

Mathematics

Part 2

CLASS TEXT & STUDY GUIDE

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GRADE

7

CAPS

3-in-1



THE
ANSWER
SERIES *Your Key to Exam Success*



Grade 7 Mathematics 3-in-1 (Part 2)

CLASS TEXT & STUDY GUIDE

This Class Text & Study Guide places a strong emphasis on concept development and deep understanding across all five CAPS modules, enabling learners to master essential and fundamental mathematical skills. It is designed to develop deep mathematical thinking, and is guaranteed to thoroughly prepare a learner for high school Mathematics.

The essence of its content is to provide learners with a solid foundation and grounding, together with extended thinking in this critical year as they enter the Senior Phase. This comprehensive and learner-friendly study guide will give a learner the best chance of continuing with Mathematics right through to Grade 12.

This publication aims to:

- Ensure mastery of fundamental knowledge and skills aligned to the Senior Phase curriculum
- Focus on critical concepts that underpin the year ahead
- Strengthen typical problem areas
- Encourage understanding over rote learning
- Prepare learners to enter high school Maths with clarity and confidence.

Key features:

- Rich, accessible explanations and teaching tips
- Continuous reinforcement of concepts across topics
- CAPS-aligned Exam Papers with detailed memos
- 'Take Note' boxes to highlight important insights
- Summaries, Reminders, and Hints
- Fun and engaging elements like Investigations, Fun Facts, Challenges and Crossword Puzzles.

This easy-to-use classroom and study companion empowers learners to take ownership of their Maths learning journey while building curiosity and confidence in a subject that is both essential and demanding.





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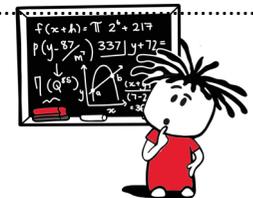
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TOPIC
1

NUMERIC & GEOMETRIC PATTERNS

The Language of Patterns



A pattern is made up of terms.

Instead of using words, we use shorthand notation, and we link the value of each term to its position in the pattern.

The 1st term is called T_1 , the 2nd term is called T_2 , and so on. When the position of a term is unknown, we can use a letter to represent its unknown position. If we use the letter n , the term in position n is the n^{th} term, also referred to as T_n .

T_n is known as the general term and is used to give the rule for each term in the pattern.

Numeric Patterns

In the number pattern 12 ; 24 ; 36 ; 48 ; 60 ; ...

- the 1st term is 12, which means $T_1 = 12$
- the 2nd term is 24, which means $T_2 = 24$, and so on ...

Can you spot the pattern and find a general rule for finding the value of the n^{th} term in the sequence?



Spotting the pattern ...

12 ; 24 ; 36 ; 48 ; 60 are multiples of 12.

What is the **link** between each term's **value** and its **position**?

- Express the value of each term as a multiple of 12.

$$T_1 = 12 = 12 \times 1$$

$$T_2 = 24 = 12 \times 2$$

$$T_3 = 36 = 12 \times 3$$

$$T_4 = 48 = 12 \times 4$$



Finding the general term ...

- **In words:**

The value of any term can be found by multiplying the term's position by 12.

- **In shorthand**

$$T_n = 12n$$

- n represents the position of any term in the sequence. If we know a term's position, we can find its value.
- T_n represents the value of the term in position n . If we know a term's value, we can find its position.

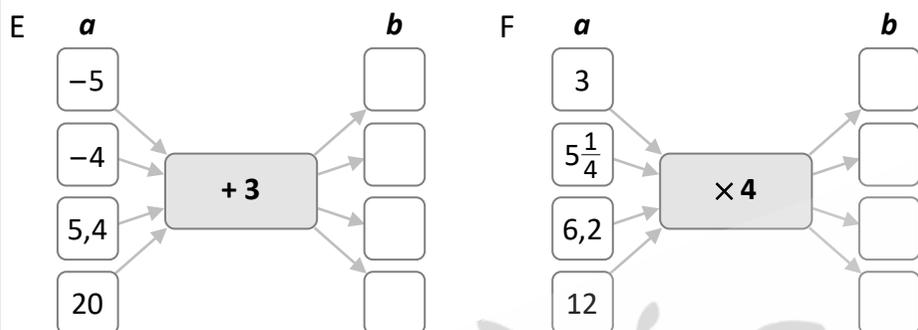
Take Note
 $12n$ means $12 \times n$



Exercise 1

Solutions on p. A191

Answer the questions that follow for E and F.



- Calculate the output value for each input value.
- Explain in words how the output value is found.
- Write down a rule to find an output value of b given an input value of a in the form $b = \dots$

Given output values, reverse the process using inverse operations, working from right to left to find the input values.

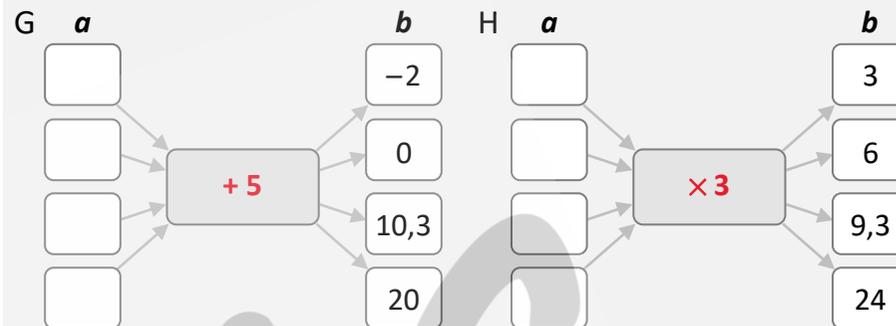
Inverse operations include:

- addition & subtraction
- multiplication & division



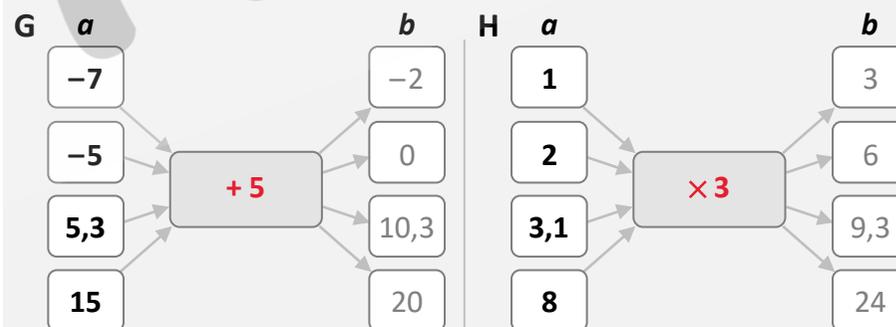
Worked Example

Answer the questions that follow for G and H.



- Calculate the input value for each output value.
- Explain in words how the input value is found.
- Write down a rule to find an input value of a given an output value of b in the form $a = \dots$

Answer



- $-2 - 5 = -7$ $0 - 5 = -5$ $3 \div 3 = 1$ $6 \div 3 = 2$
 $10,3 - 5 = 5,3$ $20 - 5 = 15$ $9,3 \div 3 = 3,1$ $24 \div 3 = 8$
- Subtract 5 from the output value.
- $a = b - 5$ $a = b \div 3 = \frac{b}{3}$

Solving Problems using Triangles



These problems require a clear mind and a step by step approach.

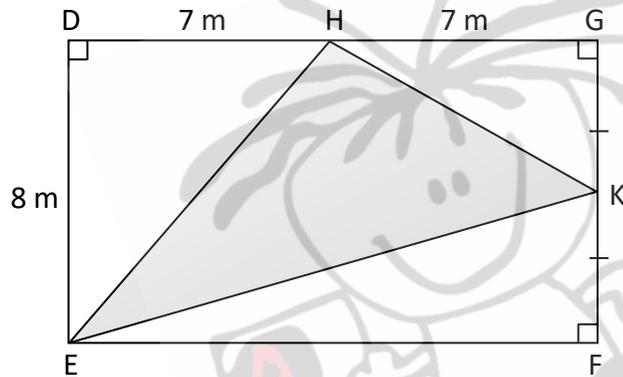


Refer to page 65 in Learner Book Part 1 for problem solving notes.

Exercise 13

Solutions on p. A301

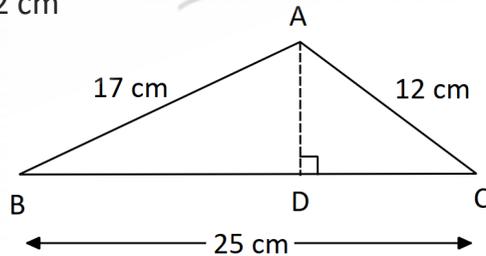
1.



- 1.1 Calculate the area of $\triangle HEK$.
- 1.2 What fraction of rectangle DEFG is shaded?

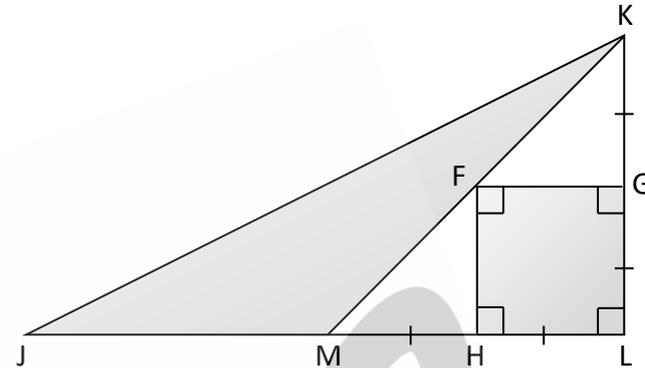


2. $\triangle ABC$ has $AB = 17$ cm, $AC = 12$ cm and $BC = 25$ cm.



- 2.1 Calculate the area of $\triangle ABC$ without using a calculator.
- 2.2 Calculate the length of AD.

3. $JL = 8$ cm and $KL = 4$ cm.



- 3.1 Classify quadrilateral FGLH and give a reason for your answer.
- 3.2 Calculate the area of FGLH.
- 3.3 What fraction of $\triangle KLM$ is shaded?
- 3.4 Calculate the area of $\triangle JKM$.
- 3.5 What fraction of $\triangle JKL$ is shaded?
- 3.6 In $\triangle JKL$, what is the ratio of the shaded area : unshaded area?
- 3.7 Classify $\triangle JKL$.
- 3.8 Classify $\triangle FHM$.
- 3.9 Calculate the size of $\hat{M}KL$ and give a reason.
- 3.10 Calculate the size of $\hat{J}MK$ and give a reason.
- 3.11 Classify $\triangle JKM$.



If you know the **ratio of the dimensions of a rectangular prism** and the **total surface area**, you can calculate the **volume**.

Worked Example

The ratio of the dimensions of a rectangular prism are given as follows:

$$\text{length} : \text{breadth} : \text{height} = 5 : 3 : 2$$

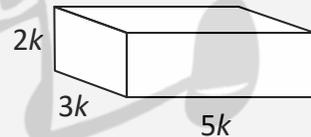
The total surface area of the prism is 558 cm^2 .

1. If the height is $2k$, state the other two dimensions in terms of k .
2. Calculate the dimensions of the prism.
3. Calculate the volume of the prism.
4. What is the capacity of the prism in litres?



Answer

1. The breadth is $3k$ and the length is $5k$.



2. Total surface area = 558 cm^2

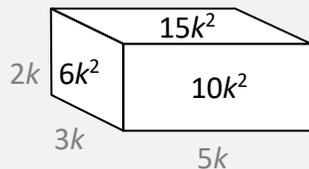
$$\therefore 2 \times (5k \times 3k) + 2 \times (5k \times 2k) + 2 \times (3k \times 2k) = 558$$

$$\therefore 30k^2 + 20k^2 + 12k^2 = 558$$

$$\therefore 62k^2 = 558$$

$$\therefore k^2 = 9$$

$$\therefore k = 3$$



\therefore the dimensions are:

$$\text{length} = 5k = 5 \times 3 = 15 \text{ cm}$$

$$\text{breadth} = 3k = 3 \times 3 = 9 \text{ cm}$$

$$\text{height} = 2k = 2 \times 3 = 6 \text{ cm}$$

$$3. \text{ Volume} = 15 \times 9 \times 6$$

$$= 810 \text{ cm}^3$$

$$4. 810 \text{ cm}^3 = 810 \text{ ml} = 0,810 \text{ l} = 0,81 \text{ l}$$

Exercise 8

Solutions on p. A313

1. A rectangular prism with a total surface area of 112 cm^2 has length : breadth : height = $4 : 2 : 1$.
 - 1.1 What are the dimensions of the prism?
 - 1.2 Calculate the volume of the prism.
 - 1.3 What is the capacity of the prism in litres?
2. The total surface area of a rectangular prism is $1\,536 \text{ cm}^2$. The ratio of the dimensions is $12 : 9 : 4$.
 - 2.1 What are the dimensions of the prism?
 - 2.2 Calculate the volume of the prism.
 - 2.3 Give the capacity of the prism in millilitres and in litres.



Using means to improve results and achieve goals

Setting goals is important, but they should be achievable.

Consider the following:

- How many marks does one need to achieve in the next test to improve the mean mark?
- What time does one need to run in the next race to improve the mean time?

Basic steps to follow:

- ① Multiply the mean value by the number of data values.
- ② Multiply the target mean by the increased number of data values.
- ③ Subtract the answer to ① from the answer to ②.
- ④ Decide if this result is reasonable.



Worked Example 1

Joshua has written five tests and has an average of 57%.

- 1.1 What percentage will he need to get for the sixth test to achieve an average of 60%?
- 1.2 Is it possible for Joshua to achieve his goal?

Answer

- 1.1 Joshua's combined total for five tests is $5 \times 57 = 285$.
Joshua needs a combined total of $6 \times 60 = 360$.
 \therefore he needs to get $360 - 285 = 75\%$ in his sixth test.
- 1.2 This is an achievable goal.
(He will have to work very hard to achieve his goal.)

Worked Example 2

Jo has run seven 400 m races in an average time of 70 seconds.

- 2.1 What time will she need to run in her next race if she wants to bring her average time down to 65 seconds?
- 2.2 Is it possible for her to achieve her goal?

Answer

- 2.1 Jo's combined total for seven races is
 $7 \times 70 = 490$ seconds.
She needs a combined total of $8 \times 65 = 520$ seconds.
 \therefore she needs to run her eighth race in
 $520 - 490 = 30$ seconds.
- 2.2 This is not an achievable goal.
(The world record, set by Marita Koch in 1985, is 47,6 seconds.)

Exercise 9

Solutions on p. A324

1. Thabiso's average mark for the first three tests is 68%.
 - 1.1 What percentage will she need to get for her fourth test to achieve an average of 70%?
 - 1.2 Is it possible for Thabiso to achieve her goal?
2. Adam runs 5 km parkruns on Saturdays. The mean time for his first nine runs is 20 minutes and 20 seconds.
 - 2.1 What time must Adam run in his tenth parkrun if he wants to achieve an average of 20 minutes for his ten runs?
 - 2.2 Is his goal achievable?