

WA5MNAUN5

Understanding number

Core + Challenge

NAPLAN-style

Factors — Marking Key

I can use arrays to find all the factors of a number and explain how I know I have them all.

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

Marks summary

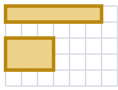
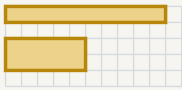
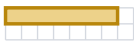
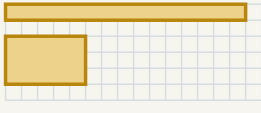
A Warm up: 16 B Practise: 21 C Think it through: 10 D Challenge: 9 **Total: 56**

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	$2 \times 9 = 18$	2 rows of 9. 2 and 9 are factors of 18. Accept $9 \times 2 = 18$.	1
2	$4 \times 5 = 20$	4 rows of 5. 4 and 5 are factors of 20. Accept $5 \times 4 = 20$.	1
3	$3 \times 7 = 21$	3 rows of 7. 3 and 7 are factors of 21. Accept $7 \times 3 = 21$.	1
4	$6 \times 6 = 36$	6 rows of 6. 6 and 6 are factors of 36.	1
5	1×6 and 2×3	 Factors of 6: 1, 2, 3, 6.	1
6	1×10 and 2×5	 Factors of 10: 1, 2, 5, 10.	1
7	1×7	 Factors of 7: 1, 7. 7 makes only one array.	1
8	1×15 and 3×5	 Factors of 15: 1, 3, 5, 15.	1
9	no	yes ☒ no $30 \div 4 = 7$ remainder 2.	1
10	yes	☒ yes ☐ no $42 \div 7 = 6$ exactly.	1

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Q	Answer	Model answer / notes	Marks
11	yes	☒ yes ☐ no $45 \div 9 = 5$ exactly.	1
12	no	☐ yes ☒ no $16 \div 6 = 2$ remainder 4.	1
13	1, 2, 4, 8	 Pairs: $1 \times 8, 2 \times 4$.	1
14	1, 2, 4, 5, 10, 20	 Pairs: $1 \times 20, 2 \times 10, 4 \times 5$.	1
15	1, 3, 9	 Pairs: $1 \times 9, 3 \times 3$.	1
16	1, 2, 7, 14	 Pairs: $1 \times 14, 2 \times 7$.	1

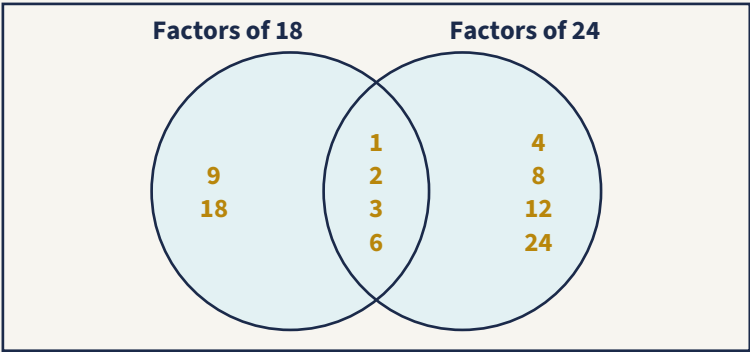
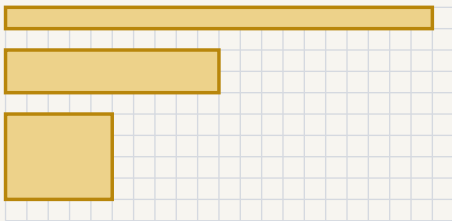
B

Practise *answers and working*

/ 21 marks

Q	Answer	Working / sample response	Marks												
1	$1 \times 36, 2 \times 18, 3 \times 12, 4 \times 9,$ 6×6 ; square: 6×6	<table><tr><th>Rows</th><th>In each row</th></tr><tr><td>1</td><td>36</td></tr><tr><td>2</td><td>18</td></tr><tr><td>3</td><td>12</td></tr><tr><td>4</td><td>9</td></tr><tr><td>6</td><td>6</td></tr></table> Try 1, 2, 3, ... in order: $36 \div 1 = 36, 36 \div 2 = 18, 36 \div 3 = 12, 36 \div 4 = 9, 5$ does not work, $36 \div 6 = 6$. After 6 the pairs repeat. 6 rows of 6 is a square. <i>2 marks: all five arrays (1 mark for three or four).</i> <i>1 mark: 6×6.</i>	Rows	In each row	1	36	2	18	3	12	4	9	6	6	3
Rows	In each row														
1	36														
2	18														
3	12														
4	9														
6	6														

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Q	Answer	Working / sample response	Marks
2	1, 2, 4, 5, 8, 10, 20, 40	 Pairs: 1×40, 2×20, 4×10, 5×8. 1 mark: all eight factors. 1 mark: pairs joined correctly.	2
3	6	 Factors of 18: 1, 2, 3, 6, 9, 18. Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24. Common factors: 1, 2, 3, 6. The greatest is 6. 1 mark: factors of 18. 1 mark: factors of 24, with the common ones in the middle. 1 mark: 6.	3
4	2, 4, 7 or 14 players	Factors of 28: 1, 2, 4, 7, 14, 28. 1 and 28 are not allowed (one player each, or one team), so 2, 4, 7 or 14 players. 2 marks: all four sizes, no extras. 1 mark: three correct.	2
5	1×20 , 2×10 , 4×5	 $20 = 1 \times 20 = 2 \times 10 = 4 \times 5$. 3 does not work ($20 \div 3$ has a remainder). 2 marks: all three rectangles. 1 mark: two.	2
6	9: 1, 3, 9	6: 1, 2, 3, 6. 9: 1, 3, 9. 10: 1, 2, 5, 10. 15: 1, 3, 5, 15. Only 9 has three factors. 1 mark: 9. 1 mark: 1, 3, 9.	2
7	a) 9 b) 3 c) 12	a) $8 \times 9 = 72$. b) $3 \times 24 = 72$. c) $6 \times 12 = 72$. 2 marks: all three. 1 mark: two.	2

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Q	Answer	Working / sample response	Marks
8	Yes	$84 = 70 + 14 = 7 \times 10 + 7 \times 2 = 7 \times 12$. $84 \div 7 = 12$ with no remainder, so 7 is a factor. <i>1 mark: Yes.</i> <i>1 mark: shows $7 \times 12 = 84$ (or $84 \div 7 = 12$).</i>	2
9	a) 15 bags b) 2 lollies, 3 stickers	The number of bags must be a factor of 30 and of 45. Common factors: 1, 3, 5, 15. The largest is 15. $30 \div 15 = 2$ lollies and $45 \div 15 = 3$ stickers per bag. <i>1 mark: uses common factors.</i> <i>1 mark: 15 bags.</i> <i>1 mark: 2 lollies and 3 stickers.</i>	3

C

Think it through *sample answers and criteria*

/ 10 marks

Q	Answer	Working / sample response	Marks
1	No, 6 factors	Jack forgot 1 and 18: $1 \times 18 = 18$. The factors of 18 are 1, 2, 3, 6, 9 and 18: six factors. <i>1 mark: disagrees.</i> <i>1 mark: includes 1 and 18.</i>	2
2	False	13 is bigger than 12, but 13 has only 2 factors (1, 13) and 12 has 6. The number of factors depends on the number, not its size. <i>1 mark: False.</i> <i>1 mark: a correct counter-example.</i>	2
3	Sometimes	6 has 4 factors (1, 2, 3, 6): even. 9 has 3 factors (1, 3, 9): odd, because 3×3 pairs 3 with itself. <i>1 mark: Sometimes.</i> <i>1 mark: one example each way (the odd case is a square number such as 4, 9, 16).</i>	2
4	20	12, 18 and 30 all have 3 (and 6) as a factor. 20 does not: $20 \div 3$ has a remainder. <i>1 mark: 20.</i> <i>1 mark: a correct reason. Accept another choice with a correct reason (e.g. 30 is the only one with 5 and 3 as factors).</i>	2
5	1, 2, 3, 4, 6, 8, 12, 16, 24, 48	Work in pairs from 1: 1×48 , 2×24 , 3×16 , 4×12 , 6×8 . 5 and 7 do not work. The next number to try is 8, which is already in a pair, so all the pairs are found. <i>1 mark: all ten factors.</i> <i>1 mark: explains working in order until the pairs repeat.</i>	2

D**Challenge** *solutions and criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	12, 18, 20, 28	12: 1, 2, 3, 4, 6, 12. 18: 1, 2, 3, 6, 9, 18. 20: 1, 2, 4, 5, 10, 20. 28: 1, 2, 4, 7, 14, 28. Others such as 24 (8 factors) and 16 (5 factors) do not work. <i>2 marks: all four numbers (1 mark for two or three). 1 mark: factors shown.</i>	3
2	a) 36 c) it is a square number	a) Numbers with 4 and 6 as factors: 24, 36, 48. 8 is a factor of 24 and 48, so I am 36. b) 1, 2, 3, 4, 6, 9, 12, 18, 36 (nine factors). c) $6 \times 6 = 36$, so 6 pairs with itself. All the other factors come in pairs. <i>1 mark each part.</i>	3
3	5×12 , 6×10 , 10×6 , 12×5	Factor pairs of 60: 1×60, 2×30, 3×20, 4×15, 5×12, 6×10. Both numbers must be 5 or more: 5×12 and 6×10, in either order. So 5, 6, 10 or 12 rows: four ways. <i>1 mark: finds the factor pairs of 60. 2 marks: all four ways (1 mark for two or three).</i>	3