

1

You are designing a custom car by picking exactly one of 2 engines, one of 8 colours, and one of 2 bases (long or short). How many unique models can you build in total?



Answer:

2

Split 66 into prime factors:

66 = ...

Example: 18 = 2 × 3 × 3.

3

Connect each condition on the left with **one** number on the right.

Divisible by 2					
by 10	7	21	2		
by 5 (but not by 10)	45	88		124	100
by 9	61		111		612
by 3 (but not by 9)				14	

4

Oliver and his four friends in a Yorkshire baking club are taking their final exam. Each person must bake one sweet for every other person in the group to taste.

How many sweets are made and tasted in total?



Answer:

5

Here is a prime factorization of 14652:

$$14652 = 2 \times 2 \times 3 \times 3 \times 11 \times 37$$

Circle the numbers that 14652 can be divided by without a remainder, and cross out the others:

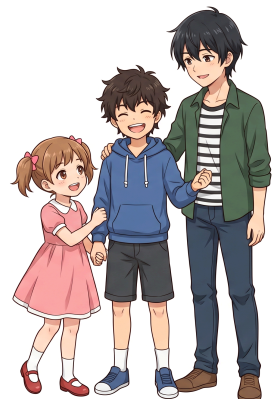
4	5	8	99
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6

Anna is the youngest child in the family. Boris is 3 years older than Anna, and Chris is 5 years older than Anna. Their ages sum up to 29. How old is Anna?

Hint: Use x for Anna's age and write an equation.

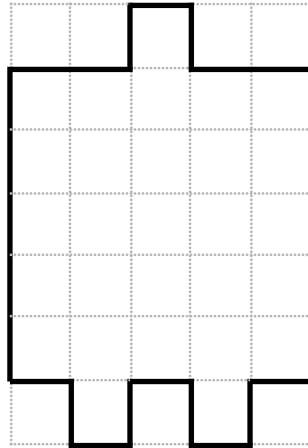
A special version for Max (to avoid guessing!): The sum is 107.



Answer:

7

Can you tile this shape with domino tiles? If **yes** – show how, if **no** – explain why.



8

Cat Alex thought of a number, added a zero to the right, divided it by 2, and added 15. In the end, he got 55. What number did he start with?



Answer:

This is how you count to 20 in different bases. Add all missing numbers.

Hint: digits you have

Base 10	0 1 2 3 4 5 6 7 8 9
Base 5	0 1 2 3 4
Base 2	0 1
Base 16	0 1 2 3 4 5 6 7 8 9 a b c d e f

Base 10	Base 5	Base 2	Base 16
0	0	0	0
1	1	1	1
2	2	10	2
3	3	11	3
4	4	100	4
5	10		5
6	11		6
7	12	111	7
8	13	1000	8
9	14	1001	9
10	20	1010	a
11		1011	b
12		1100	c
13		1101	d
14		1110	e
15			f
16	31		
17	32	10001	
18	33	10010	
19	34	10011	
20	40		

10

Amelia, Ben and Chloe were in the kitchen when the last cookie disappeared.

Amelia said:

"Ben ate it."

Ben said:

"Chloe ate it."

Chloe said:

"I ate it."

Only one person told the truth. Who ate the cookie?



Answer:

11

You flip a coin 1 to 5 times.

How many different outcomes can you get?

Note: An outcome is the whole list of heads and tails, in order.

For example, for 3 flips, these are different outcomes:

head – head – tail

head – tail – head

tail – tail – tail

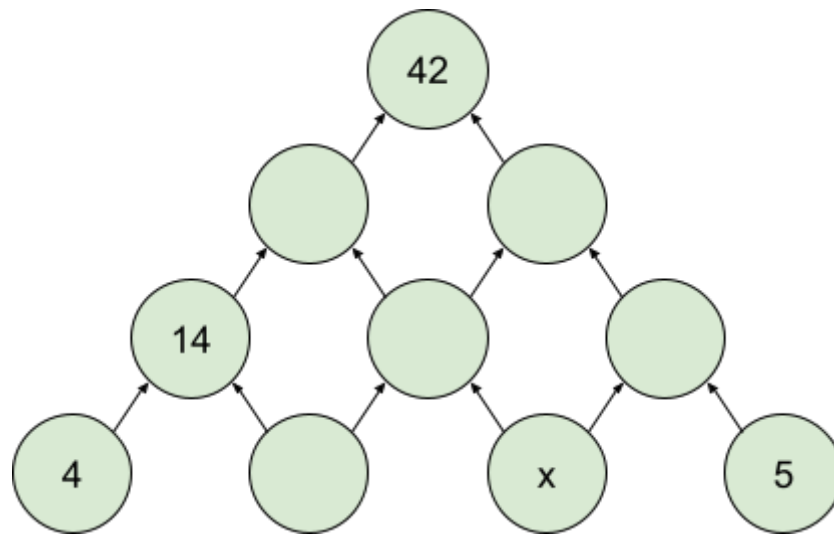


Answers:

For 1 flip:	
For 2 flips:	
For 3 flips:	
For 4 flips:	
For 5 flips:	

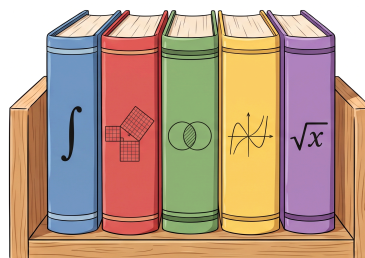
12

Each block in the pyramid equals the sum of the 2 blocks directly below it.
Find the x.



13

You are placing 1, 2, 3, 4, 5 books on a shelf. How many ways to arrange them differently?

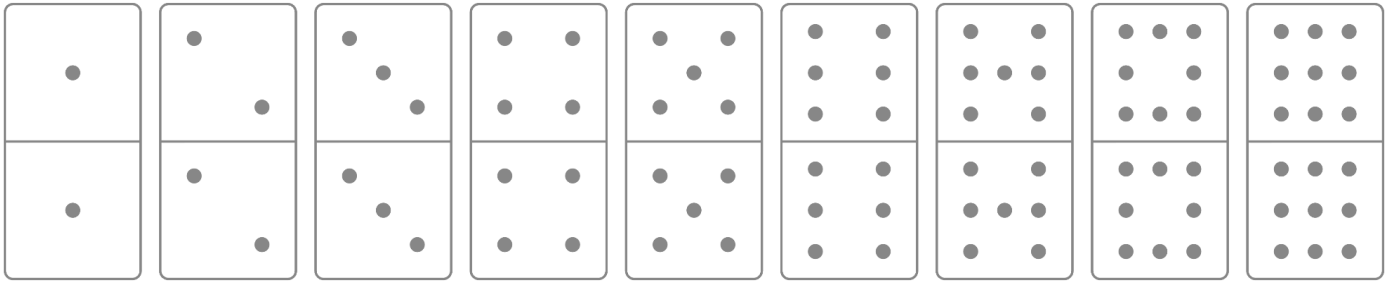


Answers:

For 1 book:	
For 2 books:	
For 3 books:	
For 4 books:	
For 5 books:	

14

A row of dominoes uses all the doubles from double-1 to double-9:



How many dots are there altogether?

Answer:

15

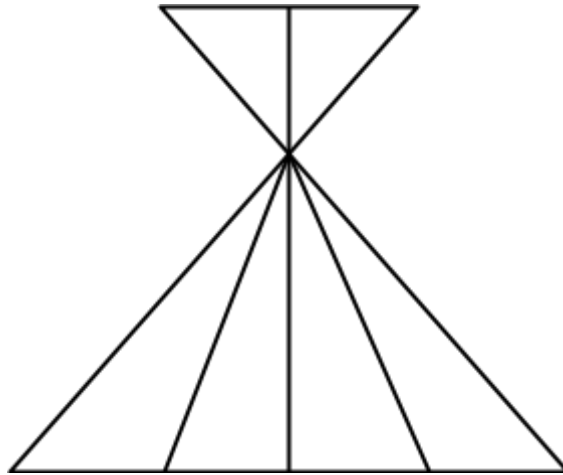
You are flipping a coin exactly 5 times. How many different outcomes could you have, if you know that in the end you had exactly 2 heads and 3 tails?



Answer:

16

How many triangles can you find here?



Answer:



Answers:

1. $32 = 2 \times 8 \times 2$
2. $66 = 2 \times 3 \times 11$
3. —
4. 20 sweets
5. Circle 4 and 99, cross out 5 and 8
6. Anna is 7 (Max version: 33)
7. No (proof by checkerboard pattern).
8. 8
9. —
10. Ben ate the cookie.
11. 2^N : 2, 4, 8, 16, 32
12. $x = 1$
13. $N!$: 1, 2, 6, 24, 120
14. 90
15. $10 = C(5, 2)$
16. $13 = (1+2)+(1+2+3+4)$