

WA6MNAUN3

Understanding number

Core + Challenge

Square Numbers

I can make square numbers as square arrays, recognise them and explain the patterns they make.

Name: _____ Date: _____ Score: _____ / 55

Key idea

A **square number** makes a **square array**: the same number of rows and columns.

$4 \times 4 = 16$, so 16 is a square number. We write $4^2 = 16$ and say “four squared”.

To test a number, look for a whole number times **itself**. $13 \times 13 = 169$, so 169 is a square number.

Some numbers only make rectangles. $8 = 2 \times 4$, but no whole number times itself makes 8, so 8 is **not** a square number.

4 squared = 16



8: only rectangles, not a square



A

Warm up *build, shade and spot*

/ 16 marks

Write the multiplication and the square number shown by each array. 1 mark each.

1 $\square \times \square = \square$



2 $\square \times \square = \square$



3 $\square \times \square = \square$

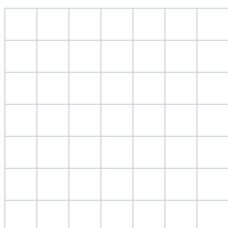


4 $\square \times \square = \square$

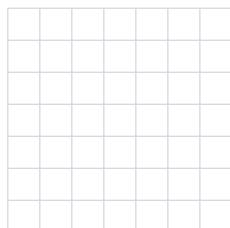


Shade a **square** on the grid with this many small squares. 1 mark each.

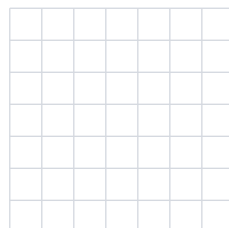
5 Shade 9



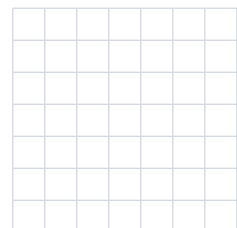
6 Shade 16



7 Shade 36



8 Shade 25



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Work out each square. 1 mark each.

9 $8^2 = \square$

10 $10^2 = \square$

11 $1^2 = \square$

12 $9^2 = \square$

Is it a square number? Write **yes** or **no**. If yes, write it as $\square \times \square$. 1 mark each.

13 49

14 50

15 81

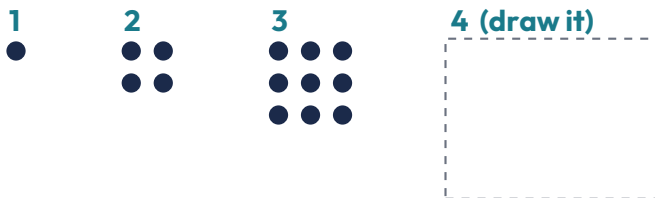
16 12

B

Practise use the skill

/ 20 marks

- 1 Look at the growing pattern of dots. **a)** Draw pattern 4 in the box. **b)** Complete the table. [3 marks]



Pattern number	1	2	3	4	5	10
Number of dots	1	4	9			

- 2 Complete the table of square numbers. Then write the **difference** between each square and the one before it. What pattern do you notice in the differences? [3 marks]

Number	1	2	3	4	5	6	7	8
Square	1	4		16		36		64
Difference		3						

Answer: _____

- 3 A square patio at home is made of **64** square pavers. **a)** How many pavers are along each side? **b)** Dad makes a bigger square patio with **10** pavers along each side. How many **more** pavers does he need? [2 marks]

Answer: _____

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- 4 Shade all the **square numbers** on the hundred chart. How many are there? [2 marks]

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Answer: _____

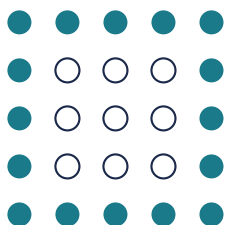
- 5 A square vegetable patch at Kings Park has an area of **81 m²**. **a)** How long is each side? **b)** What is its perimeter? [2 marks]

Answer: _____

- 6 **a)** Which square numbers are between 30 and 70? **b)** Which square number is **closest** to 90? Explain. [2 marks]

Answer: _____

- 7 The shaded dots are on the **border** of a 5 by 5 square. **a)** How many dots are on the border? **b)** How many dots would be on the border of a **6 by 6** square? [2 marks]



Answer: _____

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- 8 Draw a line to join each square to its value.

[2 marks]

5²	100
7 × 7	25
3²	9
10²	49

- 9 For the class photo, **49** students stand in a square array. **a)** How many rows are there? **b)** **15** more students join. Can they all stand in a new square array? Explain.

[2 marks]

Answer: _____

C Think it through *explain your thinking*

/ 10 marks

- 1 Ben says, “6 squared is 12, because squared means × 2.” Do you agree with Ben? Explain what he did wrong.

[2 marks]

- 2 **True or false?** “The difference between two square numbers next to each other is always odd.” Use the L-shapes in the diagram to explain.

[2 marks]



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- 3 **Always, sometimes or never true?** “A square number has an **odd** number of factors.” Test at least three square numbers, then explain why. [2 marks]
Always / Sometimes / Never

- 4 Which number is the **odd one out**? 81, 100, 120, 144. Explain. [2 marks]

- 5 Sort these numbers into the table: 16, 25, 30, 49, 64, 15, 81, 18. What do you notice about the odd square numbers? [2 marks]

	Even	Odd
Square number		
Not a square number		

D Challenge *stretch yourself*

/ 9 marks

- 1 Find **all** the ways to write **50** as the sum of two square numbers (you can use the same square twice, but not 0). Then do the same for **65**. [3 marks]

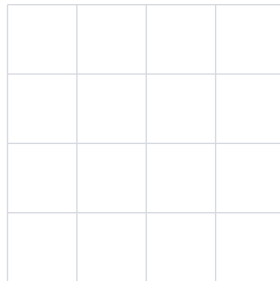
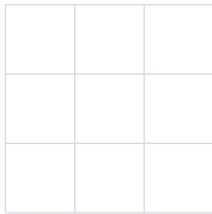
Answer: _____

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- 2 Look at the border of dots in Practise question 7. **a)** How many dots are on the border of a **10 by 10** square? **b)** Explain a rule for the border of **any** square. **c)** A square has **44** dots on its border. How many dots does the whole square have? [3 marks]

Answer: _____

- 3 How many squares of **any size** can you find in a 3 by 3 grid? And in a 4 by 4 grid? [3 marks]
What do you notice about your answers?



Answer: _____

How did I go?

Warm up ____ / 16 Practise ____ / 20 Think it through ____ / 10 Challenge ____ / 9 **Total ____ / 55**

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