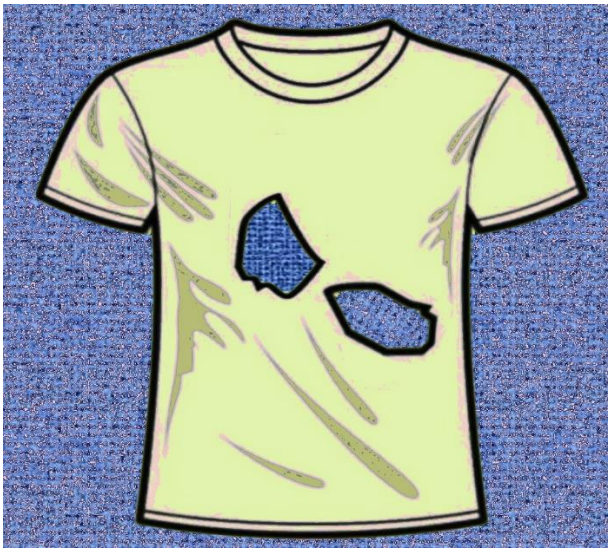
A = ?

B = ?

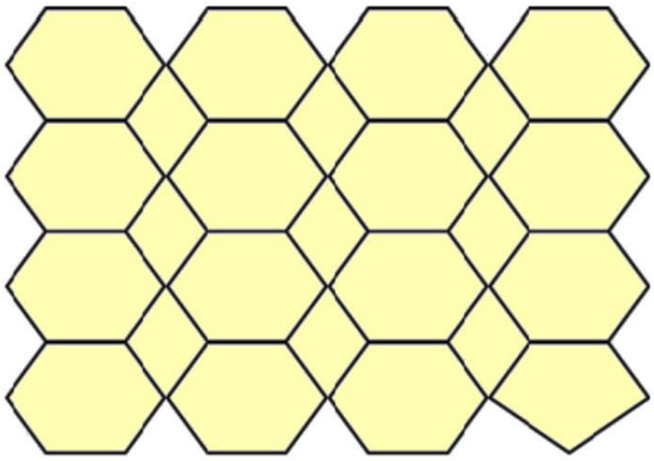
C = ?

6. The average of three numbers is 29. The average of two of these numbers is 38. What is the third number?

7. How many holes are in this T shirt?

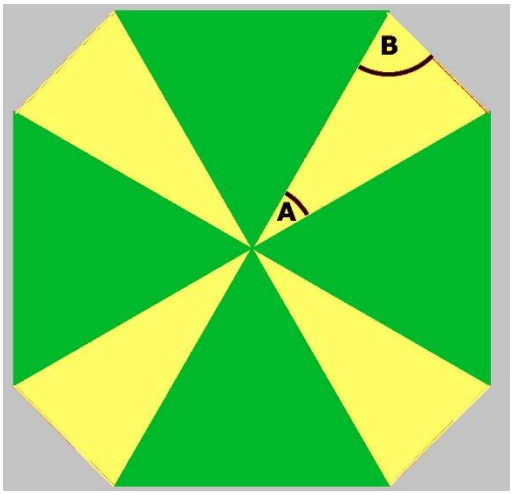


8.



How many hexagons (six sided figures) are in this pattern?

9.



This diagram is made up of four equilateral triangles (green) and four isosceles triangles (yellow)

Calculate the size of angle A and the size of angle B

10.

Given these clues, match each article of antique furniture to its owner and determine the price paid for each item.

(i) Of the desk and Pat's purchase, one sold for $750 and the other sold for $450.

(ii) The wicker whatnot cost more than Dave's purchase.

(iii) The article that sold for $750 was the bureau.

(iv) The bureau cost 150 dollars less than the chair.

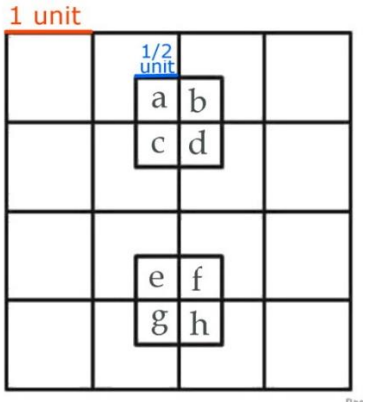
(v) The desk cost 150 dollars less than Keith's purchase.

(a) Who bought the bureau?
(b) What did the chair cost?
(c) Who paid the most for their purchase?

		Buyer				Article			
		DAVE	KEITH	PAT	SUE	BUREAU	CHAIR	DESK	WHATNOT
Price	$450								
	$600								
	$750								
	$900								
Article	BUREAU								
	CHAIR								
	DESK								
	WHATNOT								

Answers:

1. **40** squares



If we consider the main diagram as a 4 X 4 grid, with each row and column 1 unit long, then there are **eight** squares (a to h) that are each only ½ a unit on a side.
There are **eighteen** 1-unit squares: the sixteen in the main grid plus one for (a + b + c + d) plus one for (e + f + g + h)
There are **nine** 2-unit squares
There are **four** 3-unit squares (one can be drawn from each corner of the grid
There is **one** 4-unit square
8 + 18 + 9 + 4 + 1 = 40 squares in total

2. (a) **324** lettuces [18 X 18] (b) **400** lettuces [20 X 20]

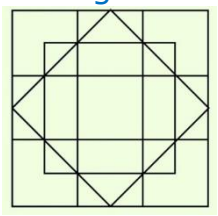
The number of lettuces grown in 2019 must be a square number.
The number of lettuces grown in 2020 must also be a square number, but 76 higher.
Odd numbers squared produce odd-number answers; even numbers squared produce even-number answers. If the difference between the two years is 76 lettuces (an even number), then both sides of the square of lettuces must be odd, OR both sides

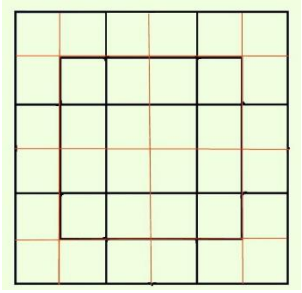
2019 GUESS	2019 GUESS + 76	SQUARE NUMBER?	2019 GUESS	2019 GUESS + 76	SQUARE NUMBER?
$1^2 = 1$	77	NO	$10^2 = 100$	176	**NO**
$2^2 = 4$	80	NO	$11^2 = 121$	197	**NO**
$3^2 = 9$	85	NO	$12^2 = 144$	220	**NO**
$4^2 = 16$	92	NO	$13^2 = 169$	245	**NO**
$5^2 = 25$	101	NO	$14^2 = 196$	272	**NO**
$6^2 = 36$	112	NO	$15^2 = 225$	301	**NO**
$7^2 = 49$	125	NO	$16^2 = 256$	332	**NO**
$8^2 = 64$	140	NO	$17^2 = 289$	365	**NO**
$9^2 = 81$	157	NO	$18^2 = 324$	400	**YES**

of the square of lettuces must be even; you know straight away that you are **not** looking for consecutive square numbers.

3. **24** squares

The diagonal lines complicate the issue and only account for **one** square





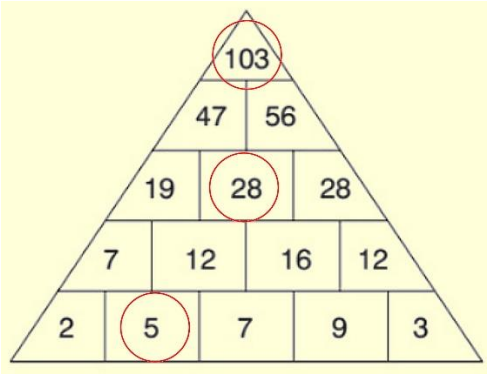
Let's imagine the diagram without the diagonal lines, but with gridlines as shown in red.

How many 6 X 6 size squares are there? Answer: **One**
How many 5 X 5 size squares are there? Answer: **None**
How many 4 X 4 size squares are there? Answer: **Five**
How many 3 X 3 size squares are there? Answer: **Four**
How many 2 X 2 size squares are there? Answer: **Nine**
How many 1 X 1 size squares are there? Answer: **Four**
How many squares are due to the original diagonal lines? Answer: **One**
The total number of squares in the diagram is therefore
(1 + 0 + 5 + 4 + 9 + 4 + 1 = 24)

4. **9** possible outcomes

1. The Army wins both trophies
2. The Navy wins both trophies
3. The Air Force wins both trophies
4. The Army wins cricket, the Navy wins football
5. The Army wins cricket, the Air Force wins football
6. The Army wins football, the Navy wins cricket
7. The Army wins football, the Air Force wins cricket
8. The Navy wins cricket, the Air Force wins football
9. The Air Force wins cricket, the Navy wins football

5. **A = 5 B = 28 C = 103**



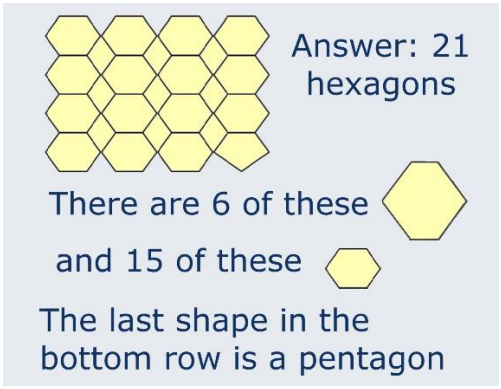
6. **11**

3 numbers 29 × 3 = 87 total
2 numbers 38 × 2 = 76 total
The third number must therefore be: 87 – 76 = 11.

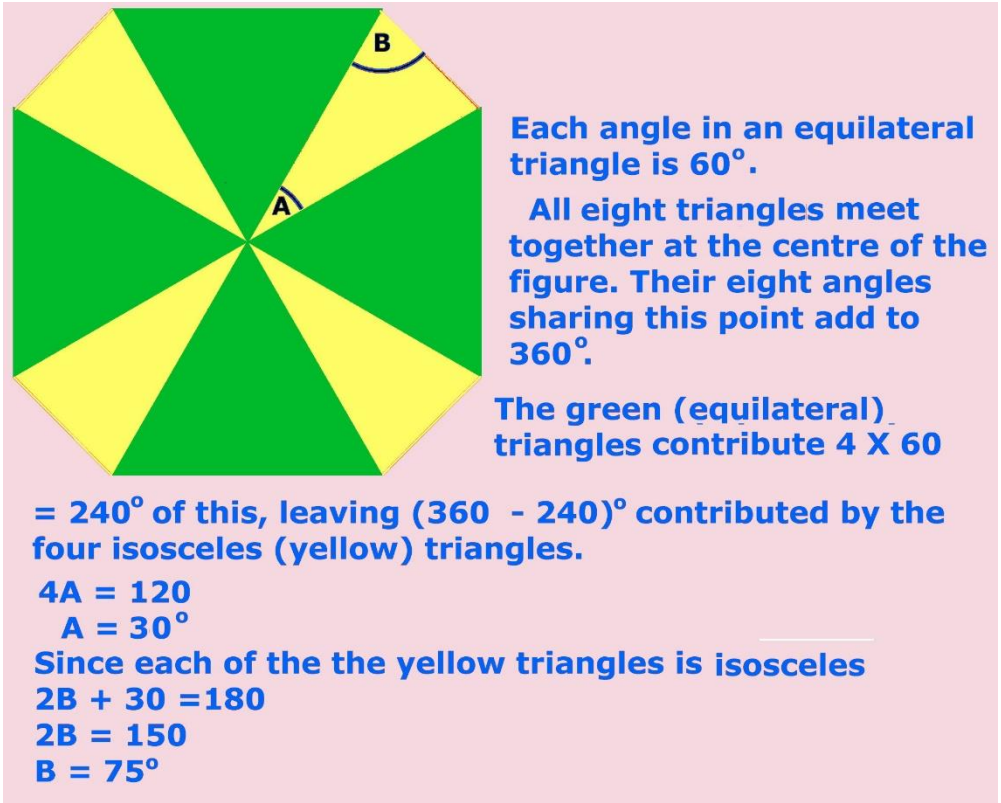
7. **8 holes**

(2 in the front, 2 in the back, one at the top, one at the bottom, 2 sleeves) although 7 holes could also be correct if the hole in the back is a single very large hole.

8.



9. **A = 30° B = 75°**



10. a. **Pat** b. **$600** c. **Sue**