Reasoning and Problem Solving
Step 5: Square Numbers

National Curriculum Objectives:

Mathematics Year 5: (5C5d) Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
Mathematics Year 5:(5C8a) Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes

Differentiation:

Questions 1, 4 and 7 (Problem Solving)
Developing Finding the sum of two square numbers up to 12^2 using pictorial representations for each question. Each question includes the full calculation as well as the notation for squared.
Expected Finding the sum of two square numbers up to 12^2.
Greater Depth Finding the sum of two square numbers up to 12^2 within set parameters.

Questions 2, 5 and 8 (Problem Solving)
Developing Identify a number using inverse operations and knowledge of square numbers up to 12^2 with pictorial representations for each question.
Expected Identify a number using inverse operations and knowledge of square numbers up to 12^2. Up to two steps in each question.
Greater Depth Identify a number using inverse operations and knowledge of square numbers up to 12^2. Up to 3 steps in each question.

Questions 3, 6 and 9 (Reasoning)
Developing Explain common misconceptions when calculating squared numbers up to 12^2 using pictorial representations for each question.
Expected Explain common misconceptions when calculating squared numbers to 12^2.
Greater Depth Explain common misconceptions when calculating with squared numbers to 12^2. Up to two steps in each question.

More Year 5 Multiplication and Division resources.

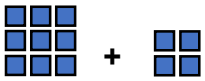
Did you like this resource? Don't forget to review it on our website.

Square Numbers

1a. 13 is the sum of two square numbers.

$13 = 3^2 + 2^2$

13 = (3 x 3) + (2 x 2)

13 =  +

Using the example above, complete the following:

41 is the sum of 4^2 and which other square number?

41 = (4 x 4) + (? x ?)

41=  + ?

D PS

1b. 18 is the sum of two square numbers.

$18 = 3^2 + 3^2$

18 = (3 x 3) + (3 x 3)

18 =  + 

Using the example above, complete the following:

45 is the sum of 3^2 and which other square number?

45 = (3 x 3) + (? x ?)

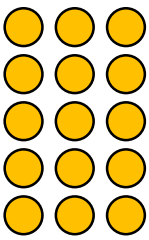
45 =  + ?

D PS

2a. Solve the following problem.

I think of a number. I square it and add 6. My answer is 15. What was my number?

Use the array below to help you.

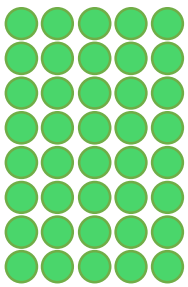


D PS

2b Solve the following problem.

I think of a number. I square it and add 15. My answer is 40. What was my number?

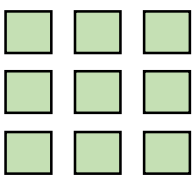
Use the array below to help you.



D PS

3a. Drew says,

This array represents 9^2.



Is Drew correct? Convince me.

D R

3b. Frankie says,

I can use this array to calculate 5^2.

Is Frankie correct? Convince me.

D R

Square Numbers

4a. 20 is the sum of two square numbers.

$20 = 4^2 + 2^2$

Using the example above, complete the following:

61 is the sum of two squared numbers. What could they be?

113 is the sum of two squared numbers. What could they be?

E PS

Square Numbers

4b. 29 is the sum of two square numbers.

$29 = 5^2 + 2^2$

Using the example above, complete the following:

89 is the sum of two squared numbers. What could they be?

193 is the sum of two squared numbers. What could they be?

E PS

5a. Solve the following problems.

I think of a number. I square it and subtract 8. My answer is 41. What was my number?

I think of another number. I square it and add 12. The answer is 48. What was my number?

E PS

5b Solve the following problems.

I think of a number. I square it and add 11. My answer is 92. What was my number?

I think of another number. I square it and subtract 14. My answer is 107. What was my number?

E PS

6a. Henry says,

To find the square of a number, you multiply it by 2.

Is Henry correct? Convince me.

E R

6b. Laura says,

To square a number, you add the number twice. For example, 2^2 means 2 + 2 which is 4.

Is Laura correct? Convince me.

E R

Square Numbers

7a. 155 is the sum of 2 squared numbers.

$155 = 12^2 + 3^2$

2 squared numbers are added together to make an odd number between 50 and 100. What could they be?

3 squared numbers are added together to make an even number between 150 and 200. What could they be?

GD PS

8a. Solve the following problems.

I think of a number. I square it, subtract 8 and multiply by 3. My answer is 24. What was my number?

I think of another number. I square it, add 12 and then subtract 16. The answer is 140. What was my number?

GD PS

9a. Tariq says,

The product of two square numbers always equals a square number.

Is Tariq correct? Convince me.

GD R

Square Numbers

7b. 149 is the sum of 2 squared numbers.

$149 = 10^2 + 7^2$

2 squared numbers are added together to make an even number between 50 and 100. What could they be?

3 squared numbers are added together to make an odd number between 150 and 200. What could they be?

GD PS

8b. Solve the following problems.

I think of a number. I square it, add 15 and times by 5. My answer is 255. What was my number?

I think of another number. I square it, subtract15 and then add 25. My answer is 131. What was my number?

GD PS

9b. Lin says,

When I add an odd square number to another odd square number, the answer is always even.

Is Lin correct? Convince me.

GD R

Reasoning and Problem Solving
Square Numbers

Developing

1a. 5^2

2a. 3

3a. Drew is incorrect. The array represents 3^2 because 3 x 3 = 9.

Expected

4a. $5^2 + 6^2$, $7^2 + 8^2$

5a. 7, 6

6a. Henry is incorrect. To find the square of a number, you multiply a number by itself. Only 2^2 is 2 x 2.

Greater Depth

7a. Various answers, for example:
$7^2 + 4^2 = 65$, $7^2 + 6^2 = 85$, $9^2 + 4^2 = 97$, $8^2 + 5^2 = 89$, $8^2 + 3^2 = 73$ and
$10^2 + 8^2 + 4^2 = 180$, $12^2 + 4^2 + 2^2 = 164$, $11^2 + 9^2 + 6^2 = 166$, $10^2 + 7^2 + 3^2 = 158$,
$11^2 + 5^2 + 4^2 = 162$

8a. 4, 12

9a. Tariq is correct. Multiplying two square numbers always equals a square number. For example, 4 x 9 = 36, 4 x 16 = 64, 4 x 25 = 100 and 4 x 36 = 144.

Reasoning and Problem Solving
Square Numbers

Developing

1b. 6^2

2b. 5

3b. Frankie is incorrect. The array represents 2 x 5 = 10.

Expected

4b. $8^2 + 5^2$, $12^2 + 7^2$

5b. 9, 11

6b. Laura is incorrect. To square a number, you multiply the number by itself. For example, 6^2 means 6 x 6 which is 36.

Greater Depth

7b. Various answers, for example:
$6^2 + 4^2 = 52$, $7^2 + 3^2 = 58$, $8^2 + 2^2 = 68$, $9^2 + 3^2 = 90$, $7^2 + 5^2 = 74$ and
$11^2 + 5^2 + 3^2 = 155$, $12^2 + 4^2 + 3^2 = 169$, $9^2 + 7^2 + 5^2 = 155$, $10^2 + 5^2 + 8^2 = 189$,
$10^2 + 8^2 + 3^2 = 173$

8b. 6, 11

9b. Lin is correct. Adding two odd numbers together always equals an even number. For example, 25 + 9 = 34, 9 + 49 = 58, 81 + 9 = 90 and 81 + 25 = 106.