Province of the
EASTERN CAPE
EDUCATION

SENIOR PHASE

GRADE 9

NOVEMBER 2019

MATHEMATICS

MARKS: **100**

TIME: **2 hours**

9MATHS

This question paper consists of 16 pages, including 2 annexures.

INSTRUCTIONS AND INFORMATION

Read the instructions for each question carefully before answering the questions.

1. This paper consists of TEN (10) questions and a diagram sheet for QUESTIONS 5.2.1 and 7.1.1.
2. Answer ALL the questions.
3. Number your answers exactly as the questions are numbered in the question paper.
4. You may use an approved scientific calculator (non-programmable and non-graphical).
5. Clearly show ALL the calculations, diagrams and graphs etc. you have used in determining your answers.
6. Diagrams are NOT necessarily drawn to scale.
7. If necessary round off to TWO decimal places unless otherwise stated.
8. Answers alone will not necessarily earn full marks.
9 Write neatly and legibly.

QUESTION 1

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number, for example if the correct answer for 1.1 is A, write your answer only as 1.1 A.

1.1 Which of the following numbers is rational?

A $\sqrt{3}$

B $\sqrt{16}$

C $\sqrt{-9}$

D $\sqrt{13}$

(1)

1.2 There are 120 learners in Grade 8 at Greenview High School. If the ratio of girls to boys is 3 : 5, how many boys are there in Grade 8?

A 75
B 55
C 15
D 8

(1)

1.3 Convert the following number to scientific notation: $0{,}00000000089123$.

A $0{,}00000000089123 \times 10^{10}$

B $8{,}9123 \times 10^{10}$

C $8{,}9123 \times 10^{-10}$

D $89{,}123 \times 10^{-10}$

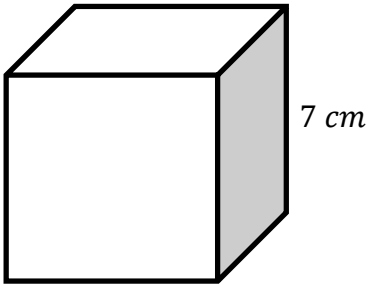
(1)

1.4 If $(x-1)(x+2)=0$ then $x=\ldots$

A -1 or 0
B 1 or -2
C 1
D -2

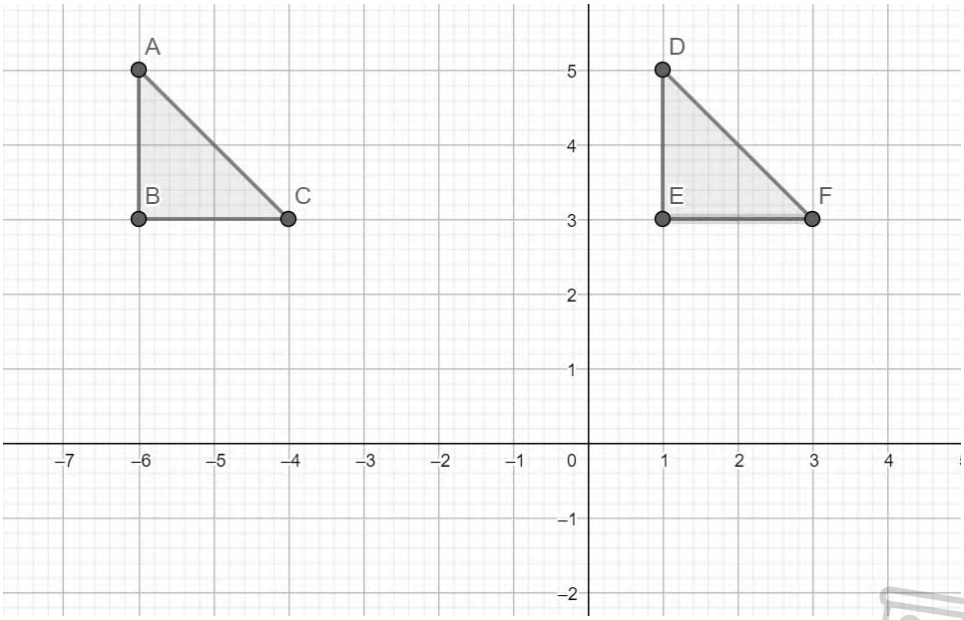
(1)

1.5 What is the volume of a cube with the side length equal to $7\ cm$?



A $49\ cm^3$
B $28\ cm^3$
C $343\ cm^3$
D $14\ cm^3$ (1)

1.6 The transformation of ΔABC to ΔDEF is called …



A a reflection.
B a reduction.
C an enlargement.
D a translation. (1)

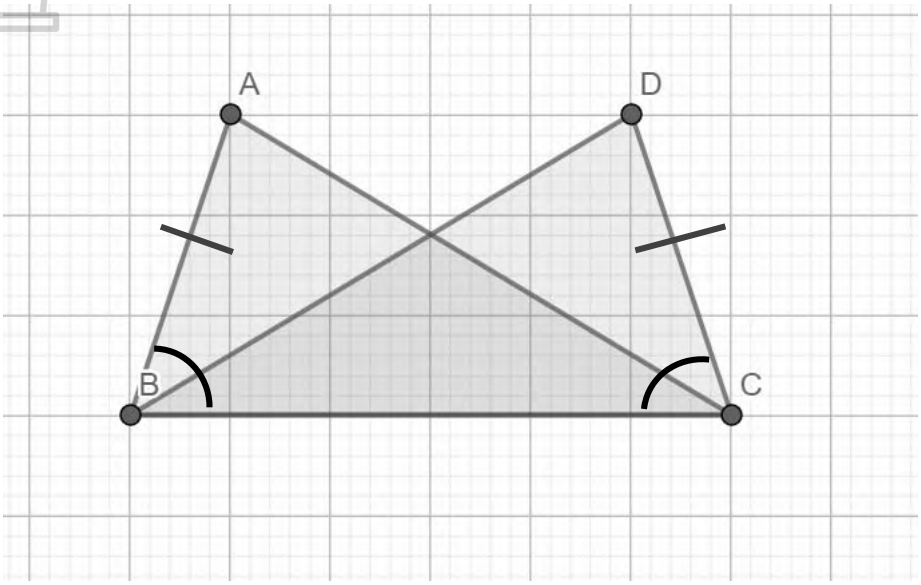
1.7 The next number in the sequence $1\ ;\ 9\ ;\ 25\ ;$ ... is:

A 33
B 36
C 49
D 50 (1)

1.8 Which 3-D figure has 5 faces, 5 vertices and 8 edges?

A Cylinder
B Dodecahedron
C Square-based pyramid
D Triangular-based pyramid (1)

1.9 Why is $\Delta ABC \equiv \Delta DCB$?



A S, S, S
B $90°$, hyp, S (R,H,S)
C $S, <, S$
D $<, <, S$ (1)

1.10 What will the probability be if an odd number is picked from a list of numbers from 1–13?

A $\frac{6}{13}$
B $\frac{7}{13}$
C $\frac{1}{13}$
D $\frac{1}{2}$

(1)
[10]

QUESTION 2

2.1 Simplify the following:

2.1.1 $\frac{4p^2q}{pq^3} \div \frac{10pq}{p^2q^3}$ (3)

2.1.2 $\frac{3x+6y}{x+2y}$ (2)

2.2 Find the product of the following:

2.2.1 $3x(2x^2-5x-4)$ (2)

2.2.2 $(x+3)(x-4)$ (2)

2.2.3 $(x-5)^2-(x+5)(x-5)+10x$ (4)

2.3 Factorise the following completely:

2.3.1 $3a^2b^3-12a^4b$ (3)

2.3.2 $x^2-3x-10$ (2)

2.3.3 $4x(a-b)+3(b-a)$ (3)

2.4 Solve for x:

$\frac{3x-1}{2}-\frac{2x}{3}=2$ (3)

[24]

QUESTION 3

3.1 Philani sees the following advert:

SCOOTER FOR SALE
R15 000 CASH
HIRE PURCHASE AGREEMENT
AVAILABLE

Since he cannot afford to pay cash for the scooter, he opts for the hire purchase agreement which states the following:

15% deposit
24 monthly equal instalments
Interest rate: 10% per annum

3.1.1 How much will his deposit be? (1)

3.1.2 Calculate the total amount that he must still pay. (3)

3.1.3 Calculate the monthly instalments. (2)

3.2 Bongiwe invested a certain amount into a savings account at 6,5% compound interest per annum. If the final amount is R15 300 after 5 years, how much did she originally invest? (3)
[9]

QUESTION 4

4.1 Write down the next term in the given sequence:

$$3 \quad ; \quad 8 \quad ; \quad 13 \quad ; \quad \ldots$$ (1)

4.2 Describe the pattern in QUESTION 4.1 in words. (1)

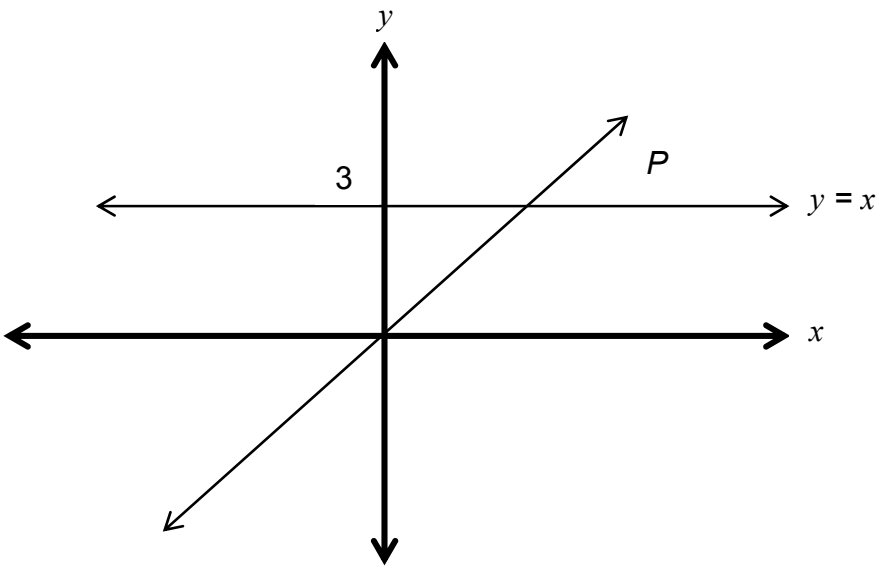
4.3 Write down the general term of the given sequence in the form $Tn = \_\_\_$ (2)

4.4 Which term in the sequence is equal to 38? (3)

[7]

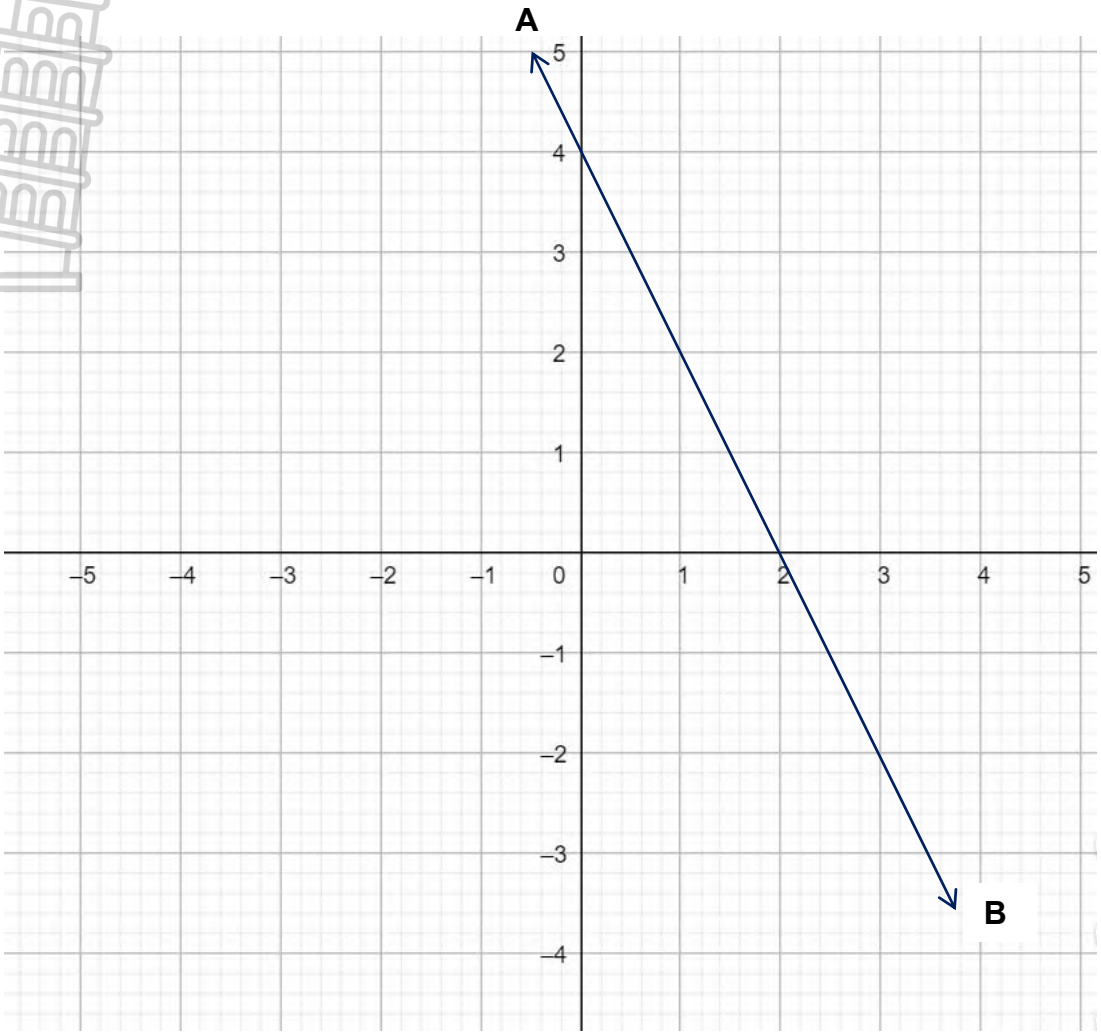
QUESTION 5

Study the graphs below.



5.1 What are the co-ordinates of P (the intersection of the two graphs)? (1)

5.2 On the Cartesian plane below, the graph $y = -2x + 4$ is shown.

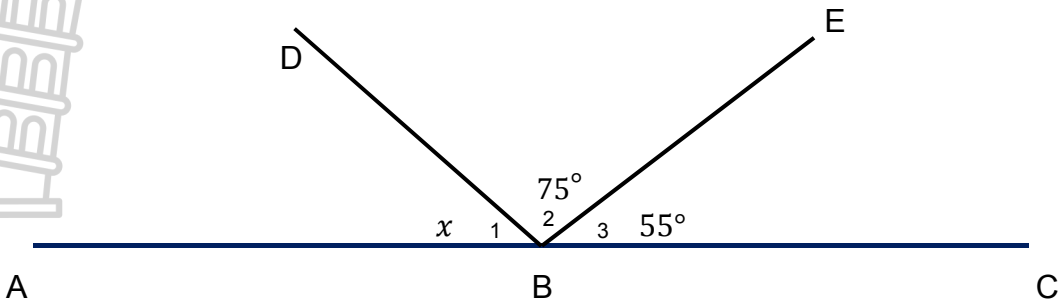


5.2.1 On the ANNEXURE provided, draw the straight line graph represented by $y = -2x - 4$.
(Indicate all intercepts and label your graph CD.) (3)

5.2.2 What can you deduce about the two graphs, AB and CD? Give a reason for your answer. (2)
[6]

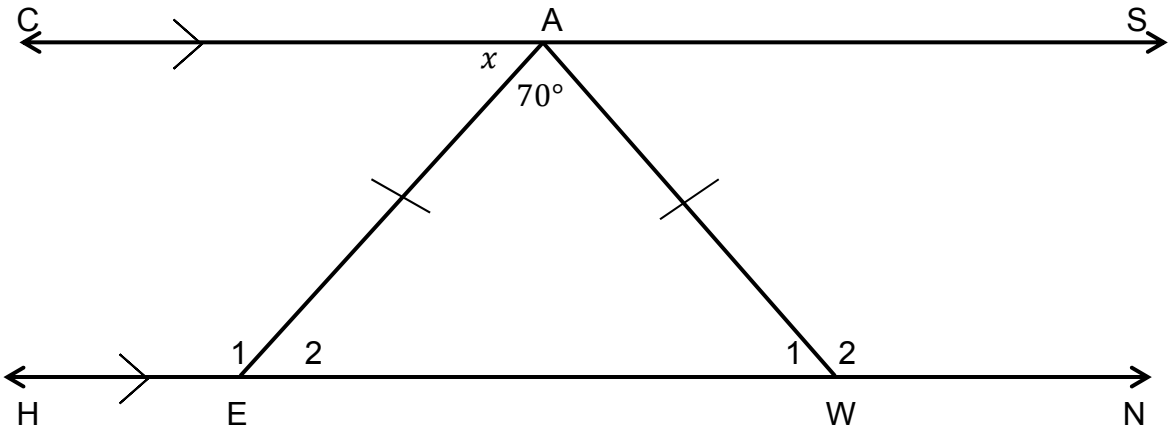
QUESTION 6

6.1 In the figure below, ABC is a straight line, $\hat{B}_2 = 75°$ and $\hat{B}_3 = 55°$.



Determine, with reasons, the size of x. (2)

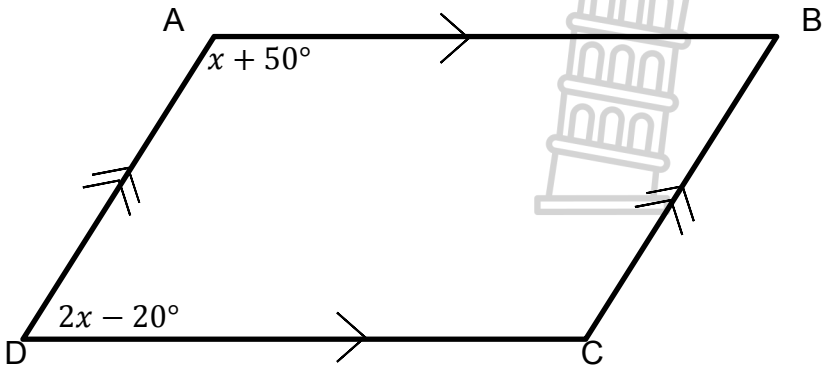
6.2 In the figure below, $CS \parallel HN$, $E\hat{A}W = 70°, AE = AW$ and $C\hat{A}E = x$.



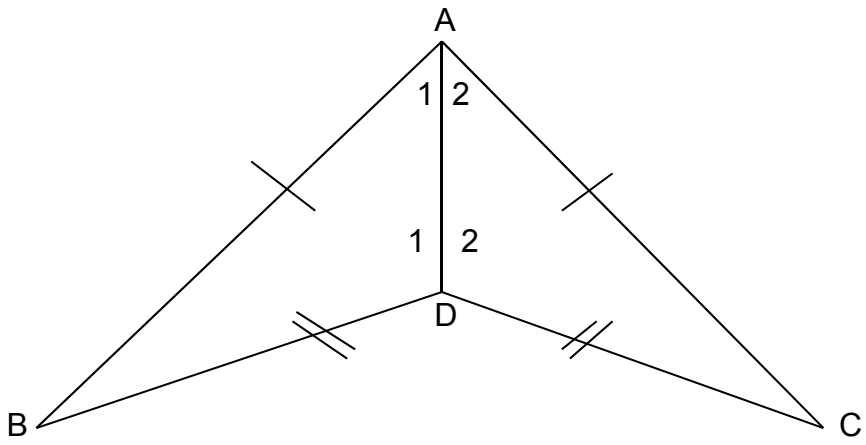
6.2.1 Give a reason why $\hat{E}_2 = x$. (1)

6.2.2 Hence, determine the value of x. (3)

6.3 $ABCD$ is a parallelogram. Calculate the size of $\hat{B}$. (4)



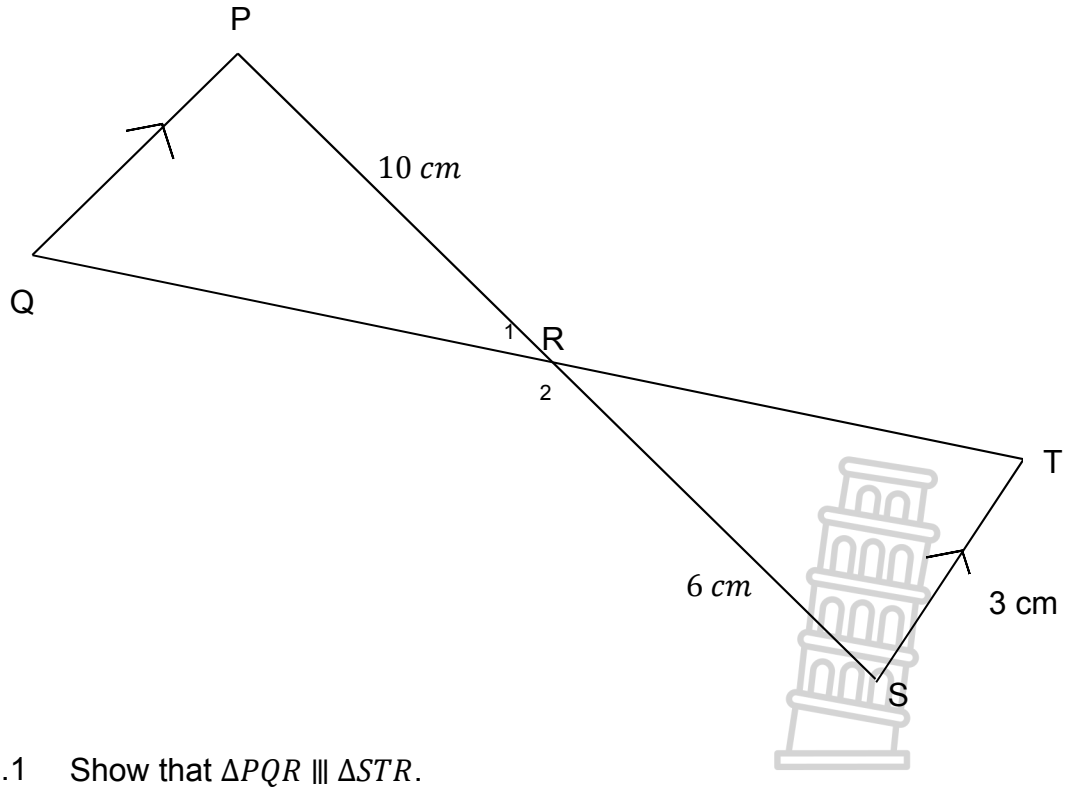
6.4 In the figure below, $AB = AC$ and $BD = CD$.



6.4.1 Prove that $\Delta ABD \equiv \Delta ACD$. (4)

6.4.2 Hence, prove that DA bisects $B\hat{A}C$. (1)

6.5 In ΔPQR and ΔSTR, $PQ \parallel ST$, $PR = 10\ cm, ST = 3\ cm$ and $SR = 6\ cm$.



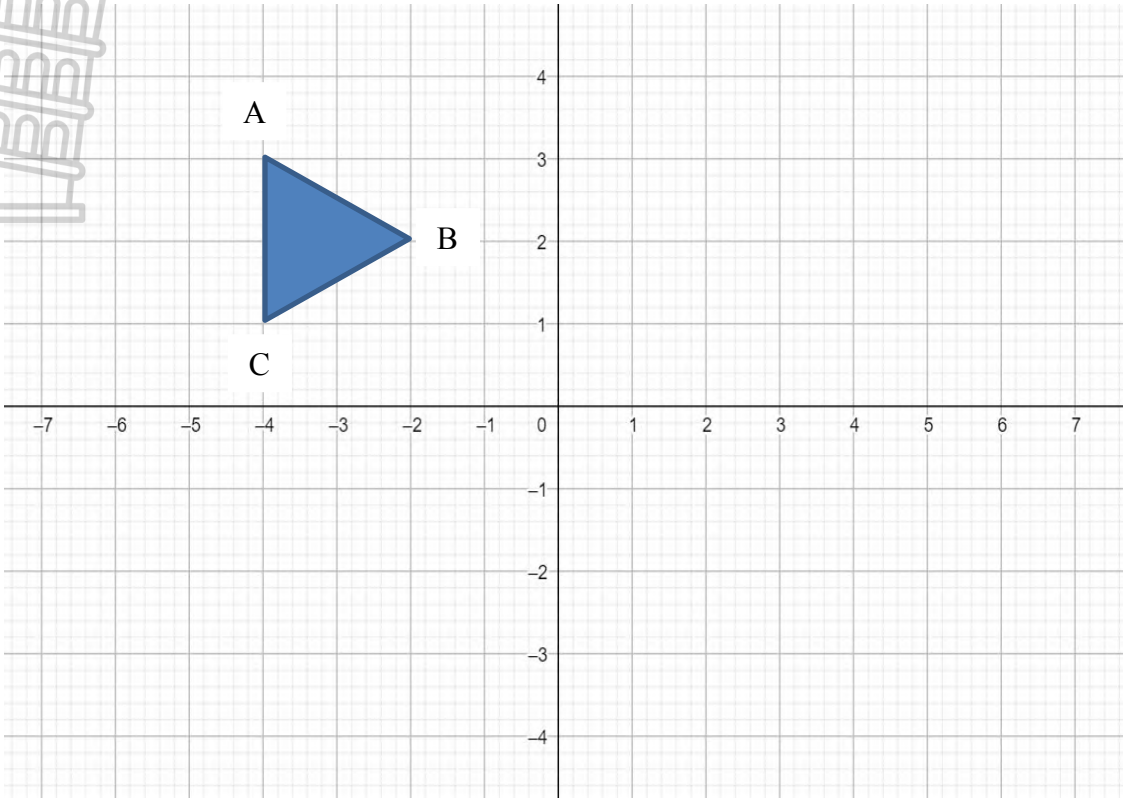
6.5.1 Show that $\Delta PQR \text{ ||| } \Delta STR$. (4)

6.5.2 Calculate the length of PQ. (3)

[22]

QUESTION 7

7.1 Study the diagram below.

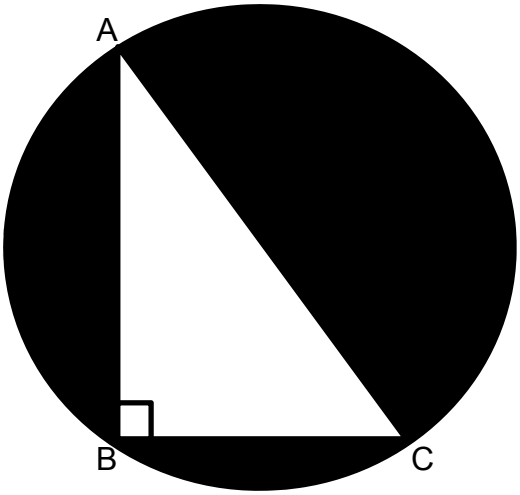


7.1.1 Using the ANNEXURE, reflect the object about the y-axis from the diagram above. (2)

7.1.2 Write the rule that you used to reflect the object in QUESTION 7.1.1 in the form:
$(x, y) \rightarrow (\ldots ; \ldots)$ (1)
[3]

QUESTION 8

8.1 ΔABC is inscribed in the circle below. $AC = 5\ cm, BC = 4\ cm$. AC is the diameter of the circle.



8.1.1 Calculate the length of AB. (2)

8.1.2 Calculate the area of ΔABC and the area of the circle.

NOTE: Use $\pi = 3{,}14$. Round off to 1 decimal place. (3)

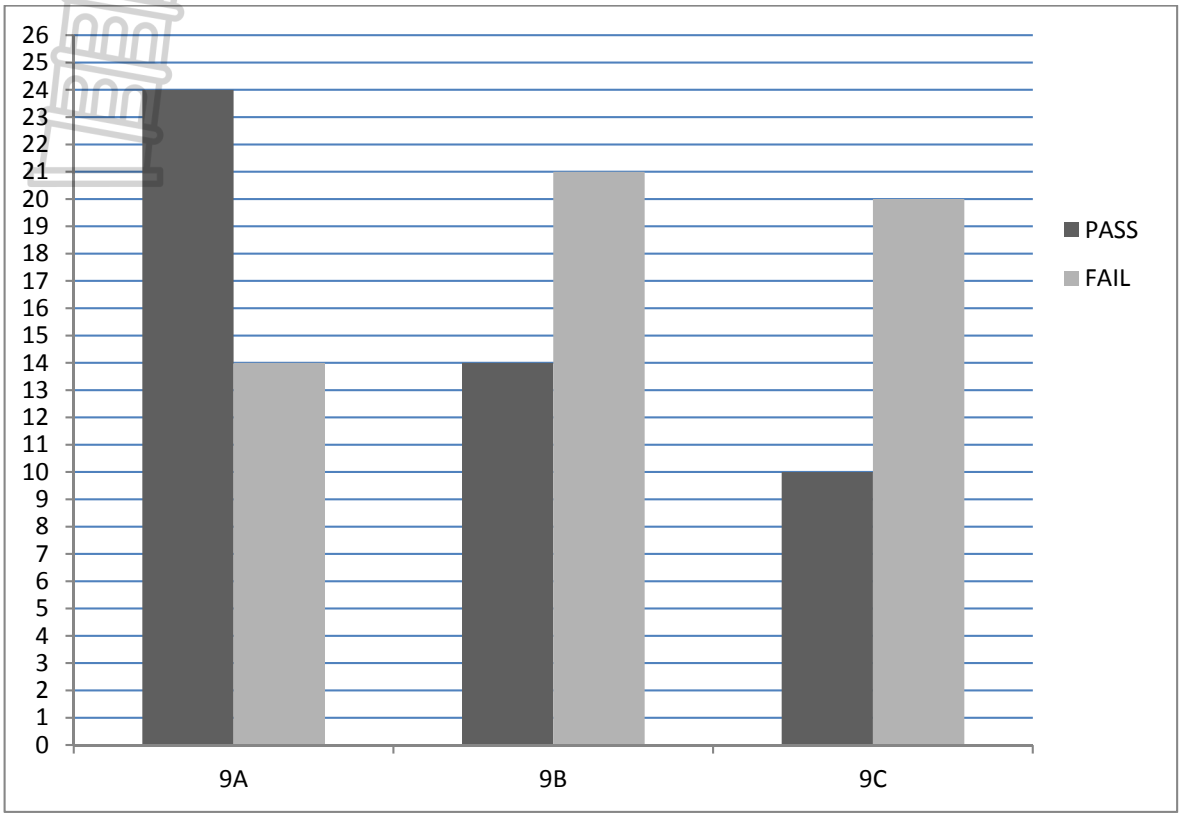
8.1.3 Hence, calculate the shaded area. (1)

8.2 Determine the volume of a cylinder if it has the following dimensions: $r = 7\ cm$ and $h = 20\ cm$.

NOTE: use $\pi = 3{,}14$. Round off to 1 decimal place. (3)
[9]

QUESTION 9

The double bar graph below shows the results of a mathematics test in three Grade 9 classes.



9.1 Which class had the most learners who passed the test? (1)

9.2 What is the mean of the learners who failed in total (all three classes)? (2)

9.3 Use your answer in QUESTION 9.2 and voice your opinion if you think the teacher will be happy with the marks represent above. Give a reason for your answer. (2)
[5]

QUESTION 10

A coin is tossed and a dice is rolled.

10.1 Represent the above scenario in a tree diagram. (2)

10.2 How many different possible outcomes are there? (1)

10.3 What is the probability of getting a tail and rolling a prime number? (2)
[5]

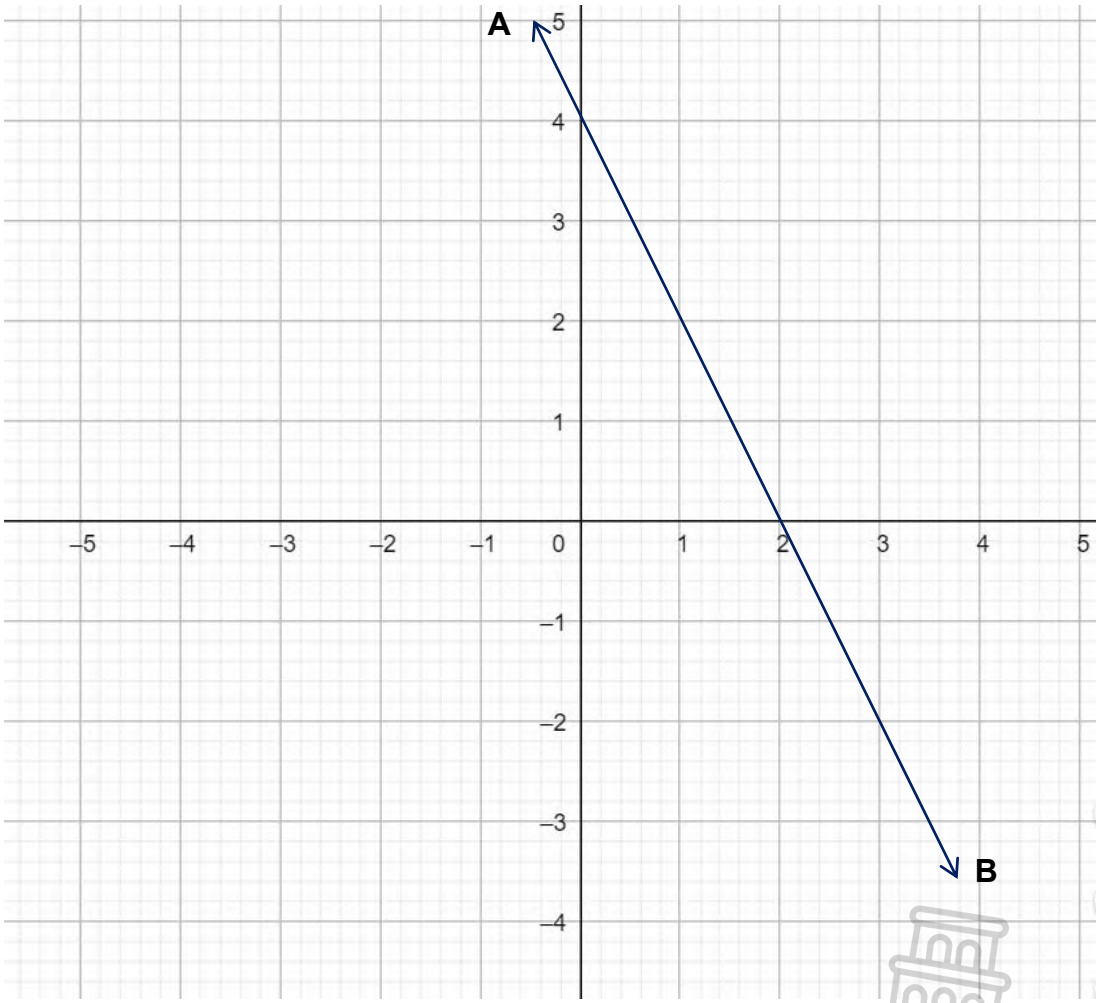
TOTAL: 100

ANNEXURE

QUESTION 5.2.1

NAME: _____

SURNAME: _____



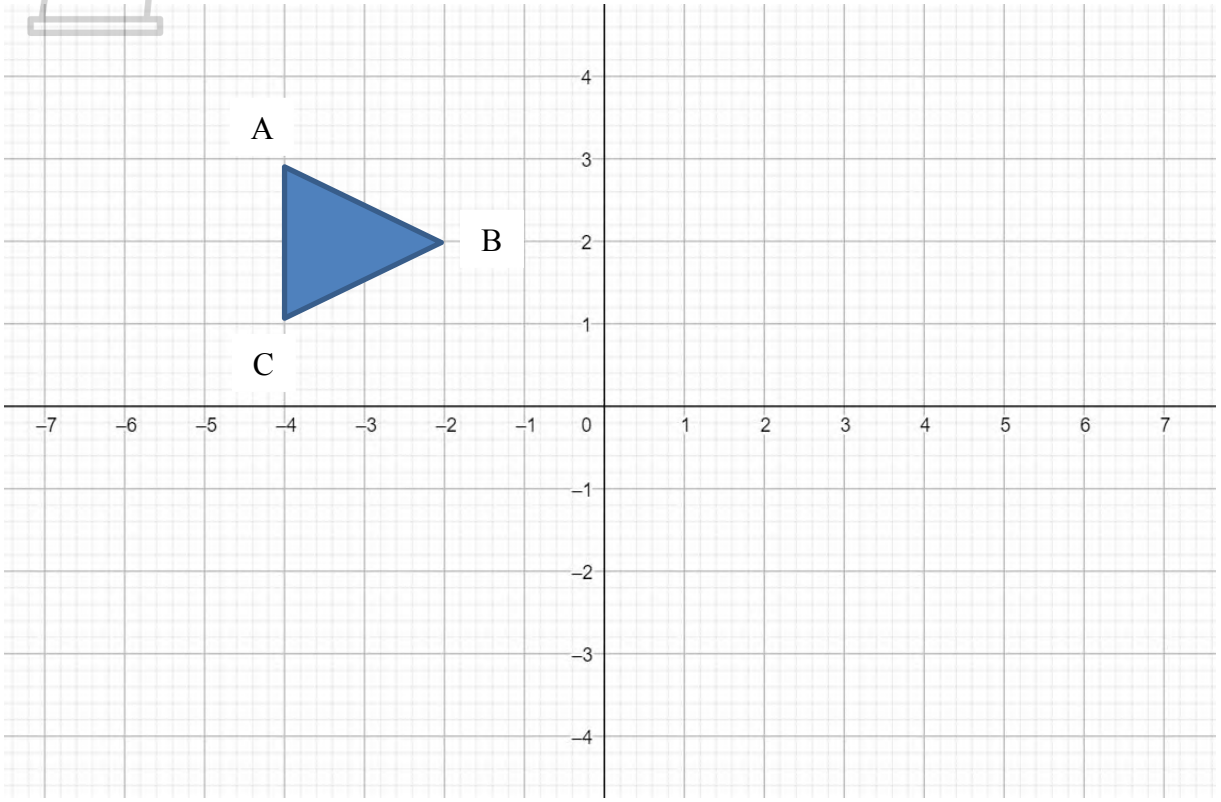
(3)

ANNEXURE

QUESTION 7.1.1

NAME: _____

SURNAME: _____



(2)

Province of the
EASTERN CAPE
EDUCATION

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ERRATA

TO: **DISTRICTS HEADS OF EXAMINATIONS**
PRINCIPALS OF SCHOOLS IN THE FET AND GET BAND

FROM: **MS N. MBELEKI**
CES: INSTRUMENT DEVELOPMENT AND MODERATION SECTION

SUBJECT: **ERRATA – MATHEMATICS GRADE 9 NOVEMBER 2019**

DATE: **20 NOVEMBER 2019**

The Mathematics Grade 9 November 2019 was written on Monday, 18 November 2019. We were made aware of certain amendments and omissions that were discovered during the marking process.

In order to address this and to ensure that learners are not disadvantaged, the following standardised approach to marking must be adopted across the Province. The following guidelines with regard to marking was prepared in conjunction with the examiner and moderator.

ERRATA

Question	Solution	Mark Guidance	Mark Allocation
8.1.2	ΔABC $A = \frac{1}{2}b \times h\ A = \frac{1}{2}(4) \times (3)$ $A = 6\ cm^2$ Circle $A = \pi r^2$ $A = (3{,}14)(2{,}5)^2$ $A = 19{,}63\ cm^2$	Formula: 1 Mark (A) Answer: 1 Mark (A) Answer: 1 Mark (A)	(3)
8.1.3	$19{,}63\ cm^2 - 6\ cm^2 = 13{,}63\ cm^2$	Answer: 1 Mark (CA)	(1)

We request that this must be brought to the attention of all educators marking these papers and sincerely apologise for the inconvenience.

Yours in education.

MS N. MBELEKI 20 November 2019 **DATE**

Province of the
EASTERN CAPE
EDUCATION

SENIOR PHASE

GRADE 9

NOVEMBER 2019

MATHEMATICS
MARKING GUIDELINE

MARKS: **100**

IMPORTANT INFORMATION:

This is a marking guideline. In any instance where learners have used different but sound mathematical strategies to solve the problems, they (learners) should be credited.

Key:
M – Method marking
CA – Consistent accuracy marking
A – Accuracy marking

This marking guideline consists of 8 pages.

QUESTION 1

Ques.	Solution		Total
1.1	B	1 Mark for each correct answer. (A)	[10]
1.2	A		
1.3	C		
1.4	B		
1.5	C		
1.6	D		
1.7	C		
1.8	C		
1.9	C		
1.10	B		

QUESTION 2

Ques.	Solution		Total
2.1.1	$\frac{4p^2q}{pq^3} \div \frac{10pq}{p^2q^3}$ $= \frac{4p^2q}{pq^3} \times \frac{p^2q^3}{10pq}$ $= \frac{4p^4q^4}{10p^2q^4}$ $= \frac{2p^2}{5}$	Changing sign and fraction: 1 mark (M) Simplifying: 1 mark (M) Answer: 1 mark (CA)	(3)
2.1.2	$\frac{3x+6y}{x+2y}$ $= \frac{3(x+2y)}{(x+2y)}$ $= 3$	HCF: 1 mark (M) Answer: 1 mark (A)	(2)
2.2.1	$3x(2x^2 - 5x - 4)$ $= 6x^3 - 15x^2 - 12x$	Answer: 2 marks (A)	(2)
2.2.2	$(x + 3)(x - 4)$ $= x^2 - 4x + 3x - 12$ $= x^2 - x - 12$	Multiplication: 1 mark (M) Answer: 1 Mark (CA)	(2)
2.2.3	$(x - 5)^2 - (x + 5)(x - 5) + 10x$ $= x^2 - 10x + 25 - (x^2 - 25) + 10x$ $= x^2 - 10x + 25 - x^2 + 25 + 10x$ $= 50$	$x^2 - 10x + 25$: 1 mark (M) ; $x^2 - 25$: 1 mark (M) $-x^2 + 25$: 1 mark (CA) Answer: 1 mark (CA)	(4)
2.3.1	$3a^2b^3 - 12a^4b$ $= 3a^2b(b^2 - 4a^2)$ $= 3a^2b\ (b + 2a)(b - 2a)$	HCF: 1 mark (M) $(b + 2a)$: 1 mark (A) $(b - 2a)$: 1 mark (A)	(3)
2.3.2	$x^2 - 3x - 10$ $= (x + 2)(x - 5)$	$(x + 2)$: 1 mark (A) $(x - 5)$: 1 mark (A)	(2)

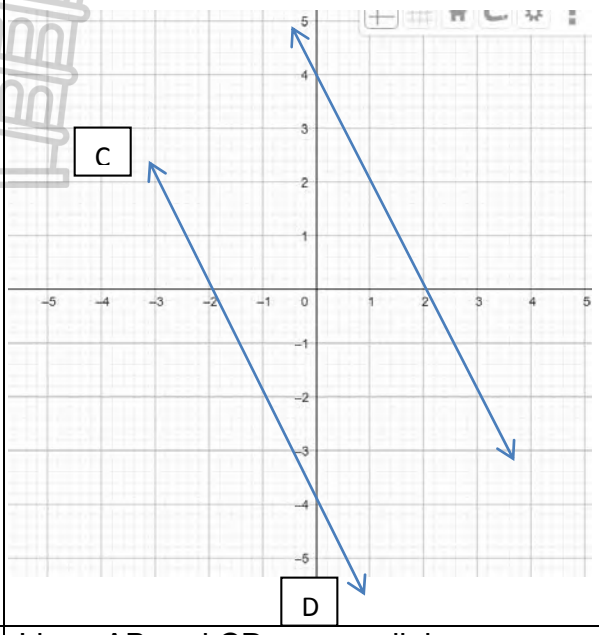
Ques.	Solution		Total
2.3.3	$4x(a-b)+3(b-a)$ $=4x(a-b)-3(a-b)$ $=(a-b)(4x-3)$	Changing signs: 1 mark (M) HCF: 1 mark (A) $(4x-3)$: 1 mark (A)	(3)
2.4	$\frac{3x-1}{2}-\frac{2x}{3}=2$ $3(3x-1)-2(2x)=6(2)$ $9x-3-4x=12$ $5x=15$ $x=3$	Multiplying by 6: 1 mark (A) Solving for x: 1 mark (M) Answer: 1 mark (CA)	(3)
			[24]

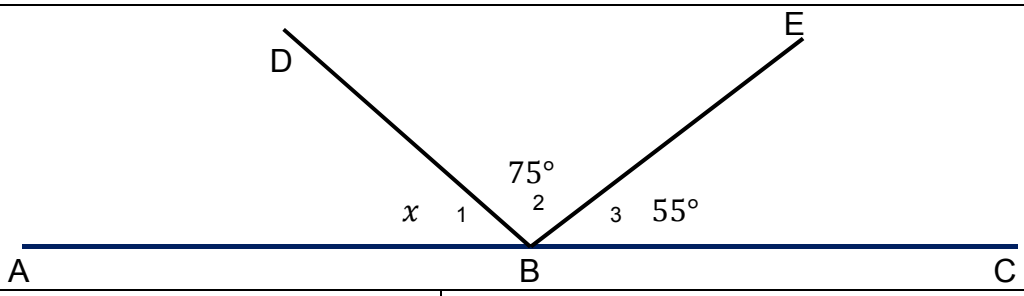
QUESTION 3

Ques.	Solution		Total
3.1.1	$15\,000 \times \frac{15}{100}=R2\,250$	Answer: 1 mark (A)	(1)
3.1.2	$A=P(1+i.n)$ $A=12\,750(1+\frac{10}{100}\times 2)$ $A=R15\,300$	Formula: 1 mark (A) Substitution: 1 mark (M) Answer: 1 mark (CA)	(3)
3.1.3	$15\,300 \div 24=R637{,}50$	Dividing by 24: 1 mark (M) Answer: 1 mark (CA)	(2)
3.2	$A=P(1+i)^n$ $15\,300=P(1+\frac{6{,}5}{100})^5$ $\frac{15\,300}{(1+\frac{6{,}5}{100})^5}=P$ $12\,000=P$	Formula: 1 mark (A) Substitution: 1 mark (M) Answer: 1 mark (CA)	(3)
			[9]

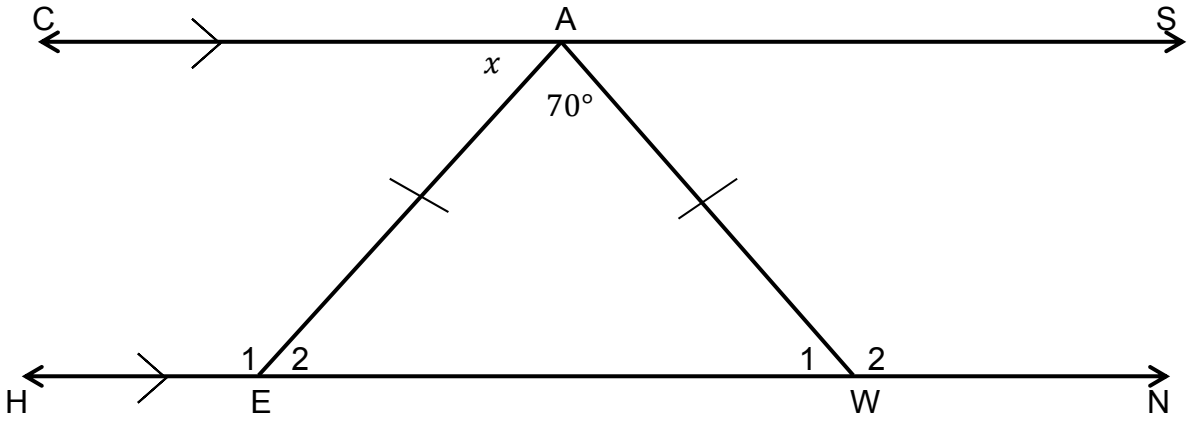
QUESTION 4

Ques.	Solution		Total
4.1	18	Answer: 1 mark (A)	(1)
4.2	Add 5	Answer: 1 mark (A)	(1)
4.3	$Tn=5n-2$	5: 1 mark -2: 1 mark	(2)
4.4	$Tn=5n-2$ $38=5n-2$ $40=5n$ $8=n$	Substitution: 1 mark (M) Solving for n: 1 mark (M) Answer: 1 mark (CA)	(3)
			[7]

QUESTION 5			
Ques.	**Solution**		**Total**
5.1	$(3;3)$		(1)
5.2.1		x-intercept: 1 mark y-intercept: 1 mark shape and direction: 1 mark	(3)
5.2.2	Lines AB and CD are parallel. Gradients are equal.	Parallel: 1 mark (A) Gradients equal: 1 mark (A)	(2)
			[6]

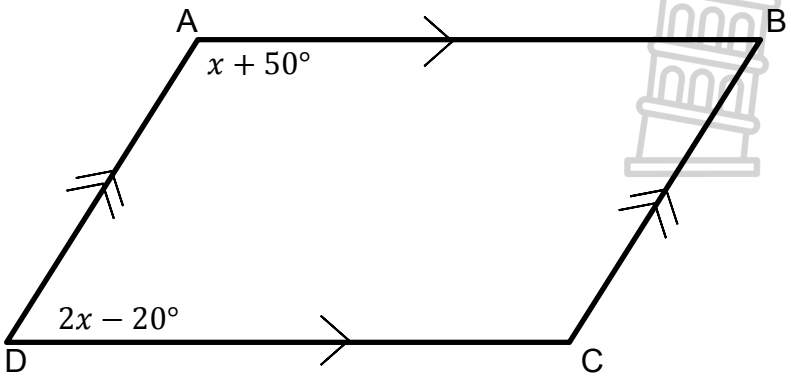
QUESTION 6			
Ques.	**Solution**		**Total**
6.1			
	$x + 75° + 55° = 180°(<'s\ on\ a\ str.line)$ $x = 50°$	Statement and reason: 1 mark (A) Answer: 1 mark (CA)	(2)

6.2



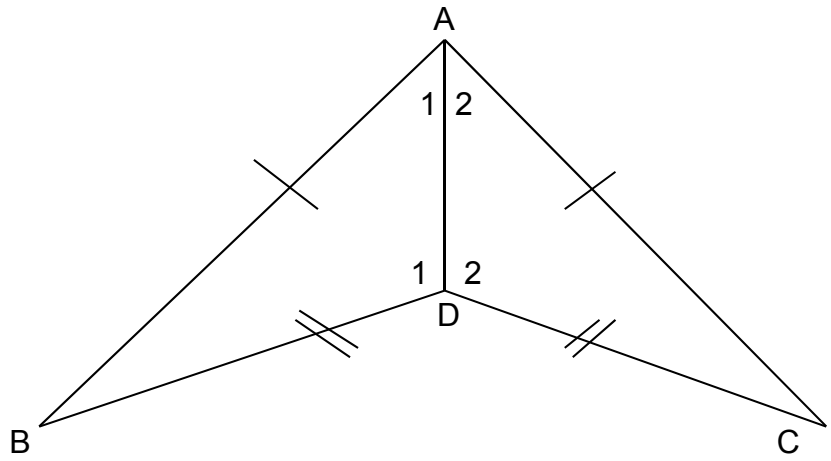
6.2.1	Alternate angles. $CS \parallel HN$	Answer: 1 mark	(1)
6.2.2	$\widehat{W}_1 = x\ (<'s\ opp; equal\ sides)$ $x + x + 70° = 180°(Sum\ of\ int\ <'s)$ $2x = 110°$ $x = 55°$	Answer and reason: 1 mark (A) Statement and reason: 1 mark (M) Answer: 1 mark (CA)	(3)

6.3



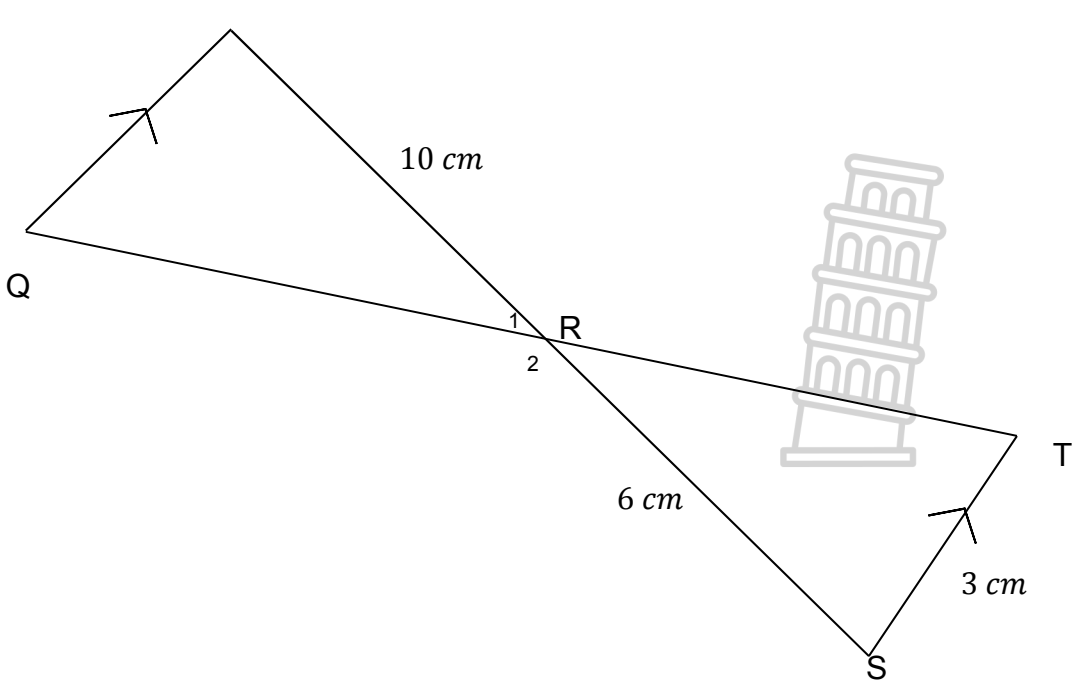
6.3	$x + 50° + 2x - 20° = 180°$ $(AB\|\|CD;\ co - int\ <'s)$ $3x = 150°$ $x = 50°$ $\hat{B} = \hat{D} = 2x - 20°$ $(opp\ <'s\ of\ parm)$ $\hat{B} = 2(50) - 20$ $\hat{B} = 80°$	Statement and reason: 1 mark (A) Answer: 1 mark (CA) Statement and reason: 1 mark Answer: 1 mark (CA)	(4)

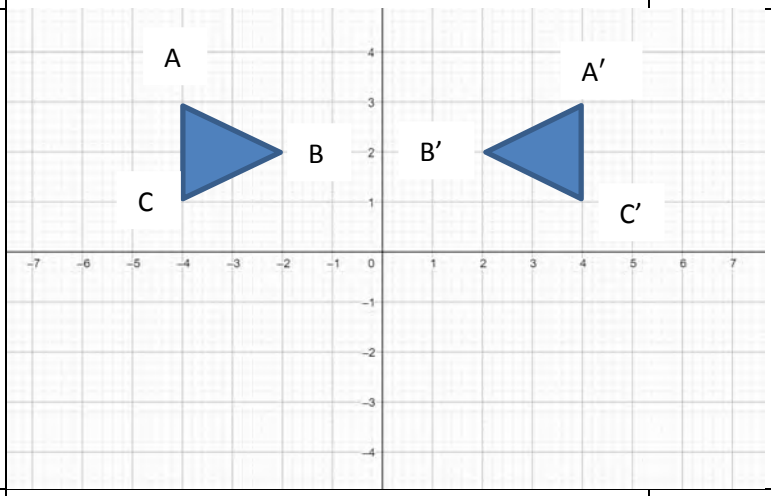
6.4



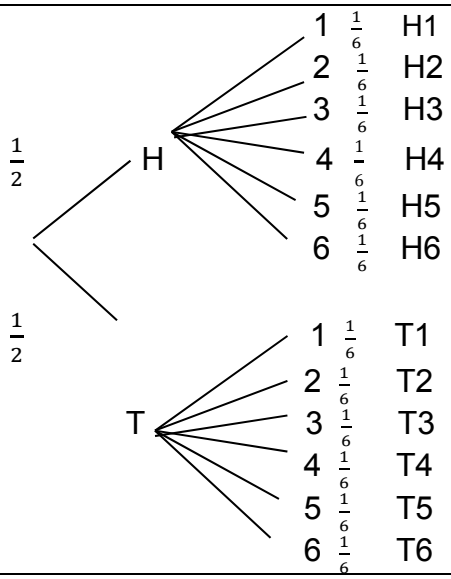
6.4.1	In $\Delta ABD\ and\ \Delta ACD$ $AB = AC\ (Given)$ $BD = CD\ (Given)$ $AD\ is\ common$ $\therefore\ \Delta ABD \equiv \Delta ACD\ (S,S,S)$	Statement and reason: 1 mark (A) Statement and reason: 1 mark (A) Statement and reason: 1 mark (A) Statement and reason: 1 mark (A)	(4)
6.4.2	$\hat{A}_1 = \hat{A}_2$ $(\Delta ABD \equiv ACD)$ Therefore, $DA\ bisects\ B\hat{A}C.$	Statement and reason: 1 mark (A)	(1)

6.5



6.5.1	In ΔPQR and ΔSTR $\hat{P} = \hat{S}$ $(Alt <' s; PQ \parallel ST)$ $\hat{Q} = \hat{T}$ $(Alt <' s; PQ \parallel ST)$ $\hat{R}_1 = \hat{R}_2$ $(Vert\ opp)$ $\therefore \Delta PQR \vert\vert\vert \Delta STR$ $(<,<,<)$	Statement and reason: 1 mark Statement and reason: 1 mark Statement and reason: 1 mark Statement and reason: 1 mark	(4)
6.5.2	$\frac{PQ}{ST} = \frac{PR}{SR} = \frac{QR}{TR}$ $(proportional\ ;\ \Delta PQR \vert\vert\vert \Delta STR)$ $\frac{PQ}{3} = \frac{10}{6}$ $PQ \times 6 = 3 \times 10$ $PQ = 30 \div 6$ $PQ = 5cm$	Statement and reason: 1 mark (A) Substitution: 1 mark (M) Answer: 1 mark (CA)	(3)
			[22]
QUESTION 7			
7.1.1		Reflection about y-axis 1 mark (A) Correct position: 1 mark (A)	(2)
7.2.2	$(x\ ;y) \rightarrow (-x\ ;y)$	Answer: 1 mark (A)	(1)
			[3]
QUESTION 8			
8.1.1	$AB^2 = AC^2 - BC^2$ (Pythagoras) $AB^2 = 25 - 16$ $AB^2 = 9$ $AB = 3\ cm$	Formula: 1 mark Answer: 1 mark	(2)
8.1.2	ΔABC $A = \frac{1}{2} b \times h$ $A = \frac{1}{2} 4 \times 3$ $A = 6\ cm^2$ Circle $A = \pi r^2$ $A = \pi(2{,}5)^2$ $A = 6{,}3\ cm^2$	Formulae: 1 mark (A) Answer: 1 mark (CA) Answer: 1 mark (CA)	(3)
8.1.3	$6{,}3 - 6 = 0{,}3cm^2$	Answer: 1 mark (CA)	(1)
8.2	$V = \pi r^2 \times H$ $V = \pi(7)^2 \times 20$ $V = 3\ 077{,}2\ cm^3$	Formula: 1 mark (A) Substitution: 1 mark (M) Answer: 1 mark (CA)	(3)
			[9]

QUESTION 9			
Ques.	**Solution**		**Total**
9.1	9A	Answer: 1 mark	(1)
9.2	$\frac{14+21+20}{3}$ =18,3	$\frac{14+21+20}{3}$: 1 mark Answer: 1 mark	(2)
9.3	On average, half of the learners in each class have failed. The teacher will NOT be happy with these results.	Answer: 1 mark Reason: 1 mark Any sound answer regarding the average of the failures can be marked correctly.	(2)
			[5]

QUESTION 10			
Ques.	**Solution**		**Total**
10.1		Column 1: 1 mark Column 2: 1 mark	(2)
10.2	12	Answer: 1 mark (A)	(1)
10.3	$P(Tail, prime\ number) = \frac{3}{12} = \frac{1}{4}$	$\frac{3}{12}$: 1 mark (A), Answer: 1 mark (CA)	(2)
			[5]
		TOTAL:	**100**