Mathematical Reasoning

Learn it the Feynman way, then practise it

NSW Opportunity Class Placement Test · for students in Year 4

10 chapters | **300** questions | **343** min at test pace | answers for **every** question

Each chapter starts by explaining one idea in plain words, shows you the mistake almost everyone makes, and gives you something to remember it by. Then you practise it thirty times.

Phase 0 hand-made sample. All 300 answers were independently re-derived by solver before printing (300/300 passed). Not reviewed by a qualified teacher — year-level appropriateness is unverified. Not for sale.

Chapter	Questions
1. Working backwards	30 questions
2. Number patterns	30 questions
3. Fractions of an amount	30 questions
4. Time and elapsed time	30 questions
5. Money and change	30 questions
6. Perimeter and area	30 questions
7. Changing units	30 questions
8. Order of operations	30 questions
9. Sharing and remainders	30 questions
10. Averages	30 questions

QuizPaste is not affiliated with, endorsed by, or approved by the NSW Department of Education or ACARA. Test-structure facts used in this book — question counts, timings, weightings and equipment rules — are taken from NSW Department of Education web pages, © State of New South Wales (Department of Education), published under CC BY 4.0 (creativecommons.org/licenses/by/4.0/). That licence expressly does not cover the Department's sample tests and related materials, whose copyright is held by Cambridge University Press & Assessment — none of that material is reproduced here. Every practice question and explanation is original work by QuizPaste. Answers are re-derived by an independent solver; they have not been reviewed by a qualified teacher. Licensing detail: quizpaste.com/worksheets/licensing

CHAPTER 1 OF 10

Working backwards



IN PLAIN WORDS

Some questions tell you how a story ENDED and ask what happened at the START. Instead of guessing, undo each step in reverse.

EXAMPLE

A number is doubled, then 5 is added, giving 23. Undo the +5 first (23 - 5 = 18), then undo the doubling (18 / 2 = 9). The start was 9.

> COMMON ERROR
>
> Undoing in the WRONG ORDER. If you halve 23 first you get 11.5, then take away 5 and get 6.5 - which is wrong. Always undo the LAST step first.

REMEMBER IT LIKE THIS

Socks then shoes. To undo, shoes off first, then socks.

CHECK YOURSELF

A number is tripled, then 4 is subtracted, giving 17. What was it? (answer: 7)

1. A number is doubled, then 11 is added. The result is 21. What was the number? YEVZXT

( ) 6 ( ) 16 ( ) 5 ( ) 10

working

2. Finn thinks of a number, subtracts 7, then multiplies by 4, and gets 32. What number was it? BG57QD

( ) 8 ( ) 16 ( ) 25 ( ) 15

working

3. A number is doubled, then 9 is added. The result is 35. What was the number? 39LDNE

( ) 26 ( ) 14 ( ) 13 ( ) 22

working

4. Ava thinks of a number, subtracts 8, then multiplies by 3, and gets 15. What number was it? 325EU8

( ) 5 ( ) 7 ( ) 13 ( ) 14

working

5. A number is tripled, then 6 is added. The result is 18. What was the number? JDSEY8

( ) 4 ( ) 10 ( ) 0 ( ) 12

working

6. Ava thinks of a number, subtracts 4, then multiplies by 2, and gets 52. What number was it? RGQMNF

( ) 30 ( ) 48 ( ) 26 ( ) 31

working

7. A number is tripled, then 8 is added. The result is 32. What was the number? 7LNRRX

( ) 24 ( ) 8 ( ) 16 ( ) 9

working

8. Owen thinks of a number, subtracts 8, then multiplies by 2, and gets 40. What number was it? RHCZF5

( ) 20 ( ) 28 ( ) 32 ( ) 29

working

9. A number is tripled, then 9 is added. The result is 51. What was the number? 6MHRH9

( ) 23 ( ) 42 ( ) 8 ( ) 14

working

10. Ella thinks of a number, subtracts 4, then multiplies by 4, and gets 36. What number was it? HSTYHQ

( ) 9 ( ) 13 ( ) 14 ( ) 32

working

11. A number is doubled, then 8 is added. The result is 38. What was the number? CER9UE

( ) 23 ( ) 11 ( ) 30 ( ) 15

working

12. Ivy thinks of a number, subtracts 8, then multiplies by 4, and gets 88. What number was it? HGQFZF

( ) 80 ( ) 31 ( ) 22 ( ) 30

working

13. A number is doubled, then 4 is added. The result is 22. What was the number? BHVG9Q

( ) 7 ( ) 9 ( ) 18 ( ) 13

working

14. Eli thinks of a number, subtracts 6, then multiplies by 3, and gets 48. What number was it? AEAE74

( ) 16 ( ) 42 ( ) 22 ( ) 23

working

15. A number is tripled, then 8 is added. The result is 50. What was the number? 9XVY3S

( ) 14 ( ) 42 ( ) 15 ( ) 22

working

16. Nina thinks of a number, subtracts 4, then multiplies by 2, and gets 48. What number was it? CKBEGQ

( ) 24 ( ) 44 ( ) 29 ( ) 28

working

17. A number is tripled, then 9 is added. The result is 24. What was the number? SSB8EA

( ) 5 ( ) 6 ( ) 15 ( ) 14

working

18. Max thinks of a number, subtracts 6, then multiplies by 2, and gets 44. What number was it? HR3N9L

( ) 38 ( ) 29 ( ) 22 ( ) 28

working

19. A number is doubled, then 9 is added. The result is 23. What was the number? 2ESX58

( ) 7 ( ) 14 ( ) 8 ( ) 16

working

20. Ava thinks of a number, subtracts 6, then multiplies by 4, and gets 80. What number was it? U9BDR5

( ) 74 ( ) 27 ( ) 26 ( ) 20

working

21. A number is doubled, then 10 is added. The result is 40. What was the number? ZRA4XK

( ) 25 ( ) 30 ( ) 10 ( ) 15

working

22. Kai thinks of a number, subtracts 3, then multiplies by 2, and gets 36. What number was it? AT3KD9

( ) 18 ( ) 21 ( ) 22 ( ) 33

working

23. A number is doubled, then 12 is added. The result is 38. What was the number? ADYL43

( ) 13 ( ) 26 ( ) 7 ( ) 25

working

24. Ava thinks of a number, subtracts 6, then multiplies by 4, and gets 56. What number was it? 9YVBJR

( ) 14 ( ) 21 ( ) 20 ( ) 50

working

25. A number is doubled, then 7 is added. The result is 27. What was the number? ZZ4B6V

( ) 17 ( ) 20 ( ) 11 ( ) 10

working

26. Max thinks of a number, subtracts 6, then multiplies by 2, and gets 46. What number was it? PM73X6

( ) 23 ( ) 29 ( ) 30 ( ) 40

working

27. A number is tripled, then 9 is added. The result is 39. What was the number? RPXQTN

( ) 4 ( ) 10 ( ) 19 ( ) 30

working

28. Ava thinks of a number, subtracts 4, then multiplies by 2, and gets 34. What number was it? B4P5MC

( ) 30 ( ) 22 ( ) 17 ( ) 21

working

29. A number is tripled, then 5 is added. The result is 23. What was the number? 27KWKR

( ) 7 ( ) 18 ( ) 11 ( ) 6

working

30. Mia thinks of a number, subtracts 3, then multiplies by 4, and gets 100. What number was it? RH8Q66

( ) 29 ( ) 97 ( ) 25 ( ) 28

working

Chapter 1 — Answers: Working backwards

1. 5

Undo the last step first: 21 - 11 = 10. Then undo the doubling: 10 / 2 = 5.

2. 15

Undo the x4 first: 32 / 4 = 8. Then undo the −7: 8 + 7 = 15.

3. 13

Undo the last step first: 35 - 9 = 26. Then undo the doubling: 26 / 2 = 13.

4. 13

Undo the x3 first: 15 / 3 = 5. Then undo the −8: 5 + 8 = 13.

5. 4

Undo the last step first: 18 - 6 = 12. Then undo the tripling: 12 / 3 = 4.

6. 30

Undo the x2 first: 52 / 2 = 26. Then undo the −4: 26 + 4 = 30.

7. 8

Undo the last step first: 32 - 8 = 24. Then undo the tripling: 24 / 3 = 8.

8. 28

Undo the x2 first: 40 / 2 = 20. Then undo the −8: 20 + 8 = 28.

9. 14

Undo the last step first: 51 - 9 = 42. Then undo the tripling: 42 / 3 = 14.

10. 13

Undo the x4 first: 36 / 4 = 9. Then undo the −4: 9 + 4 = 13.

11. 15

Undo the last step first: 38 - 8 = 30. Then undo the doubling: 30 / 2 = 15.

12. 30

Undo the x4 first: 88 / 4 = 22. Then undo the −8: 22 + 8 = 30.

13. 9

Undo the last step first: 22 - 4 = 18. Then undo the doubling: 18 / 2 = 9.

14. 22

Undo the x3 first: 48 / 3 = 16. Then undo the −6: 16 + 6 = 22.

15. 14

Undo the last step first: 50 - 8 = 42. Then undo the tripling: 42 / 3 = 14.

16. 28

Undo the x2 first: 48 / 2 = 24. Then undo the −4: 24 + 4 = 28.

17. 5

Undo the last step first: 24 - 9 = 15. Then undo the tripling: 15 / 3 = 5.

18. 28

Undo the x2 first: 44 / 2 = 22. Then undo the −6: 22 + 6 = 28.

19. 7

Undo the last step first: 23 - 9 = 14. Then undo the doubling: 14 / 2 = 7.

20. 26

Undo the x4 first: 80 / 4 = 20. Then undo the −6: 20 + 6 = 26.

21. 15

Undo the last step first: 40 - 10 = 30. Then undo the doubling: 30 / 2 = 15.

22. **21**

Undo the x2 first: 36 / 2 = 18. Then undo the −3: 18 + 3 = 21.

23. **13**

Undo the last step first: 38 - 12 = 26. Then undo the doubling: 26 / 2 = 13.

24. **20**

Undo the x4 first: 56 / 4 = 14. Then undo the −6: 14 + 6 = 20.

25. **10**

Undo the last step first: 27 - 7 = 20. Then undo the doubling: 20 / 2 = 10.

26. **29**

Undo the x2 first: 46 / 2 = 23. Then undo the −6: 23 + 6 = 29.

27. **10**

Undo the last step first: 39 - 9 = 30. Then undo the tripling: 30 / 3 = 10.

28. **21**

Undo the x2 first: 34 / 2 = 17. Then undo the −4: 17 + 4 = 21.

29. **6**

Undo the last step first: 23 - 5 = 18. Then undo the tripling: 18 / 3 = 6.

30. **28**

Undo the x4 first: 100 / 4 = 25. Then undo the −3: 25 + 3 = 28.

Number patterns



IN PLAIN WORDS

A pattern has a rule. Your job is to find the rule, not to guess the next number.

EXAMPLE

2, 6, 14, 30. The gaps are 4, 8, 16 - they double. So the rule is ‘double it, then add 2’. Check: 2x2+2 = 6, 6x2+2 = 14. It works.

COMMON ERROR

Testing your rule on only ONE pair. A rule that fits 2 to 6 might not fit 6 to 14. Check the rule against every number you were given.

REMEMBER IT LIKE THIS

A rule is like a recipe. If it only works for one step, it is not the recipe.

CHECK YOURSELF

5, 11, 23, 47. What is the rule? (answer: double it, then add 1)

1. Look at this pattern: 8, 12, 16, 20, ... What is the next number? BECRD5

( ) 28 ( ) 25 ( ) 16 ( ) 24

working

2. Look at this pattern: 6, 13, 27, 55, ... What is the next number? SZNKRJ

( ) 111 ( ) 110 ( ) 83 ( ) 113

working

3. One number is missing from this pattern: 2, ?, 20, 29, 38. What is the missing number? ME5V74

( ) 11 ( ) 20 ( ) 12 ( ) 2

working

4. Every number in this list should be 6 more than the one before, but one number is wrong: 7, 15, 19, 25, 31. Which number is wrong? STFSM2

( ) 15 ( ) 19 ( ) 16 ( ) 7

working

5. Look at this pattern: 11, 15, 19, 23, … What is the next number? R4DZPN

( ) 27 ( ) 31 ( ) 28 ( ) 19

working

6. Look at this pattern: 3, 11, 35, 107, … What is the next number? 7Q9FST

( ) 323 ( ) 326 ( ) 321 ( ) 179

working

7. One number is missing from this pattern: 11, 19, 27, ?, 43. What is the missing number? DHXAD5

( ) 43 ( ) 36 ( ) 27 ( ) 35

working

8. Every number in this list should be 6 more than the one before, but one number is wrong: 10, 17, 22, 28, 34. Which number is wrong? 5QLPUC

( ) 17 ( ) 22 ( ) 18 ( ) 10

working

9. Look at this pattern: 80, 72, 64, 56, … What is the next number? WRJUVP

( ) 64 ( ) 47 ( ) 56 ( ) 48

working

10. Look at this pattern: 2, 7, 22, 67, … What is the next number? V84CWK

( ) 205 ( ) 202 ( ) 112 ( ) 201

working

11. One number is missing from this pattern: 11, 15, 19, ?, 27. What is the missing number? VWBLFQ

( ) 27 ( ) 19 ( ) 24 ( ) 23

working

12. Every number in this list should be 5 more than the one before, but one number is wrong: 5, 10, 13, 20, 25. Which number is wrong? 8YAYFE

( ) 10 ( ) 5 ( ) 13 ( ) 20

working

13. Look at this pattern: 11, 17, 23, 29, … What is the next number? GCBEB8

( ) 23 ( ) 41 ( ) 35 ( ) 36

working

14. Look at this pattern: 5, 13, 29, 61, … What is the next number? 38GPGP

( ) 127 ( ) 125 ( ) 93 ( ) 122

working

15. One number is missing from this pattern: 9, 16, ?, 30, 37. What is the missing number? H96CGX

( ) 23 ( ) 30 ( ) 16 ( ) 24

working

16. Every number in this list should be 7 more than the one before, but one number is wrong: 7, 16, 21, 28, 35. Which number is wrong? 6S7W8S

( ) 7 ( ) 16 ( ) 17 ( ) 21

working

17. Look at this pattern: 10, 19, 28, 37, … What is the next number? S3F3J4

( ) 28 ( ) 55 ( ) 47 ( ) 46

working

18. Look at this pattern: 5, 17, 53, 161, … What is the next number? ACMSLH

( ) 483 ( ) 485 ( ) 269 ( ) 488

working

19. One number is missing from this pattern: 10, 16, 22, ?, 34. What is the missing number? BWYQWL

( ) 28 ( ) 34 ( ) 29 ( ) 22

working

20. Every number in this list should be 4 more than the one before, but one number is wrong: 7, 11, 15, 19, 22. Which number is wrong? UQK4N7

( ) 23 ( ) 19 ( ) 7 ( ) 22

working

21. Look at this pattern: 4, 13, 22, 31, … What is the next number? LBXYGB

( ) 41 ( ) 49 ( ) 22 ( ) 40

working

22. Look at this pattern: 4, 13, 40, 121, … What is the next number? 9WZFDK

( ) 367 ( ) 364 ( ) 202 ( ) 363

working

23. One number is missing from this pattern: 11, 17, 23, ?, 35. What is the missing number? SKXYV4

( ) 23 ( ) 30 ( ) 35 ( ) 29

working

24. Every number in this list should be 5 more than the one before, but one number is wrong: 9, 12, 19, 24, 29. Which number is wrong? 7PQ4P3

( ) 13 ( ) 12 ( ) 19 ( ) 9

working

25. Look at this pattern: 84, 77, 70, 63, … What is the next number? 6VSTP3

( ) 55 ( ) 56 ( ) 63 ( ) 70

working

26. Look at this pattern: 6, 20, 62, 188, … What is the next number? GA6SN2

( ) 314 ( ) 566 ( ) 569 ( ) 564

working

27. One number is missing from this pattern: 9, ?, 15, 18, 21. What is the missing number? X4R9PK

( ) 12 ( ) 9 ( ) 13 ( ) 15

working

28. Every number in this list should be 3 more than the one before, but one number is wrong: 8, 11, 14, 17, 21. Which number is wrong? RYUZCR

( ) 21 ( ) 17 ( ) 22 ( ) 8

working

29. Look at this pattern: 2, 6, 10, 14, … What is the next number? X8LQLL

( ) 19 ( ) 18 ( ) 10 ( ) 22

working

30. Look at this pattern: 2, 6, 14, 30, … What is the next number? VGS28A

( ) 64 ( ) 60 ( ) 62 ( ) 46

working

Chapter 2 — Answers: Number patterns

1. **24**

Each number is 4 more than the one before. 20 + 4 = 24.

2. **111**

Each number is the one before multiplied by 2, then 1 added. 55 x 2 + 1 = 111.

3. **11**

Each number is 9 more than the one before. 2 + 9 = 11.

4. **15**

Counting up in 6s from 7 gives 7, 13, 19, 25, 31. The list has 15 where it should have 13.

5. **27**

Each number is 4 more than the one before. 23 + 4 = 27.

6. **323**

Each number is the one before multiplied by 3, then 2 added. 107 x 3 + 2 = 323.

7. **35**

Each number is 8 more than the one before. 27 + 8 = 35.

8. **17**

Counting up in 6s from 10 gives 10, 16, 22, 28, 34. The list has 17 where it should have 16.

9. **48**

Each number is 8 less than the one before. 56 - 8 = 48.

10. **202**

Each number is the one before multiplied by 3, then 1 added. 67 x 3 + 1 = 202.

11. **23**

Each number is 4 more than the one before. 19 + 4 = 23.

12. **13**

Counting up in 5s from 5 gives 5, 10, 15, 20, 25. The list has 13 where it should have 15.

13. **35**

Each number is 6 more than the one before. 29 + 6 = 35.

14. **125**

Each number is the one before multiplied by 2, then 3 added. 61 x 2 + 3 = 125.

15. **23**

Each number is 7 more than the one before. 16 + 7 = 23.

16. **16**

Counting up in 7s from 7 gives 7, 14, 21, 28, 35. The list has 16 where it should have 14.

17. **46**

Each number is 9 more than the one before. 37 + 9 = 46.

18. **485**

Each number is the one before multiplied by 3, then 2 added. 161 x 3 + 2 = 485.

19. **28**

Each number is 6 more than the one before. 22 + 6 = 28.

20. **22**

Counting up in 4s from 7 gives 7, 11, 15, 19, 23. The list has 22 where it should have 23.

21. **40**

Each number is 9 more than the one before. 31 + 9 = 40.

22. **364**

Each number is the one before multiplied by 3, then 1 added. 121 x 3 + 1 = 364.

23. **29**

Each number is 6 more than the one before. 23 + 6 = 29.

24. **12**

Counting up in 5s from 9 gives 9, 14, 19, 24, 29. The list has 12 where it should have 14.

25. **56**

Each number is 7 less than the one before. 63 - 7 = 56.

26. **566**

Each number is the one before multiplied by 3, then 2 added. 188 x 3 + 2 = 566.

27. **12**

Each number is 3 more than the one before. 9 + 3 = 12.

28. **21**

Counting up in 3s from 8 gives 8, 11, 14, 17, 20. The list has 21 where it should have 20.

29. **18**

Each number is 4 more than the one before. 14 + 4 = 18.

30. **62**

Each number is the one before multiplied by 2, then 2 added. 30 x 2 + 2 = 62.

Fractions of an amount



IN PLAIN WORDS

To find a fraction of a number, first find ONE part, then take as many parts as you need.

EXAMPLE

3/4 of 48. Divide by the bottom number: 48 / 4 = 12 (one quarter). Multiply by the top number: 12 x 3 = 36.

> COMMON ERROR
>
> Either order gives the same answer, but dividing by the bottom number first is usually easier because the numbers stay small. Multiplying first is not wrong - it just gives you a bigger number to divide.

REMEMBER IT LIKE THIS

Cutting a cake: first cut it into equal slices, then take your slices.

CHECK YOURSELF

2/5 of 45 is what? (answer: 18)

1. What is 3/5 of 50? LZCWQQ

( ) 30 ( ) 20 ( ) 35 ( ) 10

working

2. There are 35 books. 2/7 of them have a red cover. How many is that? GXGNRY

( ) 10 ( ) 25 ( ) 5 ( ) 14

working

3. 3/4 of a number is 27. What is the number? NW4DX9

( ) 36 ( ) 9 ( ) 108 ( ) 31

working

4. What is 3/8 of 48? 95VPF6

( ) 30 ( ) 16 ( ) 18 ( ) 6

working

5. There are 28 stickers. 2/4 of them are shiny. How many is that? C4GF8Z

( ) 14 ( ) 15 ( ) 7 ( ) 8

working

6. 4/6 of a number is 12. What is the number? DMEHZW

( ) 72 ( ) 18 ( ) 19 ( ) 3

working

7. What is 2/5 of 35? 9NFG9E

( ) 21 ( ) 14 ( ) 7 ( ) 19

working

8. There are 45 marbles. 2/5 of them are red. How many is that? BXZC4Q

( ) 10 ( ) 18 ( ) 27 ( ) 9

working

9. 3/5 of a number is 21. What is the number? 5L59PL

( ) 26 ( ) 7 ( ) 35 ( ) 105

working

10. What is 3/8 of 32? HMV32K

( ) 4 ( ) 12 ( ) 13 ( ) 20

working

11. There are 24 marbles. 4/6 of them are red. How many is that? 53ZMZ5

( ) 16 ( ) 24 ( ) 8 ( ) 4

working

12. 7/8 of a number is 56. What is the number? W25DMT

( ) 65 ( ) 448 ( ) 8 ( ) 64

working

13. What is 2/5 of 75? XC5SHG

( ) 45 ( ) 35 ( ) 30 ( ) 15

working

14. There are 30 cupcakes. 2/5 of them have icing. How many is that? L9T8AX

( ) 12 ( ) 18 ( ) 6 ( ) 10

working

15. 3/5 of a number is 36. What is the number? AD9CAW

( ) 180 ( ) 60 ( ) 41 ( ) 12

working

16. What is 2/4 of 20? D6CKCY

( ) 10 ( ) 9 ( ) 5 ( ) 11

working

17. There are 36 students. 2/6 of them are in the red team. How many is that? UKUKT2

( ) 6 ( ) 12 ( ) 13 ( ) 24

working

18. 2/5 of a number is 20. What is the number? AHCBPA

( ) 50 ( ) 100 ( ) 10 ( ) 25

working

19. What is 4/8 of 112? MWNSZM

( ) 57 ( ) 14 ( ) 56 ( ) 28

working

20. There are 49 students. 5/7 of them are in the red team. How many is that? ZVGBF3

( ) 35 ( ) 14 ( ) 7 ( ) 36

working

21. 1/4 of a number is 5. What is the number? LSX4KN

( ) 20 ( ) 21 ( ) 5 ( ) 9

working

22. What is 1/5 of 60? GN3JRD

( ) 12 ( ) 48 ( ) 60 ( ) 13

working

23. There are 27 students. 1/3 of them are in the red team. How many is that? 4X7UPQ

( ) 10 ( ) 9 ( ) 18 ( ) 3

working

24. 3/4 of a number is 9. What is the number? DA8T22

( ) 36 ( ) 12 ( ) 13 ( ) 3

working

25. What is 3/6 of 36? L5Y8H3

( ) 19 ( ) 12 ( ) 6 ( ) 18

working

26. There are 28 cupcakes. 1/7 of them have icing. How many is that? YS9KVW

( ) 24 ( ) 5 ( ) 7 ( ) 4

working

27. 4/8 of a number is 28. What is the number? TMBKTT

( ) 7 ( ) 56 ( ) 36 ( ) 224

working

28. What is 2/6 of 78? X9572G

( ) 52 ( ) 26 ( ) 39 ( ) 13

working

29. There are 36 books. 1/4 of them have a red cover. How many is that? 3LXVW6

( ) 9 ( ) 10 ( ) 27 ( ) 4

working

30. 2/4 of a number is 6. What is the number? AXCNLA

( ) 3 ( ) 24 ( ) 10 ( ) 12

working

Chapter 3 — Answers: Fractions of an amount

1. **30**

50 / 5 = 10 (that is one part). 10 x 3 = 30.

2. **10**

35 / 7 = 5 (that is one part). 5 x 2 = 10 books.

3. **36**

27 is 3 parts, so one part is 27 / 3 = 9. The whole is 9 x 4 = 36.

4. **18**

48 / 8 = 6 (that is one part). 6 x 3 = 18.

5. **14**

28 / 4 = 7 (that is one part). 7 x 2 = 14 stickers.

6. **18**

12 is 4 parts, so one part is 12 / 4 = 3. The whole is 3 x 6 = 18.

7. **14**

35 / 5 = 7 (that is one part). 7 x 2 = 14.

8. **18**

45 / 5 = 9 (that is one part). 9 x 2 = 18 marbles.

9. **35**

21 is 3 parts, so one part is 21 / 3 = 7. The whole is 7 x 5 = 35.

10. **12**

32 / 8 = 4 (that is one part). 4 x 3 = 12.

11. **16**

24 / 6 = 4 (that is one part). 4 x 4 = 16 marbles.

12. **64**

56 is 7 parts, so one part is 56 / 7 = 8. The whole is 8 x 8 = 64.

13. **30**

75 / 5 = 15 (that is one part). 15 x 2 = 30.

14. **12**

30 / 5 = 6 (that is one part). 6 x 2 = 12 cupcakes.

15. **60**

36 is 3 parts, so one part is 36 / 3 = 12. The whole is 12 x 5 = 60.

16. **10**

20 / 4 = 5 (that is one part). 5 x 2 = 10.

17. **12**

36 / 6 = 6 (that is one part). 6 x 2 = 12 students.

18. **50**

20 is 2 parts, so one part is 20 / 2 = 10. The whole is 10 x 5 = 50.

19. **56**

112 / 8 = 14 (that is one part). 14 x 4 = 56.

20. **35**

49 / 7 = 7 (that is one part). 7 x 5 = 35 students.

21. **20**

5 is 1 parts, so one part is 5 / 1 = 5. The whole is 5 x 4 = 20.

22. **12**

60 / 5 = 12 (that is one part). 12 x 1 = 12.

23. **9**

27 / 3 = 9 (that is one part). 9 x 1 = 9 students.

24. **12**

9 is 3 parts, so one part is 9 / 3 = 3. The whole is 3 x 4 = 12.

25. **18**

36 / 6 = 6 (that is one part). 6 x 3 = 18.

26. **4**

28 / 7 = 4 (that is one part). 4 x 1 = 4 cupcakes.

27. **56**

28 is 4 parts, so one part is 28 / 4 = 7. The whole is 7 x 8 = 56.

28. **26**

78 / 6 = 13 (that is one part). 13 x 2 = 26.

29. **9**

36 / 4 = 9 (that is one part). 9 x 1 = 9 books.

30. **12**

6 is 2 parts, so one part is 6 / 2 = 3. The whole is 3 x 4 = 12.

Time and elapsed time



IN PLAIN WORDS

A clock is not an ordinary base-10 number. An hour is 60 minutes, not 100, so to find how long something took you regroup one hour as 60 minutes, or count across the clock in steps.

EXAMPLE

From 7:20 pm to 9:05 pm. Go to 9:00 pm first: that is 1 hour 40 minutes. Then add the last 5 minutes: 1 hour 45 minutes.

COMMON ERROR

Doing 9:05 - 7:20 as if it were 905 - 720. Clock times are not ordinary numbers - each hour is 60 minutes, not 100, so you cannot subtract the digits. (A length of time can perfectly well be written as 85 minutes, or as 1 hour 25 minutes. Both are fine. It is the subtraction that goes wrong.)

REMEMBER IT LIKE THIS

A clock is a ring, not a number line. It rolls over at 60.

CHECK YOURSELF

A film starts at 6:45 pm and runs for 95 minutes. When does it end? (answer: 8:20 pm)

1. Ivy's lesson starts at 8:25 am and lasts 35 minutes. What time does it finish? KW9U3L

( ) 8:00 am ( ) 9:10 am ( ) 9:00 am ( ) 10:00 am

working

2. A film starts at 2:15 pm and finishes at 3:10 pm. How long is the film? ANXJZS

( ) 45 min ( ) 1 h 55 min ( ) 55 min ( ) 1 h 5 min

working

3. A lesson finished at 2:10 pm after running for 55 minutes. What time did it start? BECAWX

( ) 1:15 pm ( ) 12:15 pm ( ) 2:15 pm ( ) 3:05 pm

working

4. Jack's lesson starts at 6:50 pm and lasts 85 minutes. What time does it finish? 88TGR2

( ) 8:25 pm ( ) 9:15 pm ( ) 7:15 pm ( ) 8:15 pm

working

5. A film starts at 1:50 pm and finishes at 3:05 pm. How long is the film? 2Q5WME

( ) 1 h 25 min ( ) 1 h 15 min ( ) 2 h 15 min ( ) 15 min

working

6. A lesson finished at 10:15 am after running for 95 minutes. What time did it start? D69US9

( ) 11:50 am ( ) 7:40 am ( ) 9:40 am ( ) 8:40 am

working

7. Kai's lesson starts at 2:00 pm and lasts 50 minutes. What time does it finish? K6Z6V7

( ) 3:00 pm ( ) 1:50 pm ( ) 3:50 pm ( ) 2:50 pm

working

8. A film starts at 3:15 pm and finishes at 4:50 pm. How long is the film? 348KEF

( ) 1 h 45 min ( ) 2 h 35 min ( ) 1 h 35 min ( ) 35 min

working

9. A lesson finished at 10:15 am after running for 70 minutes. What time did it start? U5M7ZX

( ) 11:25 am ( ) 10:05 am ( ) 9:05 am ( ) 8:05 am

working

10. Kai's lesson starts at 7:40 pm and lasts 70 minutes. What time does it finish? HEA67N

( ) 8:50 pm ( ) 9:50 pm ( ) 9:00 pm ( ) 7:50 pm

working

11. A film starts at 8:00 am and finishes at 9:35 am. How long is the film? 7X7MMQ

( ) 35 min ( ) 1 h 45 min ( ) 1 h 35 min ( ) 2 h 35 min

working

12. A lesson finished at 12:15 pm after running for 55 minutes. What time did it start? H3LJYU

( ) 1:10 pm ( ) 10:20 am ( ) 12:20 pm ( ) 11:20 am

working

13. Grace's lesson starts at 3:50 pm and lasts 35 minutes. What time does it finish? WSD99Q

( ) 5:25 pm ( ) 4:35 pm ( ) 4:25 pm ( ) 3:25 pm

working

14. A film starts at 3:00 pm and finishes at 4:55 pm. How long is the film? ZLRUHH

( ) 1 h 55 min ( ) 2 h 55 min ( ) 2 h 5 min ( ) 55 min

working

15. A lesson finished at 9:25 am after running for 40 minutes. What time did it start? LHRGSY

( ) 8:45 am ( ) 7:45 am ( ) 10:05 am ( ) 9:45 am

working

16. Ruby's lesson starts at 4:50 pm and lasts 45 minutes. What time does it finish? QTD2LY

( ) 5:35 pm ( ) 5:45 pm ( ) 4:35 pm ( ) 6:35 pm

working

17. A film starts at 5:40 pm and finishes at 7:05 pm. How long is the film? ZCULAS

( ) 1 h 25 min ( ) 25 min ( ) 1 h 35 min ( ) 2 h 25 min

working

18. A lesson finished at 7:35 pm after running for 95 minutes. What time did it start? WSS9TN

( ) 6:00 pm ( ) 9:10 pm ( ) 7:00 pm ( ) 5:00 pm

working

19. Sam's lesson starts at 8:50 am and lasts 45 minutes. What time does it finish? SMFPRL

( ) 8:35 am ( ) 9:45 am ( ) 9:35 am ( ) 10:35 am

working

20. A film starts at 3:45 pm and finishes at 4:30 pm. How long is the film? KKXJAT

( ) 35 min ( ) 55 min ( ) 45 min ( ) 1 h 45 min

working

21. A lesson finished at 8:00 pm after running for 50 minutes. What time did it start? CMU8J5

( ) 7:10 pm ( ) 6:10 pm ( ) 8:50 pm ( ) 8:10 pm

working

22. Sam's lesson starts at 3:00 pm and lasts 45 minutes. What time does it finish? LCYEX6

( ) 3:45 pm ( ) 3:55 pm ( ) 4:45 pm ( ) 2:45 pm

working

23. A film starts at 2:10 pm and finishes at 3:35 pm. How long is the film? UNL6R8

( ) 2 h 25 min ( ) 1 h 35 min ( ) 25 min ( ) 1 h 25 min

working

24. A lesson finished at 11:15 am after running for 35 minutes. What time did it start? CDMQEW

( ) 11:50 am ( ) 10:40 am ( ) 9:40 am ( ) 11:40 am

working

25. Lily's lesson starts at 2:25 pm and lasts 45 minutes. What time does it finish? 2CAULE

( ) 3:10 pm ( ) 4:10 pm ( ) 2:10 pm ( ) 3:20 pm

working

26. A film starts at 12:50 pm and finishes at 1:45 pm. How long is the film? 9LMSVW

( ) 45 min ( ) 55 min ( ) 1 h 5 min ( ) 1 h 55 min

working

27. A lesson finished at 10:45 am after running for 45 minutes. What time did it start? DGE62X

( ) 11:00 am ( ) 9:00 am ( ) 11:30 am ( ) 10:00 am

working

28. Leo's lesson starts at 6:35 pm and lasts 85 minutes. What time does it finish? R4RDMN

( ) 8:00 pm ( ) 9:00 pm ( ) 7:00 pm ( ) 8:10 pm

working

29. A film starts at 1:00 pm and finishes at 2:45 pm. How long is the film? TNGKYH

( ) 1 h 55 min ( ) 2 h 45 min ( ) 45 min ( ) 1 h 45 min

working

30. A lesson finished at 10:25 am after running for 40 minutes. What time did it start? LGBZHN

( ) 11:05 am ( ) 8:45 am ( ) 10:45 am ( ) 9:45 am

working

Chapter 4 — Answers: Time and elapsed time

1. **9:00 am**

8:25 am plus 35 minutes reaches 9:00 am, then 0 more minutes gives 9:00 am.

2. **55 min**

2:15 pm to 3:00 pm = 45 min, then 10 min more. Total = 55 min.

3. **1:15 pm**

Go back 55 minutes from 2:10 pm: 1:15 pm.

4. **8:15 pm**

6:50 pm plus 10 minutes reaches 7:00 pm, then 75 more minutes gives 8:15 pm.

5. **1 h 15 min**

1:50 pm to 2:00 pm = 10 min; 2:00 pm to 3:00 pm = 1 h; 3:00 pm to 3:05 pm = 5 min. Total = 1 h 15 min.

6. **8:40 am**

Go back 95 minutes from 10:15 am: 8:40 am.

7. **2:50 pm**

2:00 pm plus 50 minutes stays inside the same hour: 2:50 pm.

8. **1 h 35 min**

3:15 pm to 4:00 pm = 45 min, then 50 min more. Total = 1 h 35 min.

9. **9:05 am**

Go back 70 minutes from 10:15 am: 9:05 am.

10. **8:50 pm**

7:40 pm plus 20 minutes reaches 8:00 pm, then 50 more minutes gives 8:50 pm.

11. **1 h 35 min**

8:00 am to 8:00 am = 0 min; 8:00 am to 9:00 am = 1 h; 9:00 am to 9:35 am = 35 min. Total = 1 h 35 min.

12. **11:20 am**

Go back 55 minutes from 12:15 pm: 11:20 am.

13. **4:25 pm**

3:50 pm plus 10 minutes reaches 4:00 pm, then 25 more minutes gives 4:25 pm.

14. **1 h 55 min**

3:00 pm to 3:00 pm = 0 min; 3:00 pm to 4:00 pm = 1 h; 4:00 pm to 4:55 pm = 55 min. Total = 1 h 55 min.

15. **8:45 am**

Go back 40 minutes from 9:25 am: 8:45 am.

16. **5:35 pm**

4:50 pm plus 10 minutes reaches 5:00 pm, then 35 more minutes gives 5:35 pm.

17. **1 h 25 min**

5:40 pm to 6:00 pm = 20 min; 6:00 pm to 7:00 pm = 1 h; 7:00 pm to 7:05 pm = 5 min. Total = 1 h 25 min.

18. **6:00 pm**

Go back 95 minutes from 7:35 pm: 6:00 pm.

19. **9:35 am**

8:50 am plus 10 minutes reaches 9:00 am, then 35 more minutes gives 9:35 am.

20. **45 min**

3:45 pm to 4:00 pm = 15 min, then 30 min more. Total = 45 min.

21. **7:10 pm**

Go back 50 minutes from 8:00 pm: 7:10 pm.

22. **3:45 pm**

3:00 pm plus 45 minutes stays inside the same hour: 3:45 pm.

23. **1 h 25 min**

2:10 pm to 3:00 pm = 50 min, then 35 min more. Total = 1 h 25 min.

24. **10:40 am**

Go back 35 minutes from 11:15 am: 10:40 am.

25. **3:10 pm**

2:25 pm plus 35 minutes reaches 3:00 pm, then 10 more minutes gives 3:10 pm.

26. **55 min**

12:50 pm to 1:00 pm = 10 min, then 45 min more. Total = 55 min.

27. **10:00 am**

Go back 45 minutes from 10:45 am: 10:00 am.

28. **8:00 pm**

6:35 pm plus 25 minutes reaches 7:00 pm, then 60 more minutes gives 8:00 pm.

29. **1 h 45 min**

1:00 pm to 1:00 pm = 0 min; 1:00 pm to 2:00 pm = 1 h; 2:00 pm to 2:45 pm = 45 min. Total = 1 h 45 min.

30. **9:45 am**

Go back 40 minutes from 10:25 am: 9:45 am.

Money and change



IN PLAIN WORDS

Money questions usually hide one extra step. Find what was actually SPENT before you work out anything else.

EXAMPLE

Ana pays with $50 and gets $10 change, for tickets costing $8 each. She spent 50 - 10 = $40. So 40 / 8 = 5 tickets.

> COMMON ERROR
>
> Dividing the $50 by the ticket price. The $50 is not what she spent - the change has to come off first.

REMEMBER IT LIKE THIS

Check the receipt, not the wallet.

CHECK YOURSELF

Sam pays with $20, gets $3.50 change, buying pens at $2.75 each. How many pens? (answer: 6)

1. Kai buys tickets costing $8 each, pays with a $100 note and gets $44 change. How many tickets did Kai buy? J36V9B

( ) 12 ( ) 7 ( ) 8 ( ) 5

working

2. Nina buys 5 pens at $2 each and 5 notebooks at $12 each. How much does Nina spend altogether? BWGHPX

( ) $140 ( ) $14 ( ) $22 ( ) $70

working

3. 6 identical notebooks cost $30 altogether. How much does one notebook cost? VAR9BH

( ) $6 ( ) $5 ( ) $24 ( ) $4

working

4. Zoe buys tickets costing $8 each, pays with a $50 note and gets $10 change. How many tickets did Zoe buy? AGCBVC

( ) 1 ( ) 5 ( ) 6 ( ) 4

working

5. Ivy buys 4 pens at $4 each and 5 notebooks at $12 each. How much does Ivy spend altogether? X82YYM

( ) $28 ( ) $76 ( ) $144 ( ) $16

working

6. 9 identical notebooks cost $27 altogether. How much does one notebook cost? VPHXGY

( ) $9 ( ) $4 ( ) $18 ( ) $3

working

7. Lily buys tickets costing $8 each, pays with a $50 note and gets $26 change. How many tickets did Lily buy? WQCX2K

( ) 2 ( ) 3 ( ) 4 ( ) 6

working

8. Ivy buys 2 pens at $2 each and 4 notebooks at $8 each. How much does Ivy spend altogether? 6MB65T

( ) $36 ( ) $12 ( ) $10 ( ) $60

working

9. 8 identical notebooks cost $72 altogether. How much does one notebook cost? 8365H5

( ) $8 ( ) $9 ( ) $10 ( ) $64

working

10. Max buys tickets costing $3 each, pays with a $20 note and gets $5 change. How many tickets did Max buy? 84B3PC

( ) 6 ( ) 5 ( ) 1 ( ) 4

working

11. Eli buys 2 pens at $3 each and 2 notebooks at $9 each. How much does Eli spend altogether? 3RWRT7

( ) $24 ( ) $48 ( ) $12 ( ) $15

working

12. 4 identical notebooks cost $12 altogether. How much does one notebook cost? 5UWVR2

( ) $2 ( ) $4 ( ) $3 ( ) $8

working

13. Max buys tickets costing $9 each, pays with a $50 note and gets $23 change. How many tickets did Max buy? MVRPR6

( ) 5 ( ) 3 ( ) 2 ( ) 4

working

14. Jack buys 6 pens at $4 each and 3 notebooks at $7 each. How much does Jack spend altogether? 9NPJ7B

( ) $31 ( ) $11 ( ) $99 ( ) $45

working

15. 8 identical notebooks cost $64 altogether. How much does one notebook cost? F4PP3E

( ) $7 ( ) $56 ( ) $9 ( ) $8

working

16. Eli buys tickets costing $12 each, pays with a $100 note and gets $16 change. How many tickets did Eli buy? GGTD3W

( ) 7 ( ) 8 ( ) 1 ( ) 6

working

17. Jack buys 6 pens at $4 each and 3 notebooks at $9 each. How much does Jack spend altogether? 9TTDL8

( ) $33 ( ) $117 ( ) $13 ( ) $51

working

18. 9 identical notebooks cost $45 altogether. How much does one notebook cost? PYDTE8

( ) $5 ( ) $6 ( ) $9 ( ) $36

working

19. Sam buys tickets costing $3 each, pays with a $10 note and gets $1 change. How many tickets did Sam buy? ZPQWFF

( ) 5 ( ) 2 ( ) 4 ( ) 3

working

20. Grace buys 5 pens at $3 each and 3 notebooks at $12 each. How much does Grace spend altogether? VHSE87

( ) $27 ( ) $51 ( ) $120 ( ) $15

working

21. 5 identical notebooks cost $20 altogether. How much does one notebook cost? 2Q77YM

( ) $15 ( ) $5 ( ) $4 ( ) $3

working

22. Leo buys tickets costing $6 each, pays with a $20 note and gets $2 change. How many tickets did Leo buy? USKS9F

( ) 3 ( ) 4 ( ) 5 ( ) 2

working

23. Ruby buys 5 pens at $4 each and 3 notebooks at $6 each. How much does Ruby spend altogether? EBXJXZ

( ) $10 ( ) $26 ( ) $80 ( ) $38

working

24. 3 identical notebooks cost $9 altogether. How much does one notebook cost? 7A7A67

( ) $3 ( ) $4 ( ) $6 ( ) $2

working

25. Hugo buys tickets costing $6 each, pays with a $20 note and gets $2 change. How many tickets did Hugo buy? RHTVAN

( ) 5 ( ) 4 ( ) 3 ( ) 2

working

26. Hugo buys 3 pens at $3 each and 4 notebooks at $9 each. How much does Hugo spend altogether? CY9Q25

( ) $12 ( ) $45 ( ) $18 ( ) $84

working

27. 3 identical notebooks cost $18 altogether. How much does one notebook cost? LJRQS9

( ) $3 ( ) $15 ( ) $7 ( ) $6

working

28. Ruby buys tickets costing $8 each, pays with a $100 note and gets $36 change. How many tickets did Ruby buy? 2TRVUJ

( ) 12 ( ) 4 ( ) 9 ( ) 8

working

29. Mia buys 6 pens at $2 each and 4 notebooks at $9 each. How much does Mia spend altogether? RQ4EBK

( ) $110 ( ) $11 ( ) $21 ( ) $48

working

30. 4 identical notebooks cost $32 altogether. How much does one notebook cost? PHRXMS

( ) $28 ( ) $8 ( ) $9 ( ) $4

working

Chapter 5 — Answers: Money and change

1. 7

Spent: 100 - 44 = $56. Then 56 / 8 = 7 tickets.

2. $70

Pens: 5 x 2 = $10. Notebooks: 5 x 12 = $60. Together: $70.

3. $5

30 / 6 = $5 each.

4. 5

Spent: 50 - 10 = $40. Then 40 / 8 = 5 tickets.

5. $76

Pens: 4 x 4 = $16. Notebooks: 5 x 12 = $60. Together: $76.

6. $3

27 / 9 = $3 each.

7. 3

Spent: 50 - 26 = $24. Then 24 / 8 = 3 tickets.

8. $36

Pens: 2 x 2 = $4. Notebooks: 4 x 8 = $32. Together: $36.

9. $9

72 / 8 = $9 each.

10. 5

Spent: 20 - 5 = $15. Then 15 / 3 = 5 tickets.

11. $24

Pens: 2 x 3 = $6. Notebooks: 2 x 9 = $18. Together: $24.

12. $3

12 / 4 = $3 each.

13. 3

Spent: 50 - 23 = $27. Then 27 / 9 = 3 tickets.

14. $45

Pens: 6 x 4 = $24. Notebooks: 3 x 7 = $21. Together: $45.

15. $8

64 / 8 = $8 each.

16. 7

Spent: 100 - 16 = $84. Then 84 / 12 = 7 tickets.

17. $51

Pens: 6 x 4 = $24. Notebooks: 3 x 9 = $27. Together: $51.

18. $5

45 / 9 = $5 each.

19. 3

Spent: 10 - 1 = $9. Then 9 / 3 = 3 tickets.

20. $51

Pens: 5 x 3 = $15. Notebooks: 3 x 12 = $36. Together: $51.

21. $4

20 / 5 = $4 each.

22. **3**

Spent: 20 - 2 = $18. Then 18 / 6 = 3 tickets.

23. **$38**

Pens: 5 x 4 = $20. Notebooks: 3 x 6 = $18. Together: $38.

24. **$3**

9 / 3 = $3 each.

25. **3**

Spent: 20 - 2 = $18. Then 18 / 6 = 3 tickets.

26. **$45**

Pens: 3 x 3 = $9. Notebooks: 4 x 9 = $36. Together: $45.

27. **$6**

18 / 3 = $6 each.

28. **8**

Spent: 100 - 36 = $64. Then 64 / 8 = 8 tickets.

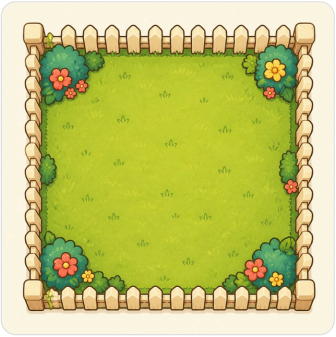
29. **$48**

Pens: 6 x 2 = $12. Notebooks: 4 x 9 = $36. Together: $48.

30. **$8**

32 / 4 = $8 each.

Perimeter and area



IN PLAIN WORDS

Perimeter is the distance AROUND the edge. Area is how much space is INSIDE. They are different questions.

EXAMPLE

A rectangle 12 m by 7 m. Perimeter = 2 x (12 + 7) = 38 m. Area = 12 x 7 = 84 square metres.

> COMMON ERROR
>
> Adding the two side lengths and stopping. 12 + 7 = 19 is only HALF the way around - you still have the other two sides.

REMEMBER IT LIKE THIS

Perimeter is the fence. Area is the grass.

CHECK YOURSELF

A rectangle has area 36 square cm and length 9 cm. What is its perimeter? (answer: 26 cm)

1. A rectangular garden is 5 metres long and 6 metres wide. A fence goes all the way around it. How many metres of fence are needed? MJ9NH6

( ) 22 m ( ) 11 m ( ) 16 m ( ) 30 m

working

2. A rectangle has an area of 32 square centimetres. Its length is 4 centimetres. What is its perimeter? LA4M7Q

( ) 16 cm ( ) 32 cm ( ) 12 cm ( ) 24 cm

working

3. A rectangle has a perimeter of 34 centimetres. One side is 5 centimetres. How long is the side next to it? CNF3FJ

( ) 5 cm ( ) 17 cm ( ) 29 cm ( ) 12 cm

working

4. A rectangular garden is 7 metres long and 14 metres wide. A fence goes all the way around it. How many metres of fence are needed? T9492Y

( ) 21 m ( ) 28 m ( ) 42 m ( ) 98 m

working

5. A rectangle has an area of 108 square centimetres. Its length is 12 centimetres. What is its perimeter? 2HD5JX

( ) 33 cm ( ) 42 cm ( ) 21 cm ( ) 108 cm

working

6. A rectangle has a perimeter of 20 centimetres. One side is 6 centimetres. How long is the side next to it? FL7E8N

( ) 6 cm ( ) 14 cm ( ) 4 cm ( ) 10 cm

working

7. A rectangular garden is 13 metres long and 3 metres wide. A fence goes all the way around it. How many metres of fence are needed? 9E8S5R

( ) 39 m ( ) 29 m ( ) 32 m ( ) 16 m

working

8. A rectangle has an area of 84 square centimetres. Its length is 12 centimetres. What is its perimeter? 5L7LRP

( ) 19 cm ( ) 84 cm ( ) 38 cm ( ) 31 cm

working

9. A rectangle has a perimeter of 36 centimetres. One side is 5 centimetres. How long is the side next to it? G7HE79

( ) 31 cm ( ) 13 cm ( ) 5 cm ( ) 18 cm

working

10. A rectangular garden is 8 metres long and 12 metres wide. A fence goes all the way around it. How many metres of fence are needed? UB53QQ

( ) 28 m ( ) 20 m ( ) 96 m ( ) 40 m

working

11. A rectangle has an area of 45 square centimetres. Its length is 9 centimetres. What is its perimeter? 8RZW7P

( ) 28 cm ( ) 45 cm ( ) 14 cm ( ) 23 cm

working

12. A rectangle has a perimeter of 36 centimetres. One side is 11 centimetres. How long is the side next to it? N5UGNE

( ) 7 cm ( ) 25 cm ( ) 18 cm ( ) 11 cm

working

13. A rectangular garden is 13 metres long and 11 metres wide. A fence goes all the way around it. How many metres of fence are needed? TA2EKN

( ) 24 m ( ) 48 m ( ) 37 m ( ) 143 m

working

14. A rectangle has an area of 48 square centimetres. Its length is 8 centimetres. What is its perimeter? UMDHTU

( ) 14 cm ( ) 22 cm ( ) 28 cm ( ) 48 cm

working

15. A rectangle has a perimeter of 20 centimetres. One side is 3 centimetres. How long is the side next to it? AZ5AXW

( ) 10 cm ( ) 17 cm ( ) 7 cm ( ) 3 cm

working

16. A rectangular garden is 13 metres long and 7 metres wide. A fence goes all the way around it. How many metres of fence are needed? R2F57Z

( ) 20 m ( ) 40 m ( ) 91 m ( ) 33 m

working

17. A rectangle has an area of 20 square centimetres. Its length is 4 centimetres. What is its perimeter? B4C9EY

( ) 18 cm ( ) 9 cm ( ) 13 cm ( ) 20 cm

working

18. A rectangle has a perimeter of 50 centimetres. One side is 13 centimetres. How long is the side next to it? HUAQR5

( ) 13 cm ( ) 37 cm ( ) 25 cm ( ) 12 cm

working

19. A rectangular garden is 14 metres long and 3 metres wide. A fence goes all the way around it. How many metres of fence are needed? Y82WGP

( ) 31 m ( ) 34 m ( ) 42 m ( ) 17 m

working

20. A rectangle has an area of 72 square centimetres. Its length is 8 centimetres. What is its perimeter? PPYK2E

( ) 34 cm ( ) 72 cm ( ) 25 cm ( ) 17 cm

working

21. A rectangle has a perimeter of 34 centimetres. One side is 10 centimetres. How long is the side next to it? DU66PF

( ) 17 cm ( ) 10 cm ( ) 24 cm ( ) 7 cm

working

22. A rectangular garden is 12 metres long and 15 metres wide. A fence goes all the way around it. How many metres of fence are needed? ZMAPA2

( ) 27 m ( ) 54 m ( ) 180 m ( ) 39 m

working

23. A rectangle has an area of 18 square centimetres. Its length is 6 centimetres. What is its perimeter? EFFDA6

( ) 9 cm ( ) 18 cm ( ) 19 cm ( ) 15 cm

working

24. A rectangle has a perimeter of 44 centimetres. One side is 12 centimetres. How long is the side next to it? 728D5L

( ) 10 cm ( ) 12 cm ( ) 32 cm ( ) 22 cm

working

25. A rectangular garden is 12 metres long and 14 metres wide. A fence goes all the way around it. How many metres of fence are needed? TVDKUX

( ) 52 m ( ) 26 m ( ) 168 m ( ) 38 m

working

26. A rectangle has an area of 60 square centimetres. Its length is 12 centimetres. What is its perimeter? NBRGEJ

( ) 34 cm ( ) 17 cm ( ) 60 cm ( ) 29 cm

working

27. A rectangle has a perimeter of 40 centimetres. One side is 13 centimetres. How long is the side next to it? CMTUPA

( ) 7 cm ( ) 13 cm ( ) 20 cm ( ) 27 cm

working

28. A rectangular garden is 14 metres long and 12 metres wide. A fence goes all the way around it. How many metres of fence are needed? RFJ6P6

( ) 26 m ( ) 40 m ( ) 52 m ( ) 168 m

working

29. A rectangle has an area of 36 square centimetres. Its length is 12 centimetres. What is its perimeter? NRQJNM

( ) 36 cm ( ) 15 cm ( ) 30 cm ( ) 27 cm

working

30. A rectangle has a perimeter of 36 centimetres. One side is 10 centimetres. How long is the side next to it? 5G3XEE

( ) 8 cm ( ) 18 cm ( ) 26 cm ( ) 10 cm

working

Chapter 6 — Answers: Perimeter and area

1. **22 m**

Perimeter = 2 x (5 + 6) = 2 x 11 = 22 metres.

2. **24 cm**

Width = 32 / 4 = 8 cm. Perimeter = 2 x (4 + 8) = 24 cm.

3. **12 cm**

Half the perimeter is 34 / 2 = 17 cm, and that is one long side plus one short side. 17 - 5 = 12 cm.

4. **42 m**

Perimeter = 2 x (7 + 14) = 2 x 21 = 42 metres.

5. **42 cm**

Width = 108 / 12 = 9 cm. Perimeter = 2 x (12 + 9) = 42 cm.

6. **4 cm**

Half the perimeter is 20 / 2 = 10 cm, and that is one long side plus one short side. 10 - 6 = 4 cm.

7. **32 m**

Perimeter = 2 x (13 + 3) = 2 x 16 = 32 metres.

8. **38 cm**

Width = 84 / 12 = 7 cm. Perimeter = 2 x (12 + 7) = 38 cm.

9. **13 cm**

Half the perimeter is 36 / 2 = 18 cm, and that is one long side plus one short side. 18 - 5 = 13 cm.

10. **40 m**

Perimeter = 2 x (8 + 12) = 2 x 20 = 40 metres.

11. **28 cm**

Width = 45 / 9 = 5 cm. Perimeter = 2 x (9 + 5) = 28 cm.

12. **7 cm**

Half the perimeter is 36 / 2 = 18 cm, and that is one long side plus one short side. 18 - 11 = 7 cm.

13. **48 m**

Perimeter = 2 x (13 + 11) = 2 x 24 = 48 metres.

14. **28 cm**

Width = 48 / 8 = 6 cm. Perimeter = 2 x (8 + 6) = 28 cm.

15. **7 cm**

Half the perimeter is 20 / 2 = 10 cm, and that is one long side plus one short side. 10 - 3 = 7 cm.

16. **40 m**

Perimeter = 2 x (13 + 7) = 2 x 20 = 40 metres.

17. **18 cm**

Width = 20 / 4 = 5 cm. Perimeter = 2 x (4 + 5) = 18 cm.

18. **12 cm**

Half the perimeter is 50 / 2 = 25 cm, and that is one long side plus one short side. 25 - 13 = 12 cm.

19. **34 m**

Perimeter = 2 x (14 + 3) = 2 x 17 = 34 metres.

20. **34 cm**

Width = 72 / 8 = 9 cm. Perimeter = 2 x (8 + 9) = 34 cm.

21. **7 cm**

Half the perimeter is 34 / 2 = 17 cm, and that is one long side plus one short side. 17 - 10 = 7 cm.

22. 54 m

Perimeter = 2 x (12 + 15) = 2 x 27 = 54 metres.

23. 18 cm

Width = 18 / 6 = 3 cm. Perimeter = 2 x (6 + 3) = 18 cm.

24. 10 cm

Half the perimeter is 44 / 2 = 22 cm, and that is one long side plus one short side. 22 - 12 = 10 cm.

25. 52 m

Perimeter = 2 x (12 + 14) = 2 x 26 = 52 metres.

26. 34 cm

Width = 60 / 12 = 5 cm. Perimeter = 2 x (12 + 5) = 34 cm.

27. 7 cm

Half the perimeter is 40 / 2 = 20 cm, and that is one long side plus one short side. 20 - 13 = 7 cm.

28. 52 m

Perimeter = 2 x (14 + 12) = 2 x 26 = 52 metres.

29. 30 cm

Width = 36 / 12 = 3 cm. Perimeter = 2 x (12 + 3) = 30 cm.

30. 8 cm

Half the perimeter is 36 / 2 = 18 cm, and that is one long side plus one short side. 18 - 10 = 8 cm.

Changing units



IN PLAIN WORDS

Before you compare or add two measurements, make sure they are in the SAME unit.

EXAMPLE

A 5 litre tank, cups of 250 millilitres. Change litres to millilitres first: 5 L = 5000 mL. Then 5000 / 250 = 20 cups.

> COMMON ERROR
>
> Dividing 5 by 250 and getting a tiny answer that makes no sense. If your answer looks silly, check your units before you check your arithmetic.

REMEMBER IT LIKE THIS

3 apples plus 4 oranges is not 7 apples. It is 7 pieces of fruit - once you pick a name that covers both. Measurements need a shared unit the same way.

CHECK YOURSELF

How many 200 mL glasses can be poured from 3 litres? (answer: 15)

1. A container holds 4 litres of juice. Each glass holds 125 millilitres. How many full glasses can be poured? J765QB

( ) 4 ( ) 320 ( ) 3 ( ) 32

working

2. A ribbon is 8 metres long. It is cut into pieces 20 centimetres long. How many pieces are there? WYXEYX

( ) 40 ( ) 8 ( ) 39 ( ) 41

working

3. A ribbon is 5 metres long. A string is 560 centimetres long. How many centimetres longer is the longer one? C9W7MF

( ) 555 ( ) 160 ( ) 1060 ( ) 60

working

4. A container holds 2 litres of juice. Each glass holds 500 millilitres. How many full glasses can be poured? TM46X3

( ) 40 ( ) 4 ( ) 0 ( ) 2

working

5. A ribbon is 5 metres long. It is cut into pieces 20 centimetres long. How many pieces are there? GAX72M

( ) 5 ( ) 25 ( ) 26 ( ) 24

working

6. A ribbon is 3 metres long. A string is 150 centimetres long. How many centimetres longer is the longer one? UWC5XT

( ) 450 ( ) 147 ( ) 150 ( ) 250

working

7. A container holds 6 litres of juice. Each glass holds 125 millilitres. How many full glasses can be poured? FN47YK

( ) 4 ( ) 48 ( ) 6 ( ) 480

working

8. A ribbon is 12 metres long. It is cut into pieces 60 centimetres long. How many pieces are there? YLHWD5

( ) 20 ( ) 19 ( ) 12 ( ) 21

working

9. A ribbon is 4 metres long. A string is 480 centimetres long. How many centimetres longer is the longer one? GSUMAL

( ) 180 ( ) 880 ( ) 476 ( ) 80

working

10. A container holds 8 litres of juice. Each glass holds 125 millilitres. How many full glasses can be poured? EKLJM7

( ) 64 ( ) 8 ( ) 6 ( ) 640

working

11. A ribbon is 2 metres long. It is cut into pieces 40 centimetres long. How many pieces are there? YE92KB

( ) 2 ( ) 5 ( ) 6 ( ) 4

working

12. A ribbon is 4 metres long. A string is 320 centimetres long. How many centimetres longer is the longer one? M7XFYF

( ) 80 ( ) 720 ( ) 180 ( ) 316

working

13. A container holds 3 litres of juice. Each glass holds 250 millilitres. How many full glasses can be poured? L77B5D

( ) 120 ( ) 1 ( ) 12 ( ) 3

working

14. A ribbon is 12 metres long. It is cut into pieces 50 centimetres long. How many pieces are there? LWKT4N

( ) 23 ( ) 25 ( ) 12 ( ) 24

working

15. A ribbon is 2 metres long. A string is 560 centimetres long. How many centimetres longer is the longer one? MXSGV5

( ) 460 ( ) 360 ( ) 558 ( ) 760

working

16. A container holds 2 litres of juice. Each glass holds 125 millilitres. How many full glasses can be poured? BVTNT7

( ) 160 ( ) 16 ( ) 2 ( ) 1

working

17. A ribbon is 5 metres long. It is cut into pieces 25 centimetres long. How many pieces are there? WKK29J

( ) 20 ( ) 21 ( ) 5 ( ) 25

working

18. A ribbon is 3 metres long. A string is 420 centimetres long. How many centimetres longer is the longer one? BSZZWH

( ) 120 ( ) 720 ( ) 220 ( ) 417

working

19. A container holds 8 litres of juice. Each glass holds 250 millilitres. How many full glasses can be poured? 7VZRFZ

( ) 3 ( ) 320 ( ) 8 ( ) 32

working

20. A ribbon is 12 metres long. It is cut into pieces 40 centimetres long. How many pieces are there? 2SX4ND

( ) 31 ( ) 12 ( ) 30 ( ) 29

working

21. A ribbon is 3 metres long. A string is 480 centimetres long. How many centimetres longer is the longer one? WDCXVF

( ) 477 ( ) 780 ( ) 180 ( ) 280

working

22. A container holds 8 litres of juice. Each glass holds 500 millilitres. How many full glasses can be poured? UVD5LZ

( ) 1 ( ) 160 ( ) 16 ( ) 8

working

23. A ribbon is 5 metres long. It is cut into pieces 50 centimetres long. How many pieces are there? PP34HM

( ) 10 ( ) 9 ( ) 11 ( ) 5

working

24. A ribbon is 4 metres long. A string is 250 centimetres long. How many centimetres longer is the longer one? MFLEYS

( ) 650 ( ) 250 ( ) 150 ( ) 246

working

25. A container holds 4 litres of juice. Each glass holds 100 millilitres. How many full glasses can be poured? NWAP7W

( ) 4 ( ) 400 ( ) 41 ( ) 40

working

26. A ribbon is 8 metres long. It is cut into pieces 40 centimetres long. How many pieces are there? JKX6B9

( ) 21 ( ) 19 ( ) 20 ( ) 8

working

27. A ribbon is 2 metres long. A string is 480 centimetres long. How many centimetres longer is the longer one? F4WAR8

( ) 680 ( ) 478 ( ) 280 ( ) 380

working

28. A container holds 4 litres of juice. Each glass holds 250 millilitres. How many full glasses can be poured? 82VLXE

( ) 16 ( ) 160 ( ) 1 ( ) 4

working

29. A ribbon is 3 metres long. It is cut into pieces 60 centimetres long. How many pieces are there? EE76PT

( ) 6 ( ) 4 ( ) 3 ( ) 5

working

30. A ribbon is 3 metres long. A string is 250 centimetres long. How many centimetres longer is the longer one? QPNMLY

( ) 150 ( ) 247 ( ) 50 ( ) 550

working

Chapter 7 — Answers: Changing units

1. **32**

4 litres = 4000 millilitres. 4000 / 125 = 32 glasses.

2. **40**

8 metres = 800 centimetres. 800 / 20 = 40 pieces.

3. **60**

5 metres = 500 centimetres. The difference is 560 - 500 = 60 centimetres (the string is longer).

4. **4**

2 litres = 2000 millilitres. 2000 / 500 = 4 glasses.

5. **25**

5 metres = 500 centimetres. 500 / 20 = 25 pieces.

6. **150**

3 metres = 300 centimetres. The difference is 300 - 150 = 150 centimetres (the ribbon is longer).

7. **48**

6 litres = 6000 millilitres. 6000 / 125 = 48 glasses.

8. **20**

12 metres = 1200 centimetres. 1200 / 60 = 20 pieces.

9. **80**

4 metres = 400 centimetres. The difference is 480 - 400 = 80 centimetres (the string is longer).

10. **64**

8 litres = 8000 millilitres. 8000 / 125 = 64 glasses.

11. **5**

2 metres = 200 centimetres. 200 / 40 = 5 pieces.

12. **80**

4 metres = 400 centimetres. The difference is 400 - 320 = 80 centimetres (the ribbon is longer).

13. **12**

3 litres = 3000 millilitres. 3000 / 250 = 12 glasses.

14. **24**

12 metres = 1200 centimetres. 1200 / 50 = 24 pieces.

15. **360**

2 metres = 200 centimetres. The difference is 560 - 200 = 360 centimetres (the string is longer).

16. **16**

2 litres = 2000 millilitres. 2000 / 125 = 16 glasses.

17. **20**

5 metres = 500 centimetres. 500 / 25 = 20 pieces.

18. **120**

3 metres = 300 centimetres. The difference is 420 - 300 = 120 centimetres (the string is longer).

19. **32**

8 litres = 8000 millilitres. 8000 / 250 = 32 glasses.

20. **30**

12 metres = 1200 centimetres. 1200 / 40 = 30 pieces.

21. **180**

3 metres = 300 centimetres. The difference is 480 - 300 = 180 centimetres (the string is longer).

22. **16**

8 litres = 8000 millilitres. 8000 / 500 = 16 glasses.

23. **10**

5 metres = 500 centimetres. 500 / 50 = 10 pieces.

24. **150**

4 metres = 400 centimetres. The difference is 400 - 250 = 150 centimetres (the ribbon is longer).

25. **40**

4 litres = 4000 millilitres. 4000 / 100 = 40 glasses.

26. **20**

8 metres = 800 centimetres. 800 / 40 = 20 pieces.

27. **280**

2 metres = 200 centimetres. The difference is 480 - 200 = 280 centimetres (the string is longer).

28. **16**

4 litres = 4000 millilitres. 4000 / 250 = 16 glasses.

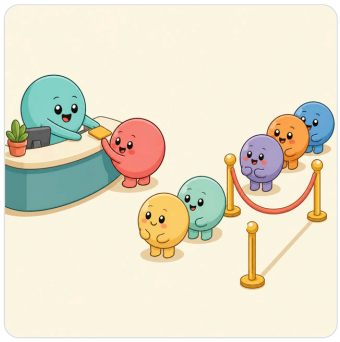
29. **5**

3 metres = 300 centimetres. 300 / 60 = 5 pieces.

30. **50**

3 metres = 300 centimetres. The difference is 300 - 250 = 50 centimetres (the ribbon is longer).

Order of operations



IN PLAIN WORDS

In a number sentence there is a fixed order: brackets first; then multiplying and dividing, working LEFT TO RIGHT; then adding and subtracting, also LEFT TO RIGHT. In a word problem, first decide which result you need before you can get the next one, write the number sentence, then use that same order.

EXAMPLE

7 x 8 - 6 x 4: multiply first (56 and 24), then subtract: 32. 24 / 6 x 2: divide and multiply are EQUAL, so go left to right: 24 / 6 = 4, then 4 x 2 = 8. It is NOT 24 / 12 = 2. 15 - 6 + 2: minus and plus are equal too, so left to right: 9 + 2 = 11.

COMMON ERROR

Thinking 'multiply always comes before divide'. They have the SAME strength, so whichever comes first as you read left to right goes first. The same is true of plus and minus.

REMEMBER IT LIKE THIS

Two queues. Multiply and divide share the front queue; plus and minus share the back one. Inside a queue, first come first served.

CHECK YOURSELF

Work out 5 x 6 - 3 x 4. Then 36 / 9 x 2. Then 20 - 8 + 5. (answer: 18, then 8, then 17)

1. Hugo has 4 boxes. Each box holds 12 pencils. 16 pencils are given away. How many pencils are left? 54AHGP

( ) 64 ( ) 48 ( ) 33 ( ) 32

working

2. What is the value of 11 x 8 - 7 x 6? ZKJ9EX

( ) 486 ( ) 46 ( ) 87 ( ) 66

working

3. Work out 48 / 4 x 5. WWMKT2

( ) 59 ( ) 64 ( ) 61 ( ) 60

working

4. Work out 72 / 2 + 5. 8M8KGC

( ) 41 ( ) 36 ( ) 40 ( ) 43

working

5. 12 buttons are shared equally into groups of 4. How many groups are there? 32RD9Z

( ) 4 ( ) 8 ( ) 3 ( ) 2

working

6. Owen has 3 boxes. Each box holds 15 pencils. 12 pencils are given away. How many pencils are left? S8SFXL

( ) 9 ( ) 33 ( ) 3 ( ) 45

working

7. What is the value of 7 x 7 - 5 x 7? 54CW36

( ) 308 ( ) 14 ( ) 98 ( ) 51

working

8. Work out 20 - 12 + 2. AJBVX7

( ) 11 ( ) 6 ( ) 9 ( ) 10

working

9. Work out 48 / 4 + 14. 7GPMWC

( ) 30 ( ) 12 ( ) 26 ( ) 25

working

10. 48 beads are shared equally into groups of 12. How many groups are there? CY979T

( ) 36 ( ) 5 ( ) 4 ( ) 12

working

11. Nina has 4 boxes. Each box holds 12 pencils. 30 pencils are given away. How many pencils are left? 3W6Z6E

( ) 19 ( ) 78 ( ) 18 ( ) 48

working

12. What is the value of 11 x 3 - 4 x 6? 6F5AN8

( ) 10 ( ) 9 ( ) 35 ( ) 174

working

13. Work out 17 - 10 + 6. XJBLD6

( ) 13 ( ) 14 ( ) 12 ( ) 1

working

14. Work out 60 / 4 + 7. 8ZSYFG

( ) 15 ( ) 21 ( ) 26 ( ) 22

working

15. 36 beads are shared equally into groups of 6. How many groups are there? DT6MA6

( ) 5 ( ) 7 ( ) 30 ( ) 6

working

16. Nina has 6 boxes. Each box holds 15 pencils. 26 pencils are given away. How many pencils are left? JQWLEF

( ) 65 ( ) 64 ( ) 90 ( ) 116

working

17. What is the value of 11 x 7 - 8 x 8? N6NZQW

( ) 552 ( ) 77 ( ) 13 ( ) 14

working

18. Work out 36 / 4 x 2. L2WAJJ

( ) 17 ( ) 19 ( ) 22 ( ) 18

working

19. Work out 36 / 2 + 9. 4LV8F4

( ) 27 ( ) 18 ( ) 29 ( ) 26

working

20. 16 stickers are shared equally into groups of 4. How many groups are there? X6XQFP

( ) 12 ( ) 5 ( ) 4 ( ) 3

working

21. Mia has 5 boxes. Each box holds 18 pencils. 31 pencils are given away. How many pencils are left? VD9XVU

( ) 59 ( ) 121 ( ) 90 ( ) 60

working

22. What is the value of 9 x 6 - 3 x 7? HNHX7L

( ) 189 ( ) 357 ( ) 33 ( ) 58

working

23. Work out 23 - 10 + 2. JWFK55

( ) 11 ( ) 14 ( ) 16 ( ) 15

working

24. Work out 72 / 6 + 14. Y2Q4YU

( ) 32 ( ) 26 ( ) 12 ( ) 25

working

25. 60 stickers are shared equally into groups of 12. How many groups are there? 2T9NLH

( ) 6 ( ) 48 ( ) 12 ( ) 5

working

26. Nina has 8 boxes. Each box holds 25 pencils. 17 pencils are given away. How many pencils are left? DPRXR7

( ) 64 ( ) 200 ( ) 8 ( ) 183

working

27. What is the value of 8 x 6 - 8 x 3? PQ4GYV

( ) 43 ( ) 25 ( ) 24 ( ) 120

working

28. Work out 24 / 2 x 4. WB92YV

( ) 49 ( ) 48 ( ) 3 ( ) 47

working

29. Work out 40 / 4 + 8. JRD5PM

( ) 22 ( ) 10 ( ) 18 ( ) 17

working

30. 54 stickers are shared equally into groups of 6. How many groups are there? 8M6H92

( ) 6 ( ) 10 ( ) 9 ( ) 48

working

Chapter 8 — Answers: Order of operations

1. **32**

4 x 12 = 48 pencils. 48 - 16 = 32.

2. **46**

Do the multiplications first: 11 x 8 = 88 and 7 x 6 = 42. Then 88 - 42 = 46.

3. **60**

Divide and multiply are equally strong, so work left to right: 48 / 4 = 12, then 12 x 5 = 60. It is not 48 / 20.

4. **41**

Divide first: 72 / 2 = 36. Then add: 36 + 5 = 41.

5. **3**

12 / 4 = 3 groups.

6. **33**

3 x 15 = 45 pencils. 45 - 12 = 33.

7. **14**

Do the multiplications first: 7 x 7 = 49 and 5 x 7 = 35. Then 49 - 35 = 14.

8. **10**

Minus and plus are equally strong, so work left to right: 20 - 12 = 8, then 8 + 2 = 10. It is not 20 - 14.

9. **26**

Divide first: 48 / 4 = 12. Then add: 12 + 14 = 26.

10. **4**

48 / 12 = 4 groups.

11. **18**

4 x 12 = 48 pencils. 48 - 30 = 18.

12. **9**

Do the multiplications first: 11 x 3 = 33 and 4 x 6 = 24. Then 33 - 24 = 9.

13. **13**

Minus and plus are equally strong, so work left to right: 17 - 10 = 7, then 7 + 6 = 13. It is not 17 - 16.

14. **22**

Divide first: 60 / 4 = 15. Then add: 15 + 7 = 22.

15. **6**

36 / 6 = 6 groups.

16. **64**

6 x 15 = 90 pencils. 90 - 26 = 64.

17. **13**

Do the multiplications first: 11 x 7 = 77 and 8 x 8 = 64. Then 77 - 64 = 13.

18. **18**

Divide and multiply are equally strong, so work left to right: 36 / 4 = 9, then 9 x 2 = 18. It is not 36 / 8.

19. **27**

Divide first: 36 / 2 = 18. Then add: 18 + 9 = 27.

20. **4**

16 / 4 = 4 groups.

21. **59**

5 x 18 = 90 pencils. 90 - 31 = 59.

22. **33**

Do the multiplications first: 9 x 6 = 54 and 3 x 7 = 21. Then 54 - 21 = 33.

23. **15**

Minus and plus are equally strong, so work left to right: 23 - 10 = 13, then 13 + 2 = 15. It is not 23 - 12.

24. **26**

Divide first: 72 / 6 = 12. Then add: 12 + 14 = 26.

25. **5**

60 / 12 = 5 groups.

26. **183**

8 x 25 = 200 pencils. 200 - 17 = 183.

27. **24**

Do the multiplications first: 8 x 6 = 48 and 8 x 3 = 24. Then 48 - 24 = 24.

28. **48**

Divide and multiply are equally strong, so work left to right: 24 / 2 = 12, then 12 x 4 = 48. It is not 24 / 8.

29. **18**

Divide first: 40 / 4 = 10. Then add: 10 + 8 = 18.

30. **9**

54 / 6 = 9 groups.

Sharing and remainders



IN PLAIN WORDS

When things do not divide evenly, the question decides whether you round UP or DOWN. Read what is being asked.

EXAMPLE

50 apples, bags of 6. 50 / 6 = 8 remainder 2. If you need to CARRY all the apples you need 9 bags. If you can only sell FULL bags you have 8.

COMMON ERROR

Always rounding the same way. ‘How many bags do I need’ and ‘how many full bags can I make’ have different answers from the same division.

REMEMBER IT LIKE THIS

You cannot take half a bus. Which way you round depends on the job.

CHECK YOURSELF

A bus holds 40 people. 138 people are going. How many buses are needed? (answer: 4)

1. A bag holds 40 apples. 150 apples must be carried. What is the smallest number of bags needed? GYYPHV

( ) 30 ( ) 5 ( ) 4 ( ) 3

working

2. Ava has 82 stickers and puts 12 on each page. How many pages can Ava fill completely? S95QBS

( ) 76 ( ) 7 ( ) 6 ( ) 10

working

3. A bag holds 6 apples. 43 apples must be carried. What is the smallest number of bags needed? FMZV8L

( ) 9 ( ) 7 ( ) 1 ( ) 8

working

4. Kai has 22 stickers and puts 6 on each page. How many pages can Kai fill completely? 98RTKB

( ) 2 ( ) 3 ( ) 4 ( ) 19

working

5. A bag holds 4 apples. 9 apples must be carried. What is the smallest number of bags needed? KH5WME

( ) 2 ( ) 1 ( ) 3 ( ) 4

working

6. Lily has 35 stickers and puts 8 on each page. How many pages can Lily fill completely? CKVQNA

( ) 4 ( ) 3 ( ) 5 ( ) 31

working

7. A bag holds 40 apples. 261 apples must be carried. What is the smallest number of bags needed? HM4ZKN

( ) 21 ( ) 7 ( ) 8 ( ) 6

working

8. Jack has 49 stickers and puts 9 on each page. How many pages can Jack fill completely? FKT7BX

( ) 5 ( ) 6 ( ) 44 ( ) 4

working

9. A bag holds 4 apples. 23 apples must be carried. What is the smallest number of bags needed? BHWJN7

( ) 7 ( ) 5 ( ) 3 ( ) 6

working

10. Kai has 29 stickers and puts 9 on each page. How many pages can Kai fill completely? QUPG65

( ) 2 ( ) 3 ( ) 4 ( ) 26

working

11. A bag holds 4 apples. 21 apples must be carried. What is the smallest number of bags needed? R7MVYJ

( ) 5 ( ) 7 ( ) 6 ( ) 1

working

12. Jack has 45 stickers and puts 6 on each page. How many pages can Jack fill completely? 5ACZG7

( ) 3 ( ) 8 ( ) 38 ( ) 7

working

13. A bag holds 12 apples. 97 apples must be carried. What is the smallest number of bags needed? 6JWHZH

( ) 9 ( ) 10 ( ) 1 ( ) 8

working

14. Jack has 61 stickers and puts 12 on each page. How many pages can Jack fill completely? XJHYPM

( ) 1 ( ) 6 ( ) 56 ( ) 5

working

15. A bag holds 50 apples. 63 apples must be carried. What is the smallest number of bags needed? XESADP

( ) 2 ( ) 3 ( ) 1 ( ) 13

working

16. Jack has 71 stickers and puts 9 on each page. How many pages can Jack fill completely? Y32KJG

( ) 6 ( ) 64 ( ) 8 ( ) 7

working

17. A bag holds 50 apples. 313 apples must be carried. What is the smallest number of bags needed? S4BX5S

( ) 13 ( ) 6 ( ) 7 ( ) 8

working

18. Jack has 37 stickers and puts 5 on each page. How many pages can Jack fill completely? MCRZUQ

( ) 7 ( ) 30 ( ) 8 ( ) 2

working

19. A bag holds 8 apples. 17 apples must be carried. What is the smallest number of bags needed? 6CZYE7

( ) 4 ( ) 2 ( ) 3 ( ) 1

working

20. Kai has 38 stickers and puts 5 on each page. How many pages can Kai fill completely? 8GW23D

( ) 7 ( ) 8 ( ) 31 ( ) 3

working

21. A bag holds 40 apples. 191 apples must be carried. What is the smallest number of bags needed? YM7FWX

( ) 31 ( ) 4 ( ) 5 ( ) 6

working

22. Ella has 65 stickers and puts 8 on each page. How many pages can Ella fill completely? 5LXNRJ

( ) 9 ( ) 1 ( ) 57 ( ) 8

working

23. A bag holds 4 apples. 25 apples must be carried. What is the smallest number of bags needed? Y3HR4M

( ) 8 ( ) 7 ( ) 1 ( ) 6

working

24. Noah has 41 stickers and puts 8 on each page. How many pages can Noah fill completely? ZK9CL8

( ) 6 ( ) 1 ( ) 36 ( ) 5

working

25. A bag holds 50 apples. 443 apples must be carried. What is the smallest number of bags needed? 64DY5Z

( ) 43 ( ) 8 ( ) 10 ( ) 9

working

26. Hugo has 46 stickers and puts 8 on each page. How many pages can Hugo fill completely? BA5826

( ) 5 ( ) 4 ( ) 6 ( ) 41

working

27. A bag holds 40 apples. 113 apples must be carried. What is the smallest number of bags needed? 2BZYDV

( ) 2 ( ) 3 ( ) 33 ( ) 4

working

28. Lily has 53 stickers and puts 9 on each page. How many pages can Lily fill completely? 327KWU

( ) 8 ( ) 5 ( ) 48 ( ) 6

working

29. A bag holds 8 apples. 60 apples must be carried. What is the smallest number of bags needed? Q4QPBS

( ) 8 ( ) 9 ( ) 4 ( ) 7

working

30. Ivy has 28 stickers and puts 6 on each page. How many pages can Ivy fill completely? F7KMD6

( ) 4 ( ) 5 ( ) 3 ( ) 24

working

Chapter 9 — Answers: Sharing and remainders

1. 4

150 / 40 = 3 with 30 left over. Those leftovers still need a bag, so 4 bags.

2. 6

82 / 12 = 6 with 10 left over. Only 6 pages are full.

3. 8

43 / 6 = 7 with 1 left over. Those leftovers still need a bag, so 8 bags.

4. 3

22 / 6 = 3 with 4 left over. Only 3 pages are full.

5. 3

9 / 4 = 2 with 1 left over. Those leftovers still need a bag, so 3 bags.

6. 4

35 / 8 = 4 with 3 left over. Only 4 pages are full.

7. 7

261 / 40 = 6 with 21 left over. Those leftovers still need a bag, so 7 bags.

8. 5

49 / 9 = 5 with 4 left over. Only 5 pages are full.

9. 6

23 / 4 = 5 with 3 left over. Those leftovers still need a bag, so 6 bags.

10. 3

29 / 9 = 3 with 2 left over. Only 3 pages are full.

11. 6

21 / 4 = 5 with 1 left over. Those leftovers still need a bag, so 6 bags.

12. 7

45 / 6 = 7 with 3 left over. Only 7 pages are full.

13. 9

97 / 12 = 8 with 1 left over. Those leftovers still need a bag, so 9 bags.

14. 5

61 / 12 = 5 with 1 left over. Only 5 pages are full.

15. 2

63 / 50 = 1 with 13 left over. Those leftovers still need a bag, so 2 bags.

16. 7

71 / 9 = 7 with 8 left over. Only 7 pages are full.

17. 7

313 / 50 = 6 with 13 left over. Those leftovers still need a bag, so 7 bags.

18. 7

37 / 5 = 7 with 2 left over. Only 7 pages are full.

19. 3

17 / 8 = 2 with 1 left over. Those leftovers still need a bag, so 3 bags.

20. 7

38 / 5 = 7 with 3 left over. Only 7 pages are full.

21. 5

191 / 40 = 4 with 31 left over. Those leftovers still need a bag, so 5 bags.

22. **8**

65 / 8 = 8 with 1 left over. Only 8 pages are full.

23. **7**

25 / 4 = 6 with 1 left over. Those leftovers still need a bag, so 7 bags.

24. **5**

41 / 8 = 5 with 1 left over. Only 5 pages are full.

25. **9**

443 / 50 = 8 with 43 left over. Those leftovers still need a bag, so 9 bags.

26. **5**

46 / 8 = 5 with 6 left over. Only 5 pages are full.

27. **3**

113 / 40 = 2 with 33 left over. Those leftovers still need a bag, so 3 bags.

28. **5**

53 / 9 = 5 with 8 left over. Only 5 pages are full.

29. **8**

60 / 8 = 7 with 4 left over. Those leftovers still need a bag, so 8 bags.

30. **4**

28 / 6 = 4 with 4 left over. Only 4 pages are full.

Averages



IN PLAIN WORDS

An average spreads the total out evenly. So the total is the average multiplied by how many there are.

EXAMPLE

4 tests average 15. The total is 15 x 4 = 60. If three tests were 12, 16 and 18 (total 46), the fourth was 60 - 46 = 14.

> COMMON ERROR
>
> Averaging two averages. That only works when the groups are the SAME size. If one group has 3 numbers and the other has 7, add up the totals and divide by 10 instead.

REMEMBER IT LIKE THIS

Sharing lollies evenly. To know how many there were, count the shares.

CHECK YOURSELF

5 numbers have an average of 8. Four of them add to 33. What is the fifth? (answer: 7)

1. 6 numbers have an average of 11. 5 of them add up to 49. What is the last number? H8FJGK

( ) 17 ( ) 38 ( ) 66 ( ) 11

working

2. 4 children have an average of 22 marbles each. How many marbles are there altogether? QUK2YT

( ) 88 ( ) 84 ( ) 22 ( ) 26

working

3. Some children share 27 stickers so that each gets exactly 9. How many children are there? 6Y2QDG

( ) 4 ( ) 3 ( ) 18 ( ) 9

working

4. 4 numbers have an average of 19. 3 of them add up to 59. What is the last number? YFURAM

( ) 19 ( ) 17 ( ) 40 ( ) 76

working

5. 4 children have an average of 18 marbles each. How many marbles are there altogether? 5NG9M4

( ) 68 ( ) 72 ( ) 18 ( ) 22

working

6. Some children share 33 stickers so that each gets exactly 11. How many children are there? S7D6JF

( ) 3 ( ) 22 ( ) 4 ( ) 11

working

7. 5 numbers have an average of 10. 4 of them add up to 42. What is the last number? E57HJ2

( ) 8 ( ) 10 ( ) 32 ( ) 50

working

8. 6 children have an average of 7 marbles each. How many marbles are there altogether? 6CXC67

( ) 42 ( ) 13 ( ) 7 ( ) 36

working

9. Some children share 24 stickers so that each gets exactly 6. How many children are there? 5AANU4

( ) 18 ( ) 5 ( ) 4 ( ) 6

working

10. 6 numbers have an average of 17. 5 of them add up to 97. What is the last number? 8XJ8UK

( ) 17 ( ) 80 ( ) 5 ( ) 102

working

11. 5 children have an average of 16 marbles each. How many marbles are there altogether? FQYPLW

( ) 80 ( ) 16 ( ) 21 ( ) 75

working

12. Some children share 65 stickers so that each gets exactly 13. How many children are there? QE8S3W

( ) 5 ( ) 13 ( ) 52 ( ) 6

working

13. 6 numbers have an average of 19. 5 of them add up to 93. What is the last number? BG44N9

( ) 19 ( ) 74 ( ) 114 ( ) 21

working

14. 4 children have an average of 17 marbles each. How many marbles are there altogether? XJJQMV

( ) 68 ( ) 17 ( ) 21 ( ) 64

working

15. Some children share 68 stickers so that each gets exactly 17. How many children are there? H36CTR

( ) 17 ( ) 51 ( ) 5 ( ) 4

working

16. 6 numbers have an average of 13. 5 of them add up to 63. What is the last number? DPAVSR

( ) 13 ( ) 15 ( ) 78 ( ) 50

working

17. 4 children have an average of 20 marbles each. How many marbles are there altogether? 3R55UX

( ) 76 ( ) 24 ( ) 20 ( ) 80

working

18. Some children share 57 stickers so that each gets exactly 19. How many children are there? UFLFYF

( ) 4 ( ) 3 ( ) 19 ( ) 38

working

19. 4 numbers have an average of 14. 3 of them add up to 39. What is the last number? AT4ZCB

( ) 14 ( ) 25 ( ) 56 ( ) 17

working

20. 3 children have an average of 6 marbles each. How many marbles are there altogether? 3AUCCV

( ) 9 ( ) 6 ( ) 18 ( ) 15

working

21. Some children share 30 stickers so that each gets exactly 10. How many children are there? 97DYQ2

( ) 3 ( ) 20 ( ) 10 ( ) 4

working

22. 6 numbers have an average of 13. 5 of them add up to 71. What is the last number? YHHY6T

( ) 58 ( ) 78 ( ) 7 ( ) 13

working

23. 6 children have an average of 19 marbles each. How many marbles are there altogether? F29DMQ

( ) 114 ( ) 108 ( ) 25 ( ) 19

working

24. Some children share 48 stickers so that each gets exactly 12. How many children are there? EL3C45

( ) 5 ( ) 36 ( ) 12 ( ) 4

working

25. 5 numbers have an average of 15. 4 of them add up to 54. What is the last number? JXCTW2

( ) 75 ( ) 21 ( ) 15 ( ) 39

working

26. 5 children have an average of 20 marbles each. How many marbles are there altogether? 88C8HS

( ) 100 ( ) 95 ( ) 25 ( ) 20

working

27. Some children share 78 stickers so that each gets exactly 13. How many children are there? HUBF63

( ) 7 ( ) 13 ( ) 6 ( ) 65

working

28. 5 numbers have an average of 18. 4 of them add up to 81. What is the last number? XPY22U

( ) 9 ( ) 90 ( ) 63 ( ) 18

working

29. 5 children have an average of 6 marbles each. How many marbles are there altogether? 45LVUY

( ) 30 ( ) 25 ( ) 11 ( ) 6

working

30. Some children share 54 stickers so that each gets exactly 18. How many children are there? NJ58XM

( ) 3 ( ) 18 ( ) 36 ( ) 4

working

Chapter 10 — Answers: Averages

1. **17**

The total is 11 x 6 = 66. The last number is 66 - 49 = 17.

2. **88**

Total = average x how many = 22 x 4 = 88.

3. **3**

27 / 9 = 3 children.

4. **17**

The total is 19 x 4 = 76. The last number is 76 - 59 = 17.

5. **72**

Total = average x how many = 18 x 4 = 72.

6. **3**

33 / 11 = 3 children.

7. **8**

The total is 10 x 5 = 50. The last number is 50 - 42 = 8.

8. **42**

Total = average x how many = 7 x 6 = 42.

9. **4**

24 / 6 = 4 children.

10. **5**

The total is 17 x 6 = 102. The last number is 102 - 97 = 5.

11. **80**

Total = average x how many = 16 x 5 = 80.

12. **5**

65 / 13 = 5 children.

13. **21**

The total is 19 x 6 = 114. The last number is 114 - 93 = 21.

14. **68**

Total = average x how many = 17 x 4 = 68.

15. **4**

68 / 17 = 4 children.

16. **15**

The total is 13 x 6 = 78. The last number is 78 - 63 = 15.

17. **80**

Total = average x how many = 20 x 4 = 80.

18. **3**

57 / 19 = 3 children.

19. **17**

The total is 14 x 4 = 56. The last number is 56 - 39 = 17.

20. **18**

Total = average x how many = 6 x 3 = 18.

21. **3**

30 / 10 = 3 children.

22. **7**

The total is 13 x 6 = 78. The last number is 78 - 71 = 7.

23. **114**

Total = average x how many = 19 x 6 = 114.

24. **4**

48 / 12 = 4 children.

25. **21**

The total is 15 x 5 = 75. The last number is 75 - 54 = 21.

26. **100**

Total = average x how many = 20 x 5 = 100.

27. **6**

78 / 13 = 6 children.

28. **9**

The total is 18 x 5 = 90. The last number is 90 - 81 = 9.

29. **30**

Total = average x how many = 6 x 5 = 30.

30. **3**

54 / 18 = 3 children.