

N2 – Objectives and Key Facts

a) Add, subtract, multiply and divide whole numbers and decimal fractions with a calculator

To add, subtract multiply two whole numbers or decimal fractions on the calculator, just enter the first number, press the appropriate operation key, enter the second number, then press '='.

b) Add and subtract whole numbers and decimal fractions on paper

Make sure you get the decimal places lined up properly. With whole numbers make sure the ones digits are underneath one another; with decimal fractions, make sure the decimal points are underneath one another.

c) Multiply whole numbers and decimal fractions by 1- and 2-digit whole numbers on paper

To find 23 times a number, multiply it by 2, then add a zero, this gives 20 times the number. Then multiply the original number by 3. This gives 3 times the number. Then add the twenty times the number to the three times the number to get 23 times the number.

d) Divide whole numbers and decimal fractions by 1-digit whole numbers giving the answer as a decimal fraction on paper

Divide by either long or short division. If you are dividing a whole number and it does not go evenly, put a decimal point followed by 3 zeros at the end of the number and keep going till you get to the end of the zeros. Put a decimal point in the answer above the decimal point in the number you are dividing.

e) Multiply and divide whole numbers and decimal fractions by powers of 10 and simple multiples of powers of 10 on paper

To multiply by 10, add a zero or move the decimal point one place to the right. To multiply by 100, add 2 zeros or move the decimal point 2 places to the right. For a thousand, 3 zeros or 3 places etc.

To divide by 10, remove a zero or move the decimal point one place to the left. To divide by 100, remove 2 zeros or move the decimal point 2 place to the left. And so on. The decimal point on a whole number is after the last digit, for example 540 is 540.0

To multiply by 30, multiply by 3, then by 10. To divide by 2000, divide by 2, then by 1000 etc.

f) Find squares, cubes and square roots with a calculator

The square of a number is the number multiplied by itself. For example, the square of 5 is 25 (because $5 \times 5 = 25$). We also say 5 squared is 25 and we can write this as $5^2 = 25$. Scientific calculators have a key for squaring numbers.

The cube of a number is the number multiplied by itself, then multiplied by itself again. For example, the cube of 5 is $5 \times 5 \times 5$ (three 5's multiplied together) and this equals 125. We also say 5 cubed is 125 and we can write this as $5^3 = 125$.

The square root of a number is the number which can be squared to make that number. For example, the square root of 25 is 5 (because $5^2 = 25$). Square roots are often simply called roots, so we can say 'root 25 = 5'. Square roots can be written using the square root symbol, $\sqrt{\quad}$, so $\sqrt{16} = 4$. All calculators have a key for calculating square roots.

g) Use a range of methods and short-cuts for mental calculation

The standard written method is often not the quickest way to perform a calculation. There are often short cuts than can be used mentally. For example, $8 \times 95c$ is $8 \times \$1$ minus $8 \times 5c$, which is $\$7.60$.

EXERCISE N2a-1:

Do the following with your calculator:

- | | | |
|------------------------|------------------------|------------------------|
| 1. $273 + 459$ | 2. $1264 + 365$ | 3. $285 + 2461$ |
| 4. $336 - 289$ | 5. $1242 - 774$ | 6. $1490 - 774$ |
| 7. 265×43 | 8. 170×34 | 9. 724×482 |
| 10. $1288 \div 23$ | 11. $2701 \div 73$ | 12. $1148 \div 28$ |
| 13. $700 \div 26$ | 14. $5238 \div 71$ | 15. $298 \div 19$ |
| 16. $4.29 + 15.74$ | 17. $9.26 + 4.88$ | 18. $2.92 + 5.82$ |
| 19. $3.84 + 2.066$ | 20. $51.82 + 5.8$ | 21. $27.2 + 4.034$ |
| 22. $16 - 7.35$ | 23. $17 - 3.993$ | 24. $8.0 - 2.53$ |
| 25. $5.72 - 3.177$ | 26. $12.96 - 5.4$ | 27. $5.9 - 4.37$ |
| 28. 3.7×17 | 29. 5.26×23 | 30. 1.05×45 |
| 31. 4.72×0.04 | 32. 12.6×0.27 | 33. 45×0.003 |
| 34. 5.6×3.65 | 35. 2.01×4.62 | 36. 5.9×4.118 |
| 37. $4.7 \div 1.2$ | 38. $4.62 \div 2.9$ | 39. $1.26 \div 1.04$ |
| 40. $3.82 \div 15$ | 41. $2.51 \div 2.9$ | 42. $6.2 \div 12.4$ |
| 43. $0.27 \div 5.4$ | 44. $0.357 \div 72$ | 45. $3.28 \div 5.1$ |
| 46. $12 \div 0.12$ | 47. $24.3 \div 0.025$ | 48. $327 \div 0.4$ |
| 49. $3.52 - 1.2$ | 50. $3.8 + 3.87$ | 51. $19 - 2.17$ |
| 52. 0.12×0.34 | 53. 0.62×3.46 | 54. 0.03×0.44 |
| 55. $0.02 \div 0.5$ | 56. $0.004 \div 0.12$ | 57. $0.5 \div 0.866$ |
| 58. $0.56 \div 0.0004$ | 59. $0.36 \div 0.09$ | 60. $0.1 \div 0.001$ |

EXERCISE N2b-1:

Do the following, laying out your working:

- | | | |
|-------------------------|----------------------|---------------------------|
| 1. $23 + 64$ | 2. $481 + 207$ | 3. $316 + 341$ |
| 4. $450 + 273$ | 5. $625 + 392$ | 6. $707 + 138$ |
| 7. $642 + 92$ | 8. $53 + 623$ | 9. $87 + 251$ |
| 10. $1492 + 366$ | 11. $682 + 2305$ | 12. $83 + 1126$ |
| 13. $623 + 6245$ | 14. $2308 + 2354$ | 15. $724 + 693$ |
| 16. $73 + 62$ | 17. $824 + 781$ | 18. $652 + 1280$ |
| 19. $76\ 293 + 2833$ | 20. $6399 + 34\ 902$ | 21. $48\ 720 + 5329$ |
| 22. $64\ 926 + 48\ 391$ | 23. $72\ 094 + 9957$ | 24. $569\ 023 + 712\ 094$ |

EXERCISE N2b-2:

Do the following, laying out your working:

- | | | |
|-------------------------|-------------------------|-------------------------|
| 1. $74 - 31$ | 2. $92 - 81$ | 3. $139 - 25$ |
| 4. $853 - 252$ | 5. $649 - 38$ | 6. $853 - 120$ |
| 7. $537 - 162$ | 8. $742 - 480$ | 9. $296 - 78$ |
| 10. $340 - 155$ | 11. $662 - 399$ | 12. $712 - 417$ |
| 13. $1285 - 674$ | 14. $5906 - 355$ | 15. $2107 - 1475$ |
| 16. $200 - 163$ | 17. $505 - 389$ | 18. $800 - 224$ |
| 19. $3000 - 928$ | 20. $700 - 472$ | 21. $4050 - 3672$ |
| 22. $67\ 834 - 38\ 590$ | 23. $54\ 902 - 27\ 748$ | 24. $64\ 000 - 27\ 884$ |

EXERCISE N2b-3:

Do the following, laying out your working:

- | | | |
|---------------------|---------------------|----------------------|
| 1. $4.5 + 5.2$ | 2. $12.6 + 4.3$ | 3. $22.6 + 26.1$ |
| 4. $19.1 + 32.6$ | 5. $43.8 + 2.7$ | 6. $27.3 + 41.8$ |
| 7. $3.27 + 4.32$ | 8. $4.44 + 3.52$ | 9. $9.03 + 3.46$ |
| 10. $0.73 + 3.61$ | 11. $3.97 + 11.26$ | 12. $4.21 + 8.83$ |
| 13. $4.72 + 5.1$ | 14. $8.3 + 5.68$ | 15. $2.9 + 7.22$ |
| 16. $4.185 + 5.263$ | 17. $6.927 + 2.409$ | 18. $11.813 + 4.925$ |
| 19. $6.238 + 4.72$ | 20. $8.54 + 4.823$ | 21. $65.12 + 4.285$ |
| 22. $3.792 + 12.1$ | 23. $8.003 + 3.1$ | 24. $7.49 + 0.046$ |
| 25. $.034 + 2.3$ | 26. $45.18 + .043$ | 27. $9.7 + 3.871$ |
| 28. $0.3 + 2.945$ | 29. $6 + 2.53$ | 30. $8.835 + 3$ |

EXERCISE N2b-4:

Do the following, laying out your working:

- | | | |
|----------------------|---------------------|-----------------------|
| 1. $2.98 - 1.73$ | 2. $0.75 - 0.34$ | 3. $12.6 - 3.5$ |
| 4. $13.5 - 6.2$ | 5. $35.62 - 12.41$ | 6. $4.58 - 0.33$ |
| 7. $6.45 - 2.28$ | 8. $7.26 - 1.93$ | 9. $44.51 - 31.37$ |
| 10. $0.37 - 0.19$ | 11. $.82 - .05$ | 12. $2.76 - 1.92$ |
| 13. $4.33 - 1.96$ | 14. $8.5 - 2.9$ | 15. $5.0 - 1.9$ |
| 16. $4.00 - 3.28$ | 17. $7.0 - 3.8$ | 18. $8 - 3.5$ |
| 19. $4.53 - 2.7$ | 20. $51.87 - 41.7$ | 21. $3.05 - 1.2$ |
| 22. $4.6 - 3.22$ | 23. $9.4 - 4.18$ | 24. $5 - 1.22$ |
| 25. $7 - 4.2$ | 26. $5 - 3.87$ | 27. $9.2 - .47$ |
| 28. $3.518 - 1.283$ | 29. $7.382 - 4.25$ | 30. $7.01 - 4.888$ |
| 31. $2.9 - 1.885$ | 32. $7.92 - 5.771$ | 33. $3 - 2.664$ |
| 34. $.17 - .0456$ | 35. $9.32 - .566$ | 36. $10.3 - 7.9913$ |
| 37. $5 - 2.005$ | 38. $0.8 - 0.0253$ | 39. $18 - 2.00835$ |
| 40. $65.81 - 2.9772$ | 41. $0.0822 - 0.03$ | 42. $0.005 - 0.00027$ |
| 43. $0.02 - 0.00037$ | 44. $9.2 - 0.0059$ | 45. $2.22 - 1.339825$ |

EXERCISE N2c-1:

Do the following, laying out your working:

- | | | |
|----------------------|----------------------|----------------------|
| 1. 34×7 | 2. 62×4 | 3. 91×8 |
| 4. 154×5 | 5. 782×3 | 6. 298×9 |
| 7. 2816×2 | 8. 9023×6 | 9. 3385×4 |
| 10. 65×31 | 11. 73×26 | 12. 84×52 |
| 13. 168×25 | 14. 825×73 | 15. 903×19 |
| 16. 4819×59 | 17. 8382×87 | 18. 7821×44 |
| 19. 4×8269 | 20. 9×672 | 21. 7×777 |
| 22. 41×982 | 23. 83×5712 | 24. 19×6775 |

EXERCISE N2c-2:

Do the following, laying out your working:

- | | | |
|----------------------|---------------------|--------------------|
| 1. 5.1×7 | 2. 9.2×6 | 3. 8.2×8 |
| 4. 4.92×6 | 5. 3.995×4 | 6. 18.1×2 |
| 7. 31.993×5 | 8. 7.002×8 | 9. 4.82×3 |

- | | | |
|-----------------------|------------------------|-----------------------|
| 10. 3.56×23 | 11. 8.45×49 | 12. 9.428×52 |
| 13. 0.46×27 | 14. 0.0274×56 | 15. 90.35×72 |
| 16. 7×6.72 | 17. 12×2.766 | 18. 52×0.78 |
| 19. 81×34.56 | 20. 3.1×67 | 21. 0.4×51 |
| 22. 9.31×88 | 23. 0.0042×9 | 24. 6.297×71 |

EXERCISE N2d-1:

Do the following by either short or long division. Give fractional answers as decimals to 3 decimal places.

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|--------------------|---------------------|--------------------|
| 1. $96 \div 3$ | 2. $468 \div 4$ | 3. $265 \div 5$ |
| 4. $7926 \div 6$ | 5. $7352 \div 8$ | 6. $406 \div 7$ |
| 7. $4.5 \div 5$ | 8. $5.30 \div 4$ | 9. $1.71 \div 8$ |
| 10. $475 \div 9$ | 11. $193 \div 2$ | 12. $504 \div 9$ |
| 13. $431 \div 5$ | 14. $9 \div 5$ | 15. $17 \div 8$ |
| 16. $5.6 \div 8$ | 17. $9.1 \div 4$ | 18. $45.3 \div 6$ |
| 19. $0.4 \div 2$ | 20. $4.65 \div 7$ | 21. $8.0 \div 9$ |
| 22. $4 \div 5$ | 23. $9.25 \div 3$ | 24. $1 \div 8$ |
| 25. $67.1 \div 3$ | 26. $0.45 \div 4$ | 27. $0.052 \div 7$ |
| 28. $0.039 \div 5$ | 29. $.3 \div 5$ | 30. $8.1 \div 6$ |
| 31. $7 \div 6$ | 32. $4 \div 8$ | 33. $3 \div 8$ |
| 34. $.7 \div 4$ | 35. $0.0006 \div 8$ | 36. $182.4 \div 5$ |

EXERCISE N2e-1:

Do the following in your head by moving the decimal point.

- | | | |
|--------------------------|------------------------|---------------------------|
| 1. 3.82×10 | 2. 89.132×100 | 3. 0.645×10 |
| 4. 0.9226×100 | 5. 8.243×1000 | 6. 41.2×10 |
| 7. 6.2×10 | 8. $17.43 \div 10$ | 9. $45.28 \div 10$ |
| 10. $238.1 \div 100$ | 11. $92.3 \div 100$ | 12. $87.129 \div 100$ |
| 13. $92 \div 100$ | 14. $7 \div 10$ | 15. $0.76 \div 10$ |
| 16. $.72 \div 10$ | 17. $0.4 \div 100$ | 18. $.5 \div 10$ |
| 19. 6.28×100 | 20. 9.2×10 | 21. 7.921×1000 |
| 22. 4.3×100 | 23. 8.23×1000 | 24. $0.6 \div 100$ |
| 25. $1.3 \div 100$ | 26. $9.23 \div 1000$ | 27. $8.12 \div 1000$ |
| 28. 0.34×1000 | 29. $7 \div 100$ | 30. $2 \div 10$ |
| 31. $9 \div 1000$ | 32. 4×100 | 33. $9.01 \times 10\ 000$ |
| 34. 0.003×100 | 35. $.004 \times 10$ | 36. $90 \div 100$ |
| 37. $400 \div 10$ | 38. $95 \div 1000$ | 39. 23×100 |
| 40. 50×100 | 41. $6 \times 10\ 000$ | 42. $.01 \div 100$ |
| 43. $.04 \div 1000$ | 44. 9×10 | 45. $8 \div 100$ |
| 46. 2.87×1000 | 47. $9.002 \div 10$ | 48. $40 \div 1000$ |
| 49. 20×100 | 50. $30 \div 1000$ | 51. $3 \times 100\ 000$ |
| 52. 0.00045×100 | 53. $0.07 \div 1000$ | 54. $9.23 \div 10$ |
| 55. $6000 \div 100$ | 56. $400 \div 10$ | 57. $8 \div 1000$ |
| 58. $200 \div 10\ 000$ | 59. $.2 \times 100$ | 60. $.09 \times 10$ |

EXERCISE N2e-2:

Do the following by multiplying/dividing on paper, then moving the decimal point.

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|--------------------------|------------------------|------------------------------|
| 1. 23×700 | 2. 542×5000 | 3. 81×70 |
| 4. 63.2×3000 | 5. 9.87×60 | 6. $10.12 \times 20\,000$ |
| 7. 0.054×800 | 8. 934×300 | 9. 270×9000 |
| 10. $.79 \times 20$ | 11. 88×4000 | 12. 0.14×600 |
| 13. 0.0035×500 | 14. 0.028×90 | 15. 92×4000 |
| 16. $82 \div 400$ | 17. $4.9 \div 90$ | 18. $0.34 \div 800$ |
| 19. $.45 \div 70$ | 20. $0.38 \div 200$ | 21. $800 \div 50$ |
| 22. $320 \div 3000$ | 23. $5.4 \div 600$ | 24. $7 \div 3000$ |
| 25. $0.43 \div 40$ | 26. $120 \div 70$ | 27. $60 \div 80$ |
| 28. 3.4×900 | 29. 52×2000 | 30. 0.8×2000 |
| 31. $7 \div 80\,000$ | 32. $400 \div 20$ | 33. $6900 \div 500$ |
| 34. 0.00042×800 | 35. 0.0018×50 | 36. $0.000\,021 \times 3000$ |
| 37. $8.9 \div 2000$ | 38. $238 \div 400$ | 39. $2090 \div 700$ |
| 40. $1 \div 5000$ | 41. $1 \div 800$ | 42. $1 \div 40$ |
| 43. $8 \div 60$ | 44. $4 \div 9000$ | 45. $11 \div 40\,000$ |

EXERCISE N2f-1:

Find the following in your head, on paper or using the calculator

- | | | |
|---------------------|--------------------|--------------------|
| 1. the square of 6 | 2. the square of 2 | 3. the square of 3 |
| 4. the square of 10 | 5. the square of 9 | 6. the square of 7 |
| 7. 8 squared | 8. 1 squared | 9. 4 squared |
| 10. 12 squared | 11. 11 squared | 12. 20 squared |
| 13. 5^2 | 14. 7^2 | 15. 1^2 |
| 16. 1^2 | 17. 4^2 | 18. 9^2 |
| 19. 3^2 | 20. 0^2 | 21. 2^2 |
| 22. 0^2 | 23. 8^2 | 24. 6^2 |
| 25. 23^2 | 26. 51^2 | 27. 65^2 |
| 28. 161^2 | 29. 99^2 | 30. 271^2 |
| 31. 2.5^2 | 32. 5.5^2 | 33. 6.5^2 |
| 34. 1.9^2 | 35. 7.2^2 | 36. 4.8^2 |
| 37. 28^2 | 38. 47^2 | 39. 31^2 |
| 40. 49.2^2 | 41. 54.8^2 | 42. 39.9^2 |
| 43. 134.2^2 | 44. 604.1^2 | 45. 309.5^2 |
| 46. 2.98^2 | 47. 4.19^2 | 48. 5.31^2 |
| 49. 7.224^2 | 50. 5.261^2 | 51. 11.67^2 |
| 52. 0.2^2 | 53. 0.5^2 | 54. 0.1^2 |
| 55. 0.03^2 | 56. 0.041^2 | 57. 0.018^2 |
| 58. 0.007^2 | 59. 0.006^2 | 60. 0.0001^2 |

EXERCISE N2f-2:

Find the following in your head, on paper or using the calculator. Note that some are cubes and some are squares.

- | | | |
|--------------|--------------|---------------|
| 1. 3^3 | 2. 5^3 | 3. 2^3 |
| 4. 11^3 | 5. 8^3 | 6. 9^3 |
| 7. 1^3 | 8. 10^3 | 9. 100^3 |
| 10. 5.5^3 | 11. 3.4^3 | 12. 1.9^3 |
| 13. 11.6^3 | 14. 30.5^3 | 15. 28.8^3 |
| 16. 0^3 | 17. 3.0^3 | 18. 10^3 |
| 19. 4.91^3 | 20. 5.21^3 | 21. 8.285^3 |

- | | | | | | |
|-----|----------|-----|-----------|-----|----------|
| 22. | 3.66^3 | 23. | 1.92^3 | 24. | 4.01^3 |
| 25. | 0.2^3 | 26. | 0.1^3 | 27. | 0.01^3 |
| 28. | 0.05^3 | 29. | 0.8^3 | 30. | 0.9^3 |
| 31. | 3.94^2 | 32. | 7.24^2 | 33. | 6.91^2 |
| 34. | 40^2 | 35. | 1000^2 | 36. | 20^2 |
| 37. | 4.6^3 | 38. | 2.9^3 | 39. | 11^3 |
| 40. | 0.15^3 | 41. | 4.558^3 | 42. | 7.23^3 |
| 43. | 50^2 | 44. | 60^2 | 45. | 80^2 |
| 46. | 20^2 | 47. | 30^2 | 48. | 40^2 |
| 49. | 300^2 | 50. | 200^2 | 51. | 100^2 |
| 52. | 20^3 | 53. | 50^3 | 54. | 20^3 |
| 55. | 21^3 | 56. | 13^3 | 57. | 7^3 |
| 58. | 0^3 | 59. | 1^3 | 60. | 1000^3 |

EXERCISE N2f-3:

Find the following in your head or using the calculator.

- | | | | | | |
|-----|-----------------|-----|-----------------|-----|------------------|
| 1. | $\sqrt{16}$ | 2. | $\sqrt{25}$ | 3. | $\sqrt{9}$ |
| 4. | $\sqrt{100}$ | 5. | $\sqrt{36}$ | 6. | $\sqrt{49}$ |
| 7. | $\sqrt{81}$ | 8. | $\sqrt{1}$ | 9. | $\sqrt{4}$ |
| 10. | $\sqrt{1}$ | 11. | $\sqrt{121}$ | 12. | $\sqrt{144}$ |
| 13. | $\sqrt{0}$ | 14. | $\sqrt{400}$ | 15. | $\sqrt{1}$ |
| 16. | $\sqrt{64}$ | 17. | $\sqrt{169}$ | 18. | $\sqrt{225}$ |
| 19. | $\sqrt{441}$ | 20. | $\sqrt{196}$ | 21. | $\sqrt{529}$ |
| 22. | $\sqrt{324}$ | 23. | $\sqrt{289}$ | 24. | $\sqrt{676}$ |
| 25. | $\sqrt{4}$ | 26. | $\sqrt{9}$ | 27. | $\sqrt{16}$ |
| 28. | $\sqrt{5}$ | 29. | $\sqrt{7}$ | 30. | $\sqrt{3}$ |
| 31. | $\sqrt{10}$ | 32. | $\sqrt{50}$ | 33. | $\sqrt{30}$ |
| 34. | $\sqrt{8}$ | 35. | $\sqrt{40}$ | 36. | $\sqrt{300}$ |
| 37. | $\sqrt{60}$ | 38. | $\sqrt{110}$ | 39. | $\sqrt{3000}$ |
| 40. | $\sqrt{200}$ | 41. | $\sqrt{845}$ | 42. | $\sqrt{30\ 000}$ |
| 43. | $\sqrt{748}$ | 44. | $\sqrt{29}$ | 45. | $\sqrt{89}$ |
| 46. | $\sqrt{729}$ | 47. | $\sqrt{784}$ | 48. | $\sqrt{1369}$ |
| 49. | $\sqrt{4.6}$ | 50. | $\sqrt{7.2}$ | 51. | $\sqrt{3.9}$ |
| 52. | $\sqrt{35.13}$ | 53. | $\sqrt{73.01}$ | 54. | $\sqrt{54.2}$ |
| 55. | $\sqrt{23.882}$ | 56. | $\sqrt{13.98}$ | 57. | $\sqrt{79.3}$ |
| 58. | $\sqrt{485.2}$ | 59. | $\sqrt{273.09}$ | 60. | $\sqrt{311.9}$ |

ANSWERS – EXERCISE N2a-1

1.	732	2.	1629	3.	2746
7.	11 395	8.	5780	9.	348 968
13.	26.923...	14.	73.774...	15.	15.684...
19.	5.906	20.	57.62	21.	31.234
25.	2.543	26.	7.56	27.	1.53
31.	0.188 8	32.	3.402	33.	0.135
37.	3.916...	38.	1.593...	39.	1.211...
43.	0.05	44.	0.004 95...	45.	0.643...
49.	2.32	50.	7.67	51.	16.83
55.	0.04	56.	0.033 3...	57.	0.577...

ANSWERS – EXERCISE N2b-1

1.	87	2.	688	3.	757
7.	734	8.	676	9.	338
13.	6868	14.	4662	15.	1417
19.	79 126	20.	41 301	21.	54 049

ANSWERS – EXERCISE N2b-2

1.	43	2.	11	3.	114
7.	375	8.	262	9.	218
13.	611	14.	5551	15.	632
19.	2072	20.	228	21.	378

ANSWERS – EXERCISE N2b-3

1.	9.7	2.	16.9	3.	48.7
7.	7.59	8.	7.96	9.	12.49
13.	9.82	14.	13.98	15.	10.12
19.	10.958	20.	13.363	21.	69.405
25.	2.334	26.	45.223	27.	13.571

ANSWERS – EXERCISE N2b-4

1.	1.25	2.	0.41	3.	9.1
7.	4.17	8.	5.33	9.	13.14
13.	2.37	14.	5.6	15.	3.1
19.	1.83	20.	10.17	21.	1.85
25.	2.8	26.	1.13	27.	8.73
31.	1.015	32.	2.149	33.	0.336
37.	2.995	38.	0.7747	39.	15.99165
43.	0.01963	44.	9.1941	45.	0.880175

ANSWERS – EXERCISE N2c-1

1.	238	2.	248	3.	728
7.	5 632	8.	54 138	9.	13 540
13.	4 200	14.	60 225	15.	17 157
19.	33 076	20.	6 048	21.	5 439

ANSWERS – EXERCISE N2c-2

1.	35.7	2.	55.2	3.	65.6
7.	159.965	8.	56.016	9.	14.46
13.	12.42	14.	1.5344	15.	650.52
19.	2 799.36	20.	207.7	21.	20.4

ANSWERS – EXERCISE N2d-1

1.	32	2.	117	3.	53
7.	0.9	8.	1.325	9.	0.21375
13.	86.2	14.	1.8	15.	2.125
19.	0.2	20.	0.66428...	21.	0.88888...
25.	22.36666...	26.	0.1125	27.	0.00742...
31.	1.66666...	32.	0.5	33.	0.375

ANSWERS – EXERCISE N2e-1

1.	38.2	2.	8913.2	3.	6.45
7.	62	8.	1.743	9.	4.528
13.	0.92	14.	0.7	15.	0.076
19.	628	20.	92	21.	7921
25.	0.013	26.	0.009 23	27.	0.008 12
31.	0.009	32.	400	33.	90 100
37.	40	38.	0.095	39.	2 300
43.	0.000 04	44.	90	45.	0.08

- | | | | | | |
|-----|-------|-----|------|-----|---------|
| 49. | 2 000 | 50. | 0.03 | 51. | 300 000 |
| 55. | 60 | 56. | 40 | 57. | 0.008 |

ANSWERS – EXERCISE N2e-2

- | | | | | | |
|-----|-------------|-----|-------------|-----|-------------|
| 1. | 16 100 | 2. | 2 710 000 | 3. | 5 670 |
| 7. | 43.2 | 8. | 280 200 | 9. | 2 430 000 |
| 13. | 1.75 | 14. | 2.52 | 15. | 368 000 |
| 19. | 0.006 42... | 20. | 0.001 9 | 21. | 16 |
| 25. | 0.010 75 | 26. | 1.714 28... | 27. | 0.75 |
| 31. | 0.000 087 5 | 32. | 20 | 33. | 13.8 |
| 37. | 0.004 95 | 38. | 0.595 | 39. | 2.985 71... |
| 43. | 0.133 33... | 44. | 0.000 44... | 45. | 0.000 275 |

ANSWERS – EXERCISE N2f-1

- | | | | | | |
|-----|------------|-----|------------|-----|-----------|
| 1. | 36 | 2. | 4 | 3. | 9 |
| 7. | 64 | 8. | 1 | 9. | 16 |
| 13. | 25 | 14. | 49 | 15. | 1 |
| 19. | 9 | 20. | 0 | 21. | 4 |
| 25. | 529 | 26. | 2601 | 27. | 4225 |
| 31. | 6.25 | 32. | 30.25 | 33. | 42.25 |
| 37. | 784 | 38. | 2209 | 39. | 1024 |
| 43. | 18 009.64 | 44. | 364 936.81 | 45. | 95 790.25 |
| 49. | 52.186 176 | 50. | 27.678 121 | 51. | 136.188 9 |
| 55. | 0.0009 | 56. | 0.001 681 | 57. | 0.000 324 |

ANSWERS – EXERCISE N2f-2

- | | | | | | |
|-----|-------------|-----|-------------|-----|---------------|
| 1. | 27 | 2. | 125 | 3. | 8 |
| 7. | 1 | 8. | 1000 | 9. | 1 000 000 |
| 13. | 1560.896 | 14. | 28 372.625 | 15. | 23 887.872 |
| 19. | 118.370 771 | 20. | 141.420 761 | 21. | 568.692 549 1 |
| 25. | 0.008 | 26. | 0.001 | 27. | 0.000 001 |
| 31. | 15.523 6 | 32. | 52.417 6 | 33. | 47.748 1 |
| 37. | 97.336 | 38. | 24.389 | 39. | 1331 |
| 43. | 2500 | 44. | 3600 | 45. | 6400 |
| 49. | 90 000 | 50. | 40 000 | 51. | 10 000 |
| 55. | 9261 | 56. | 2197 | 57. | 343 |

ANSWERS – EXERCISE N2f-3

- | | | | | | |
|-----|-----------|-----|-----------|-----|-----------|
| 1. | 4 | 2. | 5 | 3. | 3 |
| 7. | 9 | 8. | 1 | 9. | 2 |
| 13. | 0 | 14. | 20 | 15. | 1 |
| 19. | 21 | 20. | 14 | 21. | 23 |
| 25. | 2 | 26. | 3 | 27. | 4 |
| 31. | 3.162... | 32. | 7.071... | 33. | 5.477... |
| 37. | 7.745... | 38. | 10.488... | 39. | 54.772... |
| 43. | 27.349... | 44. | 5.385... | 45. | 9.433... |
| 49. | 2.144... | 50. | 2.683... | 51. | 1.974... |
| 55. | 4.886... | 56. | 3.738... | 57. | 8.905... |

TEACHER NOTES

Operations

Go through each operation, bearing in mind that many of the students will already be familiar with them, and use the exercises for practice. You might like to explain and model some of them. For others you can get students to teach each other. One way to do this is to ask students who know how to do the operation to stand at the back of the class. Then ask those at the back to find someone still sitting and teach them how to do it. It could be worth stressing the difference between teaching and showing. Another way is to get students to stand somewhere across the front of the room, total confidence on the right, not a clue on the left. Then pair students from opposite ends to teach each other.

Diamond activity

This activity can help students to realise that multiplying does not always make a number bigger and dividing does not always make it smaller. Get students to do the diamond on page 7 of their notes. To begin with they will come up with quite small results. You can keep a list of new records on the board. Put the route with each in the format LLRLRRRL so that students can check each other's work. The highest possible score is 2 742 550. It generally takes students quite a while to get this, so you might be able to stretch the activity over two or three lessons.

Cube activity

To add a bit of interest to finding cubes, you might like to demonstrate and then teach this trick. Get a student to pick a two-digit number (but not tell you what it is) and then to cube it with their calculator. Get them to read you the cube and write it on the board. Look at it for a few seconds and then tell them what the original number was. In other words you can work out the cube root of any perfect cube up to 1 000 000 in about 5 seconds in your head. This is how you do it.

First you have to memorise the cubes of the numbers from 0 to 9. They are:

0	0
1	1
2	8
3	27
4	64
5	125
6	216
7	343
8	512
9	729

Suppose the cube is 300 763. Take the number of whole thousands – 300. This is between 216 and 343, so the first digit of the cube root is 6. Then take the ones digit. As it is a 3, the ones digit of the cube root must be 7. So the cube root is 67. You will notice that each perfect cube has a different digit in the ones place:

0	0
1	1
2	8
3	7
4	4
5	5
6	6
7	3
8	2
9	9

This means that you can always identify the ones digit uniquely. The pattern is fairly easy to remember too.

Mental Calculation

Most arithmetic carried out in real life is done mentally. It is therefore suggested that students are encouraged to do calculations mentally where possible. Some work on paper should be included. Students should be able to decide which is more appropriate in a given situation.

Below are 3 suggested techniques for enhancing mental arithmetic skills.

1. Ask students to answer a question such as 41×120 . Then ask them to share the strategies they used with the rest of the class. This helps them broaden their range of strategies.

As an alternative pick one person and ask others to guess how that person worked it out.

2. Give a series of questions without post-mortem except for answers. The old '10 quick questions at the start of the lesson' is a good way of including this type of practice and provides an opportunity to keep some record of students' levels of success.
3. Conduct class quizzes. Divide the class into two teams, A and B (left and right halves of the class). Have a list of mental arithmetic (or mental and written arithmetic) questions. Read the first one to Team A. Give them a few seconds (no conferring), then say 'hands up'. Count the number of hands that go up straight away. Pick one of them at random and ask for the answer. If it is correct, that team gets one point for each hand that was up. If the answer is wrong or not provided straight away, the team gets no points; offer the question to Team B; say 'hands up' straight away. Again count and ask one at random. If correct, that team gets points according to the number of hands they had up. If wrong or not forthcoming, nobody scores. The next question goes to Team B, regardless of whether Team A or B scored on the previous one. Score on the board. The biggest score at the end wins. Bluffing is an allowable strategy, but one that carries risks. Note: neither team may confer after the question has been read out. If anyone does talk, that team disqualifies itself from scoring on that question. If the team asked first is disqualified, the other team automatically gets the question. If the team asked second is disqualified, that is the end of that round.

Mental arithmetic questions I

- | | | |
|--------------------------------------|---------------------------------|-----------------------------------|
| 1. 23×3 | 2. $112 - 50$ | 3. 40×20 |
| 4. $75 \div 3$ | 5. Half of 170 | 6. Quarter of 52 |
| 7. $\$1.95 \times 4$ | 8. $\$2.40 \times 3$ | 9. $\$18 \times 5$ |
| 10. Five items at 99c | 11. 6 items at \$3.50 | 12. $\$10 - \4.20 |
| 13. $\$50 - 17.50$ | 14. $\frac{3}{10}$ as a decimal | 15. $\frac{1}{2}$ as a decimal |
| 16. 42% as a decimal | 17. 7% as a common fraction | 18. $\frac{27}{100}$ as a percent |
| 19. 0.34 as a percent | 20. 0.5 as a percent | 21. $\frac{1}{4}$ as a percent |
| 22. 40×7 | 23. 53×4 | 24. 20×21 |
| 25. 120×11 | 26. 109×8 | 27. Half of 78 |
| 28. One third of \$60 | 29. One tenth of \$20.50 | 30. 15×40 |
| 31. $1000 - 345$ | 32. $500 - 179$ | 33. $1100 - 840$ |
| 34. $400 \div 8$ | 35. $40 + 50 + 60 + 70$ | 36. $\$60 \div 8$ |
| 37. $\$123 + \78 | 38. One third of \$90 | 39. Two thirds of \$90 |
| 40. $\frac{1}{100}$ of \$40 | 41. $176 + 148$ | 42. $600 - 385$ |
| 43. 140×6 | 44. 220×15 | 45. $480 \div 6$ |
| 46. $5 \times \$23$ | 47. $2 \times \$14.85$ | 48. $15 \times \$12$ |
| 49. One fifth of 200 kg | 50. One sixth of 240 m | 51. Minutes in 5 hours |
| 52. Minutes in $2 \frac{1}{2}$ hours | 53. Seconds in 15 minutes | 54. Seconds in 1 hour |
| 55. Months in 7 years | 56. Days in 14 weeks | 57. Minutes in $\frac{2}{5}$ hour |
| 58. 34×9 | 59. $560 \div 70$ | 60. 345×3 |

Mental arithmetic questions II

- | | | |
|-----------------------------------|----------------------------------|-----------------------------------|
| 1. $34 + 82$ | 2. $170 - 38$ | 3. 28×3 |
| 4. $50 \div 4$ | 5. $70 \div 4$ | 6. $80 - 59.5$ |
| 7. 38.5×2 | 8. $41 \div 2$ | 9. $63 \div 3$ |
| 10. $45 \div 4$ | 11. $213 + 212$ | 12. $76 \div 4$ |
| 13. 19×6 | 14. $\frac{1}{4}$ of 46 | 15. $\frac{1}{2}$ of 77 |
| 16. $\frac{1}{2}$ of 41.8 | 17. $10 - 3.8$ | 18. $90 - 34.5$ |
| 19. $15.5 + 34.5$ | 20. $3.7 + 5.1$ | 21. $\frac{1}{4}$ of 8.84 |
| 22. $5.2 \div 2$ | 23. Half of 3.3 | 24. $\frac{7}{100}$ as a decimal |
| 25. $\frac{3}{4}$ as a percent | 26. 0.25 as a common fraction | 27. 12% as a decimal |
| 28. $4 \times \$34$ | 29. $10 \times \$2.95$ | 30. $\$50 - \18.40 |
| 31. $\$6.20 + \12.35 | 32. cm in $\frac{3}{4}$ m | 33. g in $\frac{1}{4}$ kg |
| 34. m in $\frac{1}{5}$ km | 35. days in July and August | 36. seconds in 7 minutes |
| 37. days in 5 fortnights | 38. months in a century | 39. $140 \div 10$ |
| 40. $146 \div 10$ | 41. 213×10 | 42. 200×20 |
| 43. $1\frac{1}{2}$ lots of \$14 | 44. $2\frac{1}{2}$ lots of 5 kg | 45. $1\frac{1}{4}$ lots of 36 m |
| 46. $\frac{3}{4}$ of 48 days | 47. $2\frac{2}{3}$ lots of \$12 | 48. $1\frac{4}{5}$ lots of \$20 |
| 49. $\$100 - \35.75 | 50. $\$80 - \14.90 | 51. 45×9 |
| 52. 61×7 | 53. 29×20 | 54. $31 \div 2$ |
| 55. $27\frac{1}{2} \times 2$ | 56. $4\frac{1}{2} \times 3$ | 57. $5\frac{1}{2} \times 5$ |
| 58. $3\frac{3}{4} - 1\frac{1}{2}$ | 59. $2\frac{1}{2} + \frac{3}{4}$ | 60. $3\frac{3}{4} + 2\frac{1}{2}$ |

Mental arithmetic questions III

- | | | |
|-------------------------------------|------------------------------------|------------------------------------|
| 1. 7×8 | 2. 9×6 | 3. 4×9 |
| 4. 9×7 | 5. $42 \div 6$ | 6. $63 \div 9$ |
| 7. $72 \div 3$ | 8. 12×11 | 9. 13×12 |
| 10. 8^2 | 11. 10^2 | 12. 13^2 |
| 13. 20^2 | 14. $13 \div 2$ | 15. $12\frac{1}{2} \div 2$ |
| 16. $3\frac{1}{2} \times 3$ | 17. $4\frac{1}{4} \times 4$ | 18. $\$10 - \4.35 |
| 19. $\$7.25 \times 8$ | 20. $\$6.60 \times 9$ | 21. $\$12.40 \div 8$ |
| 22. cm in $2\frac{1}{4}$ m | 23. m in $\frac{2}{5}$ km | 24. g in $\frac{3}{10}$ kg |
| 25. $2\frac{1}{2} \times 12$ | 26. $1\frac{3}{4} \times 100$ | 27. $4\frac{1}{4} - 1\frac{1}{2}$ |
| 28. $\frac{3}{8}$ of \$40 | 29. 1% of \$300 | 30. 1% of \$4000 |
| 31. $\frac{1}{5}$ as a decimal | 32. 50% of \$40 | 33. 0.23 as a percent |
| 34. 0.4 as a percent | 35. $\frac{3}{4}$ as a decimal | 36. 8×12 |
| 37. 20×24 | 38. 125×8 | 39. $1000 \div 20$ |
| 40. $1000 \div 50$ | 41. $1000 - 445$ | 42. $\frac{3}{4}$ of 1000 |
| 43. $\frac{2}{5}$ of 1000 | 44. 27×5 | 45. 13^2 |
| 46. 4^3 | 47. $\sqrt{144}$ | 48. 5^3 |
| 49. months in 2 decades | 50. mL in $\frac{1}{2}$ L | 51. L in 0.1 kL |
| 52. L in $1\frac{3}{4}$ kL | 53. cm in 100 m | 54. seconds in 1 hour |
| 55. $\frac{1}{2}$ of $8\frac{1}{2}$ | 56. $4\frac{1}{4} - 2\frac{3}{4}$ | 57. $2\frac{3}{4} + 2\frac{1}{4}$ |
| 58. $7 - 3\frac{3}{4}$ | 59. $\frac{1}{2}$ of $\frac{1}{2}$ | 60. $\frac{1}{4}$ of $\frac{1}{2}$ |

ANSWERS – EXERCISE N2a-1

4.	47	5.	468	6.	716
10.	56	11.	37	12.	41
16.	20.03	17.	14.14	18.	8.74
22.	8.65	23.	13.007	24.	5.47
28.	62.9	29.	120.98	30.	47.25
34.	20.44	35.	9.286 2	36.	24.296 2
40.	0.254...	41.	0.865...	42.	0.5
46.	100	47.	972	48.	817.5
52.	0.040 8	53.	2.145 2	54.	0.013 2
58.	1400	59.	4	60.	100

ANSWERS – EXERCISE N2b-1

4.	723	5.	1017	6.	845
10.	1858	11.	2987	12.	1209
16.	135	17.	1605	18.	1932
22.	113 317	23.	82 051	24.	1 281 117

ANSWERS – EXERCISE N2b-2

4.	601	5.	611	6.	733
10.	185	11.	263	12.	295
16.	37	17.	116	18.	576
22.	29 244	23.	27 154	24.	36 116

ANSWERS – EXERCISE N2b-3

4.	51.7	5.	46.5	6.	69.1
10.	4.34	11.	15.23	12.	13.04
16.	9.448	17.	9.336	18.	16.738
22.	15.892	23.	11.103	24.	7.536
28.	3.245	29.	8.53	30.	11.835

ANSWERS – EXERCISE N2b-4

4.	7.3	5.	23.21	6.	4.25
10.	0.18	11.	0.77	12.	0.84
16.	0.72	17.	3.2	18.	4.5
22.	1.38	23.	5.22	24.	3.78
28.	2.235	29.	3.132	30.	2.122
34.	0.1244	35.	8.754	36.	2.3087
40.	62.8328	41.	0.0522	42.	0.00473

ANSWERS – EXERCISE N2c-1

4.	770	5.	2 346	6.	2 682
10.	2 015	11.	1 898	12.	4 368
16.	284 321	17.	729 234	18.	344 124
22.	40 262	23.	474 096	24.	128 725

ANSWERS – EXERCISE N2c-2

4.	29.52	5.	15.98	6.	36.2
10.	81.88	11.	414.05	12.	490.256
16.	47.04	17.	33.192	18.	40.56
22.	819.28	23.	0.0378	24.	447.087

ANSWERS – EXERCISE N2d-1

4.	1 321	5.	919	6.	58
10.	52.77777...	11.	96.5	12.	56
16.	0.7	17.	2.275	18.	7.55
22.	0.8	23.	3.08333...	24.	0.125
28.	0.0078	29.	0.06	30.	1.35
34.	0.175	35.	0.000075	36.	36.48

ANSWERS – EXERCISE N2e-1

4.	92.26	5.	8 243	6.	412
10.	2.381	11.	0.923	12.	0.871 29
16.	0.072	17.	0.004	18.	0.05
22.	430	23.	8 230	24.	0.006
28.	340	29.	0.07	30.	0.2
34.	0.3	35.	0.04	36.	0.9
40.	5 000	41.	60 000	42.	0.000 1
46.	2 870	47.	0.900 2	48.	0.04
52.	0.004 5	53.	0.000 07	54.	0.923

