Name:

Exam Style Questions

Sequences: Patterns

Corbettmaths

Ensure you have: Pencil, pen, ruler, protractor, pair of compasses and eraser

You may use tracing paper if needed

Guidance

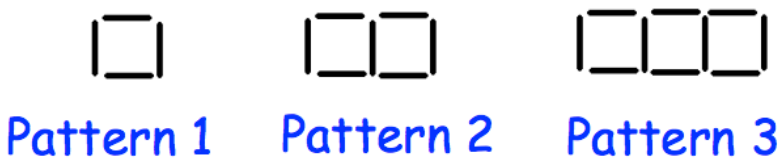
1. Read each question carefully before you begin answering it.
2. Don't spend too long on one question.
3. Attempt every question.
4. Check your answers seem right.
5. Always show your workings

Revision for this topic

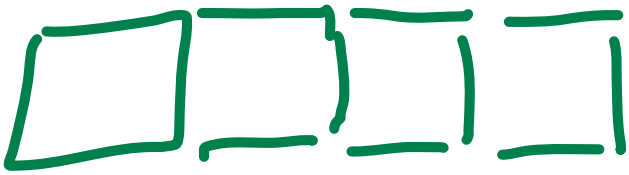
www.corbettmaths.com/contents

Video 290

1. These patterns are made of sticks



(a) Draw Pattern 4



(1)

(b) How many sticks will there be in Pattern 10?

$4+3+3+3\ldots$

$4+(10-1)3 = 4+(9)(3)$

$= 4+27$

31

.....

(1)

(c) Which pattern will use 40 sticks?

$40 = 4+(n-1)3$

$40 = 4+3n-3$

$40 = 1+3n$

$39 = 3n$

$13 = n$

13

.....

(1)

2. Here is a pattern of dots

(a) Continue the pattern to show Pattern 4

(2)

(b) How many dots will there be in Pattern 6?

$1+4+4+4\ldots$

$1+(6-1)4 = 1+(5)(4)$

$= 1+20$

21

(1)

(c) Which pattern will use 77 dots?

$77 = 1+(n-1)4$

$77 = 1+4n-4$

$77 = 4n-3$, $80 = 4n$

20

(1)

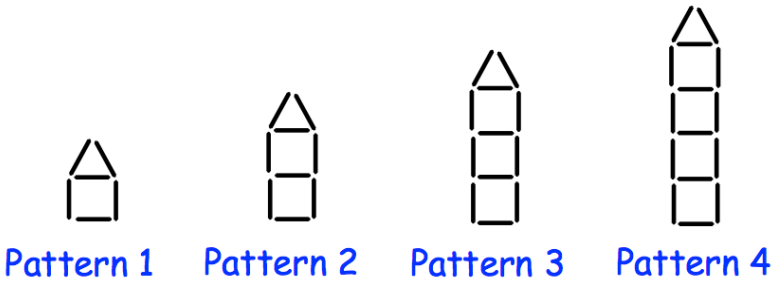
(d) Explain why there will **not** be a pattern that uses 200 dots.

200 has to $= 4n-3$

so 203 has to be $4n$ but 203 is not even so not in 4x table

(1)

3. Patterns are made of sticks



(a) Complete the table for Pattern 4.

Pattern Number	1	2	3	4	5
Number of Sticks	6	9	12	15	18

+3 +3 +3 +3

(1)

(b) Sketch Pattern 5

(1)

(c) Which pattern will have 30 sticks?

=6 =3 +3 etc so $30 = 6 + (n-1)3$

$30 = 6 + 3n - 3$

$30 = 3 + 3n$

$10 = 1 + n$

$n = 9$

.....

(1)

(d) Here is the rule for working out the number of sticks

Multiply pattern number by 3 and add 3

n ×3 +3

How many sticks will be in Pattern 200?

$n = 200$

So $200 \times 3 + 3$

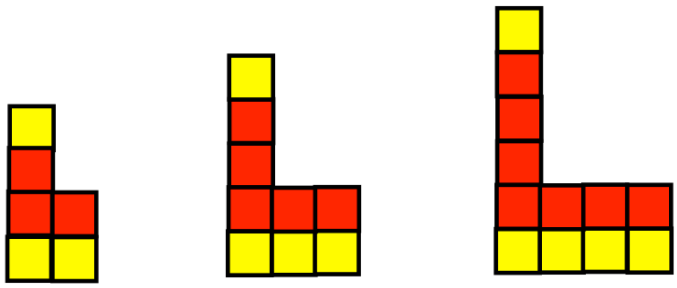
$= 600 + 3$

603

.....

(1)

4. Here is a pattern of red and yellow squares.



Pattern 1 Pattern 2 Pattern 3

(a) Here is a method for working out the number of red squares in each pattern.

Complete the method for Pattern 20.

Pattern 1 $3 + (2 \times 0) = 3$

Pattern 2 $3 + 2 \times 1 = 5$

Pattern 3 $3 + 2 \times 2 = 7$

Pattern 4 $3 + 2 \times 3 = 9$

⋮

Pattern 20 $3 + (2 \times 19) = 3 + 38 = 41$

mult first !

(2)

(b) Which statements below are true?

A Pattern 10 has 11 yellow squares false — 2 more than the pattern

B The number of red squares is always odd True — even + odd

C Every pattern has more red squares than yellow squares False — pattern 1 doesn't !

D Pattern 5 has 11 red squares True

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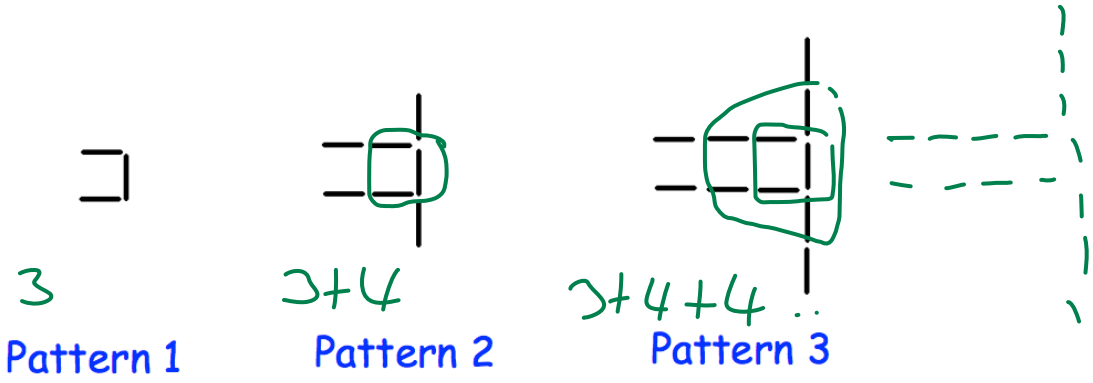
(2)

5. These patterns are made from sticks.



(a) Draw Pattern 4

(1)

(b) How many sticks will there be in Pattern 5?

3+4+4+4 . . .

$3+(5-1)4 = 3+20-4 =$ 19

(1)

(c) Write down a rule for continuing the patterns.

Keep adding 4

(1)

(d) Explain why you **cannot** make a pattern with exactly 44 sticks.

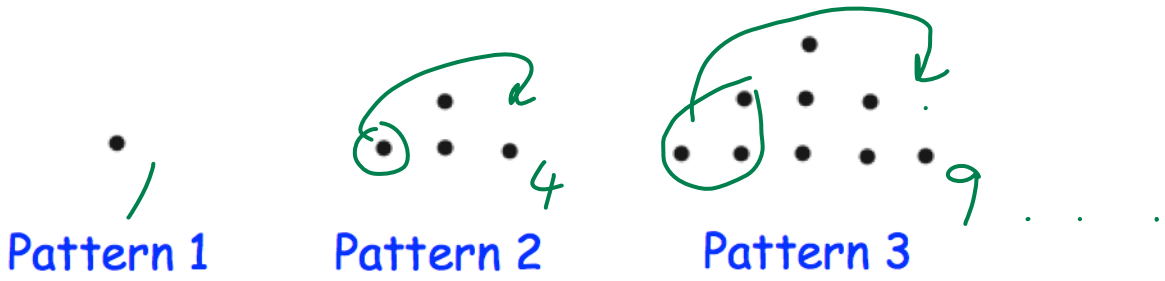
44 would have to be $3+(n-1)4$

or $3+4n-4$, $4n-1$ ($4n$ is same as 4x table)

44 is in the 4x table not one less

(1)

6. Dots are used to make a sequence of patterns.
The first three patterns are shown.



How many dots are needed to make Pattern 6?

1^2 2^2 3^2

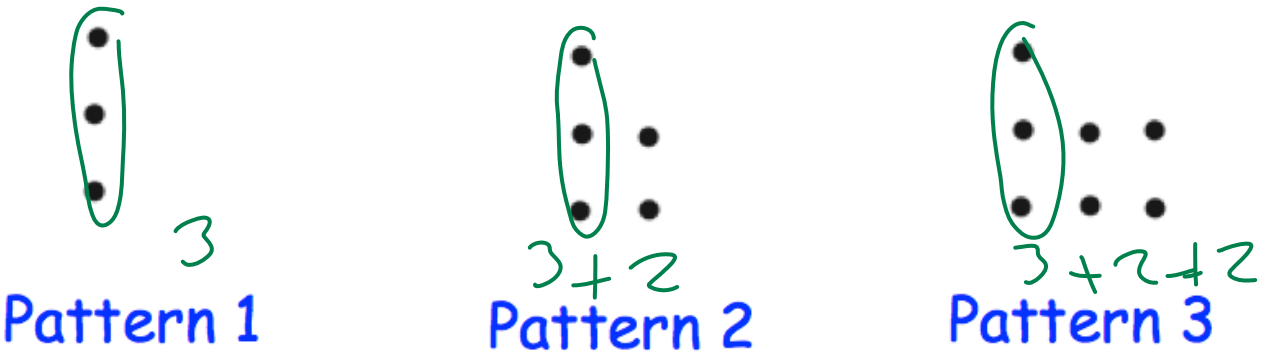
6th pattern is $6^2 = 36$ dots

36

.....

(2)

7. Here are some patterns made from dots.



(a) Complete the table for Pattern 4.

Pattern Number	1	2	3	4
Number of dots	3	5	7	9 ✓

+2 +2 +2

(1)

Harry wants to find the number of dots in Pattern number 50.

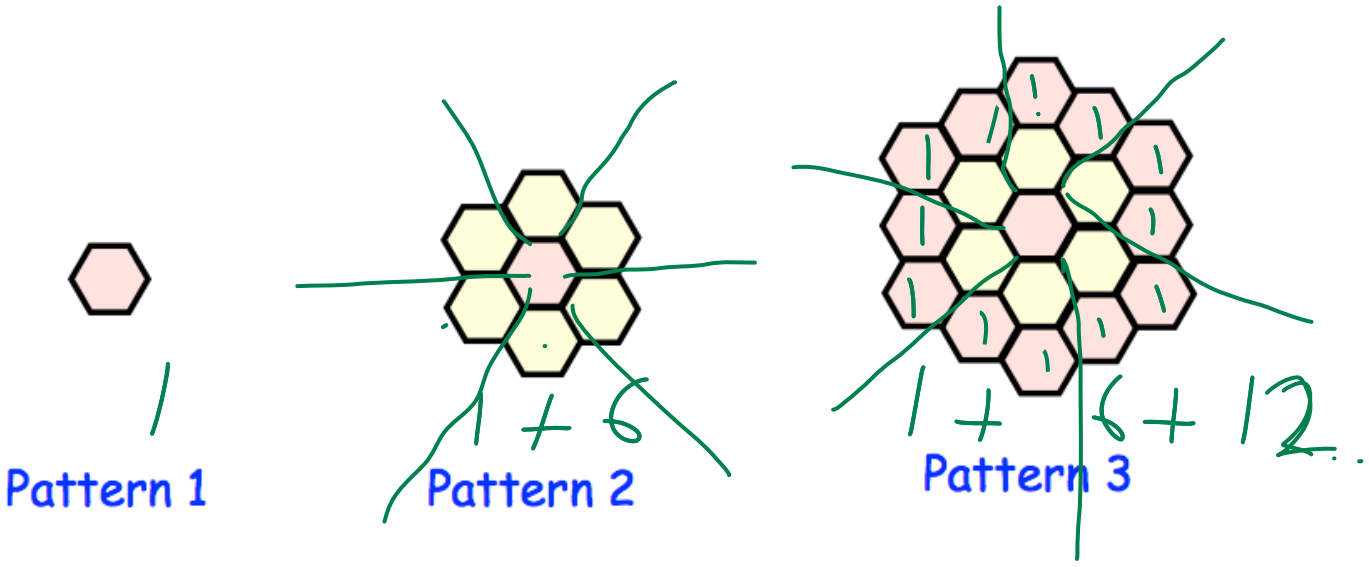
(b) Write down a method he could use.

3 + (50 − 1) 2

(1)

8. Here is a tile.

Here is a sequence of patterns made from these tiles.



How many of these tiles are needed to make Pattern number 6?

1 + 6 x 1 then 6 x 2 . .

then 6 x 3 . . .

So 1 + 6 + 12 + 18 + 24 + 30

= 1 + 15(6)

= 1 + 90

91

.....

(3)

9. Patterns are made from yellow and blue triangles.

y = yellow

Pattern 1 Pattern 2 Pattern 3

y = 2 y = 4 y = 6

(a) How many yellow triangles are there in the *n* th pattern?

Pattern No. × 2 = Triangles

T = 2n

.....

(2)

(b) How many blue triangles are there in the *n* th pattern?

Blue = 1 | 3 | 5 | ...

P 1 | 2 | 3 | n

(P × 2) − 1 = Triangles

T = 2n − 1

.....

(2)

(c) How many triangles, yellow and blue, are there in the 100th pattern?

Add both formulas

So (T = 2n) + (T = 2n − 1)

When n = 100

T = 2(100) + T = 2(100) − 1

= 200 + = 199

= 399

399 ✓

.....

(2)