Varied Fluency
Step 12: Square and Cube 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:

Developing Questions to support recognising, ordering and calculating square numbers up to 7^2 and cube numbers up to 5^3.
Expected Questions to support recognising, ordering and calculating square numbers up to 12^2 and cube numbers up to 12^3.
Greater Depth Questions to support recognising, ordering and calculating square numbers up to and beyond 12^2 and cube numbers up to and beyond 12^3.

More resources which follow the same small steps as White Rose.

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Varied Fluency – Square and Cube Numbers

1a. Circle all the square numbers.

	19	22
16		14
	45	10
21		4
	9	25

D VF

1b. Circle all the cube numbers.

	8	125
105		212
	118	100
64		27
	34	81

D VF

2a. Complete the calculations.

a. $4^2 =$ ☐

b. $5^2 =$ ☐

c. $7^2 =$ ☐

D VF

2b. Complete the calculations.

a. $2^3 =$ ☐

b. $5^3 =$ ☐

c. $3^3 =$ ☐

D VF

3a. Calculate then order from smallest to largest.

a. 7^2 b. 3^3

c. 2^2

d. 4^2 e. 2^3

D VF

3b. Calculate then order from smallest to largest.

a. 5^2 b. 4^3

c. 3^2

d. 6^2 e. 1^3

D VF

4a. Here is part of a number square. Shade the first 3 square numbers that appear.

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

D VF

4b. Here is part of a number square. Shade the first 3 cube numbers that appear.

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

D VF

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Varied Fluency – Square and Cube Numbers

5a. Circle all the square numbers.

	101	82
16	144	
	28	100
121	45	
	49	91

E VF

5b. Circle all the cube numbers

	729	121
134	512	
	218	216
300	205	
	343	81

E VF

6a. Complete the calculations.

a. $8^2 =$ ☐

b. $11^2 =$ ☐

c. $9^2 =$ ☐

E VF

6b. Complete the calculations.

a. $9^3 =$ ☐

b. $11^3 =$ ☐

c. $7^3 =$ ☐

E VF

7a. Calculate then order from smallest to largest.

a. 7^2 b. 5^3

c. 11^2

d. 8^2 e. 3^3

E VF

7b. Calculate then order from smallest to largest.

a. 10^2 b. 7^3

c. 9^2

d. 12^2 e. 4^3

E VF

8a. Find the pattern. What are the missing numbers in the sequence?

4, 16, 36, ___, ___

E VF

8a. Find the pattern. What are the missing numbers in the sequence?

27, 125, ___, ___, 1,331

E VF

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Varied Fluency – Square and Cube Numbers

9a. Circle all the square numbers.

	196	182
163	144	
	218	109
121	169	
	249	191

GD VF

9b. Circle all the cube numbers

	1,331	1,321
2,744	1,512	
	2,128	2,197
3,100	2,005	
	1,728	2,181

GD VF

10a. Complete the calculations.

a. $17^2 =$ ☐

b. $16^2 =$ ☐

c. $15^2 =$ ☐

GD VF

10b. Complete the calculations.

a. $13^3 =$ ☐

b. $11^3 =$ ☐

c. $17^3 =$ ☐

GD VF

11a. Calculate then order from smallest to largest.

a. 13^2 b. 12^3

c. 18^2

d. 14^2 e. 14^3

GD VF

11b. Calculate then order from smallest to largest.

a. 15^2 b. 15^3

c. 12^2

d. 19^2 e. 16^3

GD VF

12a. Find the pattern. What are the missing numbers in the sequence?

256, 289, 324, ___, ___

GD VF

12a. Find the pattern. What are the missing numbers in the sequence?

3,375, 2,744, 2,197, ___, ___

GD VF

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Varied Fluency – Square and Cube Numbers

Developing

1a. 4, 9, 16, 25
1b. 8, 27, 64, 125
2a. a = 16, b = 25, c = 49
2b. a = 8, b = 125, c = 27
3a. a = 49, b = 27, c = 4, d = 16, e = 8; order: c, e, d, b, a
3b. a = 25, b = 64, c = 9, d = 36, e = 1; order: e, c, a, d, b
4a. 25, 36, 49
4b. 1, 8, 27

Expected

5a. 16, 49, 100, 121, 144
5b. 216, 343, 512, 729
6a. a = 64, b = 121, c = 81
6b. a = 729, b = 1,331, c = 343
7a. a = 49, b = 125, c = 121, d = 64, e = 27; order: e, a, d, c, b
7b. a = 100, b = 343, c = 81, d = 144, e = 64; order: e, c, a, d, b
8a. The pattern is even square numbers: 2^2, 4^2, 6^2.
Missing numbers: 64 and 100
8b. The pattern is odd cube numbers: 3^3, 5^3, 11^3.
Missing numbers: 343 and 729

Greater Depth

9a. 121, 144, 169, 196
9b. 1,331; 1,728; 2,197; 2,744
10a. a = 289, b = 256, c = 225
10b. a = 2,197, b = 1,331, c = 4,913
11a. a = 169, b = 1,728, c = 324, d = 196, e = 2,744; order: a, d, c, b, e
11b. a = 225, b = 3,375, c = 144, d = 361, e = 4,096; order: c, a, d, b, e
12a. The pattern is square numbers from 16^2 in ascending order: 16^2, 17^2, 18^2.
Missing numbers: 361 and 400
12b. The pattern is odd cube numbers from 15^3 in descending order: 15^3, 14^3, 13^3.
Missing numbers: 1,728 and 1,331

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Reasoning and Problem Solving
Step 12: Square and Cubed 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 Use knowledge of square numbers up to 7^2 and cube numbers up to 5^3 to complete the missing sections on a Venn diagram.
Expected Use knowledge of square numbers up to 12^2 and cube numbers up to 12^3 to complete the missing sections on a Venn diagram.
Greater Depth Use knowledge of square numbers up to and beyond 12^2 and cube numbers up to and beyond 12^3 to complete the missing sections on a Venn diagram.

Questions 2, 5 and 8 (Reasoning)
Developing Identifying the odd one out and explain why using knowledge of square numbers up to 7^2 and cube numbers up to 5^3.
Expected Identifying the odd one out and explain why using knowledge of square numbers up to 12^2 and cube numbers up to 12^3.
Greater Depth Identifying the odd one out and explain why using knowledge of square numbers up to and beyond 12^2 and cube numbers up to and beyond 12^3.

Questions 3, 6 and 9 (Problem Solving)
Developing Identify the square and cube numbers and their root number from a given statement, including numbers up to 7^2 and 5^3 (1 root number).
Expected Identify the square and cube numbers and their root numbers from a given statement, including numbers up to 12^2 and 12^3 (1 or 2 root numbers).
Greater Depth Identify the square and cube numbers and their root numbers from a given statement, including numbers up to and beyond 12^2 and 12^3 (2 root numbers).

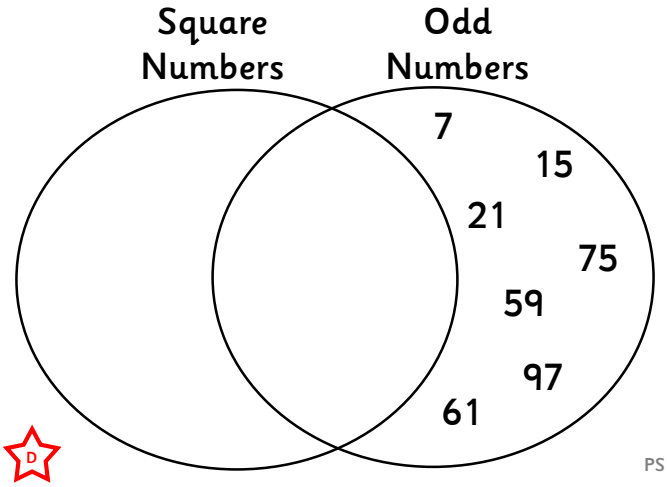
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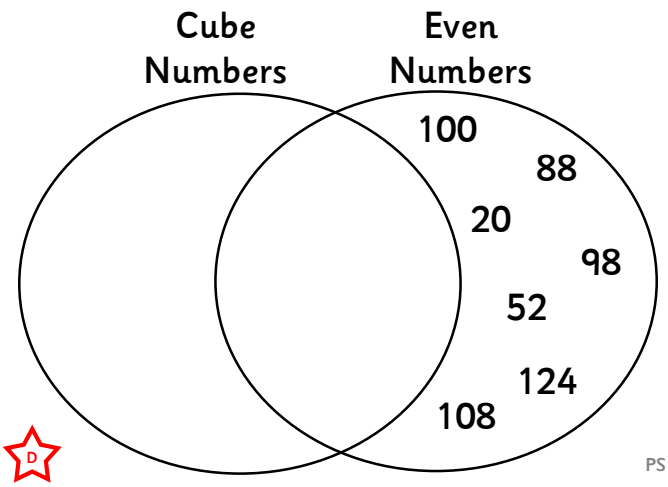
Reasoning and Problem Solving – Square and Cube Numbers

1a. Complete the Venn diagram using numbers up to 50.



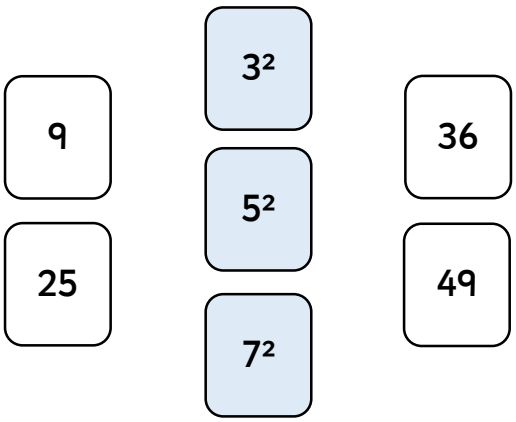
D PS

1b. Complete the Venn diagram using numbers up to 150.



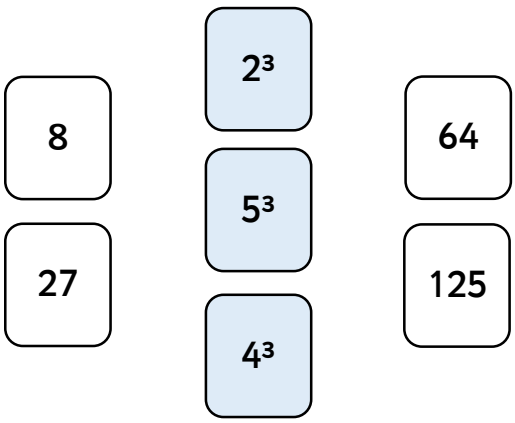
D PS

2a. Match the square number to the correct calculation. Which is the odd one out? How do you know?



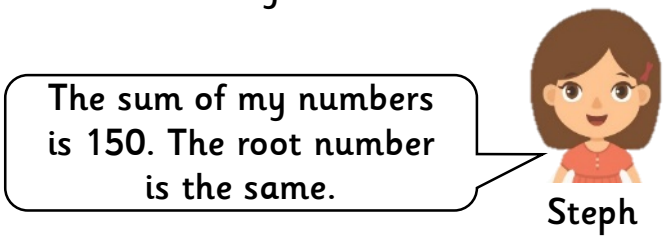
D R

2b. Match the cube number to the correct calculation. Which is the odd one out? How do you know?



D R

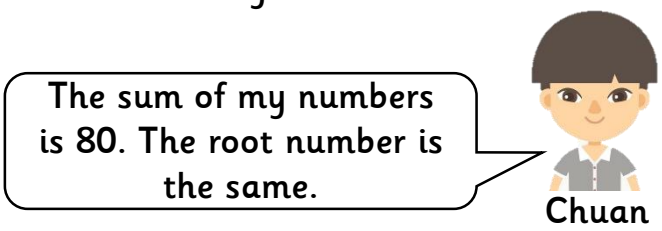
3a. Steph has two number cards. One is a square number and one is a cube number. She says:



What are her numbers?
What is the root number?

D PS

3b. Chuan has two number cards. One is a square number and one is a cube number. He says:



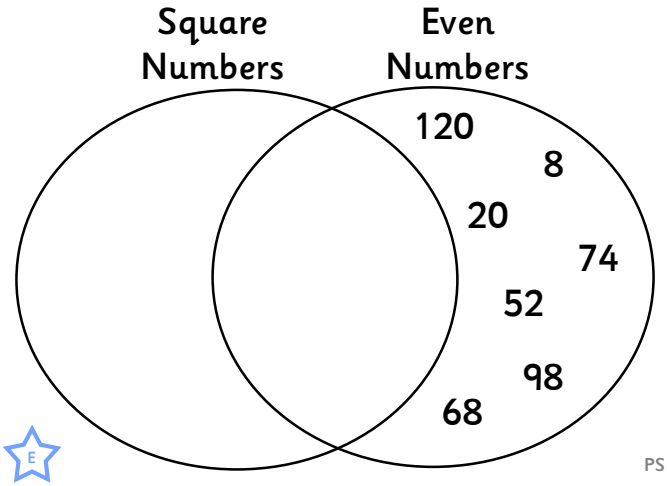
What are his numbers?
What is the root number?

D PS

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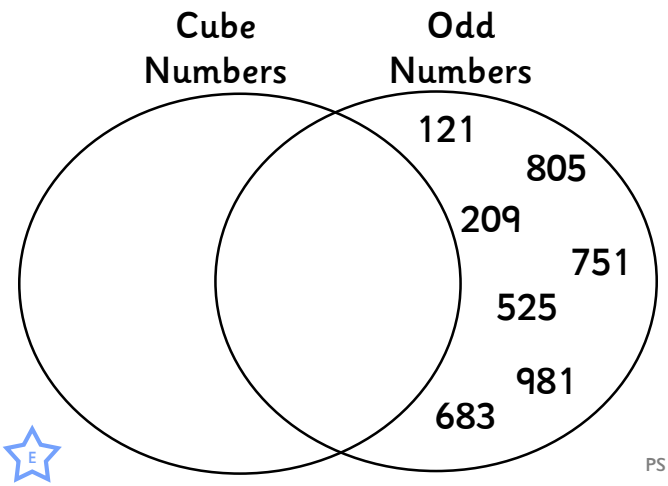
Reasoning and Problem Solving – Square and Cube Numbers

4a. Complete the Venn diagram using numbers up to 150.



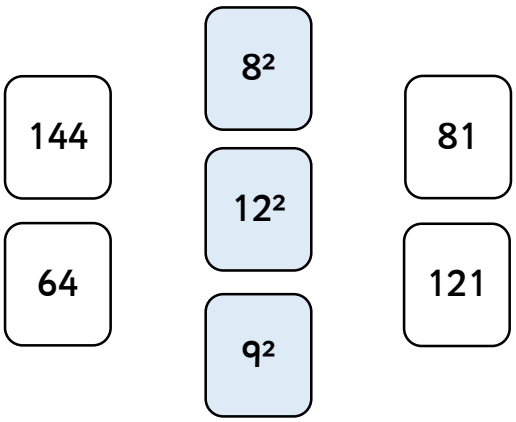
E PS

4b. Complete the Venn diagram using numbers up to 1,000.



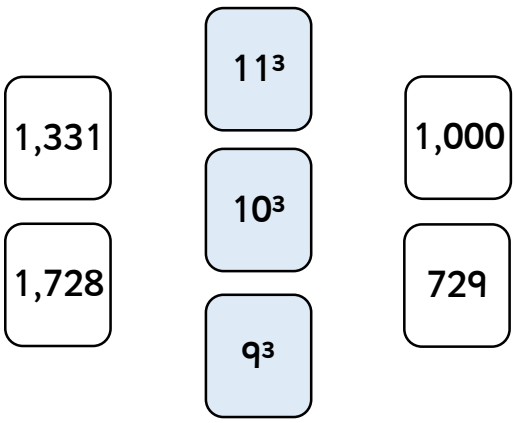
E PS

5a. Match the square number to the correct calculation. Which is the odd one out? How do you know?



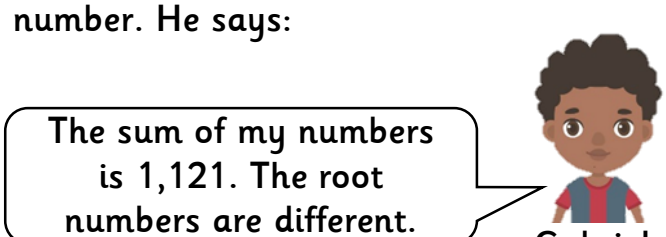
E R

5b. Match the cube number to the correct calculation. Which is the odd one out? How do you know?



E R

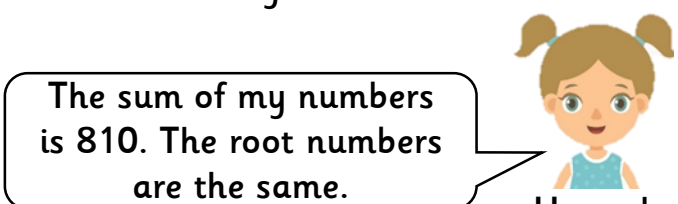
6a. Gabriel has two number cards. One is a square number and one is a cube number. He says:



What are his numbers?
What are the root numbers?

E PS

6b. Hannah has two number cards. One is a square number and one is a cube number. She says:



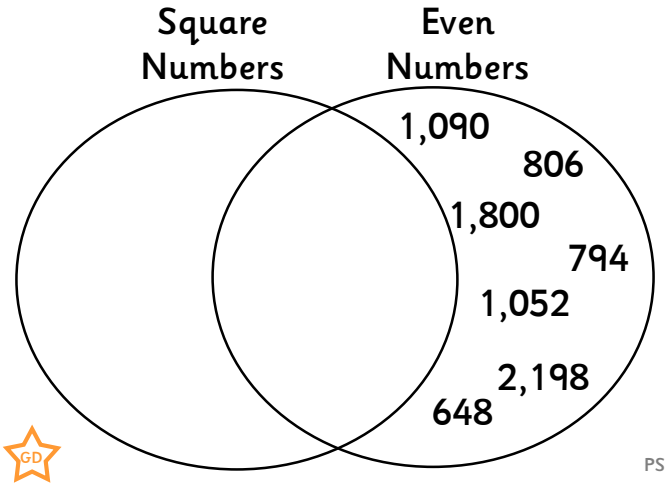
What are her numbers?
What is the root number?

E PS

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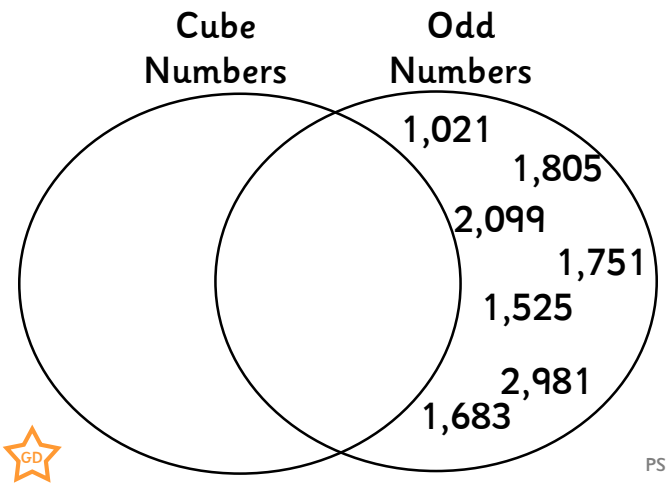
Reasoning and Problem Solving – Square and Cube Numbers

7a. Complete the Venn diagram using numbers between 100 and 400.



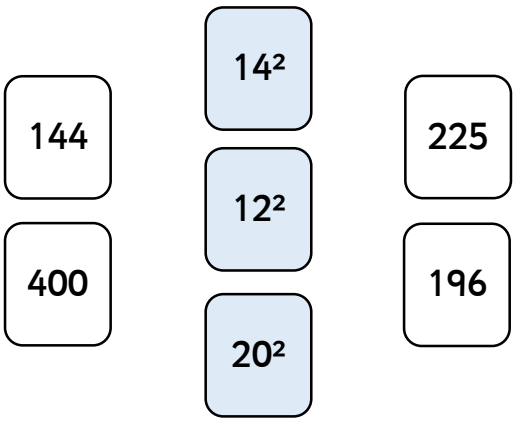
PS

7b. Complete the Venn diagram using numbers up to 1,000 and 8,000.



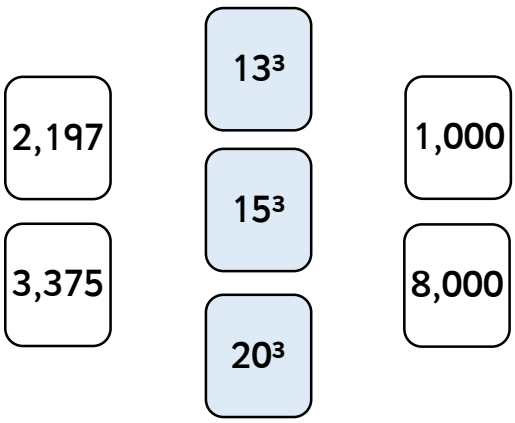
PS

8a. Match the square number to the correct calculation. Which is the odd one out? How do you know?



R

8b. Match the cube number to the correct calculation. Which is the odd one out? How do you know?



R

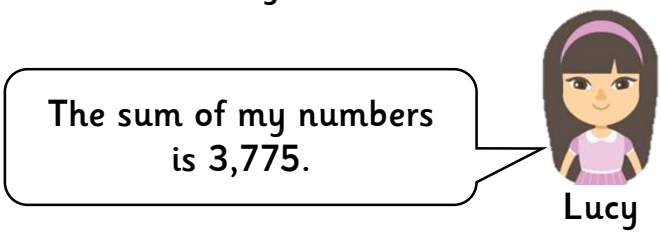
9a. Sean has two number cards. One is a square number and one is a cube number. He says:



What are his numbers?
What are the root numbers?

PS

9b. Lucy has two number cards. One is a square number and one is a cube number. She says:



What are her numbers?
What are the root numbers?

PS

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Reasoning and Problem Solving – Square and Cube Numbers

Developing

1a. Square Numbers: 4, 16, 36; Square/Odd Numbers: 1, 9, 25, 49
1b. Cube Numbers: 1, 27, 125; Cube/Even Numbers: 8, 64
2a. $3^2 = 9$, $5^2 = 25$, $7^2 = 49$; 36 is the odd one out as it does not match any of the square number cards.
2b. $2^3 = 8$, $5^3 = 125$, $4^3 = 64$; 27 is the odd one out as it does not match any of the cube number cards.
3a. Her numbers are 25 and 125. The root number is 5.
3b. His numbers are 16 and 64. The root number is 4.

Expected

4a. Square Numbers: 1, 9, 25, 49, 81, 121; Square/Even Numbers: 4, 16, 36, 64, 100, 144
4b. Cube Numbers: 8, 64, 216, 512, 1,000; Cube/Odd Numbers: 1, 27, 125, 343, 729
5a. $8^2 = 64$, $12^2 = 144$, $9^2 = 81$; 121 is the odd one out as it does not match any of the square number cards.
5b. $11^3 = 1{,}331$, $10^3 = 1{,}000$, $7^3 = 729$; 1,728 is the odd one out as it does not match any of the cube number cards.
6a. His numbers are 121 and 1,000. The root numbers are 11 and 10.
6b. Her numbers are 81 and 729. The root number is 9.

Greater Depth

7a. Square numbers: 121, 169, 225, 289, 361; Square/Even Numbers: 100, 144, 196, 256, 324, 400
7b. Cube numbers: 1,000, 1,728, 2,744, 4,096, 5,832, 8,000; Cube/Odd Numbers: 1,331, 2,197, 3,375, 4,913, 6,859
8a. $14^2 = 196$, $12^2 = 144$, $20^2 = 400$; 225 is the odd one out as it does not match any of the square number cards.
8b. $13^3 = 2{,}197$, $15^3 = 3{,}375$, $20^3 = 8{,}000$; 1,000 is the odd one out as it does not match any of the cube number cards.
9a. His numbers are 225 and 8,000. The root numbers are 15 and 20.
9b. Her numbers are 400 and 3,375. The root numbers are 20 and 15.

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