

Mathematics

Navigation pack

**SENIOR PHASE
GRADE 9**

Platinum



**X-kit
Achieve!**



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Mathematics Grade 9 Navigation Pack

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Dear Teacher

The National State of Disaster due to the COVID-19 pandemic has resulted in the disruption of Education in South Africa and the loss of valuable teaching time and disruption of the school calendar.

As a result of this, the DBE has created and released revised Annual Teaching Plans (ATPs) to assist schools and teachers in ensuring the 2021 school year is completed. The 2021 ATPs are based on the revised ATPs that were developed in 2020. It is important to note that fundamental and core topics are retained in the 2021 ATPs. Some of the strategies that have been used in the process of developing the 2021 DBE ATPs are:

- reduction of content covered in certain topics
- merging of topics
- deleting topics
- revising the assessment guidelines
- reduction in teaching time for certain topics
- resequencing of topics/concepts

At Pearson South Africa, we believe that education is the key to every individuals' success. To ensure that despite the challenges, teachers and learners can meet all the necessary learning outcomes for the year, we have created the Navigation Guide, a free resource to support teachers and learners during this challenging time.

The Navigation Pack aims to summarise and highlight the changes in the 2021 DBE ATP and provide teachers and learners with worksheets that focus on impacted topics in the curriculum.

Due to resequencing of topics, the order of topics in the textbook that is currently used in the classroom may not be aligned to the new sequence of topics in the ATP. The Navigation Pack has a set of assessments based on the Section 4 changes and the revised assessment guidelines.

COVID-19 safety guidelines for teachers and learners

Gatherings at school

Where schools are open for learning, it is up to management to take decisive action to ensure sites are not simultaneously used for other functions such as shelters or treatment units in order to reduce the risk.

Implement social distancing practices that may include:



- A staggered timetable, where teachers and learners do not arrive/leave at the same time for the beginning and end of the school day.
- Cancelling any community meetings/events such as assemblies, cake sales, market day, tuckshop, after-care classes, matric dance, Eisteddfod and other events.
- Cancelling any extra-mural activities such as ballet classes, swimming lessons, sport games, music class and other events that create a crowd gathering.
- Teaching and modeling creating space and avoiding unnecessary touching.
- Limiting movement and interaction between classes.
- Schools with an established feeding scheme plan are to ensure that hygiene and social distancing is always implemented. Teachers and staff members assisting with food distribution are to wear masks, sanitise prior to issuing food items and learners are to stand 1,5m apart in the queue.

Wear a mask at all times.



1. Restrooms/toilets

Hand washing

Washing hands with soap and water  or using alcohol-based hand sanitisers  is one of the most important ways to help everybody stay healthy at school. Critical to this is preparing and maintaining handwashing stations with soap and water at the toilet and in each classroom.



Teachers and learners should always wash their hands after:

- eating
- entering the classroom
- using the toilet
- blowing your nose or coughing
- touching tears, mucous, saliva, blood or sweat.

2. Premises and classroom setting

When schools open, classroom settings should be altered in order to promote hygiene, safety and social distancing.

Changed classroom settings may include:

- Cleaning and disinfecting school buildings, classrooms and especially sanitation of facilities at least once a day, particularly surfaces that are touched by many people (railings, lunch tables, sports equipment, door and window handles, toys, teaching and learning tools etc.).
- Ensure the proper ventilation and fresh flow of air through classrooms.
- Providing learners with vital information about how to protect themselves by incorporating the importance of hygiene, handwashing and other measures of protecting themselves, into the lessons.
- Promoting best handwashing and hygiene practices and providing hygiene supplies.

- Prepare and maintain handwashing stations with soap and water, and if possible, place alcohol-based hand sanitisers in each classroom, at entrances and exits, and near lunchrooms and toilets.



- Ensure teachers and learners wear a mask at all times.



Social distancing

- Space the learners out in the classroom (or outdoors) – try to keep learners separated by a minimum of 1,5m.



- Create space for learner's desks to be at least 1,5m apart

- Learners are not to exceed 30 per class or 50% of original class size



- Learners should not share cups, eating utensils, or food
- Do not let learners eat items that fall on the floor or chew on pencils or other objects

- Avoid close contact, like shaking hands, hugging or kissing



3. Social behaviour

It is extremely vital during a pandemic that focus is not only directed towards optimal physical health and hygiene but finding ways to facilitate mental health support.

- Treat everybody with respect and empathy – no teasing about COVID-19.
- Encourage kindness towards each other and avoid any stereotyping when talking about the virus.
- Stay home if you have a temperature or are ill.
- Do not touch people who are ill, but be empathetic.

Wear a mask at all times.




How to use this Navigation Pack

Revised DBE Teaching Plan:

Comprehensive summary of the CAPS topics according to the revised ATPs.

Navigation Plan: Link to the resources in the Navigation Pack.

REVISED DBE ANNUAL TEACHING PLAN				NAVIGATION PLAN	
TOPIC	UNIT	CONTENT SPECIFIC CONCEPTS	TIME	LINKS TO PEARSON NAVIGATION PACK	PAGE REFERENCE
GEOMETRY OF 2D SHAPES AND CONSTRUCTION OF GEOMETRIC FIGURES	Classifying 2D shapes	Revise properties and definitions of triangles in terms of their sides and angles, distinguishing between: <ul style="list-style-type: none">• equilateral triangles• isosceles triangles• right-angled triangles	9 hours		
	Constructions	Investigate the angles in a triangle, focusing on the relationship between the exterior angle of a triangle and its interior angles			
	Classifying 2D shapes	Revise and write clear definitions of quadrilaterals in terms of their sides, angles and diagonals, distinguishing between: <ul style="list-style-type: none">• parallelogram• rectangle• square• rhombus• trapezium• kite			
	Constructions	Investigate sides and angles, and diagonals in quadrilaterals, focusing on: <ul style="list-style-type: none">• exploring the sum of the interior angles of polygons• the diagonals of rectangles, squares, parallelograms, rhombi and kites		Navigation Pack: Targeted Worksheet 1	Page 50
REVISION			4,5 hours		
ASSESSMENT TASK	Project Term 3 Test				
			4 hours	Navigation Pack: Term 3 Test Exemplar	Pages 41–44
<div> TOTAL HOURS = 47</div>					

*1 Only calculations using numbers in exponential form¹ is the focus in the new ATP – the rest of the Concepts and Skills as per the CAPS have been removed (see pages 124–125 of CAPS).

Assessments for the Term as per the revised ATPs and the Section 4 amendments.

Link to a targeted worksheet in the Navigation Pack, that focus on impacted or challenging topics in the curriculum.

Footnotes provide any additional information.

Link to an exemplar assessment in the Navigation Pack, that was created with Section 4 and curriculum changes in mind.

Navigation Guide

Mathematics Phase overview


GRADE	NO OF WEEKS	TOTAL TIME (HOURS)
7	42	174
8	33	132
9	42	175

TOPIC	GRADE 7	GRADE 9	GRADE 9
WHOLE NUMBERS	Revision; calculation techniques; multiples and factors; solve problems	Revision; calculation techniques; multiples and factors; solve problems	Revision; properties of numbers; calculations using whole numbers; multiples and factors; solve problems
EXPONENTS	Mental calculations; comparing and representing numbers in exponential form; calculations using numbers in exponential form	Comparing and representing numbers in exponential form; calculations using numbers in exponential form; solve problems	Calculations using numbers in exponential form: Revise and extend to include integer exponents
INTEGERS	Counting; ordering and comparing integers; calculations with integers	Revise calculations with integers; properties of integers	Revise calculations with integers; revise properties of integers
COMMON FRACTIONS	Ordering; comparing and simplifying common fractions; calculations with fractions; calculation techniques; percentages; solve problems	Calculations with fractions; calculation techniques; percentage; solve problems	Removed as a stand-alone topic but to be incorporated into Expressions (Page 122 & 123 of CAPS)
DECIMAL FRACTIONS	Ordering and comparing decimal fractions	Calculations with decimal fractions; calculation techniques	Removed as a stand-alone topic but to be incorporated into Expressions (Page 122 & 123 of CAPS)
PATTERNS	Investigate and extend patterns	Revise, investigate and extend numeric and geometric patterns; investigate and extend numeric and geometric patterns; describe and justify the general rules for observed relationships between numbers in own words or in algebraic language	Investigate and extend numeric and geometric patterns; describe and justify the general rules for observed relationships between numbers in own words or in algebraic language
FUNCTIONS AND RELATIONSHIPS	Input and output values; equivalent forms	Input and output values; equivalent forms	Input and output values; equivalent forms
ALGEBRAIC EXPRESSIONS	Recognise and interpret rules or relationships represented in symbolic form; identify variables and constants in given formulae and equations	Algebraic language; expand and simplify algebraic expressions	Algebraic language; expand and simplify algebraic expressions; factorise algebraic expressions

ALGEBRAIC EQUATIONS	Number sentences	Equations	Revision, extend solving equations to include factorisation and equations of the form: a product of factors = 0
GRAPHS	Removed	Interpreting graphs; drawing graphs	Interpreting graphs; drawing graphs
CONSTRUCTION OF GEOMETRIC FIGURES	Measuring angles; constructions (Provide learners with accurately constructed figures); geometry of straight lines	Removed as a stand-alone topic and part of it has been incorporated into Geometry of 2D shapes	Removed as a stand-alone topic and part of it has been incorporated into Geometry of 2D shapes
GEOMETRY OF 2D SHAPES	Classifying 2D shapes (triangles; quadrilaterals); similar and congruent 2D shapes; solving problems	Classifying 2D shapes (Triangles; Quadrilaterals); constructions; investigating properties of geometric figures; solve problems; similar and congruent 2D shapes	Revise classifying 2D shapes (triangles; quadrilaterals); constructions
GEOMETRY OF 3D OBJECTS	Removed	Removed	Removed
GEOMETRY OF STRAIGHT LINES	Part of Construction of geometric figures	Angle relationships; Solving problems	Revise angle relationships; Solving problems
TRANSFORMATION GEOMETRY	Transformations; enlargements and reductions	Transformations	Transformations
THEOREM OF PYTHAGORAS	N/A	Develop and use the Theorem of Pythagoras	Use the Theorem of Pythagoras to solve problems involving unknown lengths in geometric figures that contain right-angled triangles
AREA AND PERIMETER OF 2D SHAPES	Area and perimeter; calculations and solving problems	Area and perimeter; calculations and solving problems	Use appropriate formulae and conversions between SI units to solve problems and calculate perimeter and area of polygons and circles
SURFACE AREA AND VOLUME OF 3D OBJECTS	Surface area and volume; calculations and solving problems	Removed	Use appropriate formulae and conversions between SI units to solve problems and calculate the surface area, volume and capacity of rectangular prisms; triangular prisms and cylinders
DATA HANDLING	Collect data (provide learners with data to save time); Organise and summarise data; Represent data; Interpret data; Analyse data; Report data	Removed	Removed
PROBABILITY	Removed	Removed	Removed

Term 1

REVISED DBE ANNUAL TEACHING PLAN				NAVIGATION PLAN	
TOPIC	UNITS	CONTENT SPECIFIC CONCEPTS	TIME	LINKS TO PEARSON NAVIGATION PACK	PAGE REFERENCE
REVISION OF Grade 8 WORK (Week 1)			2,5 hours		
WHOLE NUMBERS	Properties of numbers	Describe the real number system by recognising, defining and distinguishing properties of: <ul style="list-style-type: none"> natural numbers, whole numbers, integers, rational numbers, irrational numbers 	6 hours		
	Calculating using whole numbers	Revise: Calculations using all four operations on whole numbers, estimating and using calculators where appropriate			
	Multiples and factors	Use prime factorisation of numbers to find LCM and HCF			
	Solving problems	Solve problems in contexts involving: <ul style="list-style-type: none"> ratio and rate direct and indirect proportion 			
INTEGERS	Calculation with integers	Revise: <ul style="list-style-type: none"> addition and subtraction with integers multiplication and division with integers perform calculations involving all four operations with integers perform calculations involving all four operations with numbers that involve the squares, cubes, square roots and cube roots of integers 	9 hours		
	Properties of integers	Revise: <ul style="list-style-type: none"> Commutative, associative and distributive properties of addition and multiplication for integers Additive and multiplicative inverses for integers 			

REVISED DBE ANNUAL TEACHING PLAN			NAVIGATION PLAN		
TOPIC	UNITS	CONTENT SPECIFIC CONCEPTS	TIME	LINKS TO PEARSON NAVIGATION PACK	PAGE REFERENCE
EXPONENTS ^(*)	Calculations using numbers in exponential form	Revise the following general laws of exponents: $a^m \times a^n = a^{m+n}$ $a^m \div a^n = a^{m-n}$ if $m > n$ $(a^m)^n = a^{m \times n}$ $(a \times t)^n = a^n \times t^n$ $a^0 = 1$ Extend the general laws of exponents to include: • integer exponents: $a^{-m} = \frac{1}{a^m}$ Perform calculations involving all four operations using numbers in exponential form	9 hours		
NUMERIC AND GEOMETRIC PATTERNS– NUMERIC PATTERNS	Investigate and extend patterns	Investigate and extend numeric and geometric patterns looking for relationships between numbers including patterns: • represented in physical or diagram form, not limited to sequences involving a constant difference or ratio, of learner's own creation, represented in tables, represented algebraically Describe and justify the general rules for observed relationships between numbers in own words or in algebraic language	4,5 hours		
ASSESSMENTS	Assignment Test		2 hours		
			3,5 hours		
<div> TOTAL HOURS = 36,5</div>					

*1 Only calculations using numbers in exponential form' is the focus in the new ATP – the rest of the Concepts and Skills as per the CAPS have been removed (see pages 124–125 of CAPS).

Term 2

(Note that the topics covered in Term 2 according to the CAPS document ARE NOT covered in the ATP for 2021, instead Patterns, functions and algebra are carried over from Term 1)

REVISED DBE ANNUAL TEACHING PLAN				NAVIGATION PLAN	
TOPIC	UNITS	CONTENT SPECIFIC CONCEPTS	TIME	LINKS TO PEARSON NAVIGATION PACK	PAGE REFERENCE
NUMERIC AND GEOMETRIC PATTERNS – GEOMETRIC PATTERNS	Investigate and extend patterns	Investigate and extend numeric and geometric patterns looking for relationships between numbers including patterns: <ul style="list-style-type: none"> represented in physical or diagram form, not limited to sequences involving a constant difference or ratio, of learner's own creation, represented in tables, represented algebraically Describe and justify the general rules for observed relationships between numbers in own words or in algebraic language	6 hours		
ALGEBRAIC EXPRESSIONS	Algebraic language	Revise the following: <ul style="list-style-type: none"> Recognise and identify conventions for writing algebraic expressions Identify and classify like and unlike terms in algebraic expressions Recognise and identify coefficients and exponents in algebraic expressions Recognise and differentiate between monomials, binomials and trinomials 	16 hours		
	Expand and simplify algebraic expressions N.B. Ensure that common fractions and decimal fractions are part of calculations with expressions (Pages 122 and 123 of CAPS)	Revise the following: using the commutative, associative and distributive laws for rational numbers and laws of exponents to: <ul style="list-style-type: none"> add and subtract like terms in algebraic expressions multiply integers and monomials by monomials, binomials, trinomials divide the following by integers or monomials: monomials, binomials, trinomials simplify algebraic expressions involving the above operations determine the squares, cubes, square roots and cube roots of single algebraic terms or like algebraic terms Extend the above algebraic manipulations to include: <ul style="list-style-type: none"> multiply integers and monomials by polynomials, divide polynomials by integers or monomials, the product of two binomials, the square of a binomial 			
	Factorise algebraic expressions	Factorise algebraic expressions that involve: <ul style="list-style-type: none"> common factors difference of two squares trinomials of the form: $x^2 + bx + c$ $ax^2 + bx + c$, where a is a common factor 			

REVISED DBE ANNUAL TEACHING PLAN				NAVIGATION PLAN	
TOPIC	UNITS	CONTENT SPECIFIC CONCEPTS	TIME	LINKS TO PEARSON NAVIGATION PACK	PAGE REFERENCE
ALGEBRAIC EXPRESSIONS* ² (continued)	Factorise algebraic expressions (continued)	Simplify algebraic expressions that involve the above factorisation processes Simplify algebraic fractions using factorisation			
ALGEBRAIC EQUATIONS	Equations	Revise the following: <ul style="list-style-type: none"> • set up equations to describe problem situations • analyse and interpret equations that describe a given situation • Solve equations by inspection • using additive and multiplicative inverses • using laws of exponents • Solve equations by substitution • Use substitution in equations to generate tables of ordered pairs Extend solving equations to include: <ul style="list-style-type: none"> • using factorisation • equations of the form: a product of factors = 0 	13,5 hours		
Revision			3,5 hours		
ASSESSMENTS	Investigation	Investigation (Numeric and geometric patterns; Algebraic expressions)	2 hours		
	Mid-year Test		4,5 hours	Navigation Pack: Mid-year Test Exemplar	Pages 38–40
TOTAL HOURS = 45,5					

Note that in the amended ATP for 2021, the following topics have been moved from Term 1: Common fractions, Decimal fractions, Functions and relationships, Algebraic functions, Algebraic equations. Under normal circumstances, according to the CAPS document these topics are covered in Term 1.

*²In the CAPS document Algebraic Expressions are covered in Term 1 and 3, however in the amended ATP for 2021, this topic has been moved to Term 2 only.

Ensure that common fractions and decimal fractions are part of calculations with expressions (p. 122 and 123 of CAPS).


Considerations during incorporation of common fractions/decimal fractions into expressions:

- Start by introducing 'Simplifying algebraic expressions with common fractions as coefficients.'
- Do as many examples as needed.
- Then introduce 'Simplifying algebraic expressions with decimal fractions.'

Also important to note are the prerequisite skills or pre-knowledge included in the amended ATP in order to make considerations of how to go about teaching the topics and concepts in this term.

Term 3

REVISED DBE ANNUAL TEACHING PLAN				NAVIGATION PLAN	
TOPIC	UNIT	CONTENT SPECIFIC CONCEPTS	TIME	LINKS TO PEARSON NAVIGATION PACK	PAGE REFERENCE
FUNCTIONS AND RELATIONSHIPS	Input and output values	Determine input values, output values or rules for patterns and relationships using: <ul style="list-style-type: none"> • flow diagrams • tables • formulae • equations 	6,5 hours		
		Determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented: <ul style="list-style-type: none"> • verbally • in flow diagrams • in tables • by formulae • by equations • by graphs on a Cartesian plane 			
	Equivalent forms				
GRAPHS	Interpreting graphs	Extend the focus on features of graphs with special focus on the following features of linear graphs: <ul style="list-style-type: none"> • x-intercept and y-intercept • gradient 	9 hours		
	Drawing graphs	Use tables of ordered pairs to plot points and draw graphs on the Cartesian plane Extend drawing of graphs with special focus on: <ul style="list-style-type: none"> • drawing linear graphs from given equations • determining equations from given linear graphs 			
TRANSFORMATION GEOMETRY	Transformations	Recognise, describe and perform transformations with points, line segments and simple geometric figures on a co-ordinate plane, focusing on: <ul style="list-style-type: none"> • reflection in the x-axis or y-axis • translation within and across quadrants 	5 hours		
GEOMETRY OF STRAIGHT LINES	Angle relationships	Revise and write clear descriptions of the relationship between angles formed by: <ul style="list-style-type: none"> • perpendicular lines • intersecting lines • parallel lines cut by a transversal 	9 hours		

REVISED DBE ANNUAL TEACHING PLAN				NAVIGATION PLAN	
TOPIC	UNIT	CONTENT SPECIFIC CONCEPTS	TIME	LINKS TO PEARSON NAVIGATION PACK	PAGE REFERENCE
GEOMETRY OF STRAIGHT LINES (continued)	Solving problems	Solve geometric problems using the relationships between pairs of angles described above			
	Classifying 2D shapes	Revise properties and definitions of triangles in terms of their sides and angles, distinguishing between: <ul style="list-style-type: none">• equilateral triangles• isosceles triangles• right-angled triangles	9 hours		
	Constructions	Investigate the angles in a triangle, focusing on the relationship between the exterior angle of a triangle and its interior angles			
	Classifying 2D shapes	Revise and write clear definitions of quadrilaterals in terms of their sides, angles and diagonals, distinguishing between: <ul style="list-style-type: none">• parallelogram• rectangle• square• rhombus• trapezium• kite			
	Constructions	Investigate sides and angles. and diagonals in quadrilaterals, focusing on: <ul style="list-style-type: none">• exploring the sum of the interior angles of polygons• the diagonals of rectangles, squares, parallelograms, rhombi and kites			
REVISION			4,5 hours		
ASSESSMENT TASK	Project Term 3 Test				
			4 hours	Navigation Pack: Term 3 Test Exemplar	Pages 41–44
<div> TOTAL HOURS = 47</div>					

Term 3

FUNCTIONS AND RELATIONSHIPS: This topic should have been covered in Term 1 but is not covered according to the amended ATP for 2021. Important to note is that learners consolidate work with input and output values done in Grade 9. They should continue to find input or output values in flow diagrams, tables, formulae and equations. In this phase, it is useful to start specifying whether the input values are natural numbers or integers or rational numbers. This builds learners' awareness of the domain. Hence, to find output values, learners should be given the rule/formula as well as the input values.

Note that prerequisite skills or pre-knowledge for the content covered in this Term have been provided for you. These might be helpful for scaffolding especially of complex concepts.


TRANSFORMATIONS: In the CAPS document, Transformations are covered in Term 4 (page 147), however in the amended ATP for 2021 Transformations have been moved to Term 3.

GEOMETRY OF STRAIGHT LINES: In the CAPS document, Geometry of Straight Lines is covered in Term 2, however in the amended ATP for 2021 this topic has been moved to Term 3.

GEOMETRY OF 2D SHAPES: In the CAPS document, Geometry of 2D Shapes is covered in Term 2, however in the amended ATP for 2021 this topic has been moved to Term 3.

GEOMETRY OF 2D SHAPES AND CONSTRUCTION OF GEOMETRIC FIGURES: Constructions serve as a useful context for exploring properties of triangles and quadrilaterals. See 3.5 Construction of Geometric figures (CAPS page 30).

Term 4

REVISED DBE ANNUAL TEACHING PLAN				NAVIGATION PLAN	
TOPIC	UNIT	CONTENT SPECIFIC CONCEPTS	TIME	LINKS TO PEARSON NAVIGATION PACK	PAGE REFERENCE
GEOMETRY OF 2D SHAPES AND CONSTRUCTIONS	Similar and congruent triangles	Through investigation, establish the minimum conditions for congruent triangles Through investigation, establish the minimum conditions for similar triangles	6 hours		
	Constructions <i>Provide learners with accurately constructed figures</i>	Explore the minimum conditions for two triangles to be congruent			
	Solving problems	Solve geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties of triangles and quadrilaterals, as well as properties of congruent and similar triangles			
		Use the Theorem of Pythagoras to solve problems involving unknown lengths in geometric figures that contain right-angled triangles	4,5 hours		
THEOREM OF PYTHAGORAS*3		Use appropriate formulae and conversions between SI units, to solve problems and calculate perimeter and area of: <ul style="list-style-type: none">• polygons• circles	9 hours		
SURFACE AREA AND VOLUME OF 3D SHAPES*5		Use appropriate formulae and conversions between SI units to solve problems and calculate the surface area, volume and capacity of: <ul style="list-style-type: none">• rectangular prisms• triangular prisms• cylinders	9 hours		
REVISION			2 hours		
ASSESSMENT	Term 4 Test (Term 3 and 4 work)			Navigation Pack: Term 4 Test Exemplar	Pages 45–47
<div> TOTAL HOURS = 35</div>					

^{*3} In the CAPS document, the Theorem of Pythagoras is covered in Term 2, however in the amended ATP for 2021 this topic has been moved to Term 4. Note the prerequisite skills or pre-knowledge in order to scaffold the learning of this topic and this applies for the rest of the topics covered in Term 4.

^{*4} In the CAPS document, Area and perimeter of 2D shapes is covered in Term 2, however in the amended ATP for 2021 this topic has been moved to Term 4. Note the prerequisite skills or pre-knowledge in order to scaffold the learning of this topic and this applies for the rest of the topics covered in Term 4.

^{*5} In the CAPS document, Surface area and volume of 3D objects is covered in Term 3, however in the amended ATP for 2021 this topic has been moved to Term 4. Note the prerequisite skills or pre-knowledge in order to scaffold the learning of this topic and this applies for the rest of the topics covered in Term 4.

Targeted Worksheets

TARGETED WORKSHEET	TOPIC IN CAPS
1	Algebraic expressions
2	Geometry of 2D shapes & Construction of geometric figures (Properties of triangles and quadrilaterals)
3	Geometry of 2D shapes & Construction of geometric figures (Similar and congruent triangles)

Targeted Worksheet 1

Topic: Algebraic expressions

Content summary

Learners should know the following content.

The topic Algebraic expressions introduces formal algebraic language and is new in the Senior Phase. The use of symbolic language helps to develop an understanding of variables. Learners have opportunities to write and interpret algebraic expressions when they write general rules to describe relationships between numbers in number patterns, and when they find input and output values for given rules in flow diagrams, tables and formulae.

For example:

- What does the rule $2 \times n - 1$ mean for the following number sequence: 1; 3; 5; 7; 9; ...? Here learners should recognise that $2 \times n - 1$ represents the general term in this sequence, where n represents the position of the term in the sequence. It is the rule that can be used to find any term in the given sequence.
- The relationship between a boy's age (x years old) and his mother's age is given as $25 + x$. How can this relationship be used to find the mother's age when the boy is 11 years old? Here learners should recognise that to find the mother's age, they should substitute the boy's given age into the rule $25 + x$. They should also recognise that the given rule means the mother is 25 years older than the boy.

We often use expressions with numbers and symbols to describe different situations.

An **expression** is a group of terms separated by $+$ and $-$ signs.

Symbols are signs we use in mathematics, for example $+$, $-$, \times and \div to describe mathematical operations.

A **term** can be a single number (a constant), or numbers and variables multiplied together. These mathematical expressions are called algebraic expressions when they contain letters in the place of unknown values.

In algebra, we often use the letters x and y in the place of an unknown value, but any letter may be used. These letters are called variables because they can stand for any unknown number.

As the variable in an expression takes on different numerical values, the value of the whole expression changes. The expression $11x^2 - 3x + 4$ has a value of 12 when $x = 1$ but has a value of 4 when $x = 0$.

A numerical term containing no variable is called a **constant**, as its value does not change.

$5x - 10 + x - 8$ is an expression that may be simplified to $6x - 18$. In this simplified expression, the variable term is $6x$ and the constant is -18 .

The number in front of the variable is the **coefficient**. In the expression $6x - 18$, the coefficient of the variable term is 6.

Targeted Worksheet 1

Topic: Algebraic expressions

Name: _____

Surname: _____

Marks: 30

Time: 30 minutes

Instructions**Read the following instructions carefully before answering the questions.**

1. This paper consists of 3 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations in the spaces provided.
4. You may use a non-programmable scientific calculator.
5. Write neatly and legibly.

1. Simplify the expressions.

1.1 $-x(3x - 4)$ (2)

1.2 $7 - 2(x + 5)$ (2)

1.3 $(3x - 4)(-2x)$ (2)

1.4 $-2x - (3x - 7)$ (2)

[8]

2. Simplify the expressions.

2.1 $\frac{3}{x-2} + \frac{4}{x+5}$ (4)

2.2 $\frac{a^2 - b^2}{5a - 5b}$ (3)

2.3 $\frac{4x^2 - 9}{4x^2 - 6x}$ (3)

2.4 $\frac{x^2 + 2x - 8}{x^2 + x - 6}$ (3)

[13]

3. Factorise completely.

3.1 $y^2 - 25$ (2)

3.2 $16 - x^2$ (2)

3.3 $4d^2 - 9e^2$ (2)

3.4 $a^4 - b^4$ (3)

[9]**Total: 30**

Targeted Worksheet 2

Topic: Geometry of 2D shapes & Construction of geometric figures
(Properties of triangles and quadrilaterals)

It is important to note that Geometry of 2D shapes has been merged with Construction. In the amended ATP for 2021 teachers are expected to provide learners with accurately constructed figures to investigate properties of triangles and quadrilaterals. Learners are therefore expected to: investigate the angles in a triangle; focusing on the relationship between the exterior angle of a triangle and its interior angles; explore the minimum conditions for two triangles to be congruent; investigate sides, angles and diagonals in quadrilaterals, focusing on the diagonals of rectangles, squares, parallelograms, rhombi and kites, and explore the sum of the interior angles of polygons.

Constructions serve as a useful context for exploring properties of triangles and quadrilaterals. Learners are expected to know properties of triangles and quadrilaterals, as follows:

Properties of triangles

The sum of the interior angles of triangles = 180° .

An equilateral triangle has all sides equal and all interior angles = 60° .

An isosceles triangle has at least two equal sides and its base angles are equal.

A right-angled triangle has one angle that is a right angle.

The side opposite the right-angle in a right-angled triangle, is called the hypotenuse.

In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides (Theorem of Pythagoras).

The exterior angle of a triangle = the sum of the opposite two interior angles.

Properties of quadrilaterals

The sum of the interior angles of quadrilaterals = 360° .

The opposite sides of parallelograms are parallel and equal.

The opposite angles of parallelograms are equal.

The opposite angles of a rhombus are equal.

The opposite sides of a rhombus are parallel and equal.

The size of each angle of rectangles and squares is 90° .

A trapezium has one pair of opposite sides parallel.

A kite has two pairs of adjacent sides equal.

The diagonals of a square, rectangle, parallelogram and rhombus bisect each other.

The diagonals of a square, rhombus and kite are perpendicular.

Targeted Worksheet 2

Topic: Geometry of 2D shapes & Construction of geometric figures
(Properties of triangles and quadrilaterals)

Name: _____

Surname: _____

Marks: 17

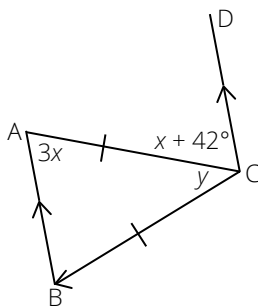
Time: 20 minutes

Instructions

Read the following instructions carefully before answering the questions.

1. This paper consists of 3 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations in the spaces provided.
4. You may use a non-programmable scientific calculator.
5. Write neatly and legibly.

1. Find, giving reasons, the values of:

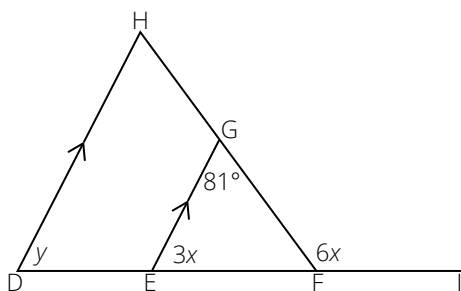


1.1 x (3)

1.2 y . (4)

[7]

2. Determine the value of:

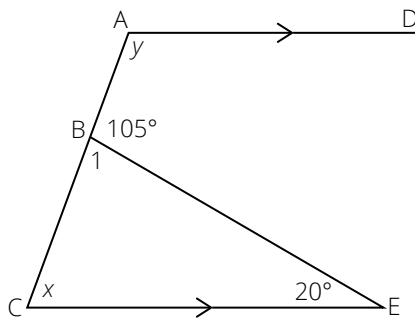


2.1 x (2)

2.2 y . (2)

[4]

3. Use the diagram to find (with reasons) the value of:



3.1 x

(3)

3.2 y .

(3)

[6]

Total: 17

Targeted Worksheet 3

Topic: Geometry of 2D shapes & Construction of geometric figures (Similar and congruent triangles)

As with Worksheet 2, it is important to note that Geometry of 2D shapes has been merged with Construction. In the amended ATP for 2021 teachers are expected to provide learners with accurately constructed figures in order to investigate similar and congruent triangles.

Learners are expected to:

- investigate and establish the minimum conditions for congruent and similar triangles
- explore minimum conditions for two triangles to be congruent
- solve geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties of triangles and quadrilaterals, as well as properties of congruent and similar triangles.

Teachers must provide learners with accurately constructed figures in order for learners explore and solve problems of similarity and congruence. In addition to the knowledge of properties of triangles and quadrilaterals learners are expected to know the following:

Congruent triangles

Constructions are a useful context for establishing the minimum conditions for two triangles to be congruent.

Conditions for two triangles to be congruent:

- Three corresponding sides are equal (S, S, S).
- Two corresponding sides and the included angle are equal (S, A, S).
- Two corresponding angles and a corresponding side are equal (A, A, S).
- Right-angle, hypotenuse and one other corresponding side are equal (R, H, S).

Similar triangles

Constructions are a useful context for establishing the minimum conditions for two triangles to be similar. See notes on Constructions above.

Condition for two triangles to be similar:

- corresponding angles are equal
- corresponding sides are proportional.

Solving problems

Learners can solve geometric problems to find unknown sides and angles in triangles and quadrilaterals, using known definitions as well as angle relationships on straight lines.

Targeted Worksheet 3

Topic: Geometry of 2D shapes & Construction of geometric figures
(Similar and congruent triangles)

Name: _____

Surname: _____

Marks: 20

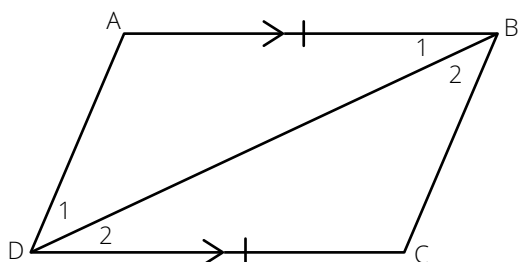
Time: 20 minutes

Instructions

Read the following instructions carefully before answering the questions.

1. This paper consists of 4 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations in the spaces provided.
4. You may use a non-programmable scientific calculator.
5. Write neatly and legibly.

1. In quadrilateral ABCD, $AB \parallel DC$ and $AB = DC$.

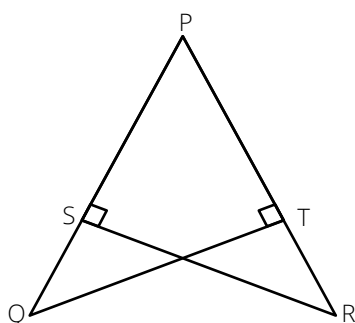


- 1.1 Prove that $\triangle ABD \equiv \triangle CDB$.

(4)

[4]

2. In the diagram, $PS = PT$, $QT \perp PR$ and $RS \perp PQ$.

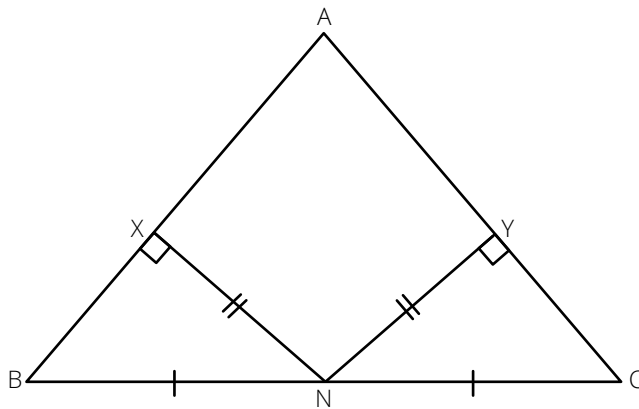


- 2.1 Prove that $\triangle PQT \equiv \triangle PRS$.

(6)

[6]

3. In the diagram, $XN = YN$, $BN = NC$, $NX \perp AB$ and $NY \perp AC$.

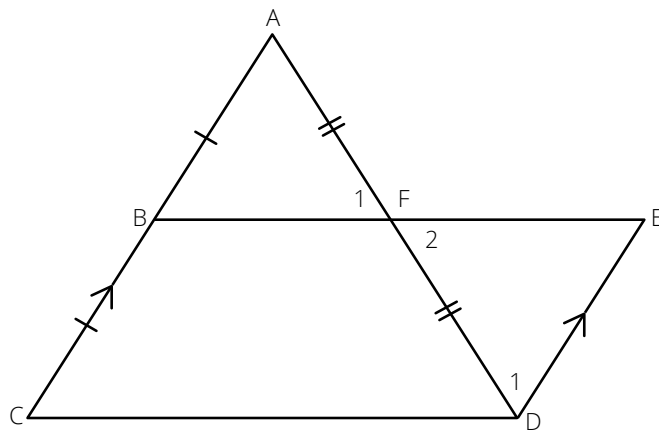


3.1 Prove $AB = AC$.

(4)

[4]

4. Use the following diagram to prove:



4.1 $\triangle AFB \equiv \triangle DFE$

(4)

4.2 $ED = BC$

(2)

[6]

Total: 20

Targeted Worksheet 1 Memorandum

Marks: 30

- 1.1 $-x(3x - 4) = -3x^2 + 4x$ ✓✓ (2)
- 1.2 $7 - 2(x + 5) = 7 - 2x - 10 = -2x - 3$ ✓✓ (2)
- 1.3 $(3x - 4)(-2x) = -6x^2 + 8x$ ✓✓ (2)
- 1.4 $-2x - (3x - 7) = -2x - 3x + 7 = -5x + 7$ ✓✓ (2)

[8]

2.1 $\frac{3}{x-2} + \frac{4}{x+5}$

$$= \frac{3(x+5)+4(x-2)}{(x-2)(x+5)} \quad \checkmark$$

$$= \frac{3x+15+4x-8}{(x-2)(x+5)} \quad \checkmark$$

$$= \frac{7x+7}{(x-2)(x+5)} \quad \checkmark$$

$$= \frac{7(x+1)}{(x-2)(x+5)} \quad \checkmark \quad (4)$$

2.2 $\frac{a^2-b^2}{5a-5b}$

$$\frac{(a+b)(a-b)}{5(a-b)} \quad \checkmark \checkmark$$

$$\frac{(a+b)}{5} \quad \checkmark \quad (3)$$

2.3 $\frac{4x^2-9}{4x^2-6x}$

$$= \frac{(2x-3)(2x+3)}{2x(2x-3)} \quad \checkmark \checkmark$$

$$= \frac{(2x+3)}{2x} \quad \checkmark \quad (3)$$

2.4 $\frac{x^2+2x-8}{x^2+x-6}$

$$= \frac{(x+4)(x-2)}{(x+3)(x-2)} \quad \checkmark \checkmark$$

$$= \frac{x+4}{x+3} \quad \checkmark \quad (3)$$

[13]

- 3.1 $y^2 - 25 = (y + 5)(y - 5)$ ✓✓ (2)
- 3.2 $16 - x^2 = (4 - x)(4 + x)$ ✓✓ (2)
- 3.3 $4d^2 - 9e^2 = (2d + 3e)(2d - 3e)$ ✓✓ (2)
- 3.4 $a^4 - b^4 = (a^2 + b^2)(a^2 - b^2)$ ✓
- $$= (a^2 + b^2)(a + b)(a - b) \quad \checkmark \checkmark \quad (3)$$

[9]
Total: 30

Targeted Worksheet 2 Memorandum

Marks: 17

1.1 $3x = x + 42^\circ$ (alternate angles, $AB \parallel DC$) ✓
 $2x = 42^\circ$ ✓
 $x = 21^\circ$ ✓ (3)

1.2 $3x + \hat{B} + y = 180^\circ$ (\angle s of a triangle) ✓
 $\hat{B} = 3x$ (\angle s opposite = sides) ✓
 $3x + 3x + y = 180^\circ$ ✓
 $6(21^\circ) + y = 180^\circ$
 $\therefore y = 54^\circ$ ✓ (4)

[7]

2.1 $3x + 81^\circ = 6x$ (ext. angle of \triangle) ✓
 $3x = 81^\circ$
 $x = 27^\circ$ ✓ (2)

2.2 $y = 3x$ (corresponding angles, $HD \parallel GE$) ✓
 $y = 3(27^\circ)$
 $\therefore y = 81^\circ$ ✓ (2)

[4]

3.1 $x + 20 + \hat{B}_1 = 180^\circ$ (\angle s of \triangle) ✓
 $\hat{B}_1 + 105^\circ = 180^\circ$ (angles on a straight line) ✓
 $\hat{B}_1 = 75^\circ$
 $x + 20^\circ + 75^\circ = 180^\circ$
 $\therefore x = 85^\circ$ ✓ (3)

3.2 $x + y = 180^\circ$ (co-interior angles, $AD \parallel CE$) ✓
 $85 + y = 180^\circ$ ✓
 $\therefore y = 95^\circ$ ✓ (3)

[6]

Total: 17

Targeted Worksheet 3 Memorandum

Marks: 20

- 1.1 $AB = CD$ (given) ✓
 $\hat{B}_1 = \hat{D}_2$ (alternate angles, $AB \parallel DC$) ✓
 $BD = BD$ (common) ✓
 $\therefore \triangle ABD \equiv \triangle CDB$ (S, A, S) ✓ (4)
- [4]**
- 2.1 In $\triangle PSR$ and $\triangle PTQ$:
 $P = P$ (common) ✓
 $S = T$ (given) ✓
 $PS = PT$ (given) ✓
 $\triangle PSR \equiv \triangle PTS$ (A, A, S)
 $\therefore R = T$ ✓ (4)
- In $\triangle PQT$ and $\triangle PRS$:
 $PS = PT$ (given)
 $\hat{S}_1 = \hat{T}_2$ (given)
 $\hat{R}_1 = \hat{Q}_2$, since $\triangle PSR \equiv \triangle PTS$ ✓
 $\therefore \triangle PQT \equiv \triangle PRS$ (A, A, S) ✓ (2)
- [6]**
- 3.1 $XN = YN$ (given) ✓
 $BN = CN$ (given) ✓
 $\hat{X}_1 = \hat{Y}_2$ (given) ✓
 $\triangle XNB \equiv \triangle YNC$ (RHS)
 $\hat{B}_1 = \hat{C}_2$ (congruence) ✓
 $\therefore AB = AC$ (angles opposite equal sides) (4)
- [4]**
- 4.1 $AF = FD$ (given) ✓
 $\hat{A} = \hat{D}_1$ (alternate angles, $AB \parallel ED$) ✓
 $\hat{F}_1 = \hat{F}_2$ (vertically opposite angles) ✓
 $\therefore \triangle AFB \equiv \triangle DFE$ (A, A, S) ✓ (4)
- 4.2 $AB = DE$ (congruence) ✓
 But $AB = BC$ (given)
 $\therefore ED = BC$ ✓ (2)
- [6]**
- Total: 20**

Exemplar Assessments

Exemplar Assessments

Mid-year Test

Name: _____

Surname: _____

Time: 1 hour

Marks: 60

Instructions and information

1. This question paper consists of 10 questions. Read the questions carefully.
2. Answer ALL the questions.
3. Write neatly and legibly.
4. Number your answers exactly as questions are numbered.
5. Clearly show ALL the calculations, diagrams and graphs you have used in determining the answers.
6. You may use an approved scientific calculator (non-programmable and non-graphical).
7. Diagrams are NOT drawn to scale.

Question 1

Given the information: 3; $\sqrt{16}$; 64; $\frac{5}{2}$; -5; 4; 5.

Write down:

1.1 a prime number (2)

1.2 an irrational number. (2)

[4]

Question 2

Classify each number as fraction, an integer, mixed number or a decimal number.

2.1 -2 (2)

2.2 $\frac{24}{27}$ (2)

[4]

Question 3

3.1 Find the HCF and LCM of 9 and 24 by prime factorisation. (5)

[5]

Question 4

4.1 Calculate, without the use of a calculator: $-45 \div (-5) - 6 + 4$. (2)

[2]

Question 5

5.1 Calculate, without the use of a calculator: $-5 + 4 - 23$. (2)

[2]

Question 6

6.1 Simplify the following as far as possible: $\frac{24x^4}{8x^6}$. (3)

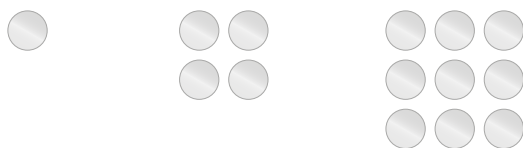
[3]

Question 7

7.1 Draw up a table for these values:

$$y = -2x + 7, x = -4, x = -2, x = 0, x = 1, x = 3, x = 8. \quad (6)$$

7.2.1 Draw the next two diagrams for the pattern in the diagram. (3)



7.2.2 Write down the general term for the pattern. (3)

[12]

Question 8

Simplify.

8.1 $a \times 2b + 3a \times (-2b) - (-2a) \times (-2b)$ (2)

8.2 $ab \times c + (a + b)c$ (2)

8.3 $13x^2 - 3y - 21x^2 + 7y$ (2)

8.4 $(-54x^2y) \div (-6xy)$ (2)

8.5 $\sqrt[3]{-\frac{8x^6}{27}}$ (2)

[10]

Question 9

Solve for x.

9.1 $\frac{21}{x} = 3$ (2)

9.2 $15 - 2x = 9x - 7$ (3)

9.3 $5(x - 4) = 60$ (4)

9.4 $\frac{x}{5} = \frac{3}{35} + \frac{x+1}{7}$ (4)

[13]

Question 10

Given: $-4; -7; -10; -13; \dots$

10.1 Write down the next two terms. (2)

10.2 Determine the rule (formula) to describe the general term, T_n . (3)

[5]

Total: 60

Exemplar Assessments

Term 3 Test

Name: _____

Surname: _____

Time: 1 hour

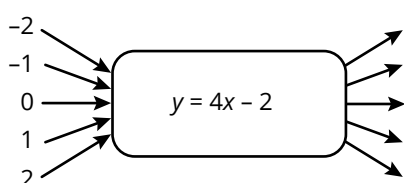
Marks: 50

Instructions and information

1. This question paper consists of 6 questions. Read the questions carefully.
2. Answer ALL the questions.
3. Write neatly and legibly.
4. Number your answers exactly as questions are numbered.
5. Clearly show ALL the calculations, diagrams and graphs you have used in determining the answers.
6. You may use an approved scientific calculator (non-programmable and non-graphical).
7. Diagrams are NOT drawn to scale.

Question 1

Look at the flow diagram.



1.1 Copy and complete the diagram. (5)

1.2 Record the results in a table. (5)

[10]

Question 2

2.1 Complete the table. (5)

x	-2	-1	0	1	2	7			n
y		-7	-4	-1			26	44	

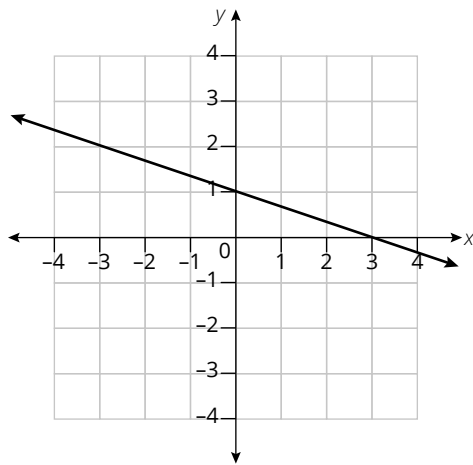
2.2 Give the formula that defines the table (2)

[7]

Question 3

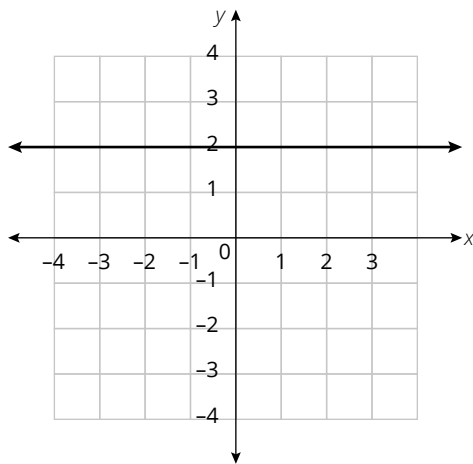
Write down the equation of each graph.

3.1



(4)

3.2



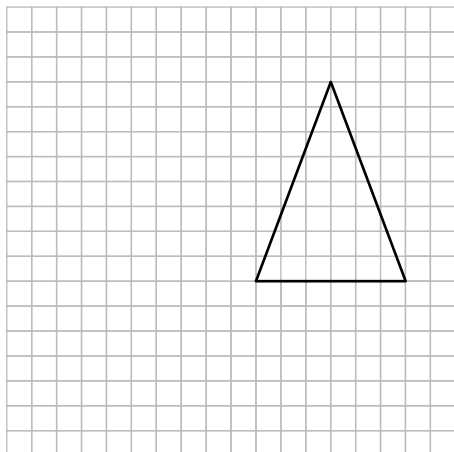
(2)

[6]

Question 4

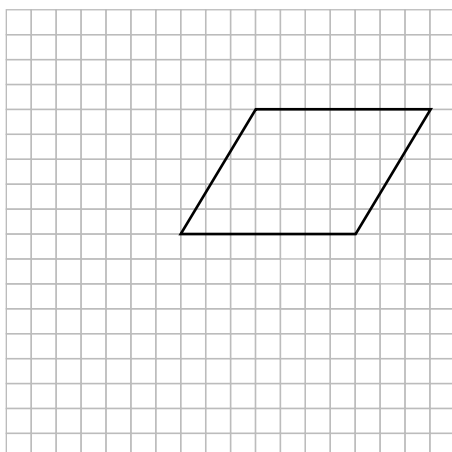
Translate each object as described and draw its image in the correct position.

4.1 $(x; y) \rightarrow (x - 6; y)$



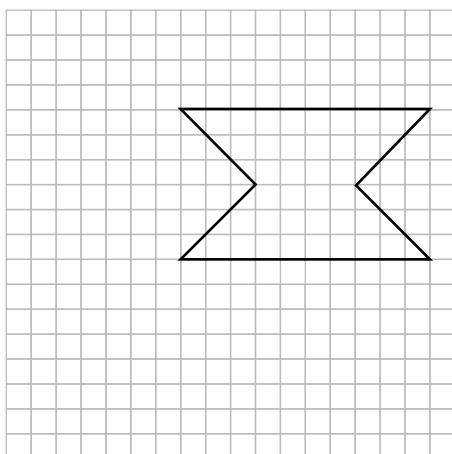
(2)

4.2 $(x; y) \rightarrow (x - 2; y - 5)$



(2)

4.3 $(x; y) \rightarrow (x; y + 1)$



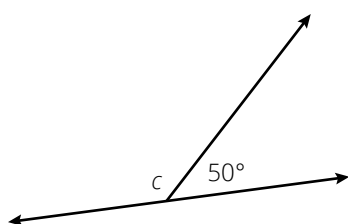
(2)

[6]

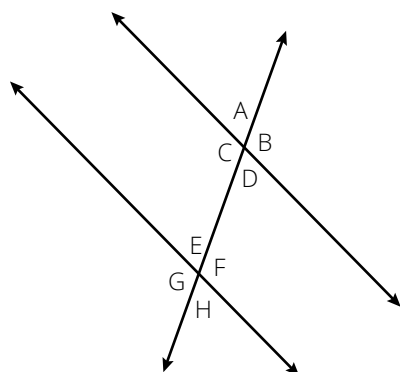
Question 5

5.1 Determine the value of c in the diagram.

(2)



5.2 Name the relationship between the angles in each pair.



5.2.1 \hat{D} and \hat{E} (1)

5.2.2 \hat{C} and \hat{E} (1)

5.2.3 \hat{G} and \hat{C} (1)

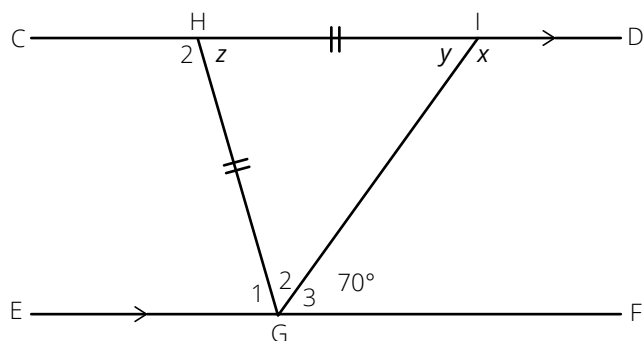
5.2.4 \hat{B} and \hat{C} (1)

5.2.5 \hat{H} and \hat{E} (1)

5.2.6 \hat{A} and \hat{D} (1)

5.2.7 \hat{D} and \hat{F} (1)

5.3 In the diagram, $CD \parallel EF$, $\hat{G}_3 = 70^\circ$ and $HI = HG$. Calculate the values of x , y and z .



(6)

[15]

Question 6

6.1 Construct DEF with $DE = 5$ cm, $EF = 7$ cm and $DF = 8$ cm. (4)

6.2.1 How many triangles can you construct from this information? (1)

6.2.2 Does this produce a unique triangle? (1)

[6]

Exemplar Assessments

Term 4 Test

Name: _____

Surname: _____

Time: 1 hour

Marks: 60

Instructions and information

1. This question paper consists of **8** questions. Read the questions carefully.
2. Answer ALL the questions.
3. Write neatly and legibly.
4. Number your answers exactly as questions are numbered.
5. Clearly show ALL the calculations, diagrams and graphs you have used in determining the answers.
6. You may use an approved scientific calculator (non-programmable and non-graphical).
7. Diagrams are NOT drawn to scale.

Question 1

- 1.1 Draw the graph of $y = -3x + 8$. (5)

[5]

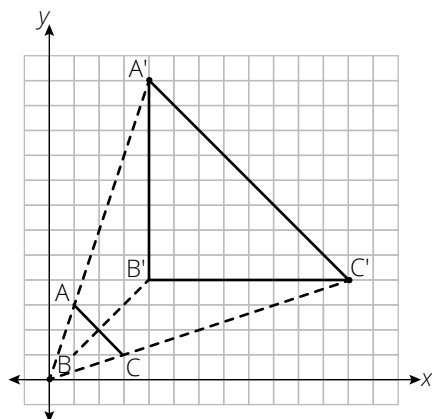
Question 2

- 2.1 Draw the graph of $y = 2x - 4$. (3)

[3]

Question 3

- 3.1 Describe the enlargement of $\triangle ABC$ to $\triangle A'B'C'$.

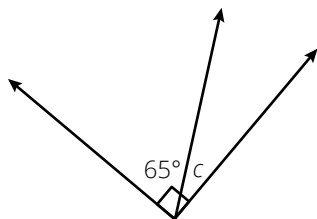


(3)

[3]

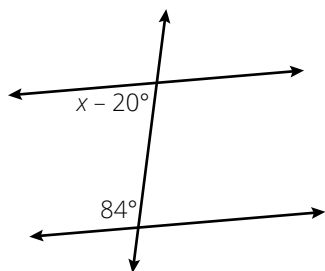
Question 4

- 4.1 Determine the value of c in the diagram.



(2)

- 4.2 Determine the value of x in the diagram.



(3)

[5]

Question 5

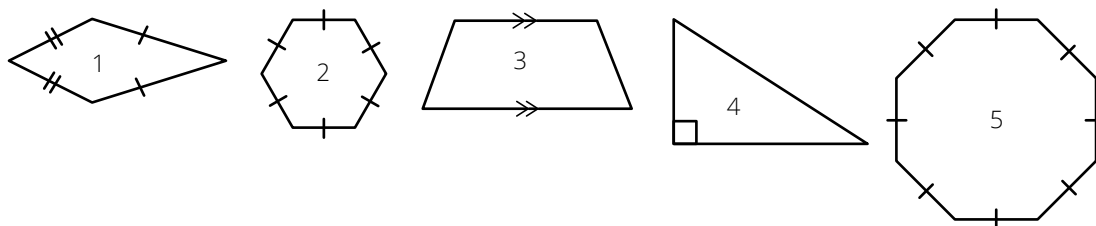
- 5.1 Construct any two lines PQ and RS to intersect at V.

(3)

- 5.2 Name two properties of a parallelogram.

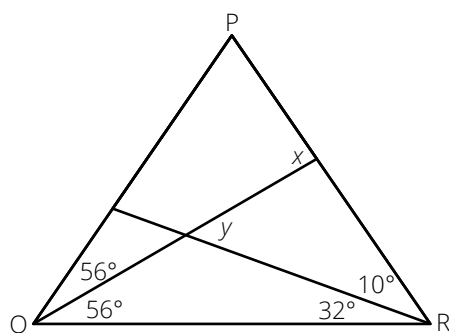
(2)

- 5.3 Identify each of the figures in the diagram.



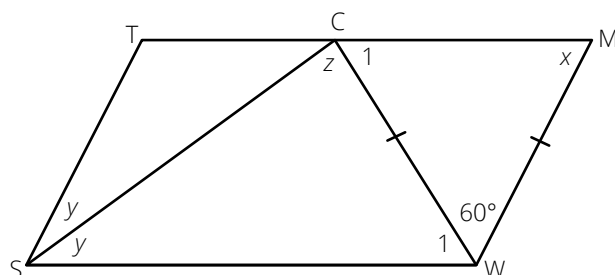
(5)

- 5.4 Find the values of the unknowns in the diagram (give reasons for your answers).



(4)

- 5.5 TMWS is a parallelogram. Calculate the values of x , y and z .

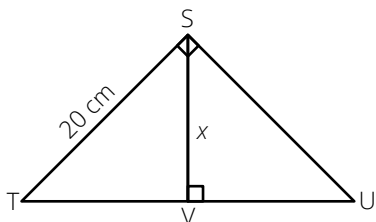


(6)

[20]

Question 6

In the diagram, the area of $\triangle STU$ is 150 cm^2 .



6.1 Calculate the length of TU. (4)

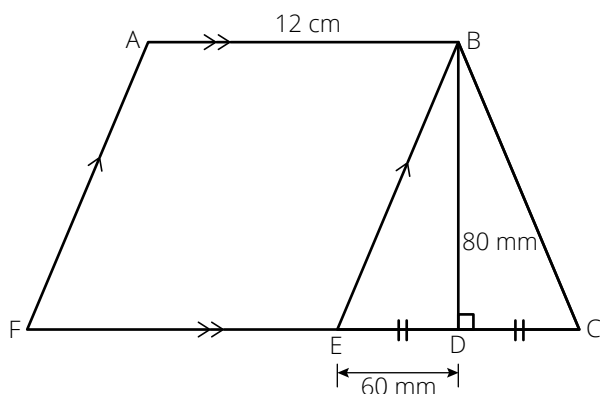
6.2 Determine the value of x . (4)

[8]

Question 7

7.1 Write down the formula for the area of a square. (1)

7.2 Calculate the area of ABCF and give your answer in cm .

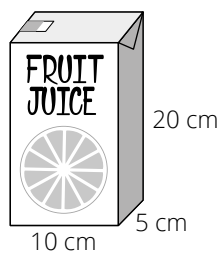


(5)

[6]

Question 8

8.1 Determine the volume and surface area of the solid shown here. Give your answers correct to two decimal places where necessary.



(10)

[10]

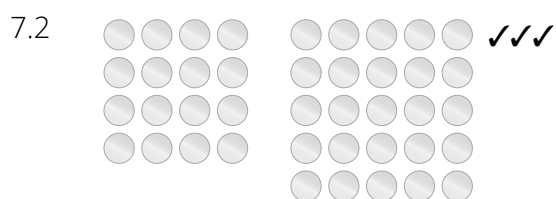
Total: 60

Exemplar Assessments

Mid-year Test Memorandum

Marks: 100

- 1.1 3 or 5 ✓✓ (2)
- 1.2 There is no irrational number in the list. ✓✓ (2)
- [4]**
- 2.1 integer ✓✓ (2)
- 2.2 fraction ✓✓ (2)
- [4]**
- 3.1
- | | |
|------------|------------|
| 3 9 | 2 2 4 |
| <u>3 3</u> | 2 1 2 |
| <u>1</u> | 2 6 |
| | <u>3 3</u> |
| | <u>1</u> |
- $9 = 3 \times 3$ ✓ and $24 = 2 \times 2 \times 2 \times 3$ ✓
- $\text{LCM} = 3 \times 3 \times 2 \times 2 \times 2 = 72$ ✓✓
- $\text{HCF} = 3$ ✓ (5)
- [5]**
- 4.1 $-45 \div (-5) - 6 + 4 = 9 - 6 + 4 = 7$ ✓✓ (2)
- [2]**
- 5.1 $-5 + 4 - 23 = -24$ ✓✓ (2)
- [2]**
- 6.1
- $$\frac{24x^4}{8x^6}$$
- $= 3x^{4-6}$ ✓ (1)
- $= 3x^{-2}$ ✓ (1)
- $= \frac{3}{x^2}$ ✓ (1)
- [3]**
- 7.1
- | | | | | | | |
|---|----|----|---|---|---|----|
| x | -4 | -2 | 0 | 1 | 3 | 8 |
| y | 15 | 11 | 7 | 5 | 1 | -9 |



(3)

7.3 $T_n = 2n + 1$ ✓✓✓

(3)

[12]

8.1 $a \times 2b + 3a \times (-2b) - (-2a) \times (-2b)$
 $= 2ab - 6ab - 4ab$ ✓
 $= -8ab$ ✓

(2)

8.2 $ab \times c + (a + b)c = abc + ac + bc$ ✓✓

(2)

8.3 $x^2 - 3y - 21x^2 + 7y$ ✓✓
 $= -8x^2 + 4y$

(2)

8.4 $(-54x^2y) \div (-6xy)$
 $= 9x$ ✓✓

(2)

8.5 $\sqrt[3]{-\frac{8x^6}{27}}$
 $= -\frac{2x^2}{3}$ ✓✓

(2)

[10]

9.1 $\frac{21}{x} = 3$
 $3x = 21$ ✓
 $x = 7$ ✓

(2)

9.2 $15 - 2x = 9x - 7$
 $-2x - 9x = -7 - 15$ ✓
 $-11x = -22$ ✓
 $x = 2$ ✓

(3)

9.3 $5(x - 4) = 60$
 $5x - 20 = 60$ ✓
 $5x = 60 + 20$ ✓
 $5x = 80$ ✓
 $x = 16$ ✓

(4)

9.4 $\frac{x}{5} = \frac{3}{35} + \frac{x+1}{7}$

$\times 35: 7x = 3 + 5(x + 1)$

$7x = 3 + 5x + 5 \checkmark\checkmark$

$7x - 5x = 3 + 5$

$2x = 8 \checkmark$

$x = 4 \checkmark$

(4)

[13]

10.1 $-4; -7; -10; -13; -16; -19 \checkmark\checkmark$

(2)

10.2 $T_n = an + b$

$T_n = -3n + b$

If $n = 1; T_n = -4 \checkmark$

$-4 = -3 + b$

$b = -1 \checkmark$

$T_n = -3n - 1 \checkmark$

(3)

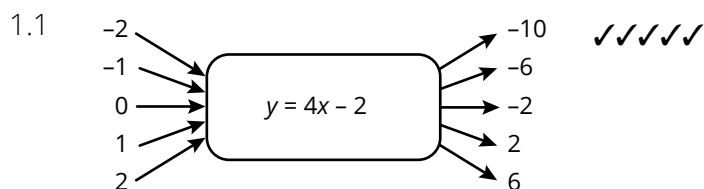
[5]

Total: 60

Exemplar Assessments

Term 3 Test Memorandum

Marks: 50



(5)

1.2

x	-2	-1	0	1	2
y	-10	-6	-2	2	6

✓✓✓✓✓

(5)

[10]

2.1

x	-2	-1	0	1	2	7	10	16	n
y	-10	-7	-4	-1	2	17	26	44	$T_n = 3n - 4$

✓✓✓✓✓

(5)

2.2 $T_n = 3n - 4$ ✓✓

(2)

[7]

3.1 $y = -\frac{1}{3}x + 1$ ✓✓✓✓

(4)

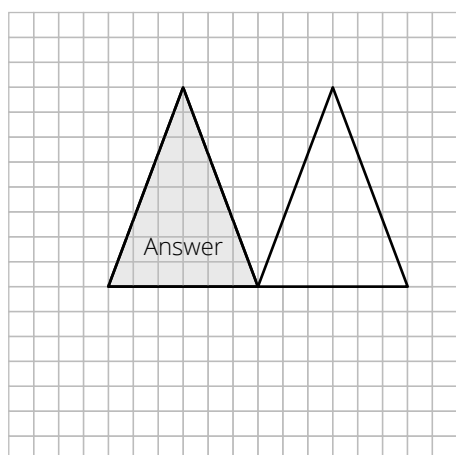
3.2 $y = 2$ ✓✓

(2)

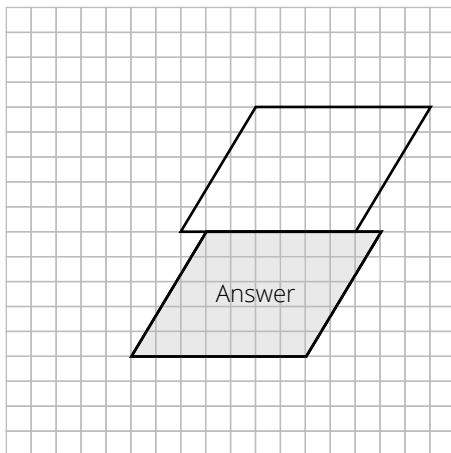
[5]

4.1 $(x; y) \rightarrow (x - 6; y)$ ✓✓

(2)

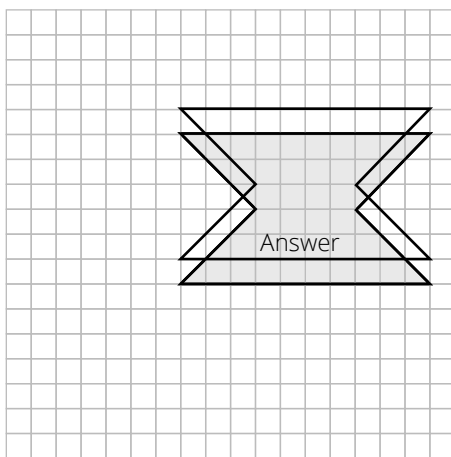


4.1.2 $(x; y) \rightarrow (x - 2; y - 5)$ ✓✓



(2)

4.1.3 $(x; y) \rightarrow (x; y + 1)$ ✓✓



(2)

[6]

5.1 $c = 180^\circ - 50^\circ$ (angles on a straight line) ✓

$c = 130^\circ$ ✓

(2)

5.2 alternate angles ✓

(1)

5.2.1 co-interior angles ✓

(1)

5.2.2 corresponding angles ✓

(1)

5.2.3 vertically opposite angles ✓

(1)

5.2.4 vertically opposite angles ✓

(1)

5.2.5 vertically opposite angles ✓

(1)

5.2.6 alternate angles ✓

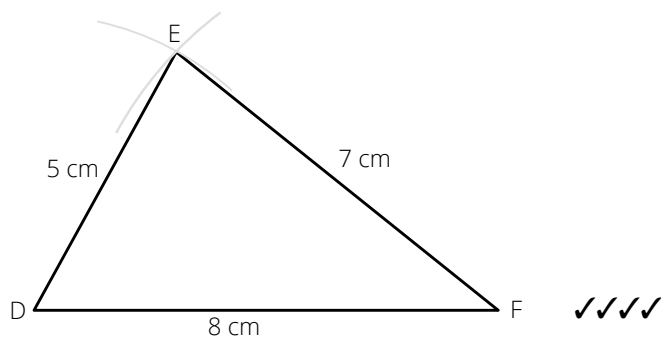
(1)

[9]

- 5.3 $y = 70^\circ$ (alternate angles; $CD \parallel EF$) ✓✓ (2)
- $x = 180 - 70^\circ = 110^\circ$ (angles on a straight line) ✓✓ (2)
- $\hat{G}_2 = y = 70^\circ$ (angles opposite equal sides)
- $z = 180^\circ - (70^\circ + 70^\circ) = 40^\circ$ (sum of angles of a triangle) ✓✓ (2)

[6]

6.1



(4)

6.2.1 Only one triangle. (1)

6.2.2 Yes. (1)

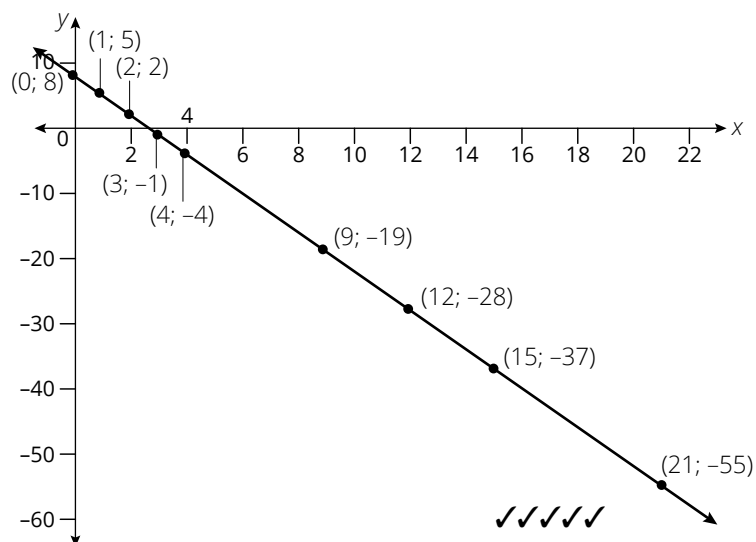
[6]

Exemplar Assessments

Term 4 Test Memorandum

Marks: 60

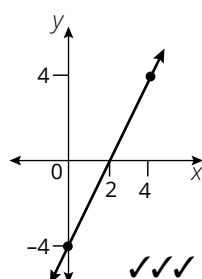
1.1



(5)

[5]

2.1



(3)

[3]

3.1 Scale factor = 4; centre of enlargement is the origin (0; 0) ✓✓✓

(3)

[3]

4.1 $65^\circ + c = 90^\circ$ ✓ (complementary angles)

$$c = 25^\circ \checkmark$$

(2)

4.2 $x - 20^\circ + 84^\circ = 180^\circ$ (co-interior angles, parallel lines)

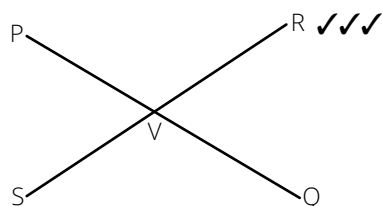
$$x = 180^\circ - 64^\circ$$

$$= 116^\circ \checkmark \checkmark \checkmark$$

(3)

[5]

5.1



(3)

- 5.2 The opposite angles are equal ✓
 The diagonals bisect each other ✓
 The opposite sides are equal ✓
 The opposite sides are parallel ✓ (any two answers) (2)

- 5.3 1 – kite ✓
 2 – hexagon ✓
 3 – trapezium ✓
 4 – right-angled triangle ✓
 5 – octagon ✓ (5)

- 5.4 $x = 10^\circ + 32^\circ + 56^\circ$ (exterior angle of \triangle) ✓
 $x = 98^\circ$ ✓
 $x = 32^\circ + 56^\circ$ (exterior angle of \triangle) ✓
 $x = 88^\circ$ ✓ (4)

- 5.5 $60^\circ + x + \hat{C}_1$ (sum of angles of \triangle) ✓
 $x = \hat{C}_1$ (angles of opposite equal sides) ✓
 $60^\circ + x + x = 180^\circ$
 $2x = 180^\circ - 60^\circ = 120^\circ$
 $x = 60^\circ$ ✓
 $x = y + y$ (opposite angles of a parallelogram) ✓
 $60^\circ = 2y$
 $y = 30^\circ$
 $\hat{C}_1 = \hat{W}_1$ (alternate angles; $AD \parallel BC$) ✓
 $\hat{W}_1 = x$
 $z = 180^\circ - 60^\circ - 30^\circ$
 $z = 90^\circ$ ✓ (6)

[20]

- 6.1 Area = $\frac{1}{2}(b)(h)$
 $150 = \frac{1}{2}(20)(SU)$
 $15 \text{ cm} = SU$ ✓
 $TU^2 = S + S$ (Theorem of Pythagoras)
 $TU^2 = (20)^2 + (15)^2 + \checkmark$
 $TU^2 = 400 + 225$
 $TU^2 = 625$ ✓
 $TU = \sqrt{625} = 25 \text{ cm}$ ✓ (4)

$$6.2 \quad \text{Area STU} = \frac{1}{2} ST \times SU = \frac{1}{2} \times 20 \times 15 = 150 \text{ cm}^2 \checkmark$$

$$\text{Area STU} = \frac{1}{2} x \times TU \checkmark$$

$$150 = \frac{1}{2} x \times 25 \checkmark$$

$$6 = \frac{1}{2} x = 12 \text{ cm} \checkmark$$

[8]

$$7.1 \quad A = s \times s \text{ or } s^2 \checkmark$$

(1)

$$7.2 \quad \text{Area of trapezium ABEF} = \frac{1}{2} (a + b) \times h = \frac{1}{2} AB + FE \times BD \checkmark$$

$$FE = AB = 12 \text{ cm (AB} \parallel FE; AF \parallel BE)$$

$$\text{Area of trapezium ABEF} = \frac{1}{2} (AB + FE) \times BD$$

$$= \frac{1}{2} (12 + 12) \times 8$$

$$= 96 \text{ cm}^2$$

$$\text{Area of } \triangle BCE = \frac{1}{2} bh$$

$$= \frac{1}{2} EC \times BD$$

$$= \frac{1}{2} \times 12 \times 8$$

$$= 48 \text{ cm}^2 \checkmark$$

$$\text{Area of ABCF} = \text{Area of trapezium ABEF} + \text{Area of } \triangle BCE \checkmark$$

$$\text{Area of ABCF} = 96 + 48 = 144 \text{ cm}^2 \checkmark \checkmark$$

(5)

[6]

$$8. \quad V = l \times b \times h \checkmark$$

$$= 10 \times 5 \times 20 \text{ cm} \checkmark \checkmark$$

$$= 1\,000 \text{ cm}^3 \checkmark$$

$$SA = 2 \times (10 \times 20) + 2 \times (5 \times 20) + 2 \times (10 \times 5) \checkmark \checkmark \checkmark \checkmark$$

$$= 700 \text{ cm}^2 \checkmark \checkmark$$

$$\text{Or } (20 + 20 + 10 + 10) \times 5 + (2 \times 20 \times 10) = 700 \text{ cm}^2$$

(10)

[10]

Total: 60

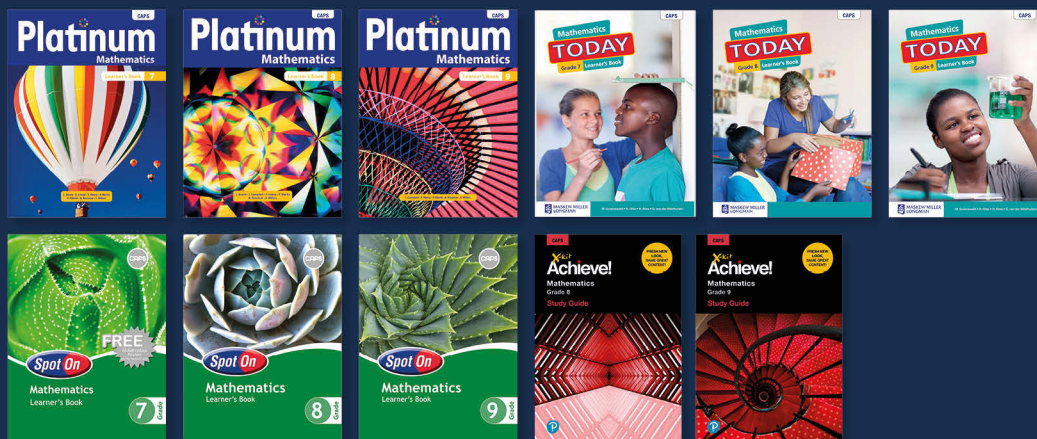
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