Yocket Prep

FREE DOWNLOADABLE FULL-LENGTH PRACTICE PAPER

dMAT Core Module Practice Paper 1

Figure Sequences, Mathematical Equations and Latin Squares with full solutions

3	subtests	60	questions	75 min	suggested time

This paper follows the structure of the dMAT Core Module, which has three subtests of 20 questions each. The questions are original practice material prepared by Yocket Prep and are not taken from any official dMAT paper.

Prepared by the Yocket Prep team

Instructions

The paper has three subtests, each with 20 questions and a suggested time of 25 minutes. Work through each subtest without notes or a calculator, and treat the three subtests as separate timed blocks. Marks are not deducted for wrong answers, so every question should be attempted, and an informed guess is better than leaving a question blank.

Subtest	Questions	Task
Figure Sequences	1 to 20	Find the 5th and the 6th matrix of a sequence of 3 × 3 matrices.
Mathematical Equations	21 to 40	Solve a system of linked equations and find the asked letters, which are whole numbers from 1 to 20.
Latin Squares	41 to 60	Find the letter that belongs in the cell marked "?" in a 5 × 5 square, with each letter A to E once in every row and column.

Rules for Figure Sequences

Every matrix has the same figures, and each figure follows its own rule from one matrix to the next. A figure can change its cell, its colour and its orientation. Movement is horizontal, vertical, diagonal or along the outer boundary, and a figure that reaches the edge of a line bounces back. Figures never overlap and never disappear. Some rules follow an x + 1 pattern, in which the change grows by one more step each time.

Answering

Figure Sequences has two answers per question, one option letter (a to d) for the 5th matrix and one for the 6th matrix. Mathematical Equations has four options (a to d). Latin Squares has five letter options, A to E. The answer key and the full solutions are at the end of the paper, and they should be opened only after every subtest has been attempted.

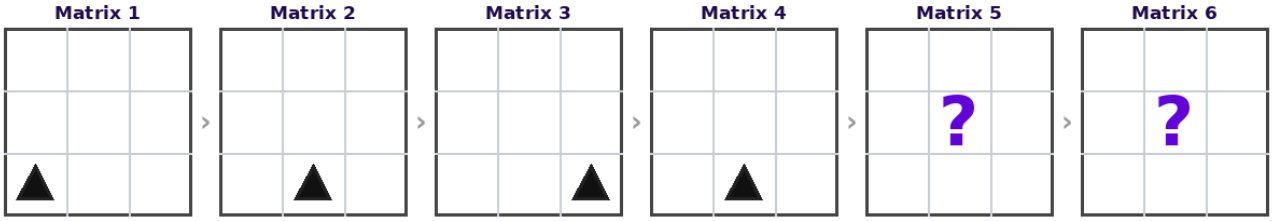
Subtest 1: Figure Sequences (Questions 1 to 20)

Each question shows Matrices 1 to 4. Choose the option that gives Matrix 5 and the option that gives Matrix 6.

Question 1

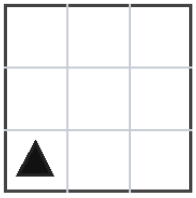
Easy

Matrix 1 › Matrix 2 › Matrix 3 › Matrix 4 › Matrix 5 (?) › Matrix 6 (?)

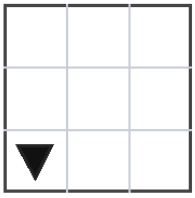


Options for Matrix 5

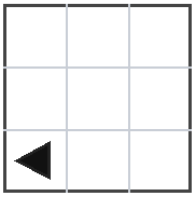
a



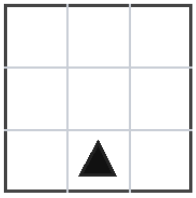
b



c

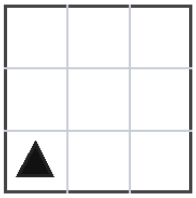


d

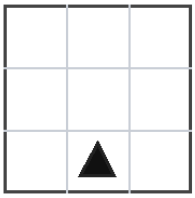


Options for Matrix 6

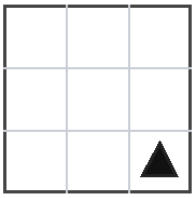
a



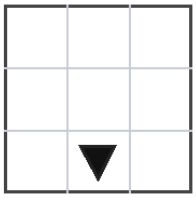
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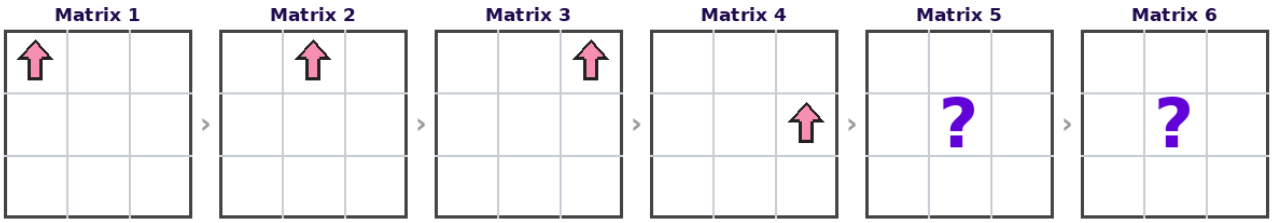
d



Question 2

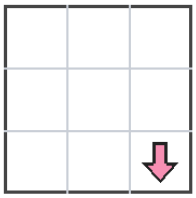
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Matrix 1 › Matrix 2 › Matrix 3 › Matrix 4 › Matrix 5 (?) › Matrix 6 (?)

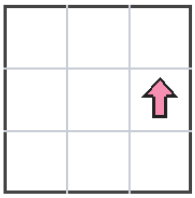


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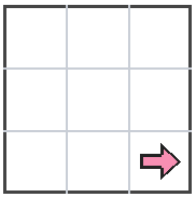
a



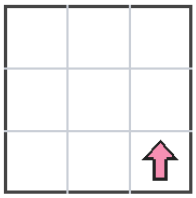
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c

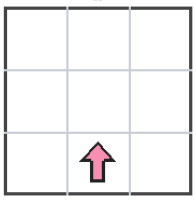


d

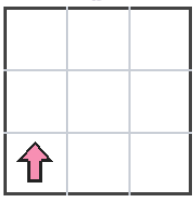


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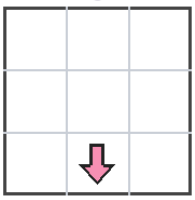
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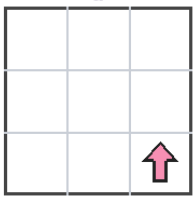
b



c

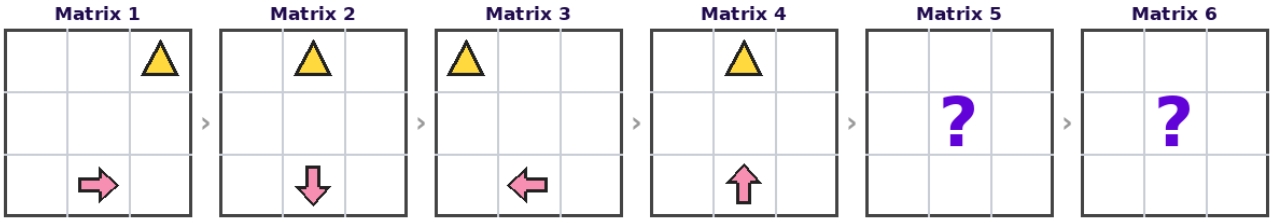


d

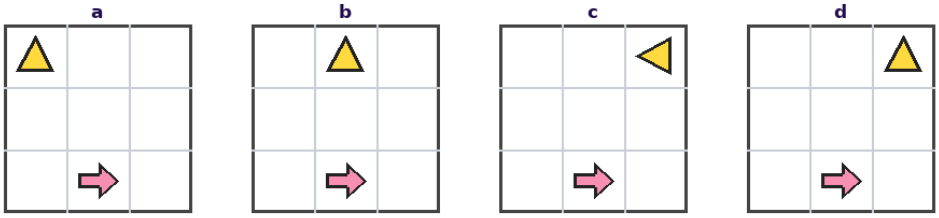


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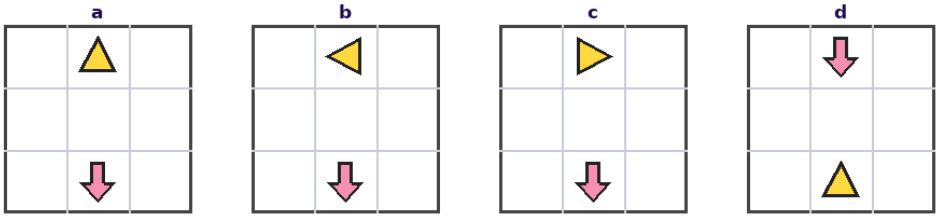
Easy



Options for Matrix 5

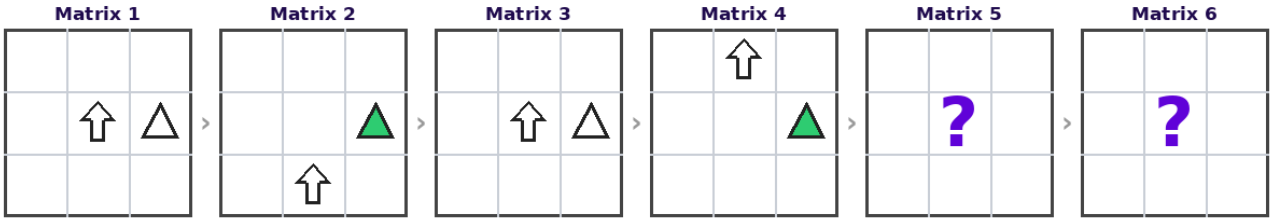


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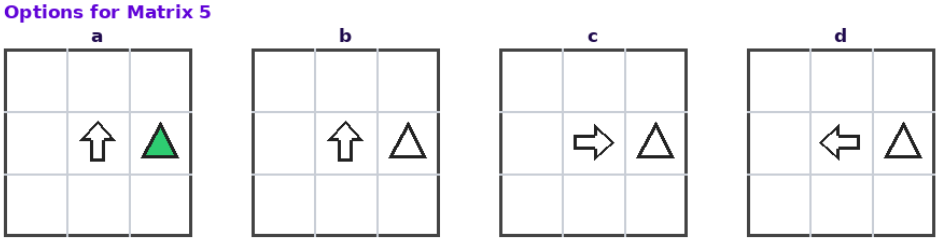


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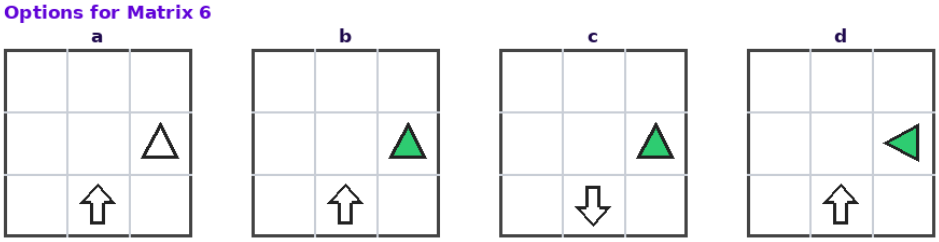
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Options for Matrix 5

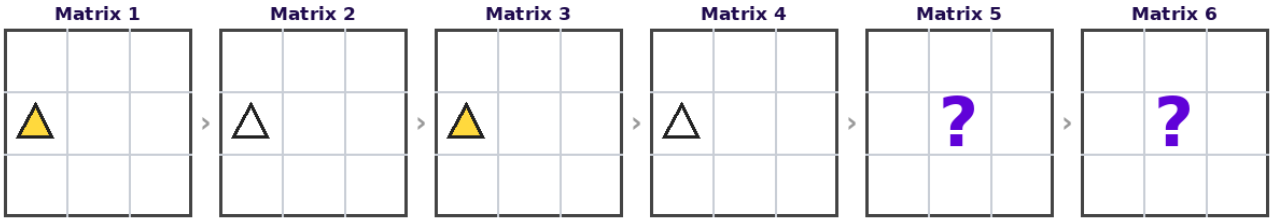


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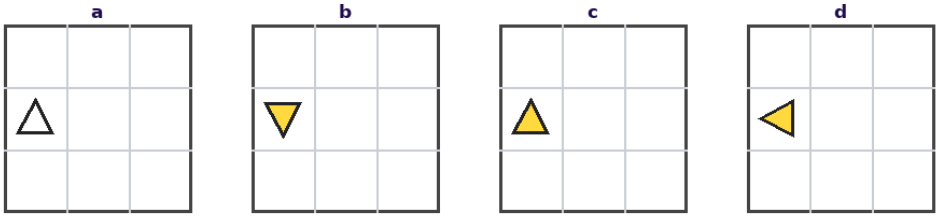


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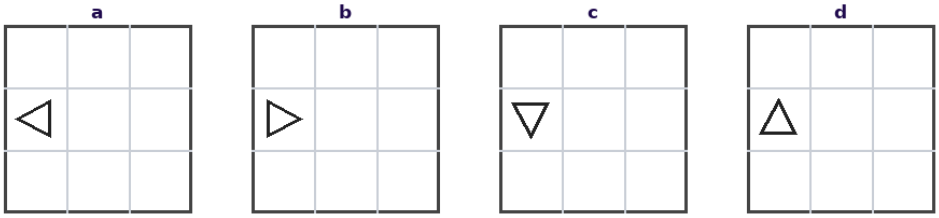
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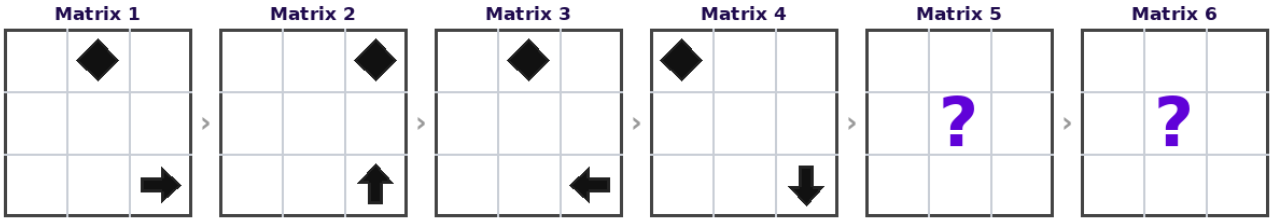


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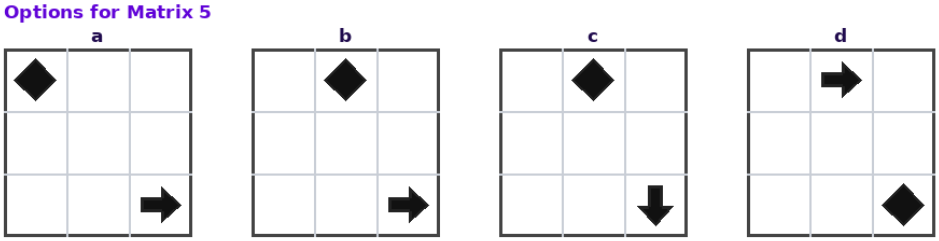


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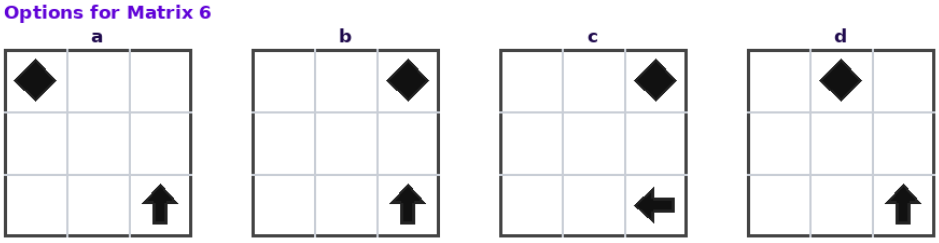
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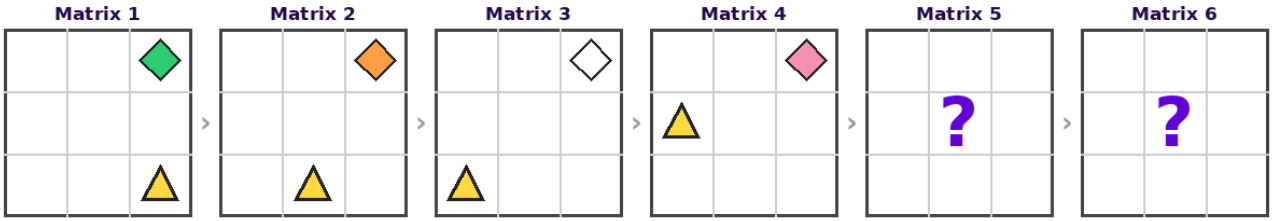


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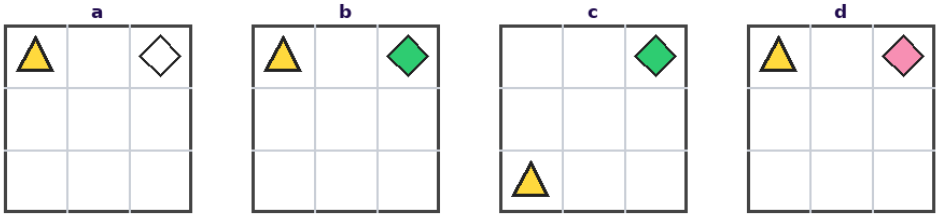


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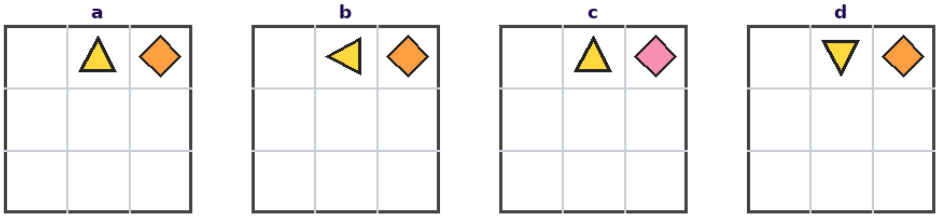
Easy



Options for Matrix 5

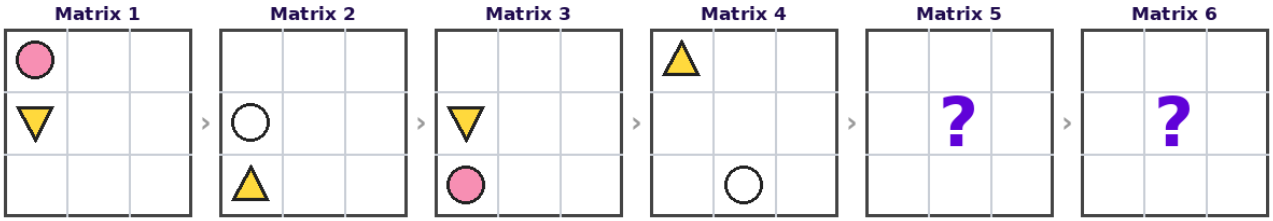


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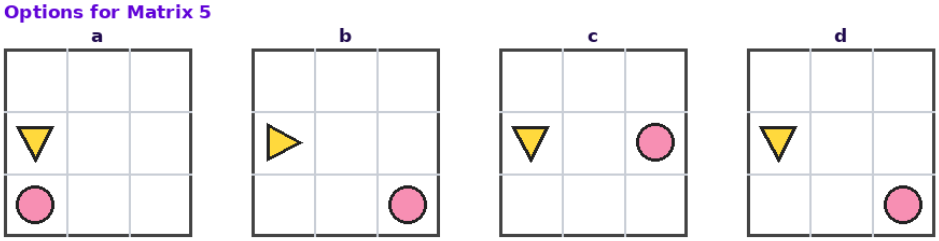


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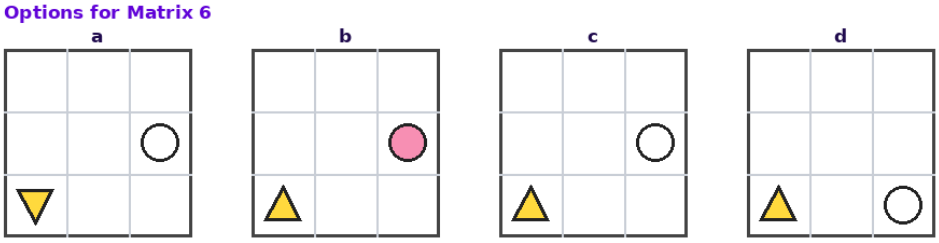
Medium



Options for Matrix 5

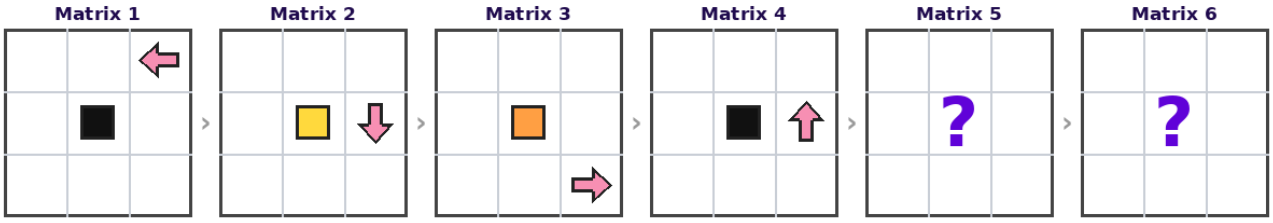


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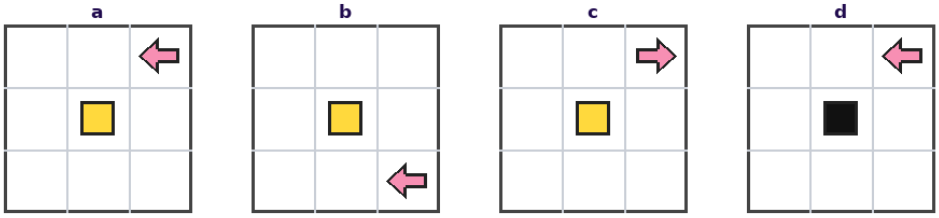


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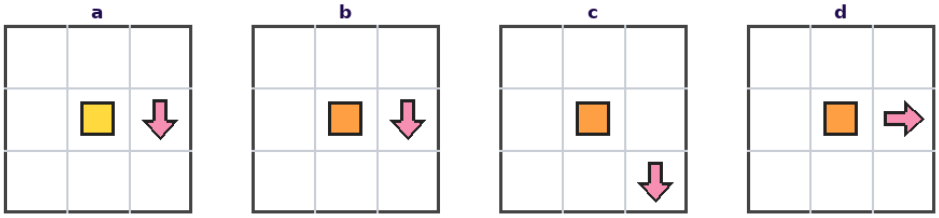
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Options for Matrix 5

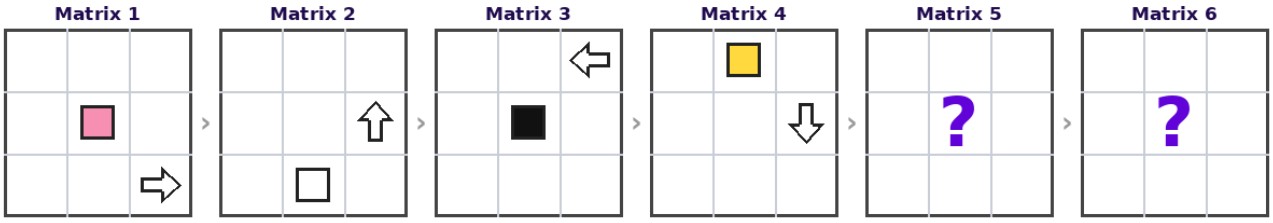


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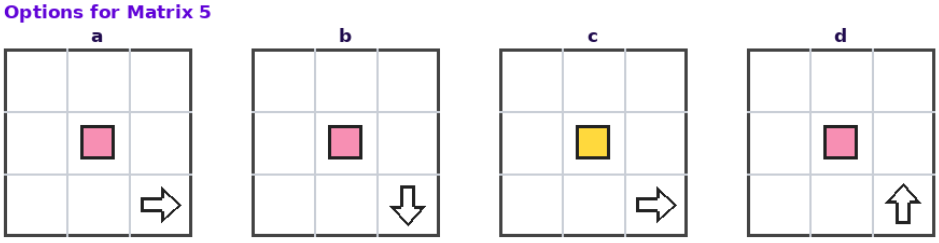


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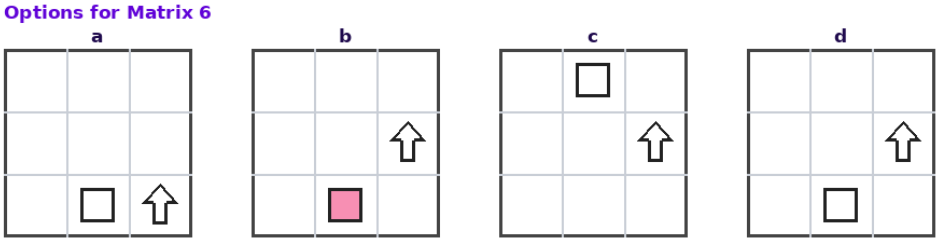
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Options for Matrix 5

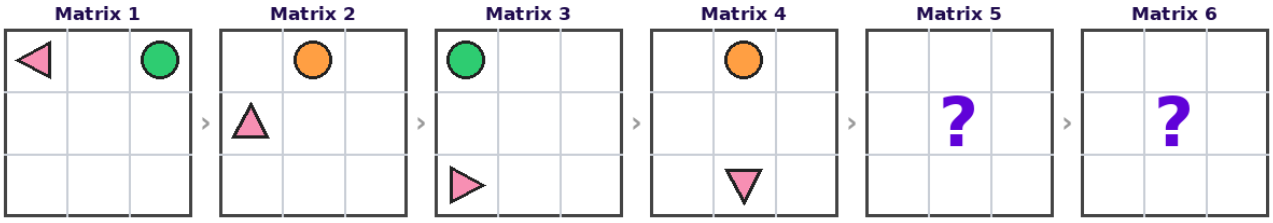


Options for Matrix 6

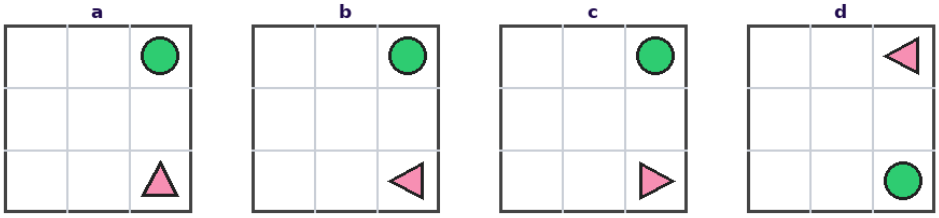


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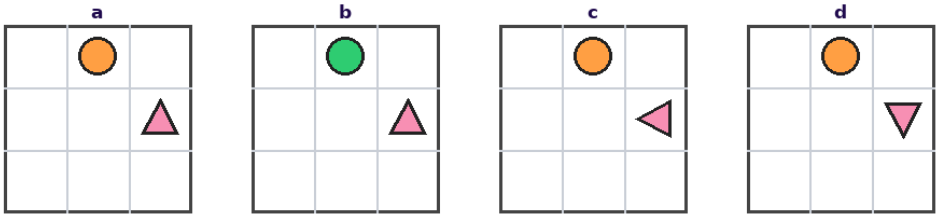
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Options for Matrix 5

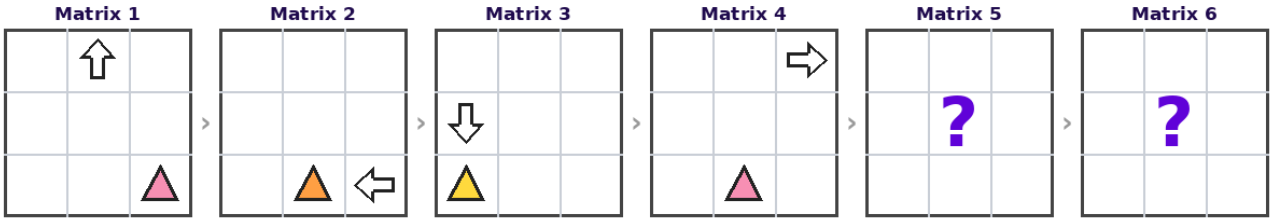


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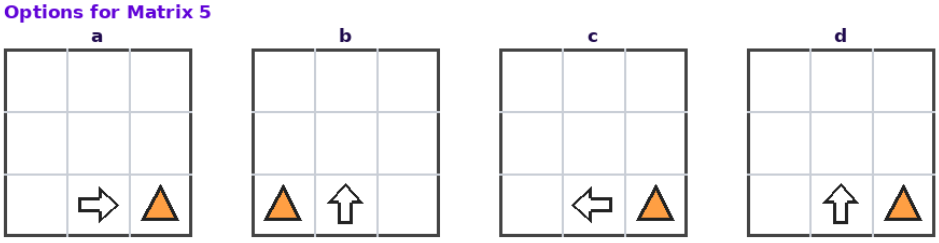


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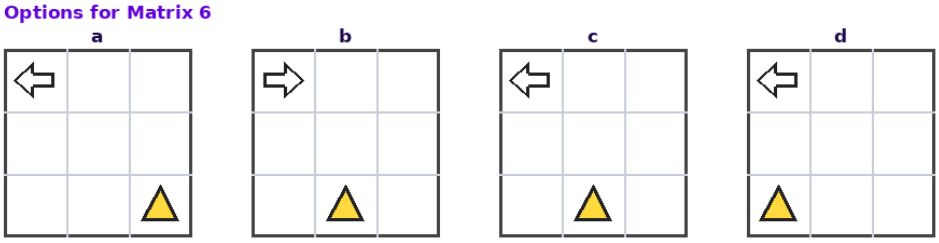
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Options for Matrix 5

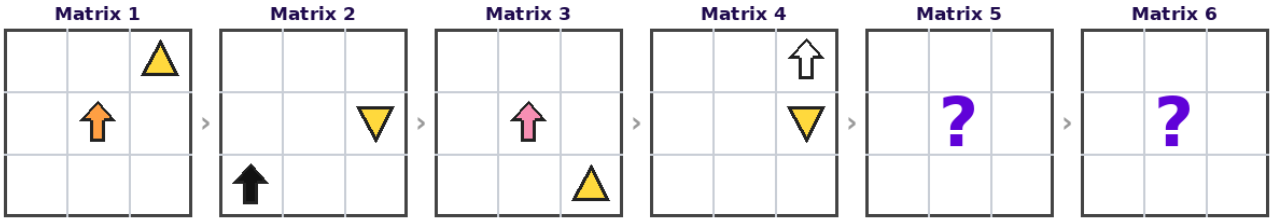


Options for Matrix 6

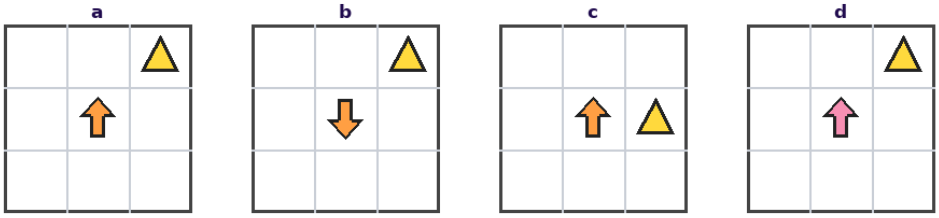


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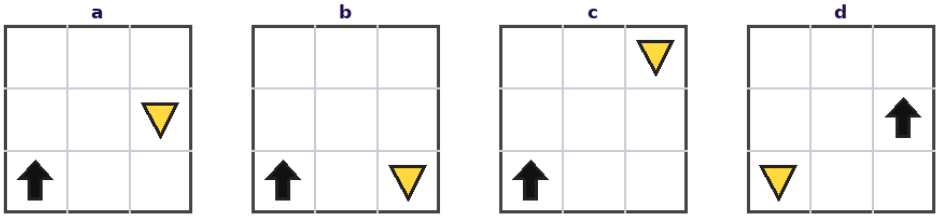
Medium



Options for Matrix 5

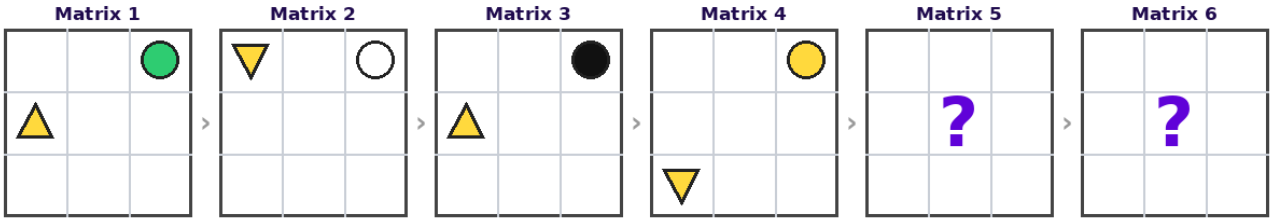


Options for Matrix 6

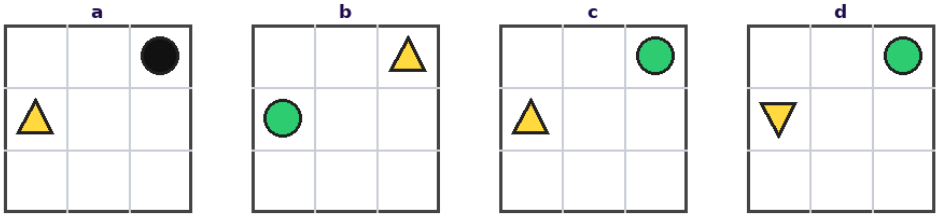


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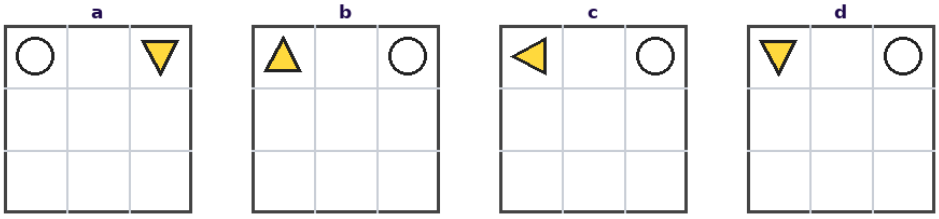
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Options for Matrix 5

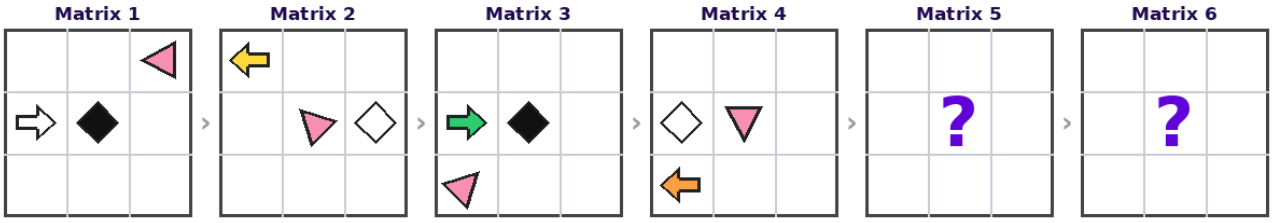


Options for Matrix 6

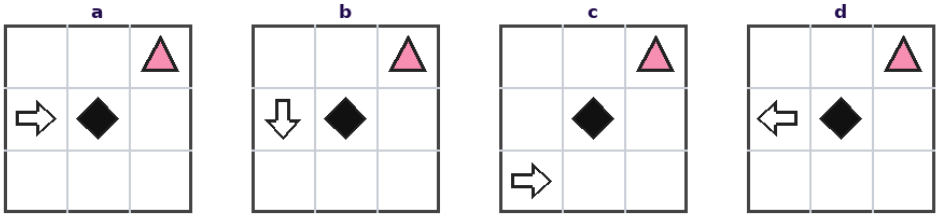


Question 15

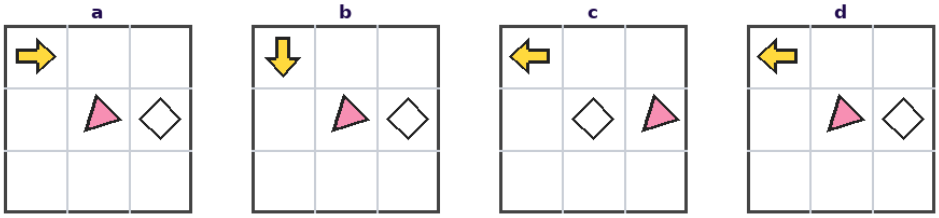
Hard



Options for Matrix 5

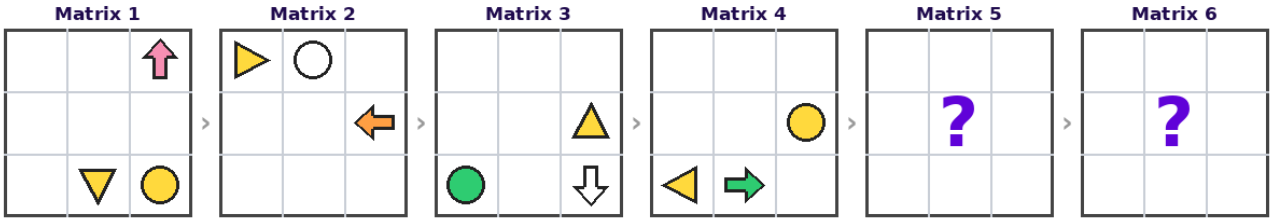


Options for Matrix 6

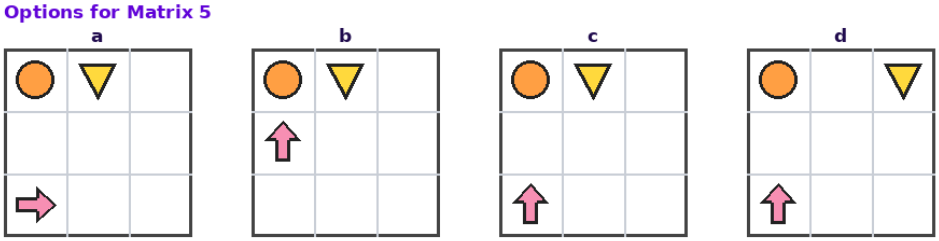


Question 16

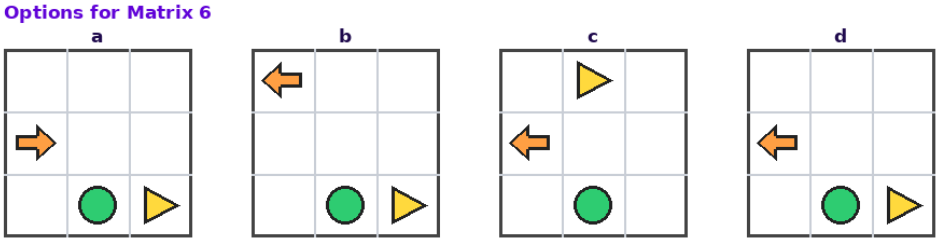
Hard



Options for Matrix 5

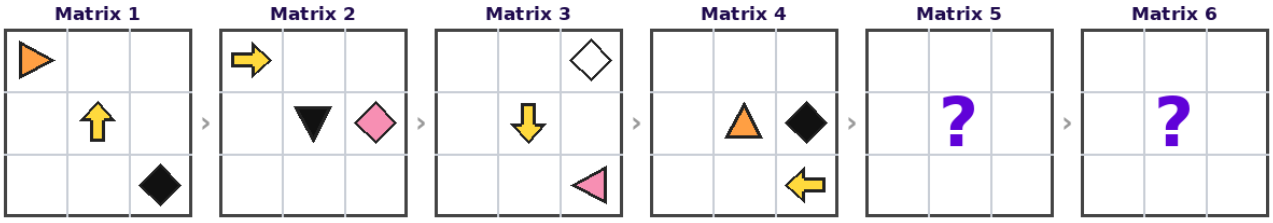


Options for Matrix 6

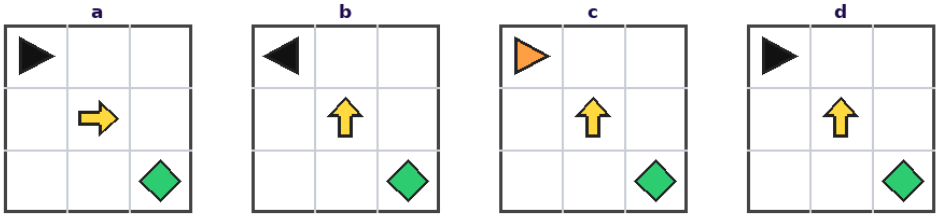


Question 17

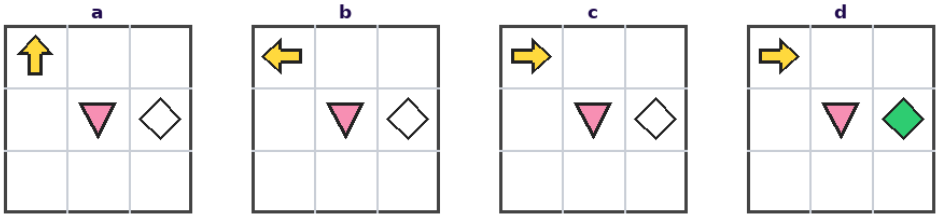
Hard



Options for Matrix 5

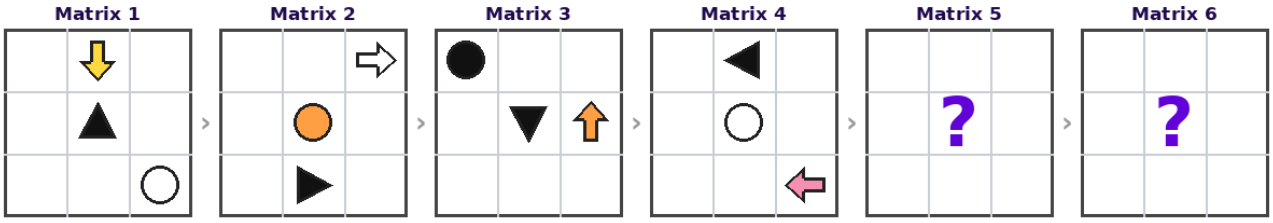


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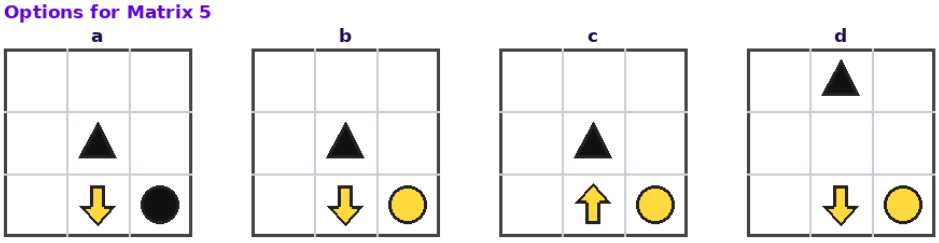


Question 18

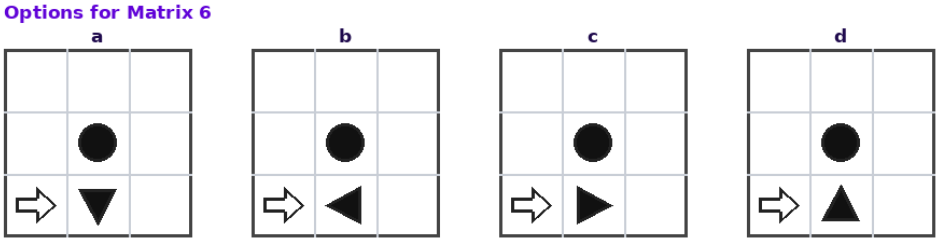
Hard



Options for Matrix 5

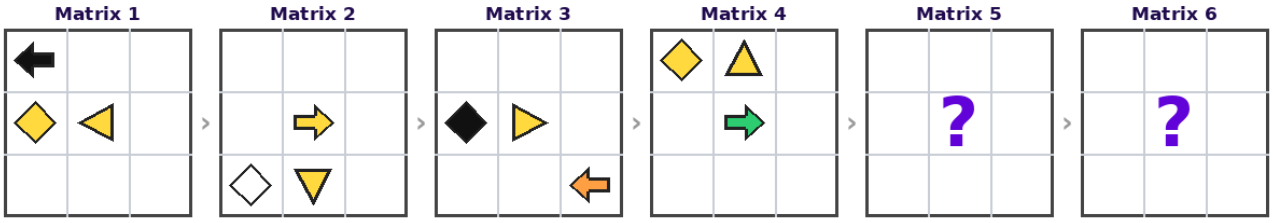


Options for Matrix 6

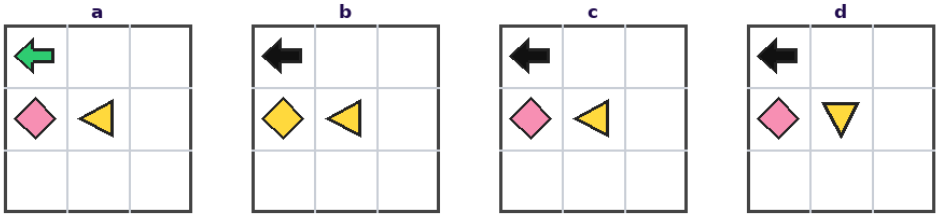


Question 19

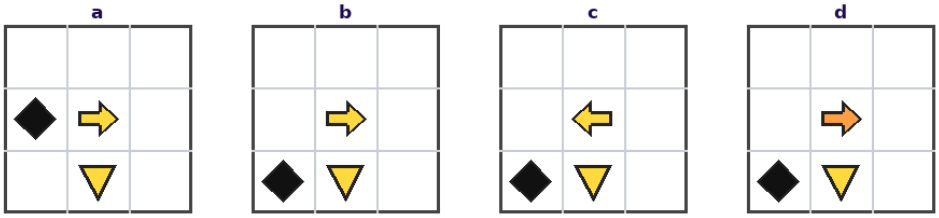
Hard



Options for Matrix 5

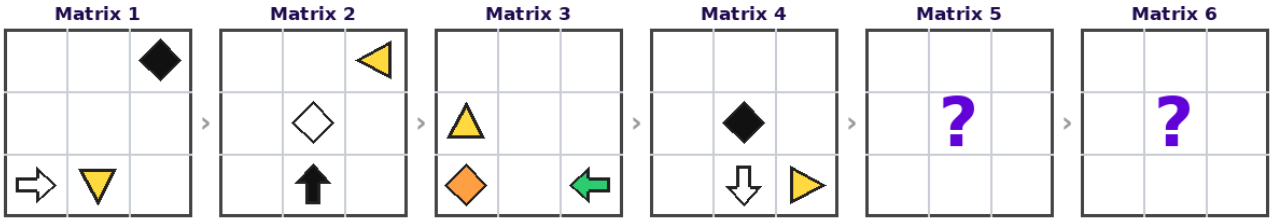


Options for Matrix 6

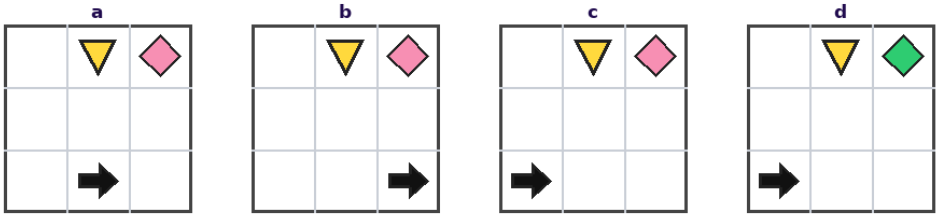


Question 20

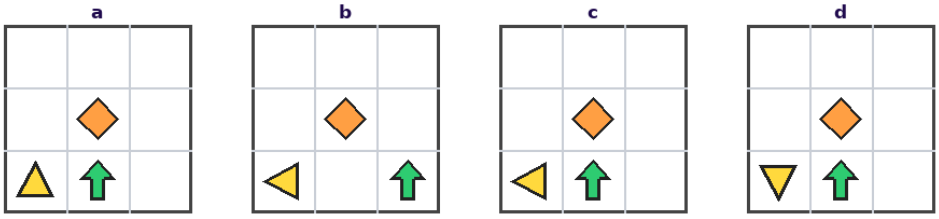
Hard



Options for Matrix 5



Options for Matrix 6



Subtest 2: Mathematical Equations (Questions 21 to 40)

Every letter stands for a whole number from 1 to 20, and each system has exactly one solution.

Question 21 Easy

B − A = 2

A = 9

What is the value of B?

a. 11	**b.** 9	**c.** 14	**d.** 8

Question 22 Easy

B − A = 9

A + B = 23

What is the value of B?

a. 7	**b.** 32	**c.** 19	**d.** 16

Question 23 Easy

A = B + 8

B = 8

What is the value of A?

a. 8	**b.** 16	**c.** 14	**d.** 13

Question 24 Easy

A = 3

A + B = 16

What is the value of B?

a. 13	**b.** 3	**c.** 26	**d.** 11

Question 25 Easy

B + 9 = A
B + A = 15

What is the value of A?

a. 3	**b.** 14	**c.** 9	**d.** 12

Question 26 Easy

A + B = 16
B = A + 6

What is the value of B?

a. 5	**b.** 11	**c.** 13	**d.** 8

Question 27 Easy

B = A ÷ 2
A = 6

What is the value of B?

a. 6	**b.** 1	**c.** 2	**d.** 3

Question 28 Medium

B = C - 4
C = 11
C + A = 25

What are the values of A and B?

a. A = 14, B = 8	**b.** A = 14, B = 7
c. A = 7, B = 14	**d.** A = 14, B = 9

Question 29 Medium

C = 3
A = C + 6
B = 3 × (A - C)

What is the value of B?

a. 18	**b.** 3	**c.** 9	**d.** 36

Question 30 Medium

C = 3 × B
B + 4 = A
C - B = 6

What is the value of A?

a. 3	**b.** 7	**c.** 9	**d.** 10

Question 31 Medium

A = C + 9
C = 7
B - C = 2

What is the value of A?

a. 7	**b.** 9	**c.** 16	**d.** 18

Question 32 Medium

A = 3
B = A ÷ 3
B + C = 13

What is the value of C?

a. 3	**b.** 1	**c.** 6	**d.** 12

Question 33 Medium

$B + A = 14$

$C = A + 6$

$B = 9$

What is the value of C?

a. 11	**b.** 9	**c.** 5	**d.** 12

Question 34 Medium

$2 \times C = B$

$B - A = 5$

$A + B = 15$

What is the value of C?

a. 5	**b.** 10	**c.** 6	**d.** 8

Question 35 Hard

$C = A - 2$

$B = A - C$

$D \div 2 = B$

$A + C = 10$

What is the value of D?

a. 6	**b.** 2	**c.** 4	**d.** 8

Question 36 Hard

$D + C = 23$

$D + 7 = C$

$B = 2 \times (D - 1)$

$A = B - D$

What is the value of A?

a. 8	**b.** 15	**c.** 6	**d.** 7

Question 37 Hard

D = 2 × C
A ÷ 3 = C
C + A = 16
B ÷ 2 = C

What is the value of B?

a. 4	**b.** 12	**c.** 8	**d.** 9

Question 38 Hard

D = B ÷ 2
B + A = 15
C - A = 5
A = B - 5

What is the value of D?

a. 10	**b.** 7	**c.** 4	**d.** 5

Question 39 Hard

C - B = 7
A = B - 4
D = C - 5
B + C = 29

What are the values of A and D?

a. A = 7, D = 15	**b.** A = 7, D = 13
c. A = 7, D = 14	**d.** A = 8, D = 13

Question 40 Hard

A + C = 14
D = B - 8
C = A - 2
B = A + C

What is the value of D?

a. 8	**b.** 14	**c.** 6	**d.** 5

Subtest 3: Latin Squares (Questions 41 to 60)

Each letter A to E appears exactly once in every row and every column. Find the letter that belongs in the cell marked "?".

Question 41 Easy

	1	2	3	4	5
1		E		A	C
2		B		C	E
3				E	
4			C		
5	B	C		D	?

Which letter belongs in the cell marked "?" (Row 5, Column 5)?

A B C D E

Question 42 Easy

	1	2	3	4	5
1	E			B	
2		B			E
3				D	
4	?	C	A		D
5	D		B	A	

Which letter belongs in the cell marked "?" (Row 4, Column 1)?

A B C D E

Question 43 Easy

	1	2	3	4	5
1		C	E	B	
2	D				
3	C	E	B	?	A
4					
5		D		C	

Which letter belongs in the cell marked "?" (Row 3, Column 4)?

A B C D E

Question 44 Easy

	1	2	3	4	5
1	B	?	C		D
2				E	
3	C	A	D	B	
4		C	E		
5				C	

Which letter belongs in the cell marked "?" (Row 1, Column 2)?

A	B	C	D	E

Question 45 Easy

	1	2	3	4	5
1	E				A
2	D				
3	C	E			D
4					E
5	A			B	?

Which letter belongs in the cell marked "?" (Row 5, Column 5)?

A	B	C	D	E

Question 46 Easy

	1	2	3	4	5
1	C	E		?	B
2			C		
3				D	
4	D		A		C
5	A		B		

Which letter belongs in the cell marked "?" (Row 1, Column 4)?

A	B	C	D	E

Question 47 Easy

	1	2	3	4	5
1		D	E		
2		B			E
3	D				C
4				E	
5		C	A	?	D

Which letter belongs in the cell marked "?" (Row 5, Column 4)?

A	B	C	D	E

Question 48 Medium

	1	2	3	4	5
1	?	C	B		
2			C	D	
3			E		
4	E		D	B	
5	C	D		E	B

Which letter belongs in the cell marked "?" (Row 1, Column 1)?

A	B	C	D	E

Question 49 Medium

	1	2	3	4	5
1	D			B	
2			B		
3		B			C
4		C	?		D
5			D	E	

Which letter belongs in the cell marked "?" (Row 4, Column 3)?

A	B	C	D	E

Question 50 Medium

	1	2	3	4	5
1	D				
2	B	C		D	
3	E	B		C	
4		?		E	
5	C				

Which letter belongs in the cell marked "?" (Row 4, Column 2)?

A	B	C	D	E

Question 51 Medium

	1	2	3	4	5
1			A		E
2		A	D		
3		E	B	A	?
4			E	D	B
5				E	A

Which letter belongs in the cell marked "?" (Row 3, Column 5)?

A	B	C	D	E

Question 52 Medium

	1	2	3	4	5
1	A			C	
2	B		C		
3					C
4			E		
5	E	?	D		B

Which letter belongs in the cell marked "?" (Row 5, Column 2)?

A	B	C	D	E

Question 53 Medium

	1	2	3	4	5
1	A	B		D	C
2	E			?	D
3	D	C		E	
4	C				
5		D		A	

Which letter belongs in the cell marked "?" (Row 2, Column 4)?

A	B	C	D	E

Question 54 Medium

	1	2	3	4	5
1			D		B
2	D	E		B	A
3			?		
4	C		B		
5			A		

Which letter belongs in the cell marked "?" (Row 3, Column 3)?

A	B	C	D	E

Question 55 Hard

	1	2	3	4	5
1	A		D	E	B
2	C		B	D	
3	?				
4					A
5	E			C	

Which letter belongs in the cell marked "?" (Row 3, Column 1)?

A	B	C	D	E

Question 56 Hard

	1	2	3	4	5
1		E	C		A
2	B				C
3	A	?			E
4	C				
5			D	C	

Which letter belongs in the cell marked "?" (Row 3, Column 2)?

A | B | C | D | E

Question 57 Hard

	1	2	3	4	5
1				E	
2			C	A	B
3		C	A		E
4	E			B	C
5			?		

Which letter belongs in the cell marked "?" (Row 5, Column 3)?

A | B | C | D | E

Question 58 Hard

	1	2	3	4	5
1		D	B		?
2	A			D	
3	B		A		
4				B	C
5		C			

Which letter belongs in the cell marked "?" (Row 1, Column 5)?

A | B | C | D | E

Question 59

Hard

	1	2	3	4	5
1			E		
2	?			B	D
3		C			B
4	D		B		
5	C				A

Which letter belongs in the cell marked "?" (Row 2, Column 1)?

A	B	C	D	E

Question 60

Hard

	1	2	3	4	5
1	B			A	
2	D			B	
3		A	C		B
4		D	?	C	
5		B			

Which letter belongs in the cell marked "?" (Row 4, Column 3)?

A	B	C	D	E

Answer key

Figure Sequences (Matrix 5, Matrix 6)

Q1 **a, b**	Q2 **d, a**	Q3 **d, a**	Q4 **b, b**	Q5 **c, d**
Q6 **b, b**	Q7 **b, a**	Q8 **d, c**	Q9 **a, b**	Q10 **a, d**
Q11 **b, a**	Q12 **d, c**	Q13 **a, a**	Q14 **c, d**	Q15 **a, d**
Q16 **c, d**	Q17 **d, c**	Q18 **b, c**	Q19 **c, b**	Q20 **c, c**

Mathematical Equations

Q21 **a**	Q22 **d**	Q23 **b**	Q24 **a**	Q25 **d**
Q26 **b**	Q27 **d**	Q28 **b**	Q29 **a**	Q30 **b**
Q31 **c**	Q32 **d**	Q33 **a**	Q34 **a**	Q35 **c**
Q36 **c**	Q37 **c**	Q38 **d**	Q39 **b**	Q40 **c**

Latin Squares

Q41 **A**	Q42 **B**	Q43 **D**	Q44 **E**	Q45 **C**
Q46 **A**	Q47 **B**	Q48 **D**	Q49 **E**	Q50 **D**
Q51 **D**	Q52 **C**	Q53 **C**	Q54 **E**	Q55 **B**
Q56 **C**	Q57 **E**	Q58 **A**	Q59 **A**	Q60 **B**

Solutions: Figure Sequences

Question 1 Easy **Answer: Matrix 5: a, Matrix 6: b**

The triangle moves one cell at a time along the bottom row and bounces back when it reaches the end of the line, so it is in the bottom-left cell in Matrix 5 and the bottom-middle cell in Matrix 6.

Question 2 Easy **Answer: Matrix 5: d, Matrix 6: a**

The arrow moves 1 cell clockwise along the outer boundary in every matrix, so it is in the bottom-right cell in Matrix 5 and the bottom-middle cell in Matrix 6.

Question 3 Easy **Answer: Matrix 5: d, Matrix 6: a**

The arrow rotates 90 degrees clockwise in every matrix, so it points right in Matrix 5 and down in Matrix 6. The triangle moves one cell at a time along the top row and bounces back when it reaches the end of the line, so it is in the top-right cell in Matrix 5 and the top-middle cell in Matrix 6.

Question 4 Easy **Answer: Matrix 5: b, Matrix 6: b**

The arrow moves one cell at a time down and up the middle column and bounces back when it reaches the end of the line, so it is in the centre cell in Matrix 5 and the bottom-middle cell in Matrix 6. The triangle changes colour in the order white and green and then repeats, so it is white in Matrix 5 and green in Matrix 6.

Question 5 Easy **Answer: Matrix 5: c, Matrix 6: d**

The triangle changes colour in the order yellow and white and then repeats, so it is yellow in Matrix 5 and white in Matrix 6.

Question 6 Easy **Answer: Matrix 5: b, Matrix 6: b**

The arrow rotates 90 degrees anticlockwise in every matrix, so it points right in Matrix 5 and up in Matrix 6. The diamond moves one cell at a time along the top row and bounces back when it reaches the end of the line, so it is in the top-middle cell in Matrix 5 and the top-right cell in Matrix 6.

Question 7 Easy **Answer: Matrix 5: b, Matrix 6: a**

The diamond changes colour in the order green, orange, white and pink and then repeats, so it is green in Matrix 5 and orange in Matrix 6. The triangle moves 1 cell clockwise along the outer boundary in every matrix, so it is in the top-left cell in Matrix 5 and the top-middle cell in Matrix 6.

Question 8 Medium **Answer: Matrix 5: d, Matrix 6: c**

The circle moves 1 cell anticlockwise along the outer boundary in every matrix, so it is in the bottom-right cell in Matrix 5 and the middle-right cell in Matrix 6. The circle changes colour in the order pink and white and then repeats, so it is pink in Matrix 5 and white in Matrix 6. The triangle moves one cell at a time down and up the left column and bounces back when it reaches the end of the line, so it is in the middle-left cell in Matrix 5 and the bottom-left cell in Matrix 6. The triangle rotates 180 degrees clockwise in every matrix, so it points down in Matrix 5 and up in Matrix 6.

Question 9 Medium **Answer: Matrix 5: a, Matrix 6: b**

The arrow moves one cell at a time down and up the right column and bounces back when it reaches the end of the line, so it is in the top-right cell in Matrix 5 and the middle-right cell in Matrix 6. The arrow rotates 90 degrees anticlockwise in every matrix, so it points left in Matrix 5 and down in Matrix 6. The square changes colour in the order black, yellow and orange and then repeats, so it is yellow in Matrix 5 and orange in Matrix 6.

Question 10 Medium **Answer: Matrix 5: a, Matrix 6: d**

The square moves one cell at a time down and up the middle column and bounces back when it reaches the end of the line, so it is in the centre cell in Matrix 5 and the bottom-middle cell in Matrix 6. The square changes colour in the order pink, white, black and yellow and then repeats, so it is pink in Matrix 5 and white in Matrix 6. The arrow moves one cell at a time down and up the right column and bounces back when it reaches the end of the line, so it is in the bottom-right cell in Matrix 5 and the middle-right cell in Matrix 6. The arrow rotates 90 degrees anticlockwise in every matrix, so it points right in Matrix 5 and up in Matrix 6.

Question 11 Medium **Answer: Matrix 5: b, Matrix 6: a**

The triangle moves 1 cell anticlockwise along the outer boundary in every matrix, so it is in the bottom-right cell in Matrix 5 and the middle-right cell in Matrix 6. The triangle rotates 90 degrees clockwise in every matrix, so it points left in Matrix 5 and up in Matrix 6. The circle moves one cell at a time along the top row and bounces back when it reaches the end of the line, so it is in the top-right cell in Matrix 5 and the top-middle cell in Matrix 6. The circle changes colour in the order green and orange and then repeats, so it is green in Matrix 5 and orange in Matrix 6.

Question 12 Medium **Answer: Matrix 5: d, Matrix 6: c**

The triangle moves one cell at a time along the bottom row and bounces back when it reaches the end of the line, so it is in the bottom-right cell in Matrix 5 and the bottom-middle cell in Matrix 6. The triangle changes colour in the order pink, orange and yellow and then repeats, so it is orange in Matrix 5 and yellow in Matrix 6. The arrow moves 3 cells clockwise along the outer boundary in every matrix, so it is in the bottom-middle cell in Matrix 5 and the top-left cell in Matrix 6. The arrow rotates 90 degrees anticlockwise in every matrix, so it points up in Matrix 5 and left in Matrix 6.

Question 13 Medium **Answer: Matrix 5: a, Matrix 6: a**

The triangle moves one cell at a time down and up the right column and bounces back when it reaches the end of the line, so it is in the top-right cell in Matrix 5 and the middle-right cell in Matrix 6. The triangle rotates 180 degrees clockwise in every matrix, so it points up in Matrix 5 and down in Matrix 6. The arrow moves one cell at a time along the diagonal from top-right to bottom-left and bounces back when it reaches the end of the line, so it is in the centre cell in Matrix 5 and the bottom-left cell in Matrix 6. The arrow changes colour in the order orange, black, pink and white and then repeats, so it is orange in Matrix 5 and black in Matrix 6.

Question 14 Medium **Answer: Matrix 5: c, Matrix 6: d**

The triangle moves one cell at a time down and up the left column and bounces back when it reaches the end of the line, so it is in the middle-left cell in Matrix 5 and the top-left cell in Matrix 6. The triangle rotates 180 degrees clockwise in every matrix, so it points up in Matrix 5 and down in Matrix 6. The circle changes colour in the order green, white, black and yellow and then repeats, so it is green in Matrix 5 and white in Matrix 6.

Question 15 Hard **Answer: Matrix 5: a, Matrix 6: d**

The triangle moves one cell at a time along the diagonal from top-right to bottom-left and bounces back when it reaches the end of the line, so it is in the top-right cell in Matrix 5 and the centre cell in Matrix 6. The triangle rotates clockwise by 45, then 90, then 135 degrees and so on (the x + 1 pattern), so it points up in Matrix 5 and down and to the left in Matrix 6. The diamond moves one cell at a time along the middle row and bounces back when it reaches the end of the line, so it is in the centre cell in Matrix 5 and the middle-right cell in Matrix 6. The diamond changes colour in the order black and white and then repeats, so it is black in Matrix 5 and white in Matrix 6. The arrow moves one cell at a time down and up the left column and bounces back when it reaches the end of the line, so it is in the middle-left cell in Matrix 5 and the top-left cell in Matrix 6. The arrow rotates 180 degrees clockwise in every matrix, so it points right in Matrix 5 and left in Matrix 6. The arrow changes colour in the order white, yellow, green and orange and then repeats, so it is white in Matrix 5 and yellow in Matrix 6.

Question 16 Hard **Answer: Matrix 5: c, Matrix 6: d**

The circle moves 3 cells anticlockwise along the outer boundary in every matrix, so it is in the top-left cell in Matrix 5 and the bottom-middle cell in Matrix 6. The circle moves forward through the colour order yellow, white, pink, green, orange and black (repeating), by 1 place, then 2, then 3 and so on (the x + 1 pattern), so it is orange in Matrix 5 and green in Matrix 6. The triangle moves 3 cells clockwise along the outer boundary in every matrix, so it is in the top-middle cell in Matrix 5 and the bottom-right cell in Matrix 6. The triangle rotates 90 degrees anticlockwise in every matrix, so it points down in Matrix 5 and right in Matrix 6. The arrow moves 1 cell clockwise along the outer boundary in every matrix, so it is in the bottom-left cell in Matrix 5 and the middle-left cell in Matrix 6. The arrow rotates 90 degrees anticlockwise in every matrix, so it points up in Matrix 5 and left in Matrix 6. The arrow changes colour in the order pink, orange, white and green and then repeats, so it is pink in Matrix 5 and orange in Matrix 6.

Question 17 Hard **Answer: Matrix 5: d, Matrix 6: c**

The diamond moves one cell at a time down and up the right column and bounces back when it reaches the end of the line, so it is in the bottom-right cell in Matrix 5 and the middle-right cell in Matrix 6. The diamond moves forward through the colour order black, pink, orange, white, green and yellow (repeating), by 1 place, then 2, then 3 and so on (the x + 1 pattern), so it is green in Matrix 5 and white in Matrix 6. The arrow moves one cell at a time along the diagonal from top-left to bottom-right and bounces back when it reaches the end of the line, so it is in the centre cell in Matrix 5 and the top-left cell in Matrix 6. The arrow rotates 90 degrees clockwise in every matrix, so it points up in Matrix 5 and right in Matrix 6. The triangle moves one cell at a time along the diagonal from top-left to bottom-right and bounces back when it reaches the end of the line, so it is in the top-left cell in Matrix 5 and the centre cell in Matrix 6. The triangle rotates 90 degrees clockwise in every matrix, so it points right in Matrix 5 and down in Matrix 6. The triangle changes colour in the order orange, black and pink and then repeats, so it is black in Matrix 5 and pink in Matrix 6.

Question 18 Hard **Answer: Matrix 5: b, Matrix 6: c**

The circle moves one cell at a time along the diagonal from top-left to bottom-right and bounces back when it reaches the end of the line, so it is in the bottom-right cell in Matrix 5 and the centre cell in Matrix 6. The circle moves forward through the colour order white, orange, pink, black, yellow and green (repeating), by 1 place, then 2, then 3 and so on (the x + 1 pattern), so it is yellow in Matrix 5 and black in Matrix 6. The triangle moves one cell at a time down and up the middle column and bounces back when it reaches the end of the line, so it is in the centre cell in Matrix 5 and the bottom-middle cell in Matrix 6. The triangle rotates 90 degrees clockwise in every matrix, so it points up in Matrix 5 and right in Matrix 6. The arrow moves 1 cell clockwise along the outer boundary in every matrix, so it is in the bottom-middle cell in Matrix 5 and the bottom-left cell in Matrix 6. The arrow rotates 90 degrees anticlockwise in every matrix, so it points down in Matrix 5 and right in Matrix 6. The arrow changes colour in the order yellow, white, orange and pink and then repeats, so it is yellow in Matrix 5 and white in Matrix 6.

Question 19 Hard **Answer: Matrix 5: c, Matrix 6: b**

The diamond moves one cell at a time down and up the left column and bounces back when it reaches the end of the line, so it is in the middle-left cell in Matrix 5 and the bottom-left cell in Matrix 6. The diamond moves forward through the colour order yellow, white, orange, black, pink and green (repeating), by 1 place, then 2, then 3 and so on (the x + 1 pattern), so it is pink in Matrix 5 and black in Matrix 6. The triangle moves one cell at a time down and up the middle column and bounces back when it reaches the end of the line, so it is in the centre cell in Matrix 5 and the bottom-middle cell in Matrix 6. The triangle rotates 90 degrees anticlockwise in every matrix, so it points left in Matrix 5 and down in Matrix 6. The arrow moves one cell at a time along the diagonal from top-left to bottom-right and bounces back when it reaches the end of the line, so it is in the top-left cell in Matrix 5 and the centre cell in Matrix 6. The arrow rotates 180 degrees clockwise in every matrix, so it points left in Matrix 5 and right in Matrix 6. The arrow changes colour in the order black, yellow, orange and green and then repeats, so it is black in Matrix 5 and yellow in Matrix 6.

Question 20 Hard **Answer: Matrix 5: c, Matrix 6: c**

The diamond moves one cell at a time along the diagonal from top-right to bottom-left and bounces back when it reaches the end of the line, so it is in the top-right cell in Matrix 5 and the centre cell in Matrix 6. The diamond moves forward through the colour order black, white, yellow, orange, pink and green (repeating), by 1 place, then 2, then 3 and so on (the x + 1 pattern), so it is pink in Matrix 5 and orange in Matrix 6. The triangle moves 3 cells anticlockwise along the outer boundary in every matrix, so it is in the top-middle cell in Matrix 5 and the bottom-left cell in Matrix 6. The triangle rotates 90 degrees clockwise in every matrix, so it points down in Matrix 5 and left in Matrix 6. The arrow moves one cell at a time along the bottom row and bounces back when it reaches the end of the line, so it is in the bottom-left cell in Matrix 5 and the bottom-middle cell in Matrix 6. The arrow rotates 90 degrees anticlockwise in every matrix, so it points right in Matrix 5 and up in Matrix 6. The arrow changes colour in the order white, black and green and then repeats, so it is black in Matrix 5 and green in Matrix 6.

Solutions: Mathematical Equations

Question 21 Easy **Answer: a (11)**

A is given directly as 9. Use B - A = 2: B = 9 + 2 = 11. So B = 11.

Question 22 Easy **Answer: d (16)**

Replace B with A + 9 in A + B = 23: A + (A + 9) = 23, so 2 × A + 9 = 23, which gives 2 × A = 14 and A = 7. Then B = 7 + 9 = 16. So B = 16.

Question 23 Easy **Answer: b (16)**

B is given directly as 8. Use A = B + 8: A = 8 + 8 = 16. So A = 16.

Question 24 Easy **Answer: a (13)**

A is given directly as 3. Use A + B = 16: B = 16 - 3 = 13. So B = 13.

Question 25 Easy **Answer: d (12)**

Replace A with B + 9 in B + A = 15: B + (B + 9) = 15, so 2 × B + 9 = 15, which gives 2 × B = 6 and B = 3. Then A = 3 + 9 = 12. So A = 12.

Question 26 Easy **Answer: b (11)**

Replace B with A + 6 in A + B = 16: A + (A + 6) = 16, so 2 × A + 6 = 16, which gives 2 × A = 10 and A = 5. Then B = 5 + 6 = 11. So B = 11.

Question 27 Easy **Answer: d (3)**

A is given directly as 6. Use B = A ÷ 2: B = 6 ÷ 2 = 3. So B = 3.

Question 28 Medium **Answer: b (A = 14, B = 7)**

C is given directly as 11. Use B = C - 4: B = 11 - 4 = 7. Use C + A = 25: A = 25 - 11 = 14. So A = 14 and B = 7.

Question 29 Medium **Answer: a (18)**

C is given directly as 3. Use A = C + 6: A = 3 + 6 = 9. Use B = 3 × (A - C): B = 3 × (9 - 3) = 18. So B = 18.

Question 30 Medium **Answer: b (7)**

Replace C with 3 × B in C - B = 6: 3 × B - B = 6, so 2 × B = 6 and B = 3. Then C = 3 × 3 = 9. Use B + 4 = A: A = 3 + 4 = 7. So A = 7.

Question 31 Medium **Answer: c (16)**

C is given directly as 7. Use B - C = 2: B = 7 + 2 = 9. Use A = C + 9: A = 7 + 9 = 16. So A = 16.

Question 32 Medium **Answer: d (12)**

A is given directly as 3. Use B = A ÷ 3: B = 3 ÷ 3 = 1. Use B + C = 13: C = 13 - 1 = 12. So C = 12.

Question 33 Medium **Answer: a (11)**

B is given directly as 9. Use B + A = 14: A = 14 - 9 = 5. Use C = A + 6: C = 5 + 6 = 11. So C = 11.

Question 34 Medium **Answer: a (5)**

Replace B with A + 5 in A + B = 15: A + (A + 5) = 15, so 2 × A + 5 = 15, which gives 2 × A = 10 and A = 5. Then B = 5 + 5 = 10. Use 2 × C = B: C = 10 ÷ 2 = 5. So C = 5.

Question 35 Hard **Answer: c (4)**

Replace C with A - 2 in A + C = 10: A + (A - 2) = 10, so 2 × A - 2 = 10, which gives 2 × A = 12 and A = 6. Then C = 6 - 2 = 4. Use B = A - C: B = 6 - 4 = 2. Use D ÷ 2 = B: D = 2 × 2 = 4. So D = 4.

Question 36 Hard **Answer: c (6)**

Replace C with D + 7 in D + C = 23: D + (D + 7) = 23, so 2 × D + 7 = 23, which gives 2 × D = 16 and D = 8. Then C = 8 + 7 = 15. Use B = 2 × (D - 1): B = 2 × (8 - 1) = 14. Use A = B - D: A = 14 - 8 = 6. So A = 6.

Question 37 Hard **Answer: c (8)**

Replace A with 3 × C in C + A = 16: C + 3 × C = 16, so 4 × C = 16 and C = 4. Then A = 3 × 4 = 12. Use D = 2 × C: D = 2 × 4 = 8. Use B ÷ 2 = C: B = 2 × 4 = 8. So B = 8.

Question 38 Hard **Answer: d (5)**

Replace A with B - 5 in B + A = 15: B + (B - 5) = 15, so 2 × B - 5 = 15, which gives 2 × B = 20 and B = 10. Then A = 10 - 5 = 5. Use C - A = 5: C = 5 + 5 = 10. Use D = B ÷ 2: D = 10 ÷ 2 = 5. So D = 5.

Question 39 Hard **Answer: b (A = 7, D = 13)**

Replace C with B + 7 in B + C = 29: B + (B + 7) = 29, so 2 × B + 7 = 29, which gives 2 × B = 22 and B = 11. Then C = 11 + 7 = 18. Use D = C - 5: D = 18 - 5 = 13. Use A = B - 4: A = 11 - 4 = 7. So A = 7 and D = 13.

Question 40 Hard **Answer: c (6)**

Replace C with A - 2 in A + C = 14: A + (A - 2) = 14, so 2 × A - 2 = 14, which gives 2 × A = 16 and A = 8. Then C = 8 - 2 = 6. Use B = A + C: B = 8 + 6 = 14. Use D = B - 8: D = 14 - 8 = 6. So D = 6.

Solutions: Latin Squares

Question 41 Easy **Answer: A**

For the marked cell at Row 5, Column 5, Row 5 already has B, C and D and Column 5 already has C and E. Together these cover B, C, D and E, so only A can go here.

Question 42 Easy **Answer: B**

For the marked cell at Row 4, Column 1, Row 4 already has A, C and D and Column 1 already has D and E. Together these cover A, C, D and E, so only B can go here.

Question 43 Easy **Answer: D**

Row 3 already contains A, B, C and E, so the marked cell at Row 3, Column 4 must be D.

Question 44 Easy **Answer: E**

For the marked cell at Row 1, Column 2, Row 1 already has B, C and D and Column 2 already has A and C. Together these cover A, B, C and D, so only E can go here.

Question 45 Easy **Answer: C**

For the marked cell at Row 5, Column 5, Row 5 already has A and B and Column 5 already has A, D and E. Together these cover A, B, D and E, so only C can go here.

Question 46 Easy **Answer: A**

For the marked cell at Row 1, Column 4, Row 1 already has B, C and E and Column 4 already has D. Together these cover B, C, D and E, so only A can go here.

Question 47 Easy **Answer: B**

For the marked cell at Row 5, Column 4, Row 5 already has A, C and D and Column 4 already has E. Together these cover A, C, D and E, so only B can go here.

Question 48 Medium **Answer: D**

Start with an easier cell. For the cell at Row 1, Column 4, Row 1 already has B and C and Column 4 already has B, D and E. Together these cover B, C, D and E, so only A can go here. With that cell filled, for the marked cell at Row 1, Column 1, Row 1 already has A, B and C and Column 1 already has C and E. Together these cover A, B, C and E, so only D can go here.

Question 49 Medium **Answer: E**

Start with an easier cell. For the cell at Row 4, Column 4, Row 4 already has C and D and Column 4 already has B and E. Together these cover B, C, D and E, so only A can go here. With that cell filled, for the marked cell at Row 4, Column 3, Row 4 already has A, C and D and Column 3 already has B and D. Together these cover A, B, C and D, so only E can go here.

Question 50 Medium **Answer: D**

Start with an easier cell. Column 1 already contains B, C, D and E, so the cell at Row 4, Column 1 must be A. With that cell filled, for the marked cell at Row 4, Column 2, Row 4 already has A and E and Column 2 already has B and C. Together these cover A, B, C and E, so only D can go here.

Question 51 Medium **Answer: D**

Start with an easier cell. For the cell at Row 2, Column 5, Row 2 already has A and D and Column 5 already has A, B and E. Together these cover A, B, D and E, so only C can go here. With that cell filled, Column 5 already contains A, B, C and E, so the marked cell at Row 3, Column 5 must be D.

Question 52 Medium **Answer: C**

Start with an easier cell. For the cell at Row 5, Column 4, Row 5 already has B, D and E and Column 4 already has C. Together these cover B, C, D and E, so only A can go here. With that cell filled, Row 5 already contains A, B, D and E, so the marked cell at Row 5, Column 2 must be C.

Question 53 Medium **Answer: C**

Start with an easier cell. For the cell at Row 4, Column 4, Row 4 already has C and Column 4 already has A, D and E. Together these cover A, C, D and E, so only B can go here. With that cell filled, Column 4 already contains A, B, D and E, so the marked cell at Row 2, Column 4 must be C.

Question 54 Medium **Answer: E**

Start with an easier cell. Row 2 already contains A, B, D and E, so the cell at Row 2, Column 3 must be C. With that cell filled, Column 3 already contains A, B, C and D, so the marked cell at Row 3, Column 3 must be E.

Question 55 Hard **Answer: B**

Start with an easier cell. For the cell at Row 4, Column 4, Row 4 already has A and Column 4 already has C, D and E. Together these cover A, C, D and E, so only B can go here. Next, for the cell at Row 4, Column 1, Row 4 already has A and B and Column 1 already has A, C and E. Together these cover A, B, C and E, so only D can go here. With those cells filled, Column 1 already contains A, C, D and E, so the marked cell at Row 3, Column 1 must be B.

Question 56 Hard **Answer: C**

Start with an easier cell. For the cell at Row 3, Column 3, Row 3 already has A and E and Column 3 already has C and D. Together these cover A, C, D and E, so only B can go here. Next, for the cell at Row 3, Column 4, Row 3 already has A, B and E and Column 4 already has C. Together these cover A, B, C and E, so only D can go here. With those cells filled, Row 3 already contains A, B, D and E, so the marked cell at Row 3, Column 2 must be C.

Question 57 Hard **Answer: E**

Start with an easier cell. For the cell at Row 4, Column 3, Row 4 already has B, C and E and Column 3 already has A and C. Together these cover A, B, C and E, so only D can go here. Next, for the cell at Row 1, Column 3, Row 1 already has E and Column 3 already has A, C and D. Together these cover A, C, D and E, so only B can go here. With those cells filled, Column 3 already contains A, B, C and D, so the marked cell at Row 5, Column 3 must be E.

Question 58 Hard **Answer: A**

Start with an easier cell. For the cell at Row 3, Column 2, Row 3 already has A and B and Column 2 already has C and D. Together these cover A, B, C and D, so only E can go here. Next, for the cell at Row 2, Column 2, Row 2 already has A and D and Column 2 already has C, D and E. Together these cover A, C, D and E, so only B can go here. Next, for the cell at Row 2, Column 5, Row 2 already has A, B and D and Column 5 already has C. Together these cover A, B, C and D, so only E can go here. With those cells filled, for the marked cell at Row 1, Column 5, Row 1 already has B and D and Column 5 already has C and E. Together these cover B, C, D and E, so only A can go here.

Question 59 Hard **Answer: A**

Start with an easier cell. For the cell at Row 5, Column 3, Row 5 already has A and C and Column 3 already has B and E. Together these cover A, B, C and E, so only D can go here. Next, for the cell at Row 3, Column 3, Row 3 already has B and C and Column 3 already has B, D and E. Together these cover B, C, D and E, so only A can go here. Next, for the cell at Row 3, Column 1, Row 3 already has A, B and C and Column 1 already has C and D. Together these cover A, B, C and D, so only E can go here. With those cells filled, for the marked cell at Row 2, Column 1, Row 2 already has B and D and Column 1 already has C, D and E. Together these cover B, C, D and E, so only A can go here.

Question 60 Hard **Answer: B**

Start with an easier cell. For the cell at Row 3, Column 1, Row 3 already has A, B and C and Column 1 already has B and D. Together these cover A, B, C and D, so only E can go here. Next, for the cell at Row 4, Column 1, Row 4 already has C and D and Column 1 already has B, D and E. Together these cover B, C, D and E, so only A can go here. Next, for the cell at Row 4, Column 5, Row 4 already has A, C and D and Column 5 already has B. Together these cover A, B, C and D, so only E can go here. With those cells filled, Row 4 already contains A, C, D and E, so the marked cell at Row 4, Column 3 must be B.

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