

Abstract reasoning: patterns, rules and transformations: open practice pack

100 untimed questions across 10 authored sections.

Detail	Value
Pack	cognitive-skills-abstract-reasoning
Source	cognitive-skills
Pack version	v1
Worksheet items	100
Authored hints	0
Worked explanations	100

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The answer key and worked explanations in this file belong only to this public, untimed educational practice source. No active aptitude suite or Novus Reasoning Challenge answer key is ever included in any download.

Learner worksheet

Every pattern in this bank is described in words, so all the information you need is in the prompt itself. Work at a comfortable pace. The aim is to notice the rule, not to race the clock.

Choose one answer for each item. For a delayed-recall item, read its study text, cover it, and then answer without looking back.

Continuing simple sequences

Spot the single repeating or stepping rule and choose what comes next.

1. abstract-reasoning-s01-q01

A sequence runs: circle, square, circle, square, circle. What comes next?

- A. Circle
- B. Square
- C. Triangle
- D. Star

Your answer: _____

2. abstract-reasoning-s01-q02

A shape repeats in three sizes: small, medium, large, small, medium. What comes next?

- A. Small
- B. Medium
- C. Large
- D. Extra large

Your answer: _____

3. abstract-reasoning-s01-q03

A letter sequence runs: A, C, E, G. Which letter comes next?

- A. I
- B. H
- C. J
- D. K

Your answer: _____

4. abstract-reasoning-s01-q04

A star pattern grows: ?, ??, ????. Which group comes next?

- A. ?
- B. ??
- C. ???
- D. ????

Your answer: _____

5. abstract-reasoning-s01-q05

An arrow turns through the sequence: up, right, down, left, up, right. Which direction comes next?

- A. Up
- B. Down
- C. Left
- D. Right

Your answer: _____

6. abstract-reasoning-s01-q06

A dot pattern runs: ?, ?, ?, ?, ?, ?, ?, ?. What comes next?

- A. ?
- B. ?
- C. ??
- D. ??

Your answer: _____

7. abstract-reasoning-s01-q07

A letter sequence runs backwards through the alphabet: Z, X, V, T. Which letter comes next?

- A. S
- B. Q
- C. R
- D. P

Your answer: _____

8. abstract-reasoning-s01-q08

A symbol sequence runs: moon, star, sun, moon, star, sun, moon, star. What comes next?

- A. Moon
- B. Star
- C. Cloud
- D. Sun

Your answer: _____

9. abstract-reasoning-s01-q09

A shape sequence gains one side each step: triangle, square, pentagon. Which shape comes next?

- A. Heptagon
- B. Octagon
- C. Hexagon
- D. Circle

Your answer: _____

10. abstract-reasoning-s01-q10

A dot pattern doubles each step: 1 dot, 2 dots, 4 dots, 8 dots. How many dots come next?

- A. 10 dots
- B. 16 dots
- C. 12 dots
- D. 24 dots

Your answer: _____

Odd one out: classifying by a shared rule

Find the feature three of the four share, then pick the one that breaks it.

11. abstract-reasoning-s02-q01

Which of these shapes does not belong with the other three?

- A. Square
- B. Triangle
- C. Rectangle
- D. Circle

Your answer: _____

12. abstract-reasoning-s02-q02

Which of these capital letters does not belong with the other three?

- A. S
- B. X
- C. K
- D. T

Your answer: _____

13. abstract-reasoning-s02-q03

Which of these capital letters does not belong with the other three?

- A. A
- B. H
- C. F
- D. M

Your answer: _____

14. abstract-reasoning-s02-q04

Which of these does not belong with the other three?

- A. Cube
- B. Square
- C. Sphere
- D. Cylinder

Your answer: _____

15. abstract-reasoning-s02-q05

Which of these letter pairs does not belong with the other three?

- A. AB
- B. XX
- C. AA
- D. MM

Your answer: _____

16. abstract-reasoning-s02-q06

Which of these codes does not belong with the other three?

- A. A1
- B. B2
- C. C3
- D. 4D

Your answer: _____

17. abstract-reasoning-s02-q07

Which of these shapes does not belong with the other three?

- A. Triangle
- B. Hexagon
- C. Pentagon
- D. Heptagon

Your answer: _____

18. abstract-reasoning-s02-q08

Which of these letters does not belong with the other three?

- A. B
- B. D
- C. K
- D. H

Your answer: _____

19. abstract-reasoning-s02-q09

Which of these symbol groups does not belong with the other three?

- A. ??
- B. ???
- C. ???
- D. ???

Your answer: _____

20. abstract-reasoning-s02-q10

Which of these capital letters does not belong with the other three?

- A. S
- B. N
- C. E
- D. Z

Your answer: _____

Alternating and repeating cycles

These patterns repeat in fixed cycles. Work out the cycle length before answering.

21. abstract-reasoning-s03-q01

In a sequence, the shape alternates circle/square while the colour cycles red, blue, green. So far: red circle, blue square, green circle, red square, blue circle. What comes next?

- A. Red square
- B. Green circle
- C. Green square
- D. Blue square

Your answer: _____

22. abstract-reasoning-s03-q02

An arrow cycles: up, right, down, up, right, down, up. Which direction comes next?

- A. Up
- B. Right
- C. Down
- D. Left

Your answer: _____

23. abstract-reasoning-s03-q03

A marker on a clock face jumps three hours clockwise each step: 12, 3, 6, 9. Where does it land next?

- A. 3
- B. 6
- C. 9
- D. 12

Your answer: _____

24. abstract-reasoning-s03-q04

A letter sequence runs: A, B, A, C, A, D, A. Which letter comes next?

- A. E
- B. A
- C. F
- D. B

Your answer: _____

25. abstract-reasoning-s03-q05

In a sequence, the triangle flips each step while the shading changes every two steps. So far: black ?, black ?, white ?, white ?, black ?. What comes next?

- A. White ?
- B. Black ?
- C. Black ?
- D. White ?

Your answer: _____

26. abstract-reasoning-s03-q06

The four suits repeat in a fixed order: ?, ?, ?, ?, and so on. Which symbol is 10th in the sequence?

- A. ?
- B. ?
- C. ?
- D. ?

Your answer: _____

27. abstract-reasoning-s03-q07

The numbers 1, 2, 3 repeat forever: 1, 2, 3, 1, 2, 3, ... What is the 12th term?

- A. 3
- B. 1
- C. 2
- D. It cannot be determined

Your answer: _____

28. abstract-reasoning-s03-q08

A pattern runs: ?, ?, ??, ??, ????. What comes next?

- A. ????
- B. ??
- C. ???
- D. ???

Your answer: _____

29. abstract-reasoning-s03-q09

A pendulum pattern runs: left, centre, right, centre, left, centre, right. What comes next?

- A. Left
- B. Right
- C. It cannot be determined
- D. Centre

Your answer: _____

30. abstract-reasoning-s03-q10

A sequence cycles the letters X, Y, Z while alternating upper and lower case: X, y, Z, x, Y, z, X. What comes next?

- A. Y
- B. y
- C. z
- D. x

Your answer: _____

Growing and shrinking patterns

Work out how much the pattern grows or shrinks at each step. The step size itself may change.

31. abstract-reasoning-s04-q01

A dot pattern grows: 1 dot, 3 dots, 5 dots, 7 dots. How many dots come next?

- A. 9
- B. 8
- C. 10
- D. 11

Your answer: _____

32. abstract-reasoning-s04-q02

A block pattern shrinks: 10 blocks, 8 blocks, 6 blocks, 4 blocks. How many blocks come next?

- A. 3

- B. 0
- C. 1
- D. 2

Your answer: _____

33. abstract-reasoning-s04-q03

A tile pattern grows: 1, 2, 4, 7, 11. How many tiles come next?

- A. 15
- B. 16
- C. 14
- D. 18

Your answer: _____

34. abstract-reasoning-s04-q04

A cell pattern doubles: 2, 4, 8, 16. How many cells come next?

- A. 24
- B. 20
- C. 32
- D. 30

Your answer: _____

35. abstract-reasoning-s04-q05

A dot pattern halves: 64, 32, 16, 8. How many dots come next?

- A. 6
- B. 2
- C. 0
- D. 4

Your answer: _____

36. abstract-reasoning-s04-q06

A counter pattern runs: 3, 6, 5, 10, 9, 18. What comes next?

- A. 17
- B. 36
- C. 19
- D. 20

Your answer: _____

37. abstract-reasoning-s04-q07

Dots are arranged in ever-larger square grids: 1 dot, 4 dots, 9 dots, 16 dots. How many dots come next?

- A. 20
- B. 24

- C. 25
- D. 36

Your answer: _____

38. abstract-reasoning-s04-q08

Dots are stacked in triangles, adding one more dot per new row: 1, 3, 6, 10. How many dots come next?

- A. 14
- B. 15
- C. 16
- D. 20

Your answer: _____

39. abstract-reasoning-s04-q09

A pattern rises and falls: 5, 8, 6, 9, 7, 10. What comes next?

- A. 11
- B. 9
- C. 12
- D. 8

Your answer: _____

40. abstract-reasoning-s04-q10

In a spiral pattern, each new count is the sum of the previous two: 1, 1, 2, 3, 5, 8. What comes next?

- A. 13
- B. 12
- C. 16
- D. 11

Your answer: _____

Shape and symbol analogies

Work out how the first pair is related, then apply exactly the same relationship to the second.

41. abstract-reasoning-s05-q01

Small circle is to large circle as small square is to what?

- A. Large circle
- B. Large square
- C. Small triangle
- D. Large triangle

Your answer: _____

42. abstract-reasoning-s05-q02

The lower-case letter b is to d as p is to what? (Think of each pair as mirror images.)

- A. q
- B. g
- C. b
- D. o

Your answer: _____

43. abstract-reasoning-s05-q03

3 is to triangle as 6 is to what?

- A. Pentagon
- B. Octagon
- C. Heptagon
- D. Hexagon

Your answer: _____

44. abstract-reasoning-s05-q04

Black square is to white square as black circle is to what?

- A. White square
- B. Black triangle
- C. White circle
- D. Grey circle

Your answer: _____

45. abstract-reasoning-s05-q05

AB is to BA as CD is to what?

- A. CD
- B. DC
- C. CC
- D. DD

Your answer: _____

46. abstract-reasoning-s05-q06

Circle is to sphere as square is to what?

- A. Cylinder
- B. Pyramid
- C. Cone
- D. Cube

Your answer: _____

47. abstract-reasoning-s05-q07

3 is to 6 as 5 is to what?

- A. 10
- B. 15
- C. 25
- D. 8

Your answer: _____

48. abstract-reasoning-s05-q08

A is to C as M is to what?

- A. N
- B. P
- C. O
- D. Q

Your answer: _____

49. abstract-reasoning-s05-q09

XOX is to OXO as ABA is to what?

- A. ABA
- B. AAB
- C. BAB
- D. BBA

Your answer: _____

50. abstract-reasoning-s05-q10

??? is to ??? as ??? is to what?

- A. ???
- B. ???
- C. ???
- D. ???

Your answer: _____

Symbol operators and transformations

Each item defines an operator in the prompt. Apply it exactly as described.

51. abstract-reasoning-s06-q01

The operator -> reverses a string of symbols. What is KLM -> ?

- A. KML
- B. LKM
- C. MLK
- D. MKL

Your answer: _____

52. abstract-reasoning-s06-q02

The operator ? swaps only the first and last symbols of a string. What is ? applied to 2589?

- A. 9852
- B. 5289
- C. 8529
- D. 9582

Your answer: _____

53. abstract-reasoning-s06-q03

The operator # doubles every symbol: #(AB) = AABB. What is #(XY)?

- A. XXYY
- B. XYXY
- C. XY
- D. YYXX

Your answer: _____

54. abstract-reasoning-s06-q04

The operator ? removes every second symbol: ?(ABCDE) = ACE. What is ?(PQRST)?

- A. QS
- B. PRT
- C. PQR
- D. QST

Your answer: _____

55. abstract-reasoning-s06-q05

A rule shifts each letter one place forward in the alphabet (A becomes B). Apply it to the letters C, F, K.

- A. D, G, L
- B. B, E, J
- C. D, G, K
- D. E, H, M

Your answer: _____

56. abstract-reasoning-s06-q06

The operator ? swaps the first and last symbols; the operator # doubles every symbol. What is #(? (ABC))?

- A. AABBC
- B. CBACBA
- C. CCBBA
- D. AACCB

Your answer: _____

57. abstract-reasoning-s06-q07

The operator ? rotates a string one position left: ?(ABCD) = BCDA. What is ?(? (WXYZ))?

- A. XYZW
- B. ZWXY
- C. WXYZ
- D. YZWX

Your answer: _____

58. abstract-reasoning-s06-q08

A rule replaces shapes in a cycle: ? becomes △, △ becomes ○, and ○ becomes △. If the rule is applied twice to △, what results?

- A. △
- B. ○
- C. △
- D. △

Your answer: _____

59. abstract-reasoning-s06-q09

The operator ! reverses a string; the operator @ removes the first symbol. What is @(!(1234))?

- A. 432
- B. 321
- C. 234
- D. 123

Your answer: _____

60. abstract-reasoning-s06-q10

The operator M appends a string's reverse to itself: M(AB) = ABBA. What is M(XY)?

- A. XYYX
- B. YXXY
- C. XXYY
- D. XYXY

Your answer: _____

Matrix reasoning: rules across rows and columns

Each item describes a 3x3 grid. Find the rule running along its rows or columns to fill the gap.

61. abstract-reasoning-s07-q01

In a 3x3 grid, every row contains one circle, one square and one triangle in some order. Row 3 so far reads: square, triangle, blank. What fills the blank?

- A. Square
- B. Triangle
- C. Star

- D. Circle

Your answer: _____

62. abstract-reasoning-s07-q02

In a 3x3 grid, the number of dots in each row increases by one from left to right. Row 3 starts with 4 dots. How many dots are in its middle cell?

- A. 4
- B. 5
- C. 6
- D. 7

Your answer: _____

63. abstract-reasoning-s07-q03

In a 3x3 grid, row 1 reads black, grey, white and row 2 reads grey, white, black. Row 3 reads white, black, blank. What shade fills the blank?

- A. Black
- B. White
- C. Grey
- D. It cannot be determined

Your answer: _____

64. abstract-reasoning-s07-q04

In a 3x3 grid, the third cell of each row shows the first two cells' contents combined into one figure. Row 3's first cell holds a vertical line and its second cell holds a horizontal line. What does its third cell show?

- A. A cross (both lines together)
- B. A vertical line only
- C. A horizontal line only
- D. An empty cell

Your answer: _____

65. abstract-reasoning-s07-q05

In a 3x3 grid, each row and each column contains exactly one star. The stars sit at row 1 column 2 and row 2 column 3. In which column is row 3's star?

- A. Column 2
- B. Column 3
- C. Any column
- D. Column 1

Your answer: _____

66. abstract-reasoning-s07-q06

In a 3x3 grid, shapes gain one side moving left to right along each row. Row 3 reads: pentagon, hexagon, blank. What fills the blank?

- A. Octagon
- B. Hexagon
- C. Heptagon
- D. Nonagon

Your answer: _____

67. abstract-reasoning-s07-q07

In a 3x3 grid, arrows rotate 90° clockwise moving left to right along each row. Row 3's first arrow points left. Where does its middle arrow point?

- A. Right
- B. Up
- C. Down
- D. Left

Your answer: _____

68. abstract-reasoning-s07-q08

In a 3x3 grid, the number of dots in each cell equals its row number multiplied by its column number. How many dots are in the bottom-right cell (row 3, column 3)?

- A. 9
- B. 6
- C. 8
- D. 12

Your answer: _____

69. abstract-reasoning-s07-q09

In a 3x3 grid, the third cell of each row shows only the shapes appearing in exactly one of the first two cells. Row 3's first cell holds a circle and a square; its second cell holds a square and a triangle. What does its third cell show?

- A. A square only
- B. A circle and a triangle
- C. A circle, a square and a triangle
- D. A square and a triangle

Your answer: _____

70. abstract-reasoning-s07-q10

In a 3x3 grid, every row and every column contains one small, one medium and one large shape. Row 1 reads small, medium, large; row 2 reads medium, large, small. Row 3 reads large, small, blank. What size fills the blank?

- A. Small
- B. Large
- C. Medium
- D. It cannot be determined

Your answer: _____

Interleaved sequences: two patterns in one

Each sequence weaves two or more independent strands together, separate them before answering.

71. abstract-reasoning-s08-q01

A sequence runs: 1, 10, 2, 20, 3, 30, 4. What comes next?

- A. 40
- B. 5
- C. 35
- D. 50

Your answer: _____

72. abstract-reasoning-s08-q02

A sequence runs: A, Z, B, Y, C, X. What comes next?

- A. W
- B. E
- C. D
- D. Y

Your answer: _____

73. abstract-reasoning-s08-q03

A sequence runs: ?, A, ??, B, ???, C. What comes next?

- A. D
- B. ????
- C. ???
- D. ?????

Your answer: _____

74. abstract-reasoning-s08-q04

A sequence runs: 2, 3, 4, 6, 6, 9, 8. What comes next?

- A. 10
- B. 9
- C. 11
- D. 12

Your answer: _____

75. abstract-reasoning-s08-q05

A sequence runs: Z, 1, X, 2, V, 4, T, 8. What comes next?

- A. S
- B. P
- C. R
- D. Q

Your answer: _____

76. abstract-reasoning-s08-q06

A sequence runs: ?, ??, ???, ????, ?????. What comes next?

- A. ??????
- B. ??????
- C. ?????
- D. ???????

Your answer: _____

77. abstract-reasoning-s08-q07

A sequence runs: 1, 2, 4, 3, 9, 4, 16, 5. What comes next?

- A. 20
- B. 6
- C. 36
- D. 25

Your answer: _____

78. abstract-reasoning-s08-q08

A sequence of codes runs: A1, C3, E5, G7. What comes next?

- A. H8
- B. I9
- C. J9
- D. I8

Your answer: _____

79. abstract-reasoning-s08-q09

A sequence runs: 1, A, ?, 2, B, ??, 3, C. What comes next?

- A. 4
- B. D
- C. ??
- D. ???

Your answer: _____

80. abstract-reasoning-s08-q10

A sequence runs: 100, 1, 90, 2, 80, 4, 70, 8. What comes next?

- A. 60
- B. 16
- C. 50
- D. 10

Your answer: _____

Rule induction: infer the hidden rule

A 'machine' transforms inputs into outputs: infer its hidden rule from the examples, then apply it.

81. abstract-reasoning-s09-q01

A machine transforms: 12 into 21, 47 into 74, and 58 into 85. What does it turn 39 into?

- A. 40
- B. 93
- C. 36
- D. 39

Your answer: _____

82. abstract-reasoning-s09-q02

A machine transforms: ABC into BCD, and HIJ into IJK. What does it turn PQR into?

- A. OPQ
- B. PQS
- C. RST
- D. QRS

Your answer: _____

83. abstract-reasoning-s09-q03

A machine transforms: 3 into 10, 5 into 16, and 7 into 22. What does it turn 9 into?

- A. 28
- B. 27
- C. 30
- D. 25

Your answer: _____

84. abstract-reasoning-s09-q04

A machine transforms: AB into ABB, and CD into CDD. What does it turn XY into?

- A. XXY
- B. XYXY
- C. XYY
- D. XY

Your answer: _____

85. abstract-reasoning-s09-q05

A machine transforms: 25 into 7, 63 into 9, and 48 into 12. What does it turn 57 into?

- A. 12
- B. 35
- C. 13
- D. 11

Your answer: _____

86. abstract-reasoning-s09-q06

A machine transforms: ??? into ??, and ????? into ???. What does it turn ????? into?

- A. ??
- B. ???
- C. ????
- D. ?????

Your answer: _____

87. abstract-reasoning-s09-q07

A machine transforms: square into triangle, pentagon into square, and hexagon into pentagon. What does it turn a heptagon into?

- A. Octagon
- B. Pentagon
- C. Hexagon
- D. Heptagon

Your answer: _____

88. abstract-reasoning-s09-q08

A machine takes a pair of numbers: (2, 3) gives 8, (3, 4) gives 14, and (4, 5) gives 22. What does (5, 6) give?

- A. 30
- B. 28
- C. 34
- D. 32

Your answer: _____

89. abstract-reasoning-s09-q09

A machine transforms: A into 1, D into 4, and J into 10. What does it turn Q into?

- A. 16
- B. 18
- C. 17
- D. 15

Your answer: _____

90. abstract-reasoning-s09-q10

A machine answers YES to 121, 3443 and 78987, and NO to 123 and 3442. Which of these new inputs would it answer YES to?

- A. 45653
- B. 45664
- C. 45674
- D. 45654

Your answer: _____

Combined and multi-step rules

These items chain several rules together. Track the intermediate result after every step.

91. abstract-reasoning-s10-q01

The operator R reverses a string; the operator D deletes its last symbol. Working from the inside out, what is D(R(58274))?

- A. 8274
- B. 5827
- C. 4728
- D. 47285

Your answer: _____

92. abstract-reasoning-s10-q02

A token sits at position 1 of a circle of eight positions numbered 1 to 8. Each step it moves forward three positions, wrapping past 8 back to 1. Where is it after five steps?

- A. Position 8
- B. Position 7
- C. Position 1
- D. Position 5

Your answer: _____

93. abstract-reasoning-s10-q03

A counter starts at 5. The rule alternates: first double, then subtract 3, then double, and so on. What is the counter after four steps?

- A. 14
- B. 17
- C. 7
- D. 11

Your answer: _____

94. abstract-reasoning-s10-q04

Apply two rules in order to the letters ACE: first shift every letter two places forward in the alphabet, then reverse the whole string. What results?

- A. CEG
- B. GEC
- C. ECA
- D. ACG

Your answer: _____

95. abstract-reasoning-s10-q05

A token starts white and flips colour (white to black or black to white) every time it passes a gate. It passes three gates of type P, which each flip it once, and two gates of type Q, which each flip it twice. What colour is it at the end?

- A. White
- B. It depends on the order of the gates
- C. It cannot be determined
- D. Black

Your answer: _____

96. abstract-reasoning-s10-q06

In each row of a 3x3 grid, the middle cell shows the left cell rotated 90° clockwise, and the right cell shows the middle cell rotated 90° clockwise again. Row 3's left cell is an arrow pointing left. Where does its right cell's arrow point?

- A. Up
- B. Right
- C. Down
- D. Left

Your answer: _____

97. abstract-reasoning-s10-q07

A sequence runs: 3, 4, 6, 10, 18. What comes next?

- A. 34
- B. 26
- C. 30
- D. 36

Your answer: _____

98. abstract-reasoning-s10-q08

A sequence runs: 2, 6, 12, 20, 30. What comes next?

- A. 40
- B. 36
- C. 42
- D. 44

Your answer: _____

99. abstract-reasoning-s10-q09

A code rule shifts every letter one place back in the alphabet and doubles every digit: C4F2 becomes B8E4. What does D3H5 become?

- A. C6G10
- B. E6I10
- C. C6G1

- D. D6H10

Your answer: _____

100. abstract-reasoning-s10-q10

The operator # doubles every symbol ($\#(AB) = AAB B$); the operator ? removes every second symbol ($?(ABCD) = AC$). What is $?(\#(AB))$?

- A. AAB B
- B. AB
- C. BA
- D. An empty string

Your answer: _____

Authored hints

This cognitive practice source does not publish authored hints. Every item is listed as missing a hint, and no hint text is generated or inferred.

100 worksheet items do not have an authored hint. No hint text was generated for them.

Answer key

The answer key and worked explanations in this file belong only to this public, untimed educational practice source. No active aptitude suite or Novus Reasoning Challenge answer key is ever included in any download.

Abstract reasoning: patterns, rules and transformations: open practice pack answer key

Item	Choice	Answer
abstract-reasoning-s01-q01	B	Square
abstract-reasoning-s01-q02	C	Large
abstract-reasoning-s01-q03	A	I
abstract-reasoning-s01-q04	D	????
abstract-reasoning-s01-q05	B	Down
abstract-reasoning-s01-q06	A	?
abstract-reasoning-s01-q07	C	R
abstract-reasoning-s01-q08	D	Sun
abstract-reasoning-s01-q09	C	Hexagon
abstract-reasoning-s01-q10	B	16 dots
abstract-reasoning-s02-q01	D	Circle
abstract-reasoning-s02-q02	A	S
abstract-reasoning-s02-q03	C	F
abstract-reasoning-s02-q04	B	Square
abstract-reasoning-s02-q05	A	AB
abstract-reasoning-s02-q06	D	4D
abstract-reasoning-s02-q07	B	Hexagon

abstract-reasoning-s02-q08	C	K
abstract-reasoning-s02-q09	A	??
abstract-reasoning-s02-q10	C	E
abstract-reasoning-s03-q01	C	Green square
abstract-reasoning-s03-q02	B	Right
abstract-reasoning-s03-q03	D	12
abstract-reasoning-s03-q04	A	E
abstract-reasoning-s03-q05	C	Black ?
abstract-reasoning-s03-q06	B	?
abstract-reasoning-s03-q07	A	3
abstract-reasoning-s03-q08	D	???
abstract-reasoning-s03-q09	D	Centre
abstract-reasoning-s03-q10	B	y
abstract-reasoning-s04-q01	A	9
abstract-reasoning-s04-q02	D	2
abstract-reasoning-s04-q03	B	16
abstract-reasoning-s04-q04	C	32
abstract-reasoning-s04-q05	D	4
abstract-reasoning-s04-q06	A	17
abstract-reasoning-s04-q07	C	25
abstract-reasoning-s04-q08	B	15
abstract-reasoning-s04-q09	D	8
abstract-reasoning-s04-q10	A	13
abstract-reasoning-s05-q01	B	Large square
abstract-reasoning-s05-q02	A	q
abstract-reasoning-s05-q03	D	Hexagon
abstract-reasoning-s05-q04	C	White circle
abstract-reasoning-s05-q05	B	DC
abstract-reasoning-s05-q06	D	Cube
abstract-reasoning-s05-q07	A	10
abstract-reasoning-s05-q08	C	O
abstract-reasoning-s05-q09	C	BAB
abstract-reasoning-s05-q10	D	???
abstract-reasoning-s06-q01	C	MLK
abstract-reasoning-s06-q02	D	9582
abstract-reasoning-s06-q03	A	XXYY
abstract-reasoning-s06-q04	B	PRT
abstract-reasoning-s06-q05	A	D, G, L
abstract-reasoning-s06-q06	C	CCBBAA
abstract-reasoning-s06-q07	D	YZWX

abstract-reasoning-s06-q08	B	?
abstract-reasoning-s06-q09	B	321
abstract-reasoning-s06-q10	A	XYYX
abstract-reasoning-s07-q01	D	Circle
abstract-reasoning-s07-q02	B	5
abstract-reasoning-s07-q03	C	Grey
abstract-reasoning-s07-q04	A	A cross (both lines together)
abstract-reasoning-s07-q05	D	Column 1
abstract-reasoning-s07-q06	C	Heptagon
abstract-reasoning-s07-q07	B	Up
abstract-reasoning-s07-q08	A	9
abstract-reasoning-s07-q09	B	A circle and a triangle
abstract-reasoning-s07-q10	C	Medium
abstract-reasoning-s08-q01	A	40
abstract-reasoning-s08-q02	C	D
abstract-reasoning-s08-q03	B	????
abstract-reasoning-s08-q04	D	12
abstract-reasoning-s08-q05	C	R
abstract-reasoning-s08-q06	A	??????
abstract-reasoning-s08-q07	D	25
abstract-reasoning-s08-q08	B	I9
abstract-reasoning-s08-q09	D	???
abstract-reasoning-s08-q10	A	60
abstract-reasoning-s09-q01	B	93
abstract-reasoning-s09-q02	D	QRS
abstract-reasoning-s09-q03	A	28
abstract-reasoning-s09-q04	C	XYY
abstract-reasoning-s09-q05	A	12
abstract-reasoning-s09-q06	B	????
abstract-reasoning-s09-q07	C	Hexagon
abstract-reasoning-s09-q08	D	32
abstract-reasoning-s09-q09	C	17
abstract-reasoning-s09-q10	D	45654
abstract-reasoning-s10-q01	C	4728
abstract-reasoning-s10-q02	A	Position 8
abstract-reasoning-s10-q03	D	11
abstract-reasoning-s10-q04	B	GEC
abstract-reasoning-s10-q05	D	Black
abstract-reasoning-s10-q06	B	Right
abstract-reasoning-s10-q07	A	34

abstract-reasoning-s10-q08	C	42
abstract-reasoning-s10-q09	A	C6G10
abstract-reasoning-s10-q10	B	AB

Worked explanations

abstract-reasoning-s01-q01: The sequence simply alternates between two shapes, so after a circle the square returns.

abstract-reasoning-s01-q02: The three sizes cycle in a fixed order, so after medium the cycle continues with large.

abstract-reasoning-s01-q03: Each step skips exactly one letter of the alphabet, so G is followed by I.

abstract-reasoning-s01-q04: Each group adds one more star than the last, so three stars are followed by four.

abstract-reasoning-s01-q05: The arrow rotates a quarter turn clockwise each step through a four-direction cycle, so after right it points down.

abstract-reasoning-s01-q06: The repeating block is two black dots followed by one white dot, so the white dot is due next.

abstract-reasoning-s01-q07: Each step moves two letters backwards through the alphabet, so T is followed by R.

abstract-reasoning-s01-q08: The three symbols repeat in a fixed cycle, and the cycle has reached the sun's turn.

abstract-reasoning-s01-q09: The side count climbs 3, 4, 5, so the next shape has six sides, a hexagon.

abstract-reasoning-s01-q10: Each group has twice as many dots as the one before, so 8 doubles to 16.

abstract-reasoning-s02-q01: Three of the shapes are built entirely from straight sides; the circle is the only curved shape.

abstract-reasoning-s02-q02: X, K and T are drawn with straight strokes only, while S is drawn entirely with curves.

abstract-reasoning-s02-q03: A, H and M each have a vertical line of symmetry, their left and right halves mirror each other, but F does not.

abstract-reasoning-s02-q04: Cube, sphere and cylinder are solid three-dimensional forms; the square is a flat two-dimensional shape.

abstract-reasoning-s02-q05: Three of the pairs repeat the same letter twice; only one pairs two different letters.

abstract-reasoning-s02-q06: Three codes place a letter before its matching digit; one reverses the order and puts the digit first.

abstract-reasoning-s02-q07: The triangle, pentagon and heptagon have odd numbers of sides (3, 5, 7); the hexagon's six sides make it the only even one.

abstract-reasoning-s02-q08: B, D and H sit at alphabet positions 2, 4 and 8, each double the last, while K sits at position 11.

abstract-reasoning-s02-q09: Three groups contain exactly three identical symbols; the star group contains only two.

abstract-reasoning-s02-q10: S, N and Z look the same after a half-turn (180° rotation), but E does not share this rotational symmetry.

abstract-reasoning-s03-q01: Track each feature separately: the shape alternates, so a square is due; the

colour cycle red-blue-green has reached green.

abstract-reasoning-s03-q02: The cycle is three directions long (up, right, down), and after up the cycle continues with right.

abstract-reasoning-s03-q03: Three hours past 9 wraps around the clock face back to 12, completing the four-step cycle.

abstract-reasoning-s03-q04: The sequence alternates between a fixed A and a letter that advances one step each visit (B, C, D), so E is due.

abstract-reasoning-s03-q05: The two features run at different speeds: the triangle flips every step (so ? is due) while the shading holds for two steps (so black continues).

abstract-reasoning-s03-q06: The cycle is four symbols long, so position 10 = two full cycles (8) plus 2 more, the second symbol of the cycle.

abstract-reasoning-s03-q07: Position 12 is exactly four complete cycles of three, so it lands on the final term of a cycle.

abstract-reasoning-s03-q08: The shapes alternate circle/square while the count rises by one each pair, so three squares follow three circles.

abstract-reasoning-s03-q09: The pendulum passes through the centre between every swing to a side, so centre always follows left or right.

abstract-reasoning-s03-q10: Run the two cycles separately: the letter cycle X-Y-Z has reached Y, and the case alternation has reached lower case.

abstract-reasoning-s04-q01: Each group adds two dots to the last, so 7 grows to 9.

abstract-reasoning-s04-q02: The pattern loses two blocks each step, so 4 shrinks to 2.

abstract-reasoning-s04-q03: The amount added grows by one each step (+1, +2, +3, +4), so the next step adds 5 to reach 16.

abstract-reasoning-s04-q04: Each count is twice the one before, so 16 doubles to 32.

abstract-reasoning-s04-q05: Each count is half the one before, so 8 halves to 4.

abstract-reasoning-s04-q06: Two rules alternate: double, then subtract one. After doubling 9 to 18, the next step subtracts one to give 17.

abstract-reasoning-s04-q07: The counts are square grids of side 1, 2, 3, 4, so the next grid is $5 \times 5 = 25$ dots.

abstract-reasoning-s04-q08: Each triangle adds a new bottom row one dot longer than the last (+2, +3, +4), so the next step adds 5 to reach 15.

abstract-reasoning-s04-q09: The rule alternates +3 then -2. After adding 3 to reach 10, the next step subtracts 2 to give 8.

abstract-reasoning-s04-q10: Adding the last two counts, $5 + 8$, gives 13.

abstract-reasoning-s05-q01: The relationship enlarges the shape without changing it, so the square simply becomes large.

abstract-reasoning-s05-q02: b and d are left-right mirror images of each other, and the mirror image of p is q.

abstract-reasoning-s05-q03: The number names how many sides the shape has, and the six-sided shape is the hexagon.

abstract-reasoning-s05-q04: The relationship swaps the shading from black to white while keeping the shape the same.

abstract-reasoning-s05-q05: The relationship reverses the order of the two symbols, so CD becomes DC.

abstract-reasoning-s05-q06: The relationship turns a flat shape into its three-dimensional counterpart, and the solid built from squares is the cube.

abstract-reasoning-s05-q07: The relationship doubles the first number, and 5 doubled is 10.

abstract-reasoning-s05-q08: The relationship moves two places forward in the alphabet, and two letters after M comes O.

abstract-reasoning-s05-q09: The relationship swaps the roles of the two symbols: the outer symbol moves to the middle and vice versa.

abstract-reasoning-s05-q10: The relationship moves the last symbol to the front of the group, so the star leads the two squares.

abstract-reasoning-s06-q01: Reversing writes the symbols in the opposite order, so the last letter comes first.

abstract-reasoning-s06-q02: Only the outer symbols trade places, 2 and 9 swap, while the middle symbols 5 and 8 stay put.

abstract-reasoning-s06-q03: Each symbol is written twice in place before moving to the next, following the worked example exactly.

abstract-reasoning-s06-q04: The operator keeps the 1st, 3rd and 5th symbols and drops the 2nd and 4th, just as in the worked example.

abstract-reasoning-s06-q05: Each letter moves forward exactly one place: C to D, F to G, K to L.

abstract-reasoning-s06-q06: Work from the inside out: swapping first and last turns ABC into CBA, then doubling each symbol gives CCBAA.

abstract-reasoning-s06-q07: Each rotation moves the front symbol to the back: WXYZ becomes XYZW, then XYZW becomes YZWX.

abstract-reasoning-s06-q08: Follow the cycle one step at a time: the circle first becomes a square, and the square then becomes a triangle.

abstract-reasoning-s06-q09: Reversing 1234 gives 4321, and removing the first symbol of that result leaves 321.

abstract-reasoning-s06-q10: The original string XY is followed by its reverse YX, producing a mirror-symmetric result.

abstract-reasoning-s07-q01: Each row must contain all three shapes exactly once, and the circle is the one still missing from row 3.

abstract-reasoning-s07-q02: Moving one cell to the right adds one dot, so the middle cell holds $4 + 1 = 5$ dots.

abstract-reasoning-s07-q03: Each row shifts the previous row one place to the left, so row 3 continues white, black, grey, and grey also completes its column.

abstract-reasoning-s07-q04: Combining the two cells overlays their contents, and a vertical line laid over a horizontal line forms a cross.

abstract-reasoning-s07-q05: Columns 2 and 3 already have their single star, so row 3's star must occupy the only remaining column.

abstract-reasoning-s07-q06: The side count rises 5, 6 along the row, so the final cell holds the seven-sided heptagon.

abstract-reasoning-s07-q07: A quarter turn clockwise carries a left-pointing arrow round to point up.

abstract-reasoning-s07-q08: Applying the stated rule to the bottom-right cell gives $3 \times 3 = 9$ dots.

abstract-reasoning-s07-q09: The square appears in both cells so it is excluded, leaving the circle and triangle, which each appear only once.

abstract-reasoning-s07-q10: Row 3 already has large and small, so medium completes the row, and it also completes the third column, which holds large and small so far.

abstract-reasoning-s08-q01: Two strands alternate: 1, 2, 3, 4 and 10, 20, 30. The next term belongs to the

tens strand.

abstract-reasoning-s08-q02: One strand climbs from the start of the alphabet (A, B, C) while the other descends from the end (Z, Y, X); the climbing strand is due next.

abstract-reasoning-s08-q03: Triangle groups (growing by one) alternate with advancing letters, and it is the triangles' turn with four.

abstract-reasoning-s08-q04: The odd positions climb by two (2, 4, 6, 8) and the even positions climb by three (3, 6, 9); the next term continues the threes with 12.

abstract-reasoning-s08-q05: The letter strand steps back two places each time (Z, X, V, T) while the number strand doubles; the letters are due next with R.

abstract-reasoning-s08-q06: The shapes alternate circle/square while the count rises by one each term, so six squares follow five circles.

abstract-reasoning-s08-q07: The odd positions hold square numbers (1, 4, 9, 16) and the even positions simply count (2, 3, 4, 5); the next square number is 25.

abstract-reasoning-s08-q08: The letters advance two places each step while the digits climb through the odd numbers, giving I paired with 9.

abstract-reasoning-s08-q09: Three strands rotate (a count, a letter, then a dot group that grows by one), and it is the dots' turn with three.

abstract-reasoning-s08-q10: One strand falls by ten (100, 90, 80, 70) while the other doubles (1, 2, 4, 8); the falling strand is due next.

abstract-reasoning-s09-q01: Each example reverses the order of the digits, so 39 becomes 93.

abstract-reasoning-s09-q02: The machine shifts every letter one place forward in the alphabet, so P, Q, R become Q, R, S.

abstract-reasoning-s09-q03: Each output is three times the input plus one, a rule all three examples satisfy, so 9 maps to 28.

abstract-reasoning-s09-q04: The machine repeats only the final symbol, so XY gains a second Y.

abstract-reasoning-s09-q05: Each output is the sum of the input's digits ($2+5=7$, $6+3=9$, $4+8=12$), so $5+7$ gives 12.

abstract-reasoning-s09-q06: The machine halves the number of dots, so eight dots become four.

abstract-reasoning-s09-q07: Each example removes one side from the shape, so the seven-sided heptagon becomes a six-sided hexagon.

abstract-reasoning-s09-q08: Each output is the pair's product plus two ($2 \times 3 + 2 = 8$, $3 \times 4 + 2 = 14$, $4 \times 5 + 2 = 22$), so $5 \times 6 + 2$ gives 32.

abstract-reasoning-s09-q09: Each output is the letter's position in the alphabet, and Q is the 17th letter.

abstract-reasoning-s09-q10: The machine accepts numbers that read the same forwards and backwards, and only 45654 is such a palindrome.

abstract-reasoning-s10-q01: Reversing 58274 gives 47285, and deleting that result's last symbol leaves 4728.

abstract-reasoning-s10-q02: Trace the wrap-around jumps one at a time: 1 to 4, 4 to 7, 7 to 2, 2 to 5, and finally 5 to 8.

abstract-reasoning-s10-q03: Apply the alternating rules in order: 5 doubles to 10, minus 3 is 7, doubles to 14, minus 3 is 11.

abstract-reasoning-s10-q04: Shifting A, C, E forward two places gives C, E, G; reversing that intermediate result gives G, E, C.

abstract-reasoning-s10-q05: Each double flip cancels itself out, so only the three single flips matter: an odd

number of flips turns white to black, whatever the order.

abstract-reasoning-s10-q06: Two quarter turns clockwise make a half turn, and a half turn points a left-facing arrow to the right.

abstract-reasoning-s10-q07: The gaps between terms double each step (+1, +2, +4, +8), so the next gap is +16, giving 34.

abstract-reasoning-s10-q08: The gaps grow by two each step (+4, +6, +8, +10), so the next gap is +12, giving 42.

abstract-reasoning-s10-q09: Handle each symbol type with its own rule: D and H step back to C and G, while 3 and 5 double to 6 and 10.

abstract-reasoning-s10-q10: Doubling AB gives AABB, and keeping the 1st and 3rd symbols of that result restores the original AB, the two operators undo each other.

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