SIGMABUDGIE · GRADE 4

Number Reasoning

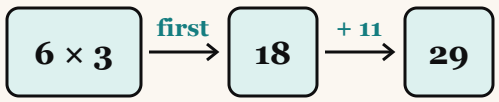
A gentle walkthrough & a 24-question exam

Part 1 walks through order of operations, factors, riddles, and working backwards from the very beginning, with drawings. Part 2 is a 24-question exam that starts easy and slowly builds to harder, ISEE-style reasoning questions. Work through the lesson together first, then let your child try the exam. The answer key at the back explains every question.

1 · Multiply before you add

11 + 6 × 3 is not 17 × 3. Multiplication and division go **first**, then addition and subtraction. 6 × 3 = 18, then 11 + 18 = **29**.

20 − 8 ÷ 2: 8 ÷ 2 = 4 first, then 20 − 4 = **16**. Brackets beat everything: (20 − 8) ÷ 2 = 6.



11 + 6 × 3 = 29

2 · Factors

A **factor** divides a number with nothing left over. Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36. Find them in pairs: 1 × 36, 2 × 18, 3 × 12, 4 × 9, 6 × 6.

"Which is a factor of 48?" Test each choice: does 48 ÷ it come out even?

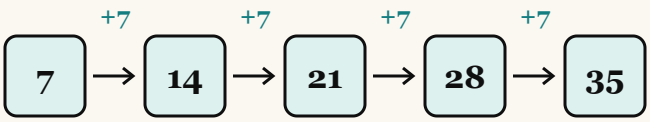
pairs	for 36
1 × 36	2 × 18
3 × 12	4 × 9
6 × 6	

factor pairs of 36

3 · Multiples

A **multiple** is what you get by multiplying: multiples of 7 are 7, 14, 21, 28, 35… Multiples of 5 end in 0 or 5. Multiples of 10 end in 0.

A number that is a multiple of both 4 and 6: 12, 24, 36. The smallest is **12**.



multiples of 7

4 · Odd and even rules

Even + even = even. Odd + odd = even. Even + odd = **odd**. Any number × even = even. Odd × odd = odd.

So the sum of two odd numbers is always even, and 3 × 7 × 9 must be odd. You can rule out choices without calculating.

5 · Consecutive numbers

Consecutive means in a row: 20, 21, 22. "Three consecutive numbers add up to 63." The middle number is 63 ÷ 3 = 21, so they are 20, 21, 22. The largest is **22**.

For three in a row, the middle one is always the total ÷ 3.

20 + 21 + 22 = 63

6 · Number riddles

"A number is greater than 29, less than 40, is odd, and its digits add up to 10." Take the clues in order. Between 29 and 40: 30 to 39. Odd: 31, 33, 35, 37, 39. Digits add to 10: 3 + 7 = 10. The number is **37**.

Each clue crosses out more numbers. Keep a list.

odd numbers in the 30s; only 37 has digits that add to 10

7 · Working backwards, two steps

"A number is multiplied by 6, then 4 is subtracted, giving 50." Undo in reverse order: add 4 back (54), then divide by 6 (**9**).

If the question then asks for **double** the number, do not stop at 9: 2 × 9 = **18**. Read the last sentence twice.

forwards

backwards: the number is 9

8 · Two-rule machines

"Put in 5 → 15, put in 9 → 23." Try × 2 + 5: 5 × 2 + 5 = 15 ✓, 9 × 2 + 5 = 23 ✓. So 14 gives 14 × 2 + 5 = **33**.

Trick to find the rule: when the In goes up by 1, how much does the Out go up? That number is the multiplier.

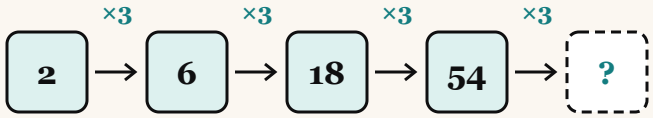
In	Out
5	15
9	23
14	?

rule: × 2 + 5, so 14 → 33

9 · Patterns that multiply

2, 6, 18, 54: each number is × **3** the one before. Next: **162**.

If the gaps grow fast, suspect multiplying. If the gaps are the same, it is adding.



next: 162

10 · Halfway and between

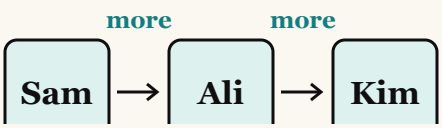
"Exactly halfway between 200 and 800": add and halve, (200 + 800) ÷ 2 = **500**. Or half the gap: 600 ÷ 2 = 300, then 200 + 300.

It works for any two numbers: halfway between 720 and 1,320 is 1,020.

11 · Which must be true?

"Sam has more than Ali. Ali has more than Kim." What **must** be true? Sam has more than Kim. What **might** be true but is not forced? Kim has 5.

Pick only what the clues force. If you can imagine a case where it fails, it is not "must."



most to least

12 · Estimate, then check

Before choosing an answer, ask "about how big should it be?" 23 × 14 is about 20 × 15 = 300, so 322 is believable and 3,220 is not.

A quick estimate catches most slips. You are ready for the test! 🎉

Read each drawing first, then choose the best answer. Take your time, there is no clock here. Questions start gentle and get harder toward the end. Circle your answer.

1 What is 11 + 6 × 3?

A 51 **B** 20

C 29 **D** 39

2 Which of these is a factor of 36?

A 9 **B** 5

C 7 **D** 8

3 Which is a multiple of 7?

A 27 **B** 17

C 32 **D** 28

4 What comes next? 2, 6, 18, 54, ____

A 108 **B** 162

C 58 **D** 72

5 What is 20 − 8 ÷ 2?

A 16 **B** 6

C 12 **D** 4

6 Which number is exactly halfway between 200 and 800?

A 400 **B** 600

C 500 **D** 300

7 Three consecutive numbers add up to 63. What is the largest?

A 21 **B** 22

C 23 **D** 20

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8 A machine's rule: put in 5 → 15, put in 9 → 23. What does 14 give?

In	Out
5	15
9	23
14	?

A 28 **B** 42

C 38 **D** 33

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9 What is 11 + 3 × 5?

A 70 **B** 19

C 26 **D** 56

---

10 Which of these is a factor of 48?

A 6 **B** 5

C 7 **D** 9

---

11 A number is greater than 29, less than 40, is odd, and its digits add up to 10. What is it?

31 **33** **35** **37** **39**

A 35 **B** 39

C 33 **D** 37

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12 Which sum is always even?

A odd + even **B** odd + odd

C even + odd **D** odd + 1

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13 What is the smallest number that is a multiple of both 4 and 6?

A 12 **B** 24

C 10 **D** 48

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14 Which number is exactly halfway between 720 and 1,320?

A 1,000 **B** 1,070

C 1,020 **D** 920

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15 A number is multiplied by 6, then 4 is subtracted, giving 50. What is double the number?

A 9 **B** 18

C 27 **D** 108

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16 A machine's rule: put in 4 → 22, put in 7 → 34. What does 13 give?

A 52 **B** 64

C 46 **D** 58

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17 What is (11 + 6) × 3?

A 29 **B** 39

C 20 **D** 51

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18 Sam has more marbles than Ali. Ali has more than Kim. Which statement MUST be true?

A Kim has more than Sam. **B** Sam has more than Kim.

C Ali has the most. **D** Kim has exactly 5.

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19 Four consecutive numbers add up to 50. What is the smallest?

A 11 **B** 12

C 10 **D** 13

---

20 How many factors does 16 have?

A 4 **B** 3

C 5 **D** 8

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21 A number is doubled, then 7 is added, giving 31. What is the number?

A 19 **B** 12

C 24 **D** 15

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22 A machine's rule: put in 6 → 16, put in 7 → 18. What does 13 give?

A 26 **B** 36

C 32 **D** 30

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23 Which of these is odd?

A $3 \times 7 \times 8$ **B** $2 + 3 + 5$

C $3 \times 7 \times 9$ **D** 4×11

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24 A two-digit number is a multiple of 9 and a multiple of 4, and it is less than 50. What is it?

A 36 **B** 45

C 18 **D** 72

ANSWER KEY & EXPLANATIONS

1	**C**	Multiply first: 6 × 3 = 18. Then 11 + 18 = 29.
2	**A**	36 ÷ 9 = 4 exactly. The others leave remainders.
3	**D**	7 × 4 = 28.
4	**B**	Each number is × 3: 54 × 3 = 162.
5	**A**	Divide first: 8 ÷ 2 = 4. Then 20 − 4 = 16.
6	**C**	(200 + 800) ÷ 2 = 500.
7	**B**	The middle is 63 ÷ 3 = 21, so the numbers are 20, 21, 22.
8	**D**	The rule is × 2 + 5. 14 × 2 + 5 = 33.
9	**C**	3 × 5 = 15, then 11 + 15 = 26.
10	**A**	48 ÷ 6 = 8.
11	**D**	Odd numbers in the 30s: 31, 33, 35, 37, 39. Only 3 + 7 = 10.
12	**B**	Two odd numbers always add to an even number, like 3 + 5 = 8.
13	**A**	Multiples of 4: 4, 8, 12. Multiples of 6: 6, 12. The first shared one is 12.
14	**C**	The gap is 600, half is 300. 720 + 300 = 1,020.
15	**B**	Undo: 50 + 4 = 54, 54 ÷ 6 = 9. Double 9 is 18.
16	**D**	In goes up 3, Out goes up 12, so × 4. 4 × 4 = 16, plus 6 = 22. Rule: × 4 + 6. 13 × 4 + 6 = 58.
17	**D**	Brackets first: 11 + 6 = 17. Then 17 × 3 = 51.
18	**B**	Most to least: Sam, Ali, Kim. So Sam has more than Kim.
19	**A**	11 + 12 + 13 + 14 = 50.
20	**C**	1, 2, 4, 8, 16: five factors. (4 × 4 counts only once.)
21	**B**	Undo: 31 − 7 = 24, 24 ÷ 2 = 12.
22	**D**	In up 1, Out up 2: × 2. 6 × 2 = 12, plus 4 = 16. Rule × 2 + 4. 13 × 2 + 4 = 30.
23	**C**	Odd × odd × odd is odd (189). The others have an even factor or an even sum.
24	**A**	Multiples of 9 under 50: 9, 18, 27, 36, 45. Only 36 is also a multiple of 4.