Grade 7 – Textbook

(Revised CAPS edition)

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Chapter A1

Whole numbers

A1.1 Natural and Whole Numbers:

Exercise 1:

Complete: * Natural numbers: $\mathbb{N}$ = {_____}
* Whole numbers: $\mathbb{N}_0$ = {_____}

A1.2 Characteristics of Whole Numbers – Revision grade 6:

* Prime numbers are numbers with only two factors, namely 1 and the number itself. Therefore, the number 1 is **not** a prime number, because it has only one factor!

* Compound numbers are numbers with more than two factors.

* The number 0 is the identity element for addition, which means that:
0 + any number = the number. E.g. $0 + 5 = 5$

* The number 1 is the identity element for multiplication, which means that:
1 × any number = the number itself. E.g. $1 \times 7 = 7$

* If we multiply any number with 0, the answer is 0. E.g. $0 \times 16 = 0$

* If we divide 0 by any number, the answer is 0: E.g. $0 \div 189 = 0$

* **If we divide by 0, the answer will be undefined.**
E.g. $24 \div 0$ = undefined

* Factors are the numbers by which a number is dividable without a remainder.
E.g. the factors of 6 are 1 ; 2 ; 3 and 6. We write it as: $F_6 = \{1 ; 2 ; 3 ; 6\}$

* Multiples are the numbers where a number can be divided without a remainder.
E.g. multiples of 6 are 6 ; 12 ; 18 .... We write it as: $M_6 = \{6 ; 12 ; 18 ; 24 ; \ldots\ldots\}$

* Commutative property: E.g. $4 + 5 = 5 + 4$ or $4 \times 5 = 5 \times 4$

* Associative property: E.g. $(2 + 3) + 4 = 2 + (3 + 4)$ or $(2 \times 3) \times 4 = 2 \times (3 \times 4)$

* Distributive property: E.g. $2 \times (3 + 4) = 2 \times 3 + 2 \times 4$ or $2 \times (3 - 4) = 2 \times 3 - 2 \times 4$

* **Remember the order of operations**: (1) Brackets
(2) Powers and roots
(3) Of → ×
(4) Multiplication and division
(5) Plus and minus

Exercise 2:

(1) Complete:

(a) The natural numbers smaller than 10.
(b) The five uneven numbers just before 10 000.
(c) The first five prime numbers.
(d) The even whole numbers between 325 and 341.
(e) The first four natural numbers greater than 25.
(f) The factors of 12.
(g) The multiples of 12 between 20 and 80.
(h) The multiples of 9, from 18 to 54.
(i) The largest six-digit number. Write this number in words as well.
(j) Add the largest five-digit number to the smallest three-digit number.
(k) Subtract the largest two-digit number from the smallest four-digit number.
(l) Is the number 1 a prime number or a compound number?
(m) The months of the year that consist of an even number of days in the year 2007.
(n) The factors of 36.
(o) The multiples of 8.
(p) The factors of 60 which are also prime numbers.

(2) Complete the next four numbers of each of the following sequences:

(a) 4 567 ; 4 570 ; 4 573 ; 4 576 ; ….
(b) 12 346 ; 12 246 ; 12 146 ; 12 046 ; ….
(c) 128 ; 130 ; 133 ; 137 ; ….
(d) 26 ; 28 ; 30 ; 32 ; ….
(e) 144 578 ; 144 538 ; 144 498 ; 144 458 ; ….
(f) 2 ; 4 ; 8 ; 16 ; ….
(g) 1 ; 4 ; 5 ; 9 ; 14 ; ….
(h) 1 ; 3 ; 5 ; 7 ; ….
(i) 1 999 ; 1 899 ; 1 799 ; 1 699 ; ….
(j) 1 ; 4 ; 9 ; 16 ; ….
(k) 1 ; 8 ; 27 ; 64 ; ….

(3) Determine the value of: **[Remember the order of operations!]**

(a) $17 \div 1$
(b) $1 \times 1 \times 1 + 0$
(c) $2 + 2 \times 0 + 2 \times 1$
(d) $389 \div 0$
(e) $0 \div 983$
(f) $64 - 0$
(g) $\dfrac{0 + 5 \times 1}{7 - 7}$
(h) $\dfrac{(14 - 14) \times 0}{18 \div 1 + 0}$

(4) Round the following off to the nearest number, as indicated in brackets:

(a) 3 472 (nearest 10)
(b) 3 472 (nearest 5)
(c) 3 475 (nearest 100)
(d) 769 909 (nearest 10)
(e) 769 909 (nearest 1 000)
(f) 769 909 (nearest 100)
(g) 769 909 (nearest 5)
(h) 567 (nearest 10)
(i) 567 (nearest 5)
(j) 567 (nearest 100)

(5) Write the following answers:

(a) $34 \times 1\,000$
(b) 50×400
(c) $48\,000 \div 1\,000$
(d) $680 \div 10$
(e) $5\,600 \div 100$
(f) $300 \times 10\,000$
(g) 800×120
(h) 451×100
(i) $770 \div 110$
(j) $350\,000 \div 50$

(6) Fill in: $<$; $=$ or $>$

(a)	25 026	25 025	(b)	8 100	81×100
(c)	123 587	123 588	(d)	487	477
(e)	1 987	1 989	(f)	100 999	101 000
(g)	520 520	520 250	(h)	2 345	2 453
(i)	7 070	$70\,700 \div 10$	(j)	$2\,300 \div 10$	$23\,000 \div 1\,000$

(7) Use the distributive property to calculate the following:

(a) E.g. $345 \times 16 = 345 \times (6 + 10)$
(b) 257×25
(c) $1\,234 \times 12$
(d) 780×34

(8) Identify the property used. Write A – associative property, C – commutative property and D – distributive property or N – if none of the properties apply.

(a) $45 + 67 = 67 + 45$
(b) $18 \times 12 = 18 \times (10 + 2)$
(c) $56 - 44 = 44 - 56$
(d) $2 \times 6 \times 18 = 2 \times (6 \times 18)$
(e) $(29 + 35) + 15 = 29 + (35 + 15)$
(f) $7 \times 234 = 234 \times 7$
(g) $450 \times 36 = 450 \times 40 - 450 \times 4$
(h) $128 \div (8 \times 8) = (128 \div 8) \times 8$

A1.3 Prime factors:

The prime factors of a number are the factors that are also prime numbers.
E.g. the factors of 12 are 1 ; 2 ; 3 ; 4 ; 6 and 12. But the prime factors of 12 are only 2 and 3.

E.g. 1 The factors of 6 are: $F_6 = \{1 ; 2 ; 3 ; 6\}$
$\therefore$ The prime factors of 6: 2 and 3. (I.e. they are the factors that are prime numbers.)

E.g. 2 The factors of 20 are: $F_{20} = \{1 ; 2 ; 4 ; 5 ; 10 ; 20\}$
$\therefore$ The prime factors of 20: 2 and 5.

E.g. 3 Determine the prime factors of 60:

2	60
2	30
3	15
5	5
	1

$\therefore 60 = 2 \times 2 \times 3 \times 5$

Exercise 3:

Determine the prime factors of the following numbers:

(1)	12	(2)	56	(3)	30	(4)	44
(5)	148	(6)	27	(7)	18	(8)	100
(9)	24	(10)	640	(11)	36	(12)	75

A1.4 LCM and HCF:

LCM = Lowest common multiple.
HCF = Highest common factor.

E.g.4 **The multiples of 3 are $M_3 = \{3 ; 6 ; 9 ; 12 ; 15 ; 18 ; 21 ; 24 ; \ldots\ldots\ldots\}$**
The multiples of 4 are $M_4 = \{4 ; 8 ; 12 ; 16 ; 20 ; 24 ; 28 ; \ldots\ldots\ldots\}$
The common multiples of 3 and 4 are all the multiples that occur with both, namely: 12 ; 24 ; ... ...
Therefore the LCM of 3 and 4 is 12, because it is the lowest common multiple!

E.g.5 **The factors of 12 are $F_{12} = \{1 ; 2 ; 3 ; 4 ; 6 ; 12\}$**
The factors of 18 are $F_{18} = \{1 ; 2 ; 3 ; 6 ; 9 ; 18\}$
The common factors of 12 and 18 are thus: 1 ; 2 ; 3 and 6.
Therefore the HCF of 12 and 18 is 6, because it is the highest common factor!

Exercise 4:

Complete:

(1) (a) The multiples of 2.
(b) The multiples of 3.
(c) The common multiples of 2 and 3.
(d) The LCM of 2 and 3.

(2) (a) M_6 (b) M_{15}
(c) The common multiples of 6 and 15. (d) The LCM of 6 and 15.

(3) (a) F_{12} (b) F_8
(c) The common factors of 12 and 8. (d) HCF of 12 and 8.

(4) (a) M_{10} and F_{10} (b) M_{15} and F_{15}
(c) LCM of 10 and 15. (d) HCF of 10 and 15.

(5) (a) The multiples of 3.
(b) The multiples of 4.
(c) The multiples of 5.
(d) The LCM of 3; 4 and 5.

(6) (a) M_3 (b) M_5 (c) M_9
(d) LCM of 3; 5 and 9.

(7) (a) F_{20} (b) F_{36} (c) F_{28}
(d) HCF of 20; 36 and 28.

(8) Paul and John are on a hike to raise funds. Paul hikes exactly 12 kilometres every day and John hikes exactly 10 kilometres every day. Calculate how many days it will take them to hike exactly the same number of kilometres. How many kilometres in total did each of them hike?

(9) The product of two numbers is 588. The HCF of the numbers is 14. Give all the possible combinations of numbers to which these conditions apply.

☺ **The ancient Romans used certain symbols to represent their numbers. Do research to find out which symbols they used for each of the following:**

1 → _____ **5 →** _____ **10 →** _____

50 → _____ **100 →** _____ **500 →** _____

1 000 → _____

(1) Which number is represented by the following: MCXLVI ?

(2) Present the following number as a Roman numeral: 3 914

A1.5 REVISION EXERCISE:

(1) Complete:

(a) The uneven compound numbers, larger than 10 and smaller than 20.
(b) The factors of 12, which are also multiples of 2.
(c) All even prime numbers.
(d) The five whole numbers just greater than 9 998.
(e) Write 2 344 298 in words.
(f) The first four whole numbers just smaller than 12.

(2) Complete:

(a) M_6 (b) M_8 (c) F_{18} (d) F_{24}

(3) Use your answer in (2) and determine the LCM of 6 and 8.

(4) Use your answer in (2) and determine the HCF of 18 and 24.

(5) Complete the next five numbers of each of the following sequences:

(a) 97 ; 96 ; 94 ; 91 ; 87 ; ... ...
(b) 14 ; 17 ; 20 ; 23 ; 26 ; ... ...
(c) 144 ; 132 ; 120 ; 108 ; ... ...
(d) 3 ; 6 ; 12 ; 24 ; 48 ; ... ...

(6) Determine the prime factors of the following numbers:

(a) 315 (b) 144 (c) 98 (d) 525

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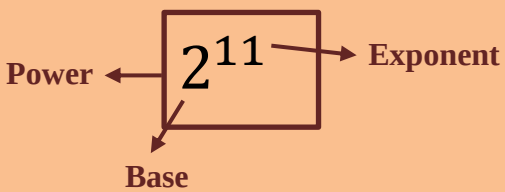
Chapter A2

Exponents

A2.1 Numbers in exponential format:

* Exponential format is a way to write large numbers in a shorter format.
  E.g. $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^{11} = 2\,048$

* We read 2^{11} as "two to the power of 11", where 2 is called the base number and 11 the exponent:



* We read 2^2 as "two to the power of two" or, "2 squared" which means that it is $2 \times 2 = 4$, where 4 is a perfect square.

* Also $2^3 = 2 \times 2 \times 2 = 8$, where 8 is therefore a perfect cube.

* Any number to the power of 1, is equal to the number itself. E.g. $6^1 = 6$.

** Any number to the power of 0, is equal to 1. E.g. $6^0 = 1$. **(Only for enrichment!)**

E.g. 1 (a) Write in exponential format: $5 \times 2 \times 2 \times 2 \times 5 \times 5 \times 2$
$= 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5$
$= 2^4 \times 5^3$

(b) Write in expanded format: $3^5 = 3 \times 3 \times 3 \times 3 \times 3$

(c) Calculate: Remember the order of operations!

(i) $2^3 + 7^2 - 9^1 = 2 \times 2 \times 2 + 7 \times 7 - 9 = 8 + 49 - 9 = 48$

(ii) $(4 \times 10^4) + (7 \times 10^3) + (2 \times 10^2) + (6 \times 10^1) + (5 \times 1)$
$= 40\,000 + 7\,000 + 200 + 60 + 5$
$= 47\,265$

Because $[4 \times 10^4 = 4 \times 10\,000 = 40\,000]$ **and** $[7 \times 10^3 = 7 \times 1\,000 = 7\,000]$ **and** $[2 \times 10^2 = 2 \times 100 = 200]$ **and** $[6 \times 10^1 = 6 \times 10 = 60]$ **and** $[5 \times 1 = 5]$

Exercise 1:

(1) Redraw the following table and complete. Mark only with ✓ in each applicable block.

Number:	1	6	8	9	12	16	25	27	30	36	64	80	100	125
Perfect square														
Perfect cube														

(2) Write in exponential format:

(a) $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

(b) $7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7$

(c) $10 \times 10 \times 7 \times 10 \times 10 \times 10$

(d) $5 \times 2 \times 5 \times 2 \times 5 \times 2 \times 5 \times 2$

(3) Write in expanded format: (a) 6^8 (b) 3^4

(4) Calculate: (Without using a calculator!)

(a) $4^2 - 3^2$

(b) $1^3 + 1^2 + 2^2$

(c) $5^2 - 4^2 - 3^2$

(d) $4^3 \times 10^2 - 5^3$

(e) $5^3 \div 5^2$

(f) $12^2 - 11^2$

(g) $5^1 + 1^5$

(h) $7^2 - 2^3$

(i) $2 \times 6^2 + 8^2$

(j) $(20 - 2 \times 4)^2$

(k) $2^2 \times 2^3$

(l) $3^3 - 3^2$

(m) $10^3 \div 10^3$

(n) $9^2 \times 1^2 \div 3^2$

(o) $(4^2 + 2^2) \times (1^2 + 1^3)$

(p) $(7 - 3)^3 + (4 + 1)^2$

*(q) $(3^3 \times 10^5)^0 + 10^2 \times 10^3$

(r) $4^2 + (8-3)^3 + (8+3)^2$

(5) Calculate:

(a) $(4 \times 10^3) + (3 \times 10^2) + (2 \times 10^1) + (1 \times 10^0)$

(b) $(7 \times 10^6) + (2 \times 10^5) + (2 \times 10^4) + (1 \times 10^3) + (2 \times 10^2) + (6 \times 10) + (9 \times 10^0)$

(c) $(5 \times 10^5) + (6 \times 10^3) + (6 \times 10)$

☺ **The American government decides to donate one trillion $ to Africa for the treatment and prevention of AIDS. If one $ is equal to R12, calculate how many rand will be donated to Africa. Write your answer in shortened format by using exponential notation.**

Remember: **1 billion = 1 thousand million**
1 trillion = 1 million million

A2.2 Square roots and cube roots:

The opposite calculation of powers is called the calculation of roots.
E.g. if $5^2 = 25$, then $\sqrt{25} = 5$. We read it as: the square root of 25 is equal to 5.
Or if $2^3 = 8$, then $\sqrt[3]{8} = 2$. We read it as: the cube root of 8 is equal to 2.

E.g. 2 Calculate: (a) $\sqrt{100} - \sqrt{64} = 10 - 8 = 2$

(b) $\sqrt{100 - 64} = \sqrt{36} = 6$

(c) $\sqrt[3]{4^2 - 8} = \sqrt[3]{16 - 8} = \sqrt[3]{8} = 2$

Exercise 2:

(1) Redraw and complete the following table and study it!!

(a)	$1^2 = 1 \quad \therefore \sqrt{1} = 1$	(j)	$10^2 = \quad \therefore \sqrt{\quad} =$
(b)	$2^2 = \quad \therefore \sqrt{\quad} =$	(k)	$11^2 = \quad \therefore \sqrt{\quad} =$
(c)	$3^2 = \quad \therefore \sqrt{\quad} =$	(l)	$12^2 = \quad \therefore \sqrt{\quad} =$
(d)	$4^2 = \quad \therefore \sqrt{\quad} =$	(m)	$1^3 = \quad \therefore \sqrt[3]{\quad} =$
(e)	$5^2 = \quad \therefore \sqrt{\quad} =$	(n)	$2^3 = \quad \therefore \sqrt[3]{\quad} =$
(f)	$6^2 = \quad \therefore \sqrt{\quad} =$	(o)	$3^3 = \quad \therefore \sqrt[3]{\quad} =$
(g)	$7^2 = \quad \therefore \sqrt{\quad} =$	(p)	$4^3 = \quad \therefore \sqrt[3]{\quad} =$
(h)	$8^2 = \quad \therefore \sqrt{\quad} =$	(q)	$5^3 = \quad \therefore \sqrt[3]{\quad} =$
(i)	$9^2 = \quad \therefore \sqrt{\quad} =$	(r)	$10^3 = \quad \therefore \sqrt[3]{\quad} =$

(2) Calculate:

(a) $\sqrt{36} - \sqrt{4}$ (b) $\sqrt{100 - 64}$ (c) $\sqrt[3]{8} \times \sqrt{100}$

(d) $\sqrt{64} - \sqrt[3]{64}$ (e) $5^2 + \sqrt{25}$ (f) $11^2 - \sqrt{121}$

(g) $\sqrt{9} - \sqrt[3]{27}$ (h) $\left(\sqrt[3]{125}\right)^2$ (i) $2^3 + \sqrt[3]{8}$

(j) $\sqrt{9 - 2^3}$ (k) $\sqrt{49 - 13}$ (l) $6^2 + 4^3$

(m) $\sqrt{4^3}$ (n) $7 \times 7 \times 7 - 7^3$ (o) $\sqrt{10^2 - 8^2}$

(p) $\sqrt[3]{1\,000} \times \sqrt{144}$ (q) $\left(\sqrt{12}\right)^2$ (r) $\sqrt{1} + 7^2 - \sqrt[3]{8}$

(3) The area of a square is 121 cm². Calculate the length of each side of the square.

A2.3 Square roots and cube roots – using prime factors:

E.g.3 Determine the following by using prime factors:

(a) $\sqrt{784}$ **(b)** $\sqrt[3]{3\,375}$

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2	784
2	392
2	196
2	98
7	49
7	7
	1

$\therefore\ 784 = 2 \times 2 \times 2 \times 2 \times 7 \times 7$

$= 2^2 \times 2^2 \times 7^2$

$\therefore \sqrt{784} = 2 \times 2 \times 7$

$= 28$

3	3 375
3	1 125
3	375
5	125
5	25
5	5
	1

$\therefore\ 3\,375 = 3 \times 3 \times 3 \times 5 \times 5 \times 5$

$= 3^3 \times 5^3$

$\therefore \sqrt[3]{3\,375} = 3 \times 5$

$= 15$

Exercise 3:

Calculate: (by using prime factors)

(1) $\sqrt{225}$ (2) $\sqrt[3]{2\,744}$ (3) $\sqrt{1\,225}$ (4) $\sqrt{4\,624}$

(5) $\sqrt[3]{343}$ (6) $\sqrt[3]{1\,728}$ (7) $\sqrt[3]{1\,000}$ (8) $\sqrt{576}$

A2.4 REVISION EXERCISE:

(1) Calculate:

(a) $2^3 + 7^2 - \sqrt{25}$ (b) $6^2 \times \sqrt[3]{1} + 0$

(c) $\sqrt{5^3 - 2^2}$ (d) $\sqrt[3]{729}$

(e) $\sqrt{100} + 7^2$ (f) $3^3 + 11^2$

(g) $\left(\sqrt{49} + 1\right)^2$ (h) $\sqrt{2\,025}$

(i) $\sqrt{144} \div 4^1$ (j) $\left(\sqrt{7}\right)^2$

(k) $\sqrt{\sqrt{81}}$ (l) $(5 - 2)^2 + \sqrt{36}$

(m) $3^2 \times 0 + (9 - 2)^2$ (n) $\sqrt{121} - \sqrt[3]{125}$

(2) The sum of the first three prime numbers is squared. What will the answer be?

(3) Calculate: $3 \times 10^5 + 2 \times 10^4 + 7 \times 10^3 + 2 \times 10 + 8 \times 10^0 + 3 \times 10^2$

(4) Are the following statements true or false?

(a) $8^2 = 8 \times 2$

(b) The square root of 4 is 16.

(c) $1^3 + 3^1 = 3 + 1 = 4$

(5) Complete the next five numbers in each sequence:

(a) 9 ; 16 ; 25 ; 36 ; ……

(b) 2×3^2 ; 3×4^3 ; 4×5^4 ; ……

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Chapter A3

Fractions

Common fractions are elements of the rational numbers ($\mathbb{Q}$).
The rational numbers are numbers that can be written as $\frac{a}{b}$, where both a and b are integers, but $b \neq 0$!

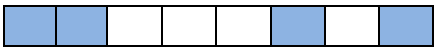
A3.1 Common fractions:

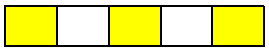
A3.1.1 What are fractions: (Revision grade 6.)

Exercise 1:

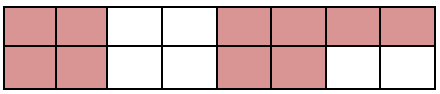
(1) Write down the fraction which is shaded:

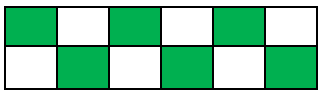
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

(2) If 20 marbles are divided equally amongst 4 boys, what fraction does each child receive?

(3) 1 litre of milk contains 1 000 mℓ. Which fraction of the litre will 250 mℓ contain?

A3.1.2 Equivalent fractions:

In exercise 1(b) and 1(f) both fractions are also equal to $\frac{1}{2}$, because $\frac{4}{8} = \frac{4\div4}{8\div4} = \frac{1}{2}$ and $\frac{6}{12} = \frac{6\div6}{12\div6} = \frac{1}{2}$.

That is why we refer to $\frac{1}{2}$; $\frac{4}{8}$ and $\frac{6}{12}$ as equivalent fractions.

Therefore, equivalent fractions have the same fraction value, but have different fraction names.

E.g.1 (a) Simplify by using equivalent fractions: $\frac{250}{400} = \frac{250\div50}{400\div50} = \frac{5}{8}$

(b) Arrange the following fractions in descending order: $\frac{1}{2}$; $\frac{5}{8}$ **and** $\frac{2}{6}$.

When doing this, it is a good idea to first write all the fractions as equivalent fractions with the same denominators!

$\frac{1}{2} = \frac{1\times12}{2\times12} = \frac{12}{24}$ **and** $\frac{5}{8} = \frac{5\times3}{8\times3} = \frac{15}{24}$ **and** $\frac{2}{6} = \frac{2\times4}{6\times4} = \frac{8}{24}$

because the LCM of 2 and 8 and 6 is 24.

$\therefore \frac{15}{24} > \frac{12}{24} > \frac{8}{24}$

$\therefore \frac{5}{8} > \frac{1}{2} > \frac{2}{6}$

Exercise 2:

(1) Complete: (a) $\frac{2}{5} = \frac{\quad}{10} = \frac{\quad}{25} = \frac{\quad}{45} = \frac{\quad}{60} = \frac{\quad}{100}$

(b) $\frac{1}{4} = \frac{\quad}{8} = \frac{\quad}{12} = \frac{\quad}{36} = \frac{100}{\quad} = \frac{1\,000}{\quad}$

(2) Write down any three equivalent fractions for the following:

(a) $\frac{1}{3}$ (b) $\frac{3}{5}$ (c) $\frac{7}{8}$ (d) $\frac{3}{4}$

(3) Convert the following to improper fractions:

(a) $2\frac{1}{4}$ (b) $5\frac{3}{7}$ (c) $1\frac{1}{8}$ (d) $17\frac{4}{5}$

(4) Write the following as improper fractions:

(a) $6 = \frac{\quad}{4}$ (b) $4 = \frac{\quad}{5}$ (c) $9 = \frac{\quad}{10}$ (d) $11 = \frac{\quad}{12}$

(5) Write each of the following fractions in its simplest form:

(a) $\frac{15}{45}$ (b) $\frac{25}{100}$ (c) $\frac{24}{36}$ (d) $\frac{18}{54}$

(e) $\frac{14}{44}$ (f) $\frac{12}{240}$ (g) $\frac{6}{42}$ (h) $\frac{21}{49}$

(i) $\frac{16}{4}$ (j) $\frac{9}{16}$ (k) $\frac{20}{90}$ (l) $\frac{35}{15}$

(6) Arrange the following fractions in ascending order. Show all calculations!

(a) $\frac{2}{5}$; $\frac{4}{6}$ and $\frac{5}{8}$ (b) $\frac{2}{3}$; $\frac{1}{6}$; $\frac{1}{2}$ and $\frac{3}{4}$

(7) Insert: < ; > or =

(a) $\frac{3}{4}$ $\frac{9}{12}$ (b) $\frac{3}{4}$ $\frac{2}{5}$ (c) $\frac{42}{7}$ $\frac{36}{6}$

(d) $\frac{4}{9}$ $\frac{5}{15}$ (e) $\frac{3}{12}$ $\frac{12}{16}$ (f) $\frac{8}{50}$ $\frac{8}{100}$

(g) $\frac{3}{5}$ $\frac{5}{3}$ (h) $1\frac{1}{4}$ $\frac{10}{8}$ (i) $\frac{7}{8}$ $\frac{8}{9}$

A3.1.3 Estimation:

Exercise 3:

Without doing any calculations or using a calculator, estimate the value of:

(1) $\frac{1}{2} + \frac{1}{4}$ (2) $\frac{2}{3} - \frac{1}{6}$ (3) $\frac{3}{4} + \frac{3}{4}$

(4) $\frac{1}{2} + \frac{1}{2}$ (5) $\frac{3}{5} + \frac{4}{10}$ (6) $\frac{4}{8} + \frac{1}{2}$

(7) $4\frac{3}{4} + 2\frac{1}{4}$ (8) $5\frac{2}{3} - 3\frac{2}{3}$ (9) $9\frac{2}{11} - 2\frac{9}{11}$

A3.1.4 Calculations with fractions:

A3.1.4.1 Addition and subtraction of fractions:

As indicated previously, fractions can only be added and subtracted if they have the same denominators. Therefore, the fractions first must be rewritten as fractions with the same denominators, by using equivalent fractions.

E.g.2 Calculate the following, without using a calculator. Write your answer in simplified form and, where necessary, as a mixed number.

(a) $\frac{4}{5} + \frac{3}{5}$ Denominators are the same already!

$= \frac{4+3}{5}$ Write as one fraction.

$= \frac{7}{5} = 1\frac{2}{5}$ Simplify the numerator. Write the answer in its simplest form.

(b) $\frac{1}{2} - \frac{1}{3}$ Denominators are not the same!

$= \frac{1}{2} \times \frac{3}{3} - \frac{1}{3} \times \frac{2}{2}$ Find the LCM of 2 and 3. Write $\frac{1}{2}$ and $\frac{1}{3}$ as equivalent fractions.

$= \frac{3-2}{6} = \frac{1}{6}$ Write as one fraction and simplify the numerator.

Exercise 4:

Calculate the following, without using a calculator: (Show all calculations!)

(1) $\frac{6}{7} + \frac{3}{7}$ (2) $\frac{11}{18} - \frac{5}{18}$ (3) $\frac{2}{5} + \frac{3}{5} + \frac{4}{5}$

(4) $\frac{3}{5} + \frac{3}{10}$ (5) $\frac{1}{6} + \frac{5}{6}$ (6) $\frac{7}{12} - \frac{1}{3}$

(7) $\frac{3}{4} + \frac{5}{8}$ (8) $\frac{1}{4} - \frac{1}{16}$ (9) $\frac{9}{14} + \frac{3}{14} - \frac{2}{14}$

(10) $\frac{7}{9} - \frac{7}{18}$ (11) $\frac{5}{8} - \frac{1}{2}$ (12) $\frac{17}{20} - \frac{15}{20}$

(13) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8}$ (14) $\frac{5}{6} + \frac{2}{3} - \frac{1}{2}$ (15) $\frac{23}{24} - \frac{1}{6} - \frac{1}{4}$

(16) $\frac{3}{5} + \frac{1}{2}$ (17) $\frac{3}{4} - \frac{1}{3}$ (18) $\frac{8}{9} - \frac{5}{6}$

(19) $\frac{1}{4} + \frac{1}{3}$ (20) $\frac{3}{5} + \frac{3}{4}$ (21) $\frac{1}{6} + \frac{4}{5}$

(22) $\frac{6}{7} - \frac{2}{3}$ (23) $\frac{2}{3} + \frac{3}{5} + \frac{4}{15}$ (24) $\frac{1}{4} + \frac{5}{6} - \frac{2}{3}$

E.g.3 Calculate, without using a calculator. Give answer in simplest form.

$3\frac{3}{4} + \frac{4}{5} - 2$

$= \frac{15}{4} + \frac{4}{5} - \frac{2}{1}$ Write the fractions as improper fractions, where necessary.

$= \frac{75}{20} + \frac{16}{20} - \frac{40}{20}$ Find the LCM of 4; 5 and 1 and write the fractions as equivalent fractions.

$= \frac{75 + 16 - 40}{20}$ Write all the fractions on one denominator.

$= \frac{51}{20} = 2\frac{11}{20}$ Simplify the numerator and simplify the answer.

Exercise 5:

Calculate the following, without using a calculator: (Show all calculations!)

(1) $4\frac{1}{5} + 2\frac{1}{2}$ (2) $1\frac{3}{4} - \frac{1}{3}$ (3) $3\frac{1}{6} - 1\frac{2}{3}$

(4) $10\frac{1}{10} - 5\frac{1}{5}$ (5) $1\frac{11}{12} + 1\frac{2}{3}$ (6) $2\frac{5}{6} + 7\frac{1}{2}$

(7) $\frac{5}{8} + 5\frac{1}{5} - 3\frac{3}{4}$ (8) $3\frac{1}{2} + \frac{2}{5} + 1$ (9) $3\frac{2}{11} - \frac{1}{3} - 1\frac{13}{33}$

(10) $\frac{1}{4} + 7\frac{3}{4} - 2\frac{1}{2}$ (11) $12 - 2\frac{5}{8} - 3\frac{5}{6}$ (12) $7\frac{2}{7} + \frac{7}{2}$

☺ **Place any three fractions between:** $\frac{1}{4}$ **and** $\frac{1}{3}$

A3.1.4.2 Multiplication and division: (Division only for enrichment!)

Exercise 6:

Divide the adjacent square into four equal parts.
Divide each quarter into halves.
Colour in one block.

Which fraction of the original square is coloured in?

Use the above and complete:

$\frac{1}{2}$ **of** $\frac{1}{4}$ = _____

It is the same as $\frac{1}{2} \times \frac{1}{4} = \frac{1 \times 1}{2 \times 4}$ = _____

From this we can deduce that, when fractions are multiplied, the denominators are multiplied and the numerators are multiplied.

E.g.4 Calculate the following, without using a calculator:

(a) $\frac{2}{3} \times \frac{5}{6}$ Write the following as improper fractions →

$= \frac{2 \times 5}{3 \times 6}$ ← Multiply denominator and denominator → and numerator and numerator

$= \frac{10}{18}$

$= \frac{5}{9}$ ← Simplify the answer →

(b) $1\frac{1}{2} \times 3 = \frac{3}{2} \times \frac{3}{1}$

$= \frac{3 \times 3}{2 \times 1}$

$= \frac{9}{2}$

$= 4\frac{1}{2}$

(c) $\frac{2}{3} \times 1\frac{1}{8} = \frac{2}{3} \times \frac{9}{8} = \frac{\cancel{2}^{1}}{\cancel{3}^{1}} \times \frac{\cancel{9}^{3}}{\cancel{8}^{4}} = \frac{1 \times 3}{1 \times 4} = \frac{3}{4}$

(d) $\frac{3}{4}$ **of** $16 = \frac{3}{4} \times 16 = \frac{3}{\cancel{4}^{1}} \times \frac{\cancel{16}^{4}}{1} = \frac{3 \times 4}{1 \times 1} = 12$

Exercise 7:

Calculate the following, without using a calculator:

(1) $\frac{1}{2} \times \frac{2}{3}$ (2) $\frac{3}{4} \times \frac{4}{3}$ (3) $\frac{2}{5} \times \frac{10}{2}$

(4) $\frac{1}{4} \times \frac{8}{13}$ (5) $\frac{2}{3} \times \frac{9}{10}$ (6) $\frac{3}{4} \times \frac{1}{4}$

(7) $\frac{5}{12} \times 4$ (8) $\frac{4}{5} \times 1\frac{1}{4}$ (9) $3 \times \frac{4}{6}$

(10) $\frac{1}{4}$ of 24 (11) $\frac{2}{7} \times 2\frac{1}{7}$ (12) $\frac{3}{5}$ of 15

(13) $\frac{5}{12} \times \frac{4}{3}$ (14) $\frac{11}{12} \times \frac{5}{22}$ (15) $\frac{14}{4} \times \frac{12}{8}$

(16) $\frac{1}{7} \times \frac{49}{3}$ (17) $\frac{7}{24} \times \frac{4}{14}$ (18) $\frac{15}{32} \times \frac{4}{5}$

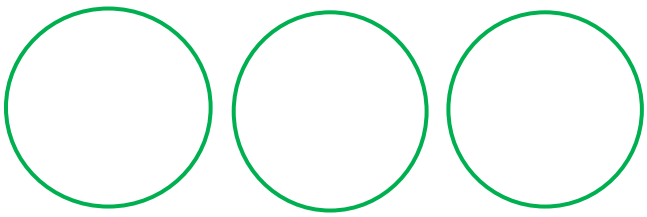
(19) $\frac{2}{3}$ of 12 (20) $\frac{9}{16} \times \frac{3}{4}$ (21) $\frac{3}{4} \times \frac{4}{5} \times \frac{5}{6}$

(22) $1\frac{1}{2} \times \frac{6}{7} \times \frac{21}{24}$ (23) $4\frac{1}{4} \times 4 \times \frac{4}{17}$ (24) $\frac{1}{5}$ of $\frac{2}{3}$ of 30

Exercise 8:

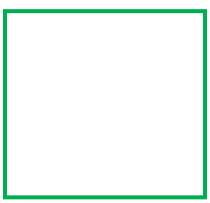
(1) Consider the following:
Divide each circle into quarters.
How many quarters are there in the 3 circles? _____

$\therefore\ 3 \div \frac{1}{4} =$ _____



(2) Use the adjacent figure and determine:

$\frac{1}{2}$ of the square $\div\ 4\ =$ _____



In exercise 8 we saw that: (1) $3 \div \frac{1}{4} = 12$ and (2) $\frac{1}{2}$ of 1 square $\div\ 4 = \frac{1}{8}$

Why is this? Remember that $\div$ is the opposite operation of $\times$!

$\therefore$ in (1) $3 \div \frac{1}{4}$

$= \frac{3}{1} \times \frac{4}{1}$

$= \frac{12}{1}$

= 12

(2) $\frac{1}{2}$ of 1 square $\div\ 4$

$= \frac{1}{2} \times 1 \div \frac{4}{1}$

$= \frac{1}{2} \times \frac{1}{4}$

= $\frac{1}{8}$

E.g.5 Calculate the following, without using a calculator:

(a) $\frac{2}{3} \div \frac{4}{9}$

$= \frac{2}{3} \times \frac{9}{4}$

$= \frac{\cancel{2}^{1}}{\cancel{3}_{1}} \times \frac{\cancel{9}^{3}}{\cancel{4}_{2}}$

$= \frac{3}{2} = 1\frac{1}{2}$

(b) $1\frac{1}{2} \div \frac{6}{7}$

$= \frac{3}{2} \times \frac{7}{6}$

$= \frac{\cancel{3}^{1}}{2} \times \frac{7}{\cancel{6}_{2}}$

$= \frac{7}{4} = 1\frac{3}{4}$

Exercise 9:

Calculate the following, without using a calculator:

(1) $\frac{2}{3} \div \frac{1}{3}$ (2) $\frac{8}{10} \div \frac{4}{25}$ (3) $2\frac{1}{4} \div \frac{9}{10}$

(4) $\frac{5}{6} \div \frac{5}{6}$ (5) $4\frac{1}{2} \div 18$ (6) $\frac{5}{12} \div \frac{5}{18}$

(7) $\frac{1}{2} \div \frac{1}{4}$ (8) $3\frac{1}{3} \div 2\frac{1}{2}$ (9) $\frac{1}{3}$ of $\frac{6}{7}$

(10) $\frac{4}{5} \div \frac{3}{5} \div \frac{2}{3}$ (11) $8 \div \frac{1}{5} \div 3\frac{1}{8}$ (12) $6 \div 1\frac{3}{4}$

A3.1.4.3 Combination of calculations:

* **Remember the order of operations**:
(1) Brackets
(2) Powers and roots
(3) Of → ×
(4) Multiplication and division
(5) Plus and minus

E.g.6 Calculate, without using a calculator.

(a) $\frac{1}{2} + 4 \times \left(1 - \frac{1}{8}\right)$ Remember order of operations!

$= \frac{1}{2} + \frac{4}{1} \times \left(\frac{1}{1} - \frac{1}{8}\right)$ First do the brackets.

$= \frac{1}{2} + \frac{4}{1} \times \left(\frac{8}{8} - \frac{1}{8}\right)$ Determine LCM of the denominators in brackets.

$= \frac{1}{2} + \frac{4}{1} \times \frac{7}{8}$ Simplify fractions in brackets.

$= \frac{1}{2} + \frac{7}{2}$ Now do the multiplication.

$= \frac{8}{2}$ Add the numerators - the denominators are the same.

$= 4$ Simplify.

(b) $1\frac{1}{3} - \frac{1}{2} \div 4 + \frac{1}{6}$

$= \frac{4}{3} - \frac{1}{2} \times \frac{1}{4} + \frac{1}{6}$ Remember that × is the opposite operation of ÷.

$= \frac{4}{3} - \frac{1}{8} + \frac{1}{6}$ First do the multiplication.

$= \frac{32}{24} - \frac{3}{24} + \frac{4}{24}$ Find the LCM of denominators and write equivalent fractions.

$= \frac{33}{24}$ Simplify numerators.

$= 1\frac{9}{24} = 1\frac{3}{8}$ Simplify the answer.

Exercise 10:

Calculate, without using a calculator:

(1) $\frac{3}{4} - \frac{3}{4} \times \frac{5}{6}$

(2) $3\frac{1}{2} - \frac{1}{2}$ of $3 + \frac{1}{4}$

(3) $\left(\frac{1}{3} + \frac{1}{2}\right) + \frac{1}{12}$

(4) $\left(\frac{5}{8} + \frac{1}{2}\right) \div \frac{3}{4}$

(5) $\left(\frac{1}{4} + \frac{3}{5}\right) \div \left(\frac{4}{5} - \frac{1}{2}\right)$

(6) $\frac{1}{3}$ of $\frac{2}{5} \times 2\frac{5}{8}$

(7) $6 - \frac{1}{8} \times \frac{2}{3} \div 1\frac{1}{3}$

(8) $\frac{4}{5} + \frac{1}{4}$ of $2 - 1$

(9) $\frac{13}{15} - \left(\frac{2}{5} + \frac{1}{10}\right)$

(10) $7\frac{3}{5} \times \frac{1}{4}$ of $\frac{6}{19} + \frac{7}{10}$

(11) $\frac{1}{5} + \frac{1}{3} \times \left(\frac{2}{5} \div \frac{4}{15}\right)$

(12) $\frac{2}{3}$ of $\frac{1}{2}$ of 56

A3.1.5 Applications:

E.g.7 (a) Susan is at school for a third of her day. How many hours does she spend at school?

(b) Divide $7\frac{1}{2}$ litres of milk among 30 children. Give your answer in litre as well as in millilitres.

****

(a) $\frac{1}{3}$ **of 24 hours**

$= \frac{1}{3} \times \frac{24}{1}$

$= \frac{24}{3} = 8$

∴ Susan is at school 8 hours per day.

(b) $7\frac{1}{2} \div 30$

$= \frac{15}{2} \div \frac{30}{1}$

$= \frac{15}{2} \times \frac{1}{30} = \frac{1}{4}$

∴ Each gets a quarter litre of milk or 250 mℓ.

Exercise 11:

(1) Jan eats a third of a chocolate and Paul eats a quarter of the same chocolate. How much of the chocolate did they eat? How much of the chocolate is left?

(2) There are $13\frac{3}{4}$ metres of cord on a reel. It is used to hem cushions. If one cushion requires $2\frac{1}{2}$ metres of cord, how many cushions can be hemmed with the available cord?

(3) I drink half a bottle cooldrink containing 340 mℓ. You drink a quarter bottle of the bottle of cooldrink containing 1 litre. How many litres of cooldrink did we drink in total? How many millilitres of cooldrink are left?

(4) A group of 12 children wins a prize consisting of $7\frac{1}{5}$ kg sweets. If the sweets are divided equally between them, how many kilograms of sweets does each get? How many grams of sweets does each get?

(5) My father must drive 500 kilometres. When he stops to fill up with fuel, he has finished $\frac{3}{4}$ of the distance. What distance does he still have to drive? Express your answer in kilometres as well as in cm.

(6) Sean buys a packet of 120 sweets. On the first day he eats $\frac{1}{3}$ of the sweets. The next day he eats half of what was left from the previous day. How many sweets are left for the third day?

(7) Represent this question in a diagram!

(a) There are 720 learners in a school. $\frac{2}{3}$ of them are girls. How many girls are there in the school?

(b) Of all the girls $\frac{1}{8}$ is in grade 7. How many girls are in grade 7?

(c) Of all the girls who are in grade 7, $\frac{1}{5}$ plays hockey. How many girls in grade 7 play hockey?

(d) If there are 11 players in a hockey team, determine whether it will be possible to form a hockey team consisting only of grade 7 girls.

☺ **Calculate:** **(a)** $\left(\frac{2}{3}\right)^3 + \frac{5}{9}$ **(b)** $\sqrt{\frac{4}{25}} - \frac{3}{10}$

A3.2 Decimal fractions:

A3.2.1 Conversion of fractions:

E.g.8 Write the following fractions as decimal fractions:
(First write the fraction as an equivalent fraction with a denominator of 10 or 100 in each case)

(a) $\frac{1}{4} = \frac{1 \times 25}{4 \times 25} = \frac{25}{100} = 0,25$ **(b)** $\frac{1}{5} = \frac{1 \times 2}{5 \times 2} = \frac{2}{10} = 0,2$

E.g.9 Write the following as decimal fractions in the simplest form:

(a) $0,7 = \frac{7}{10}$ **(b)** $0,75 = \frac{75}{100} = \frac{75 \div 25}{100 \div 25} = \frac{3}{4}$

Exercise 12:

(1) Write the following fractions as decimal fractions:

(a) $\frac{1}{25}$ (b) $\frac{3}{4}$ (c) $\frac{3}{10}$ (d) $\frac{23}{50}$ (e) $\frac{4}{5}$

(f) $\frac{13}{25}$ (g) $\frac{19}{20}$ (h) $\frac{1}{2}$ (i) $\frac{8}{25}$ (j) $1\frac{11}{20}$

(2) Write the following as common fractions in the simplest from:

(a) 0,4 (b) 0,1 (c) 0,25 (d) 0,6 (e) 0,125

(f) 0,35 (g) 0,05 (h) 0,44 (i) 0,99 (j) 1,0375

A3.2.2 Order of decimal fractions:

Remember: 0,32 > 0,31 ; 0,3 > 0,03 ; 0,5 > 0,4 or 0,88 > 0,77

Exercise 13:

(1) Insert > ; < or = to make a true statement:

(a) 0,4 ___ 0,04 (b) 0,24 ____ 0,27 (c) 1,44 ____ 1,55

(d) 0,25 ____ 0,52 (e) 5,66 ____ 5,6 (f) 0,070 ____ 0,07

(2) Write the next five numbers of the sequence:

(a) 0,7 ; 0,8 ; 0,9 ; _____

(b) 0,95 ; 0,9 ; 0,85 ; _____

(c) 0,51 ; 0,52 ; 0,53 ; _____

(d) 4,02 ; 4,04 ; 4,06 ; _____

(e) 12,171 ; 12,161 ; 12,151 ; _____

(f) 1,5 ; 1,4 ; 1,3 ; _____

(g) 0,534 ; 0,539 ; 0,544 ; _____

(h) 1,0 ; 0,94 ; 0,88 ; _____

(i) 9,5 ; 9,25 ; 9 ; _____

(j) 34 ; $34\frac{1}{4}$; 34,5 ; _____

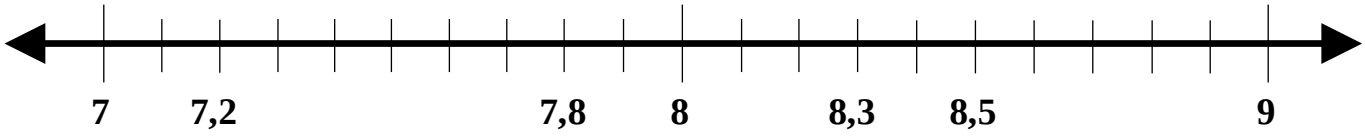
(3) Insert any five decimal fractions between each of the following:

(a) 0,4 _____ 0,5

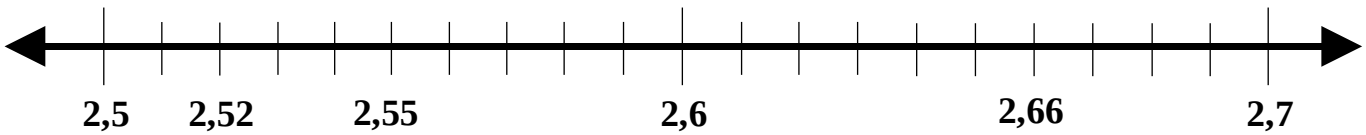
(b) 7,1 _____ 7,16

(c) 34,375 _____ 34,385

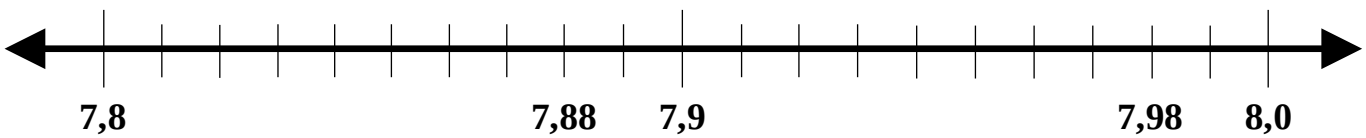
A3.2.3 Rounding-off of decimal fractions:



Here we see that 7,2 is closer to 7 and 7,8 is closer to 8, with 8,5 in the middle between 8 and 9.
Therefore, we round off as follows:
7,2 rounded off to the nearest integer is 7 and 7,8 rounded off to the nearest integer is 8
but 8,5 rounded off to the nearest integer is 9!



Here we see that:
2,52 rounded off to the nearest tenth is 2,5
2,55 rounded off to the nearest tenth is 2,6
2,66 rounded off to the nearest tenth is 2,7



Here we see that:
7,88 rounded off to the nearest tenth is 7,9 but 7,98 rounded off to the nearest tenth is 8,0

Remember: the symbol ≈ means – approximately equal or about equal!

Remember: To round off to the nearest tenth means the same as correct to 1 decimal digit.
To round off to the nearest hundredth means the same as correct to 2 decimal digits.
To round off to the nearest thousandth means the same as correct to 3 decimal digits.

Exercise 14:

(1) Round off the following, correct to the nearest tenth:

(a) 0,44 (b) 0,75 (c) 0,271

(d) 8,31 (e) 11,06 (f) 0,047

(2) Round off the following, correct to the nearest hundredth:

(a) 0,441 (b) 7,929 (c) 44,003

(d) 1,009 (e) 0,565 (f) 9,1266

(3) Round off the following, correct to the nearest integer:

(a) 0,44	(b) 7,929	(c) 8,31
(d) 0,75	(e) 0,565	(f) 0,04

(4) (a) 19,243 rounded off to 1 decimal digit
(b) 0,1777 rounded off to 3 decimal digits
(c) 14,485 rounded off to 2 decimal digits
(d) 34,34 rounded off to the nearest ten
(e) 112,89 rounded off to the nearest integer
(f) 9,89 rounded off to 1 decimal digit

A2.3.4 Estimation of answers:

To obtain answers by inspection or estimation, we use rounding-off.
Remember, these answers are not the correct, exact answers, but only estimated answers!

E.g.10 Determine an estimated answer to the following, without doing actual calculations:

(a) $3,16 \times 5,87$
$\approx 3 \times 6$ **rounded off to the nearest integer**
≈ 18

(b) $24,56 \div 2$
$\approx 25 \div 2$
$\approx 12,5$ **or** $12\frac{1}{2}$

Exercise 15:

Determine an estimated answer to the following, without doing actual calculations:

(1) 3,45 × 11,211	(2) 40,01 ÷ 5	(3) 20,56 × 3,33
(4) 9,4 × 3,982	(5) 230,12 ÷ 40	(6) 119,91 × 19,91
(7) 450,151 ÷ 30	(8) 484,1 ÷ 4	(9) 11,49 × 0,59

A3.2.5 Calculations with decimal fractions:

A3.2.5.1 Addition and subtraction:

E.g.11 Calculate, without using a calculator:

(a) $0,3 + 1,4 = 1,7$ **(b)** $5,8 - 5,3 = 0,5$

E.g.12 Calculate, without using a calculator:

(a) $1,83 + 3,466$

$$\begin{array}{r} 11,83 \\ +\,3,466 \\ \hline 5,296 \end{array}$$

(b) $0,675 - 0,512$

$$\begin{array}{r} 0,675 \\ -\,0,512 \\ \hline 0,163 \end{array}$$

(c) $9 - 3,7$

$$\begin{array}{r} 8\not{9}^{1},0 \\ -\,3,7 \\ \hline 5,3 \end{array}$$

Exercise 16:

Calculate, without using a calculator:

(1) $3{,}6 + 4{,}3$

(2) $8{,}8 + 0{,}1$

(3) $0{,}3 + 0{,}7$

(4) $7{,}7 - 7{,}5$

(5) $0{,}9 - 0{,}7$

(6) $1{,}3 - 0{,}3$

(7)
$$\begin{array}{r} 6{,}345 \\ +\ 1{,}43 \end{array}$$

(8)
$$\begin{array}{r} 0{,}293 \\ +\ 0{,}219 \end{array}$$

(9)
$$\begin{array}{r} 0{,}12 \\ +\ 4{,}441 \end{array}$$

(10)
$$\begin{array}{r} 0{,}222 \\ +\ 0{,}888 \end{array}$$

(11)
$$\begin{array}{r} 1{,}003 \\ +\ 7{,}9 \end{array}$$

(12)
$$\begin{array}{r} 2{,}33 \\ +\ 6{,}47 \end{array}$$

(13)
$$\begin{array}{r} 9{,}92 \\ +\ 0{,}451 \end{array}$$

(14)
$$\begin{array}{r} 6{,}483 \\ +\ 4{,}396 \end{array}$$

(15)
$$\begin{array}{r} 9{,}8 \\ +11{,}5 \end{array}$$

(16)
$$\begin{array}{r} 7{,}36 \\ 1{,}67 \\ +\ 2{,}04 \end{array}$$

(17)
$$\begin{array}{r} 1{,}492 \\ 4{,}902 \\ +\ 3{,}345 \end{array}$$

(18)
$$\begin{array}{r} 4{,}413 \\ 7{,}9 \\ +\ 2{,}03 \end{array}$$

(19)
$$\begin{array}{r} 0{,}009 \\ 0{,}09 \\ +\ 0{,}9 \end{array}$$

(20)
$$\begin{array}{r} 7{,}002 \\ 1{,}02 \\ +\ 3{,}992 \end{array}$$

(21)
$$\begin{array}{r} 2{,}1 \\ 1{,}21 \\ +\ 3{,}717 \end{array}$$

(22)
$$\begin{array}{r} 1{,}982 \\ -\ 0{,}452 \end{array}$$

(23)
$$\begin{array}{r} 4{,}009 \\ -\ 3{,}001 \end{array}$$

(24)
$$\begin{array}{r} 3{,}7 \\ -\ 2{,}8 \end{array}$$

(25)
$$\begin{array}{r} 123{,}457 \\ -\ 111{,}584 \end{array}$$

(26)
$$\begin{array}{r} 8{,}934 \\ -\ 6{,}151 \end{array}$$

(27)
$$\begin{array}{r} 2{,}98 \\ -\ 1{,}292 \end{array}$$

(28)
$$\begin{array}{r} 0{,}236 \\ -\ 0{,}199 \end{array}$$

(29)
$$\begin{array}{r} 22{,}029 \\ -\ 9{,}35 \end{array}$$

(30)
$$\begin{array}{r} 2{,}344 \\ -\ 2{,}305 \end{array}$$

(31)
$$\begin{array}{r} 6{,}008 \\ -\ 1{,}435 \end{array}$$

(32)
$$\begin{array}{r} 7{,}4 \\ -\ 3{,}7 \end{array}$$

(33)
$$\begin{array}{r} 8{,}3748 \\ -\ 4{,}468 \end{array}$$

(34) $36{,}12 + 23{,}4 + 9{,}19$

(35) $24{,}334 + 12{,}123 - 15{,}736$

(36) $8{,}08 - 3{,}2 + 2{,}11$

(37) $129{,}456 - 34{,}854 - 84{,}002$

☺ **Which of the following is the largest $4\frac{21}{25}$ or $4{,}88$?**
Show all calculations!

A3.2.5.2 Multiplication and division:

E.g.13 Calculate the following, without using a calculator:

(a) $12,341 \times 10 = 123,41$ **(b)** $12,341 \times 100 = 1\,234,1$ **(c)** $12,341 \times 1\,000 = 12\,341$

(d) $7,12 \times 50 = 7,12 \times 10 \times 5$
$= 71,2 \times 5$
$= 356,0$

$$\begin{array}{r} {\scriptstyle 1} \\ 71,2 \\ \times\quad 5 \\ \hline 356,0 \end{array}$$

Start multiplying from the back ∴ with the 2!

E.g.14 Calculate the following, without using a calculator:

(a) $3\,425 \div 10 = 342,5$ **(b)** $3\,425 \div 100 = 34,25$ **(c)** $3\,425 \div 1\,000 = 3,425$

(d) $23,35 \div 10 = 2,335$

(e) $23,35 \div 50$
$= \frac{23,35}{50}$
$= \frac{23,35}{10 \times 5}$
$= \frac{2,335}{5}$
$= 0,467$

∴ first divide with the 10

$$\begin{array}{r} 0,\ 4\ 6\ 7 \\ \hline 5 \;\big|\; 2,^{2}3^{3}3^{3}5 \end{array}$$

Start dividing from the front ∴ with the 2!

(f) $437,4 \div 3\,000 = \frac{437,4}{3\,000} = \frac{4\,3\,7,4}{3\,0\,0\,0} = \frac{0,4374}{3} = \frac{0,4^{1}3^{1}7^{2}4}{3} = 0,1458$

Exercise 17:

(1) Calculate the following, without using a calculator:

(a) $0,2 \times 3$ (b) $0,4 \times 4$ (c) $0,03 \times 6$

(d) $\frac{1,6}{4}$ (e) $\frac{0,08}{2}$ (f) $\frac{0,45}{5}$

(g) $237,34 \times 100$ (h) $95,394 \times 10$ (i) $647,36 \div 10$

(j) $1,933 \div 100$ (k) $1,325 \div 10$ (l) $28\,930,1 \div 1\,000$

(2) Calculate the following, without using a calculator:

(a) $1{,}2 \times 0{,}3$ (b) $0{,}4 \times 1{,}1$ (c) $0{,}003 \times 2{,}1$

(d) $0{,}001 \times 3{,}3$ (e) $5{,}5 \times 0{,}2$ (f) $1{,}2 \times 1{,}2$

(g) $3{,}5 \div 5$ (h) $0{,}016 \div 4$ (i) $28{,}2 \div 4$

(j) $\frac{14{,}4}{12}$ (k) $\frac{0{,}0004}{2}$ (l) $\frac{6{,}2}{5}$

(3) Calculate the following, without using a calculator:

(a) $1{,}23 \times 20$ (b) $9{,}02 \times 50$ (c) $38{,}4 \times 2\,000$

(d) $1{,}2 \times 200$ (e) $60 \times 5{,}4$ (f) $403{,}2 \times 300$

(4) Calculate the following, without using a calculator:

(a) $\frac{14{,}8}{20}$ (b) $\frac{5{,}35}{50}$ (c) $\frac{2\,707{,}2}{600}$

(d) $\frac{107{,}8}{7\,000}$ (e) $\frac{1{,}6}{80}$ (f) $\frac{17{,}7}{300}$

(5) Calculate the following, without using a calculator:

(a) $6\,012{,}5 \div 50$ (b) $76{,}88 \div 200$ (c) $4{,}36 \div 40$

(d) $14{,}4 \div 800$ (e) $532{,}8 \div 6\,000$ (f) $1{,}05 \div 70$

E.g.15 Calculate the following, without using a calculator and round off the answer to the nearest tenth: $23,4 \times 1,2$

But $234 \times 12 = 2\,808$ →
However, there are two places after the commas in the original question: $23,4 \times 1,2$
Therefore, there must be two places after the comma in the answer!
∴ $23,4 \times 1,2 = 28,08$
$\approx 28,1$

$$\begin{array}{r} 234 \\ \times\ 12 \\ \hline {}^{1}468 \\ 2\,340 \\ \hline 2\,808 \end{array}$$

Rounded off to the nearest tenth!

Exercise 18:

(1) Calculate the following, without using a calculator, and round off the answer, correct to the nearest tenth:

(a) $3{,}45 \times 8{,}9$ (b) $5{,}67 \times 2{,}3$ (c) $4{,}5 \times 6{,}23$ (d) $7{,}4 \times 0{,}003$

(2) Calculate the following, without using a calculator, and round off the answer, correct to two decimal digits:

(a) $3{,}2 \times 1{,}005$ (b) $1{,}6 \times 1{,}12$ (c) $5{,}5 \times 2{,}34$ (d) $8{,}2 \times 1{,}34$

A3.2.6 The calculator:

E.g.16 Calculate, by using a non-scientific calculator. Correctly round off the answer to 1 decimal digit:

Keys:

(a) $0,34 \times 1,245 = 0,4233 \approx 0,4$ [$0,34 \times 1,245 = S \Leftrightarrow D$]

(b) $42,56 \div 30 = 1,4186 \ldots \ldots \approx 1,4$ [$42,56 \div 30 = S \Leftrightarrow D$]

(c) $25,5 - 2,1 \times 9,76 = 5,004 \approx 5,0$ [$25,5 - 2,1 \times 9,76 = S \Leftrightarrow D$]

Exercise 19:

(1) Calculate, by using a non-scientific calculator. Correctly round off the answer to 2 decimal digits.

(a) $34,8 \times 8,3$

(b) $12,8 \div 700$

(c) $5,122 \div 60$

(d) $8,37 \times 0,56$

(e) $4,83 + 3,85 - 6,1$

(f) $2,85 \times 5,09$

(g) $96,45 \div 8\,000$

(h) $3,4 + 88,9$

(i) $45,34 - 28,94$

(j) $(37,8)(967,02)$

(2) Calculate, by using a non-scientific calculator. Correctly round off the answer to the nearest tenth:

(a) $2,3 \times 8,9 \div 50$

(b) $5,2 + 5,4 \times 8,8$

(c) $3,4 \times (6,5 - 3,5)$

(d) $134,4 \div 40 \div 20$

(e) $3,5 \times 17,1 + 2,456$

(f) $55,3 \ of \ 34,5$

(g) $\frac{23,76}{40} + 43,67$

(h) $(8,72)^2$

(3) Consider the following: (a) $4,56 \times 11,81$ (b) $900,09 \div 300$

Determine the answers in (a) and (b) by:

(i) estimation

(ii) calculation. Show all calculations.

(iii) using a calculator. Round off the answer to the nearest integer.

A3.2.7 Applications:

E.g.17 Twenty friends go to eat pizza. The total account is R652,60. If all the pizzas cost the same, calculate how much each must pay.

Price of one pizza: $R652,60 \div 20 = \frac{652,6}{20} = \frac{65,26}{2} = \frac{65\overset{1}{,}26}{2} = 32,63$

∴ Each must pay R32,63.

Exercise 20:

(1) Nine children each weigh 34,7 kg. What is their total weight? Added together, how many grams do the children weigh together?

(2) A drum contains 48,45 litres of water. It must be divided between 5 drinking basins. How many millilitres water will be in each basin?

(3) Four packets of flour respectively weigh: 2,45 kg ; 5,84 kg ; 3,04 kg and 6,33 kg. Calculate the total weight of the three heaviest packets of flour.

(4) I fill up my car with fuel. The fuel costs R5,89 per litre. 54 litres are poured into the tank. Calculate the total cost of the fuel.

(5) For 20 days Peter jogs a certain number of kilometres every day. How far does he jogs every day if he jogs 252,6 km in total during the 20 days? How many meters did he jog in 7 days?

(6) One bag of oranges costs R19,35.
(a) Calculate the price of 65 bags of oranges.
(b) Each bag contains 45 oranges. What does one orange cost?

(7) In a vegetable basket with 24 items, there are 10 packets of carrots which weigh 2,94 kilogram each. The rest are packets with onions, weighing 3,73 kg each. How many grams do all the items in the food basket weigh together?

(8) I buy 6,2 litres orange juice. I give 3,86 litres to a friend. I divide the rest among 6 people. How many millilitres does each person get?

☺ **In a certain household the following monthly budget is compiled:**

Rent (house)	**= R3 000**	**Domestic**	**= R4 000**
Fuel	**= R1 000**	**Savings**	**= R300**
School fees	**= R500**	**Social**	**= R200**

(a) Determine the total amount of the budget.
(b) What fraction of the budget is spent on the following?
(i) Rent
(ii) Fuel
(iii) Savings

A3.3 REVISION EXERCISE:

(1) Consider the following fractions: (i) $\frac{2}{3}$ (ii) $\frac{4}{3}$ (iii) $1\frac{1}{4}$ (iv) $\frac{5}{6}$ (v) $\frac{2}{1}$

(a) Write down the improper fraction(s).
(b) Write down the equivalent fractions.
(c) Write down the mixed fraction(s).
(d) Write down three equivalent fractions for both (iii) and (iv).
(e) Arrange the fractions in (i) ; (iii) and (iv) in ascending order.
(f) What is the sum of the fractions in (ii) ; (iii) and (iv)?
(g) What is the difference between (v) and (i)?

(2) (a) Convert the following fractions to decimal fractions:

(i) $\frac{4}{5}$ (ii) $\frac{36}{25}$ (iii) $\frac{44}{200}$ (iv) $2\frac{13}{20}$

(b) Convert the following decimal fractions to normal fractions in the simplest form:

(i) 0,8 (ii) 4,45 (iii) 0,008 (iv) 0,22

(3) Insert: < ; > or =

(a) $\frac{4}{5}$ _____ $\frac{7}{8}$ (b) $\frac{3}{21}$ _____ $\frac{1}{7}$ (c) $1\frac{1}{3}$ _____ $\frac{3}{4}$ (d) $\frac{34}{5}$ _____ 7

(e) 4,51 _____ 4,511 (f) $\frac{5}{6}$ _____ $\frac{2}{3}$ (g) 4,5 _____ $\frac{9}{2}$ (h) $\frac{3}{4}$ _____ 0,7

(4) Calculate the following, without using a calculator: (Show all calculations!)

(a) $\frac{2}{3} + \frac{2}{3}$ (b) $\frac{7}{8} - \frac{1}{4}$ (c) $5 - 2\frac{1}{3}$

(d) $7\frac{2}{5} + 3\frac{1}{4}$ (e) $\frac{5}{12} \times \frac{3}{10}$ (f) $1\frac{2}{3} \div \frac{5}{18}$

(g) $4 - \left(2\frac{1}{2} + \frac{1}{3}\right)$ (h) $\frac{7}{8} \div 1\frac{3}{4}$ (i) $\frac{3}{7}$ of 21

(j) $6\frac{1}{2} - 5\frac{1}{4}$ (k) $\frac{7}{10} \times \frac{2}{14}$ (l) $3\frac{1}{2}$ of $8 - 2\frac{1}{4}$

(m) $\frac{5}{9} + \frac{1}{4} \times 2\frac{2}{3}$ (n) $4\frac{1}{3} \div 5\frac{1}{5} + \frac{3}{5}$ (o) $1\frac{1}{4} + 2\frac{1}{2} - \frac{3}{4}$

(p) $\left(\frac{1}{6} + \frac{2}{9}\right) \times 2\frac{1}{3}$ (q) $9 - \frac{4}{5} - 3\frac{1}{10}$ (r) $2\frac{3}{7} + \frac{1}{3}$ of 6

(5) Calculate without using a calculator, correct to the nearest hundredth:

(a) $3{,}45 - 2{,}23$ (b) $45{,}921 + 34{,}837$ (c) $354{,}2 \times 3{,}5$

(d) $230{,}46 \div 20$ (e) $0{,}2(45{,}3 + 22{,}81)$ (f) $2 \times 4{,}5 \times \frac{4}{5}$

(6) Consider the following numbers: (i) $7\frac{4}{5}$ (ii) $4\frac{1}{10}$

(a) Convert the numbers in (i) and (ii) to decimal fractions.

(b) Estimate what the sum of $7\frac{4}{5}$ and $4\frac{1}{10}$ will be.

(c) Calculate the sum of $4\frac{1}{10}$ and $7\frac{4}{5}$. Show all calculations.

(d) Calculate the sum of the answers of (i) and (ii) in (a).

(e) Use your calculator and calculate, to the nearest integer, the sum of $7\frac{4}{5}$ and $4\frac{1}{10}$.

(7) In a cricket team there are 2 boys who are each 1,34 metres tall. Two of the boys are 1,45 metres tall. Three of the boys are each 1,41 metres tall. The rest are respectively 1,57 metres, 1,22 metres, 1,35 metres and 1,60 metres tall. Calculate the total height of all the boys in the team. Express your answer in terms of metre as well as in centimetre.

(8) A reel of wire contains 1 900,5 metres of wire. It must be cut into 700 pieces of equal length. How long will each piece be?

(9) Sixty cans of oil cost R853,20. What will the price of:

(a) one can of oil be?

(b) 15 cans of oil be?

(c) 51 cans of oil cost?

(d) How many cans of oil will cost R1 422?

(10) Sue buys $6\frac{1}{2}$ dozen eggs. Calculate:

(a) How many eggs did she buy?

(b) She uses $\frac{1}{6}$ of the eggs to bake cake. How many eggs are left?

(c) She gives $\frac{4}{13}$ of her remaining eggs to her neighbour. How many dozen eggs are left?

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