

Expressions and Patterns: practice solutions, Grade 5 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Operations in the right order



Multiplication and division come before addition and subtraction.

a. $14 + 6 \times 2 = 14 + 12 = 26$

b. $30 - 12 \div 4 = 30 - 3 = 27$

c. $5 \times 4 - 3 = 20 - 3 = 17$

d. $48 \div 6 + 9 = 8 + 9 = 17$

2 Parentheses first



Work inside the parentheses first.

a. $20 \times 2 = 40$

b. $18 \div 3 = 6$

c. $5 \times 5 = 25$

d. $60 \div 10 = 6$

3 Left to right



- a. $40 - 15 = 25$, then $25 + 5 = 30$.
- b. $24 \div 4 = 6$, then $6 \times 3 = 18$.
- c. $9 \times 2 = 18$, then $18 \div 6 = 3$.
- d. $50 - 20 = 30$, then $30 - 10 = 20$.

4 From words to symbols



- a. $(6 + 9) \times 4 = 15 \times 4 = 60$
- b. $6 \times 4 + 9 = 24 + 9 = 33$
- c. $(25 - 7) \div 3 = 18 \div 3 = 6$
- d. $36 \div 4 - 2 = 9 - 2 = 7$

Parentheses were needed in (a) and (c) because the first operation named is addition or subtraction.

5 Continue the pattern



Add 4 each time: $13 + 4 = 17$, $17 + 4 = 21$, $21 + 4 = 25$, $25 + 4 = 29$.

The next four terms are 17, 21, 25, 29.

6 Ordered pairs from two patterns



Pattern A: 0, 2, 4, 6, 8. Pattern B: 0, 10, 20, 30, 40.

The ordered pairs are (0, 0), (2, 10), (4, 20), (6, 30), (8, 40).

7 Reading points



Read the move to the right first, then the move up.

$A(2, 3)$, $B(5, 1)$, $C(4, 6)$, $D(0, 4)$. Point D is on the y-axis because its x-coordinate is 0.

8 Two kinds of operations



Parentheses: $8 + 5 = 13$. Expression: $3 \times 13 - 12 \div 4$.

Multiply and divide: $3 \times 13 = 39$ and $12 \div 4 = 3$. Then $39 - 3 = 36$.

The value is **36**.

9 Nested groups



a. $3 + 5 = 8$; $20 - 8 = 12$; $12 \times 4 = 48$.

b. $2 + 4 = 6$; $36 \div 6 = 6$; $2 \times 6 = 12$; $12 + 1 = 13$.

c. $9 - 3 = 6$; $2 + 6 = 8$; $5 \times 8 = 40$; $40 \div 4 = 10$.

10 Find the mistake



Leo added $8 + 2 = 10$ first, then multiplied by 5. But multiplication comes before addition.

Correct: $2 \times 5 = 10$, then $8 + 10 = 18$.

With parentheses, $(8 + 2) \times 5 = 10 \times 5 = 50$.

11 Expressions for stories



a. $3 \times 8 - 5 = 24 - 5 = 19$. Ana has 19 stickers left.

b. $5 \times 12 - 8 = 60 - 8 = 52$. The team pays 52 dollars.

c. $4 \times (7 + 3) = 4 \times 10 = 40$. The total is 40 dollars.

12 Which is larger?



- a. $6 \times (23 + 19)$ is larger: it is 6 times as large as $23 + 19$.
- b. $62 - 18$ is larger: multiplying by 0.5 gives half of it.
- c. $45 + 30$ is larger: dividing by 5 makes it one fifth as large.

13 Say it in words



- a. Twice the sum of 15 and 4.
- b. The sum of 15 and 4, divided by 2 (half of the sum).
- c. Three times 10, plus 4. Without parentheses the 4 is added after the multiplication.

14 Comparing two patterns



A: 0, 4, 8, 12, 16, 20. B: 0, 8, 16, 24, 32, 40.

Pairs: (0, 0), (4, 8), (8, 16), (12, 24), (16, 32), (20, 40).

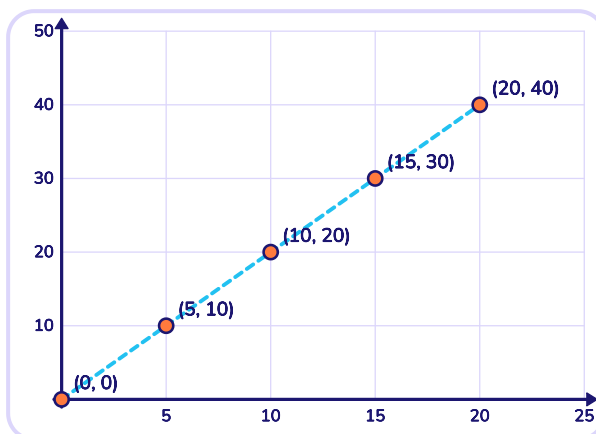
Each term of B is twice the matching term of A. The reason: 8 is 2×4 , so B grows twice as fast.

15 Graph two patterns



A: 0, 5, 10, 15, 20. B: 0, 10, 20, 30, 40.

Pairs: (0, 0), (5, 10), (10, 20), (15, 30), (20, 40).



The points are on a straight line through the origin. Each y-value is twice its x-value.

16 Different starting numbers



a. A: 1, 4, 7, 10, 13. B: 2, 8, 14, 20, 26. Pairs: (1, 2), (4, 8), (7, 14), (10, 20), (13, 26).

b. B is always twice A, so the next term of B is $2 \times 16 = 32$ (check: $26 + 6 = 32$).

c. The 10th term adds the rule 9 times: A: $1 + 3 \times 9 = 28$. B: $2 + 6 \times 9 = 56$, which is 2×28 .

17 Four times as large



a. P: 0, 3, 6, 9. Q: 0, 12, 24, 36. Pairs: (0, 0), (3, 12), (6, 24), (9, 36).

b. Q is 4 times P. For $x = 15$: $y = 4 \times 15 = 60$.

c. $4 \times 21 = 84$ so (21, 84) is on the graph. $4 \times 12 = 48$, not 40, so (12, 40) is not. $4 \times 30 = 120$ so (30, 120) is.

18 Use all four numbers



One answer is $8 + 5 \times 3 - 2$. Multiply first: $5 \times 3 = 15$. Then $8 + 15 = 23$ and $23 - 2 = 21$.

Other answers may exist. What matters is that each number is used once and the order of operations is respected.

19 Saving money



a. Sam: 0, 6, 12, 18, 24, 30. Ava: 0, 12, 24, 36, 48, 60.

b. (0, 0), (6, 12), (12, 24), (18, 36), (24, 48), (30, 60).

c. Ava always has twice as much as Sam, so $2 \times 42 = 84$. Ava has 84 dollars.

20 Is it true?



Left side: $4 \times 22 = 88$. Right side: $4 \times 13 + 9 = 52 + 9 = 61$. They are not equal, so Marco is wrong.

The 4 must multiply both numbers: $4 \times (13 + 9) = 4 \times 13 + 4 \times 9 = 52 + 36 = 88$.

21 Check the points



$3 \times 2 = 6$, $3 \times 4 = 12$, $3 \times 6 = 18$. Mia is right.

$3 \times 5 = 15$: (5, 15) is on the graph. $3 \times 8 = 24$: (8, 24) is on it. $3 \times 10 = 30$, not 20, so (10, 20) is not.



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