

WA8MNAUN4

Understanding number

Core + Challenge

Order of Operations and Mental Strategies with Integers

I can use order of operations, the number laws and inverse operations to calculate and check with integers.

Name: _____ Date: _____ Score: _____ / 58

Key idea

Order of operations: Brackets $\rightarrow$ Indices (powers) $\rightarrow$ $\times$ and $\div$ from left to right $\rightarrow$ $+$ and $-$ from left to right. $-3 + 4 \times -2 = -3 + (-8) = -11$.

Distributive law (partitioning): $-7 \times 98 = -7 \times (100 - 2) = -700 + 14 = -686$. $12 \times -15 = 12 \times -10 + 12 \times -5 = -120 - 60 = -180$.

Commutative and associative laws let you reorder and regroup $\times$ (and $+$): $-25 \times 17 \times -4 = (-25 \times -4) \times 17 = 100 \times 17 = 1700$. They do **not** work for $-$ and $\div$.

Check with the inverse: $-686 \div -7 = 98 \checkmark$. An equation ($=$) is true only when both sides have the same value; $<$ and $>$ compare the two sides.

A Fluency *practise the skill*

/ 16 marks

Q14–15: write true or false. Q16: write $<$, $>$ or $=$ in the box. 1 mark each.

1. $-3 + 4 \times -2$ _____

9. -6×99 _____

2. $(-3 + 4) \times -2$ _____

10. $-8 \times 25 \times -4$ _____

3. $20 - 6 \times -3$ _____

11. -5×102 _____

4. $-18 \div 3 - 4$ _____

12. 12×-15 _____

5. $-18 \div (3 - 9)$ _____

13. $(-36 + -12) \div -6$ _____

6. $(-4)^2 - 10$ _____

14. T or F: $-3 \times -4 = -4 \times -3$ _____

7. $-4^2 + 10$ _____

15. T or F: $-8 - (4 - 6) = -8 - 4 - 6$ _____

8. $5 \times (-2)^3$ _____

16. -2×5 -3×4

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B

Core *apply the skill to problems*

/ 22 marks

- 1 Insert one or two pairs of brackets to make each statement true.

[3 marks]

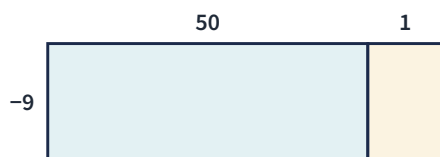
(a) $-2 + 6 \times -3 = -12$

(b) $8 - 12 \div 4 - 2 = -2$

Answer: _____

- 2 Use the distributive law to calculate mentally. (a) -9×51 (use the area model) (b) 199×-4

[2 marks]



Answer: _____

- 3 In Kalgoorlie the temperature at 6 am was -2°C . It rose 3°C per hour for 4 hours, then fell 2°C per hour for 3 hours. Write ONE expression for the temperature at 1 pm, then evaluate it.

[3 marks]

Time	6 am	6 am $\rightarrow$ 10 am	10 am $\rightarrow$ 1 pm
Temperature / change	-2°C	$+3^{\circ}\text{C}$ per hour	-2°C per hour

Answer: _____

- 4 Lily worked out $-10 - 2 \times -3$ and got 36. Find the correct answer and explain what Lily did wrong.

[2 marks]

Answer: _____

- 5 Evaluate $(-3)^2 \times 2 - (-8) \div 4$.

[2 marks]

Answer: _____

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- 6 True or false? Show working. [2 marks]

(a) $-5 \times (4 + -6) = -5 \times 4 + (-5) \times (-6)$

(b) $(-12 - 8) \div -4 = -12 \div -4 - 8$

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Answer: _____

- 7 A sports club makes 6 withdrawals of \$98 each from its account. Use a mental strategy to find the change in the balance as an integer. [2 marks]

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Answer: _____

- 8 Priya says $-1176 \div -24 = 49$. Use the inverse operation to check whether she is correct. [2 marks]

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Answer: _____

- 9 Write $<$, $>$ or $=$ in each box. [2 marks]

(a) $-3 \times (-2)^2$ $(-3 \times -2)^2$

(b) $-24 \div -4 - 2$ $-24 \div (-4 - 2)$

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- 10 Use the commutative and associative laws to evaluate $-4 \times 13 \times -25 \times -2$ mentally. Show how you regrouped. [2 marks]

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Answer: _____

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C

Reasoning *explain, justify and check*

/ 9 marks

- 1 Kai says: " -15×-12 : $-15 \times -10 = 150$, $-15 \times -2 = 30$, so the answer is $150 - 30 = 120$." Find and explain Kai's error. [2 marks]

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- 2 Is division associative? Use $(-48 \div 4) \div -2$ and $-48 \div (4 \div -2)$ to explain. [2 marks]

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- 3 True or false: $-a$ is always a negative number. Explain. [2 marks]

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- 4 Show two different mental strategies for working out -25×36 . Name the law used in each. [3 marks]

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D

Challenge *multi-step and problem-solving*

/ 11 marks

- 1 Use each of the numbers -2 , 3 , -4 and 5 exactly once, with any of $+$, $-$, $\times$, $\div$ and brackets, to make the largest possible value. (You may not join numbers together or add extra negative signs.) Explain why no larger value is possible. [3 marks]

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Answer: _____

- 2 Evaluate $[(-2)^3 - 4 \times (-3 - 5)] \div (1 - 3^2)$. [3 marks]

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Answer: _____

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- 3 Find all the integers n for which $-2 \leq -3n + 4 < 13$. Check your answers by substitution. [3 marks]

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Answer:

- 4 Without a calculator, find $-98 \times 102 + 99 \times 101$. [2 marks]

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Answer:

How did I go?

Fluency ____ / 16 Core ____ / 22 Reasoning ____ / 9 Challenge ____ / 11 **Total ____ / 58**

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