

WA6MNACN1

Calculating with number

Core + Challenge

Order of Operations — Marking Key

I can use the order of operations, including brackets, to work out and write number sentences.

For tutors and parents. Award method marks for correct working even if the final answer is wrong.

Marks summary

A Warm up: 16 B Practise: 21 C Think it through: 10 D Challenge: 9 **Total: 56**

Gold shading in this key shows what the child should have shaded or drawn. Accept any correct arrangement unless the question fixes it.

A

Warm up *answers*

/ 16 marks

Q	Answer	Model answer / notes	Marks
1	28	$8 + 4 \times 5 = 28$ First: 4×5 ($\times$ before $+$). $8 + 4 \times 5 = 28$.	1
2	60	First: $(8 + 4)$ (brackets first). $(8 + 4) \times 5 = 60$.	1
3	26	First: $12 \div 3$ ($\div$ before $-$). $30 - 12 \div 3 = 26$.	1
4	12	$50 - 8 \times 5 + 2 = 12$ First: 8×5 ($\times$ before $-$ and $+$). $50 - 8 \times 5 + 2 = 12$.	1
5	5	First: $(10 - 2)$ (brackets first). $40 \div (10 - 2) = 5$.	1
6	35	$50 - 20 + 5 = 35$ First: $50 - 20$ ($+$ and $-$ from left to right). $50 - 20 + 5 = 35$.	1
7	12	First: $36 \div 6$ ($\times$ and $\div$ from left to right). $36 \div 6 \times 2 = 12$.	1
8	20	First: 3×4 ($\times$ before $+$ and $-$). $9 + 3 \times 4 - 1 = 20$.	1
9	$(3 + 5) \times 2 = 16$	$(3 + 5) \times 2$: $(3 + 5) = 8$ first. Without brackets it is 13.	1
10	$24 \div (4 + 2) = 4$	$24 \div (4 + 2)$: $(4 + 2) = 6$ first. Without brackets it is 8.	1
11	$20 - (8 - 2) = 14$	$20 - (8 - 2)$: $(8 - 2) = 6$ first. Without brackets it is 10.	1
12	$5 \times (6 - 4) = 10$	$5 \times (6 - 4)$: $(6 - 4) = 2$ first. Without brackets it is 26.	1
13	$3 \times 7 + 5 = 26$	$3 \times 7 + 5 = 26$. Three 7s and a 5. Accept any correct number sentence with the right value.	1
14	$2 \times (4 + 6) = 20$	$2 \times (4 + 6) = 20$. Accept $4 + 6 + 4 + 6 = 20$. Accept any correct number sentence with the right value.	1

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Q	Answer	Model answer / notes	Marks
15	$30 - 4 \times 5 = 10$	$30 - 4 \times 5 = 10$. 30 take away four 5s. Accept $30 - 5 - 5 - 5 - 5 = 10$. Accept any correct number sentence with the right value.	1
16	$4 \times 8 + 2 \times 3 = 38$	$4 \times 8 + 2 \times 3 = 38$. Four 8s and two 3s. Accept any correct number sentence with the right value.	1

B

Practise *answers and working*

/ 21 marks

Q	Answer	Working / sample response	Marks
1	13	$48 \div (2 + 6) \times 3 - 5$ $= 48 \div 8 \times 3 - 5$ $= 6 \times 3 - 5$ $= 18 - 5$ $= 13$ $48 \div (2 + 6) \times 3 - 5 = 48 \div 8 \times 3 - 5 = 6 \times 3 - 5 = 18 - 5 = 13$. $\div$ and $\times$ are worked from left to right: $48 \div 8$ first, then $\times 3$. <i>1 mark: correct steps in the right order (brackets, $\div$, $\times$, $-$).</i> <i>1 mark: 13.</i>	2
2	$50 - 3 \times 12 = \$14$	\$50 \$12 \$12 \$12 ? = \$14 The whole bar is \$50. It is made of three \$12 bags and the change. $50 - 3 \times 12 = 50 - 36 = \\$14$. <i>1 mark: bar model labelled (\$12, \$12, \$12, change).</i> <i>1 mark: $50 - 3 \times 12$ (or $50 - (3 \times 12)$).</i> <i>1 mark: \$14.</i>	3
3	$5 \times 24 + 3 \times 12 = 156$	$5 \times 24 = 120$ and $3 \times 12 = 36$. $5 \times 24 + 3 \times 12 = 120 + 36 = 156$. (Brackets are not needed because $\times$ comes before $+$.) <i>1 mark: a correct single number sentence.</i> <i>1 mark: 156.</i>	2
4	$80 - (2 \times 15 + 20) = \$30$	$80 - 2 \times 15 + 20$ $80 - (2 \times 15 + 20)$ $(80 - 2) \times 15 - 20$ He spent $2 \times 15 + 20 = \\$50$, and the brackets make sure all of it is taken away from \$80. $80 - (2 \times 15 + 20) = 80 - 50 = \\$30$. ($80 - 2 \times 15 + 20 = 70$ adds the hat instead of taking it away.) <i>1 mark: circles the middle one.</i> <i>1 mark: \$30.</i>	2

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Q	Answer	Working / sample response	Marks										
5	a) $(2 + 6) \times 5 - 1$ b) $2 + 6 \times (5 - 1)$ c) $(2 + 6) \times (5 - 1)$	a) $8 \times 5 - 1 = 40 - 1 = 39$. b) $2 + 6 \times 4 = 2 + 24 = 26$. c) $8 \times 4 = 32$. (No brackets gives 31.) <i>1 mark for each part.</i>	3										
6	14, 4, 33, 6	<table><thead><tr><th>Number sentence</th><th>Answer</th></tr></thead><tbody><tr><td>$36 \div 4 + 5$</td><td>14</td></tr><tr><td>$36 \div (4 + 5)$</td><td>4</td></tr><tr><td>$36 - 12 \div 4$</td><td>33</td></tr><tr><td>$(36 - 12) \div 4$</td><td>6</td></tr></tbody></table> $36 \div 4 + 5 = 14$ $36 \div (4 + 5) = 4$ $36 - 12 \div 4 = 33$ $(36 - 12) \div 4 = 6$ <i>2 marks: all four correct. 1 mark: two or three correct.</i>	Number sentence	Answer	$36 \div 4 + 5$	14	$36 \div (4 + 5)$	4	$36 - 12 \div 4$	33	$(36 - 12) \div 4$	6	2
Number sentence	Answer												
$36 \div 4 + 5$	14												
$36 \div (4 + 5)$	4												
$36 - 12 \div 4$	33												
$(36 - 12) \div 4$	6												
7	a) 6 b) 26 c) 24	a) $4 \times 9 = 36$, so the bracket is 9 and the box is $9 - 3 = 6$. b) $21 \div 3 = 7$, so the bracket is 21 and the box is $21 + 5 = 26$. c) $15 - 9 = 6$, so the box $\div 4 = 6$ and the box is 24. <i>1 mark for each part.</i>	3										
8	$3 \times 400 + 250 = 1,450$ m	$3 \times 400 = 1,200$. Then $1,200 + 250 = 1,450$ m. <i>1 mark: $3 \times 400 + 250$.</i> <i>1 mark: 1,450 m.</i>	2										
9	16	Kai worked left to right and did the subtraction first. $\div$ must be done before $-$: $6 \div 3 = 2$, then $18 - 2 = 16$. <i>1 mark: explains that $\div$ comes before $-$.</i> <i>1 mark: 16.</i>	2										

C

Think it through *sample answers and criteria*

/ 10 marks

Q	Answer	Working / sample response	Marks
1	No, it is 11	+ and - have the same priority, so you work from left to right. $12 - 4 = 8$, then $8 + 3 = 11$. Chloe worked out $4 + 3$ first. <i>1 mark: No, 11.</i> <i>1 mark: explains left to right for + and -.</i>	2
2	a) True b) False	a) $20 - 10 = 10$ and $20 - 8 - 2 = 10$. Taking away $8 + 2$ is the same as taking away 8, then 2. b) $20 - 6 = 14$ but $20 - 8 - 2 = 10$. Taking away $8 - 2$ takes away only 6. The right side takes away 8 and then another 2, which is 4 more. <i>1 mark: a) True and b) False.</i> <i>1 mark: explanation (or both sides worked out for each part).</i>	2

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Q	Answer	Working / sample response	Marks
		Always Sometimes Never	
3	Sometimes	$10 + 5 - 3 = 12$ whichever part you do first. $10 - 5 + 3$: left to right gives 8, but doing $5 + 3$ first gives 2. So only sometimes true. <i>1 mark: Sometimes.</i> <i>1 mark: an example where the order matters (and one where it does not).</i>	2
4	$(2 + 3) \times 4$	$2 + 3 \times 4 = 14$, $20 - 3 \times 2 = 14$ and $28 \div 2 = 14$. $(2 + 3) \times 4 = 20$ is the only one that is not 14. <i>1 mark: $(2 + 3) \times 4$.</i> <i>1 mark: shows the others are all 14. Accept another choice only with a correct, clear reason.</i>	2

5

See table

	Equals 24	Does not equal 24
Has brackets	$4 \times (2 + 4)$, $(10 + 2) \times 2$	$(30 - 3) \times 2$
No brackets	$30 - 3 \times 2$, $20 + 8 \div 2$	$4 \times 2 + 4$

2

Brackets and 24: $4 \times (2 + 4)$, $(10 + 2) \times 2$. Brackets, not 24: $(30 - 3) \times 2 = 54$.
No brackets and 24: $30 - 3 \times 2$, $20 + 8 \div 2$. No brackets, not 24: $4 \times 2 + 4 = 12$.
 $30 - 3 \times 2 = 30 - 6 = 24$, but the brackets make you subtract first: $27 \times 2 = 54$.

1 mark: all six sorted correctly (accept five).

1 mark: explanation.

D Challenge solutions and criteria

/ 9 marks

Q	Answer	Working / sample response	Marks
1	e.g. a) $(4 + 4 + 4) \div 4$ b) $(4 \times 4 + 4) \div 4$ c) $4 + 4 - 4 \div 4$	a) $(4 + 4 + 4) \div 4 = 3$ b) $(4 \times 4 + 4) \div 4 = 5$ c) $4 + 4 - 4 \div 4 = 7$ Other correct answers are fine if each 4 is used on its own (no joining digits to make 44). <i>1 mark for each correct number sentence (check the order of operations).</i>	3
2	e.g. $(3 \times 6 - 8) \times 5 = 50$ and $6 \times 8 + 5 - 3 = 50$	$(3 \times 6 - 8) \times 5 = (18 - 8) \times 5 = 10 \times 5 = 50$. $6 \times 8 + 5 - 3 = 48 + 5 - 3 = 50$. $(6 \div 3 + 8) \times 5 = (2 + 8) \times 5 = 50$ also works. <i>1 mark for each correct way.</i> <i>1 mark: both written as correct single number sentences (order of operations respected).</i>	3

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Q	Answer	Working / sample response	Marks
3	a) $45 \times 3 + 28 \times 2 - 60 =$ \$131 b) 7 more cupcakes	a) $135 + 56 - 60 = \$131$. b) They need $150 - 131 = \$19$ more. 6 cupcakes give \$18 (not enough), 7 give \$21. So 7 more. <i>1 mark: the number sentence.</i> <i>1 mark: \$131.</i> <i>1 mark: 7 (not 6.3 or 6).</i>	3