education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL SENIOR CERTIFICATE

GRADE 10

MATHEMATICS

COMMON TEST

MARCH 2019

MARKS: 75

TIME: 1½ hours

This question paper consists of 6 pages.

Copyright reserved

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 8 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Write neatly and legibly.

Copyright Reserved

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL SENIOR CERTIFICATE:
COMMON TEST: MARCH 2019

TO: THE CHIEF INVIGILATOR OF ALL SCHOOLS OFFERING MATHEMATICS: GRADE 10

ERRATA

Please take note of the following change:

Page	ERROR	CORRECTION
Page 6 (Q 8.2)	In the diagram below $PQ = Q = MN$, QM P PN and …	In the diagram below $PQ = QM = MN$, $QM \,//\, PN$ and …

Kindly ensure that candidates are informed of the Errata.

E Coetzee

MS E. COETZEE
ASSISTANT DIRECTOR
PROVINCIAL EXAMINATION

4/3/2019

DATE

...Championing Quality Education-Creating and Securing a Brighter Future

KWAZULU-NATAL DEPARTMENT OF EDUCATION
Postal Address: Private Bag X01 • East End • 4018 • Republic of South Africa
Physical Address:72 Stalwart Simelane Street • Malgate Building • Durban • 4001
Tel.: +27 31-327 0361 • **Fax.:** +27 031-33/ 9913 • **Email:** phiwokuhle.mkhize@kzndoe.gov.za •**Web:**www.kzneducation.gov.za

QUESTION 1

1.1 Factorise the following expressions fully:

1.1.1 $6x^2 + 7x - 20$ (2)

1.1.2 $x^3 + x^2 - x - 1$ (3)

1.2 Simplify the following expressions fully:

1.2.1 $(2x + 3)(5 - x)$ (3)

1.2.2 $(xy^3 - 3)(x^2y^6 + 3xy^3 + 9)$ (2)

1.2.3 $\dfrac{3^{2x-1}.5^{x-3}}{45^{x-2}}$ (4)

[14]

QUESTION 2

Determine, without the use of a calculator, the value of x in each of the following:

2.1 $(x - 3)(x + 2) = 0$ (2)

2.2 $11 \times 3^{2x+1} = 297$ (3)

2.3 $\dfrac{4x^2 - 3x - 1}{4x + 1} + \dfrac{x^3 + 1}{x^2 - x + 1} = 2$ (5)

2.4 $\pi x^2 h = V$ (2)

[12]

QUESTION 3

3.1 Rewrite 0,45 as a common fraction, in simplest form. (1)

3.2 Given: $P = \sqrt{\dfrac{-20x}{1 - 3x}}$; where $x \in R$

3.2.1 For which value(s) of x is P undefined? (2)

3.2.2 If $x = 7$, determine between which two integers P lies. (2)

3.3 The larger of two consecutive integers is represented by $x + 3$.
Determine an expression which represents the smaller integer. (1)

[6]

QUESTION 4

4.1 Solve for x and y simultaneously:

$4x = 10 - 3y$
$y + 2x = 6$ (5)

4.2 The following inequality is given: $-9 \leq 2x + 3 < 5$; where $x \in R$

4.2.1 Solve for x in the inequality. (3)

4.2.2 Represent your answer to QUESTION 4.2.1 on a number line. (1)

4.2.3 Write your answer to QUESTION 4.2.1 in interval notation. (1)

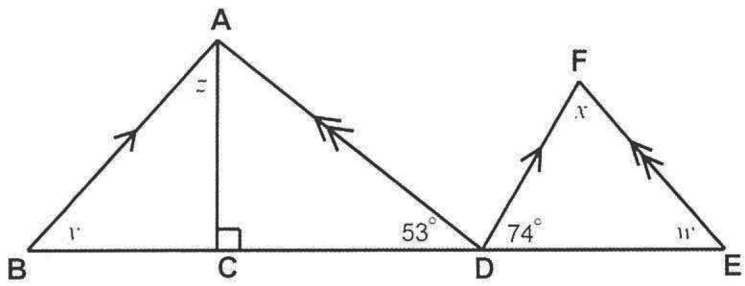
4.3 The mean of three numbers is 25. The second number is four less than twice the first. The third number is two more than four times the first.

(Hint: Let the smallest number be x)

Calculate the numerical value of the smallest number. (4)
[14]

QUESTION 5

Study the diagram below and calculate the unknown angles w , x , y and z.
Give reasons for your statements.



[4]

QUESTION 6

6.1 Complete the following statements:

6.1.1 A quadrilateral with two pairs of adjacent sides equal is a .... (1)

6.1.2 A quadrilateral with both pairs of opposite sides parallel is a .... (1)

6.2 Which quadrilateral has diagonals that always bisect its angles and also bisect each other? (1)

6.3 Given the following three quadrilaterals: a rectangle, a rhombus and a kite.

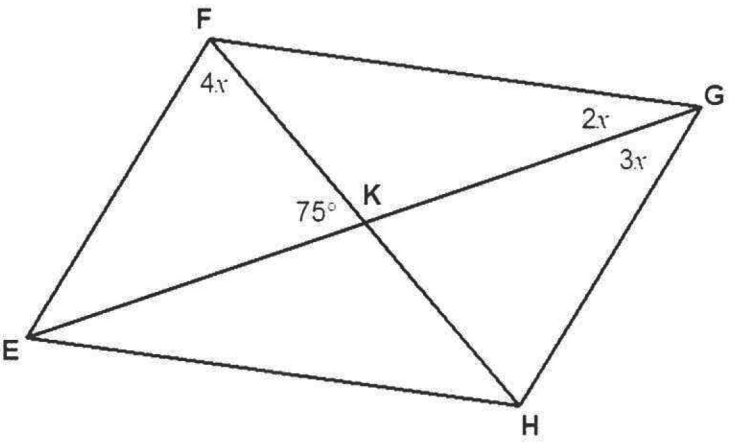
Which of these quadrilaterals do not have perpendicular diagonals? (1)
[4]

Copyright Reserved

Give reasons for your statements in QUESTIONS 7 and 8.

QUESTION 7

7.1 In the sketch below, EFGH is a parallelogram.
$F\hat{K}E = 75°$; $E\hat{F}K = 4x$; $F\hat{G}K = 2x$ and $K\hat{G}H = 3x$.

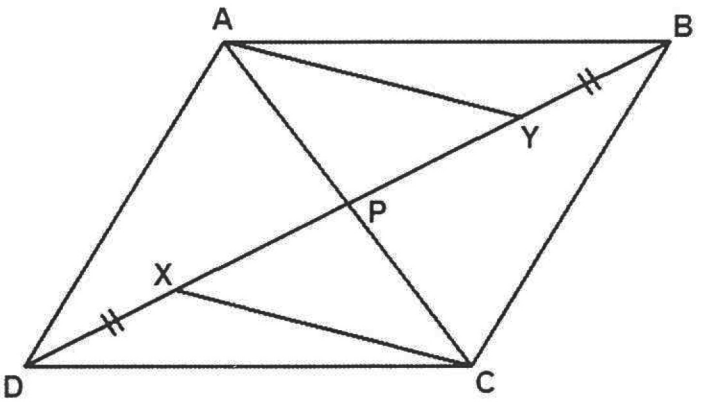


7.1.1 Calculate the value of x. (3)

7.1.2 Calculate the size of $G\hat{H}E$. (2)

7.2 In the diagram ABCD is a parallelogram with diagonals intersecting at P.

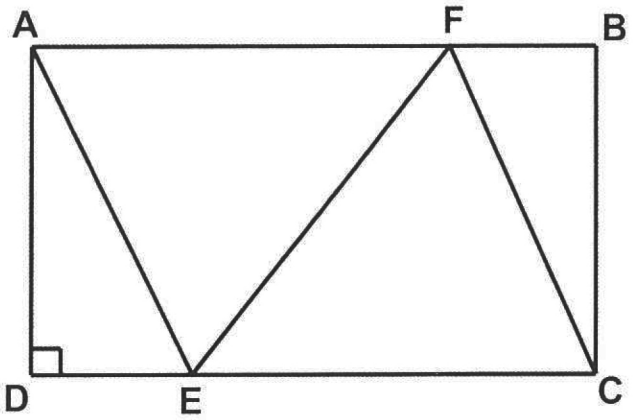
AY and CX are drawn such that BY = DX.



Prove that AYCX is a parallelogram. (3)
[8]

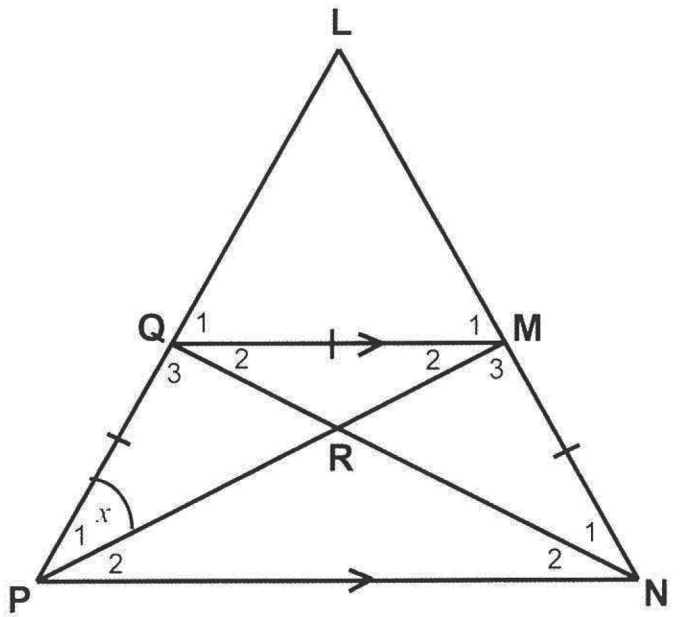
QUESTION 8

8.1 The sketch below shows rectangle $ABCD$ with points F and E drawn such that $AFCE$ is a rhombus.



If it is further given that $AB = 16cm$ and $BC = 12cm$, calculate the length of CF. (7)

8.2 In the diagram below $PQ = QM = MN$, $QM \parallel PN$ and $L\hat{P}N = L\hat{N}P$.



8.2.1 Show that MP bisects $\hat{P}$. (Hint: let $\hat{P}_1 = x$) (3)

8.2.2 Prove that $\Delta PRN \,|||\, \Delta QRM$. (3)

[13]

TOTAL: 75

Copyright Reserved

GR 10 MATH + MLIT.

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

MATHEMATICS

COMMON TEST

MARCH 2019

MARKING GUIDELINE

NATIONAL SENIOR CERTIFICATE

GRADE 10

MARKS: 75

These marking guideline consists of 10 pages.

GRADE 10 MEMORANDUM

QUESTION 1

1.1.1	$6x^2+7x-20$ $=(3x-4)(2x+5)$	✓ $(2x+5)$ ✓ $(3x-4)$ (2)
1.1.2	x^3+x^2-x-1 $=x^2(x+1)-1(x+1)$ $=(x^2-1)(x+1)$ $=(x-1)(x+1)(x+1)$	✓ common bracket ✓ factors ✓ diff. of two squares (3)
1.2.1	$(2x+3)(5-x)$ $=10x-2x^2+15-3x$ $=-2x^2+7x+15$	✓ $-2x^2$ ✓ $+7x$ ✓ $+15$ (3)
1.2.2	$(xy^3-3)(x^2y^6+3xy^3+9)$ $=(x^3y^9-27)$	✓ x^3y^9 ✓ -27 (2)
1.2.3	$\frac{3^{2x-1}.5^{x-3}}{45^{x-2}}$ $=\frac{3^{2x-1}.5^{x-3}}{(3^2.5)^{x-2}}$ $=\frac{3^{2x-1}.5^{x-3}}{3^{2x-4}.5^{x-2}}$ $=3^{2x-1-2x+4}.5^{x-3-x+2}$ $=3^3.5^{-1}$ $=\frac{27}{5}$	✓ base as prime factors $(3^2.5)$ ✓ simplification ✓ adding and subtracting indices ✓ $3^3.5^{-1}$ or $5\frac{2}{5}$ (4)
		[14]

Copyright Reserved

QUESTION 2

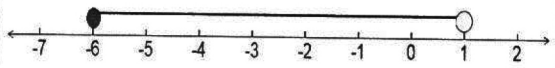
2.1	$(x-3)(x+2)=0$ $\therefore x=3$ or $x=-2$	✓✓ answers (2)
2.2	$11\times3^{2x+1}=297$ $3^{2x+1}=27$ $3^{2x+1}=3^3$ $\therefore 2x+1=3$ $2x=2$ $x=1$	✓ dividing through by 11 ✓ 3^3 ✓answer (3)
2.3	$\frac{4x^2-3x-1}{4x+1}+\frac{x^3+1}{x^2-x+1}=2$ $\frac{(4x+1)(x-1)}{4x+1}+\frac{(x+1)(x^2-x+1)}{x^2-x+1}=2$ $x-1+x+1=2$ $2x=2$ $x=1$	✓✓factors $(x+1)(x^2-x+1)$ ✓factors $(4x+1)(x-1)$ ✓ simplification ✓ answer (5)
2.4	$\pi x^2h=V$ $x^2=\frac{V}{\pi h}$ $x=\sqrt{\frac{V}{\pi h}}$	✓ dividing by πh ✓ answer (2)
		[12]

QUESTION 3

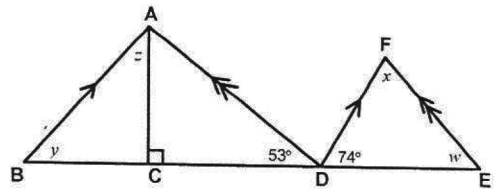
3.1	$\frac{9}{20}$	✓ answer (1)
3.2.1	$1-3x=0$ $x=\frac{1}{3}$	✓ denominator = 0 ✓ answer (2)
3.2.2	$P=\sqrt{\frac{-20(7)}{1-3(7)}}=\sqrt{7}$ $\sqrt{9}<\sqrt{7}<\sqrt{4}$ $3<\sqrt{7}<2$	✓$\sqrt{7}$ ✓ answer (2)
3.3	$x+2$	✓ answer (1)
		[6]

QUESTION 4

4.1	$4x=10-3y$ .....$(Eq1)$ $y+2x=6$ .....$(Eq2)$ $(Eq2)\times2 \rightarrow 2y+4x=12$ .....$(Eq3)$ $(Eq1) \rightarrow 3y+4x=10$ .....$(Eq4)$ $(Eq3)-(Eq4)\rightarrow -y=2$ $y=-2$ Substitute $y=-2$ into $(Eq2)\rightarrow -2+2x=6$ $2x=8$ $x=4$ **OR/OF** $4x=10-3y$ .....$(Eq1)$ $y+2x=6$ .....$(Eq2)$ $(Eq2)\times3 \rightarrow 3y+6x=18$ .....$(Eq3)$ $(Eq1) \rightarrow 3y+4x=10$ .....$(Eq4)$ $(Eq3)-(Eq4)\rightarrow 2x=8$ $x=4$ Substitute $x=4$ into $(Eq2)\rightarrow y+2(4)=6$ $y=-2$	✓multiply $(Eq2)$ by 2 ✓subtracting $(Eq3)$ and $(Eq4)$ ✓ y-value ✓ substitution of y back into Eq ✓ x-value **OR/OF** ✓multiply $(Eq2)$ by 3 ✓subtracting $(Eq3)$ and $(Eq4)$ ✓ x-value ✓ substitution of x back into Eq ✓ y-value

	OR/OF $4x = 10-3y$ .....$(Eq1)$ $y + 2x = 6$ .....$(Eq2)$ $(Eq2) \rightarrow y = 6-2x$ .....$(Eq3)$ Substitute $(Eq3)$ into $(Eq1) \rightarrow 4x = 10-3(6-2x)$ $4x = 10-18+6x$ $-2x = -8$ $x = 4$ Substitute $x = 4$ into $(Eq\ 3) \rightarrow y = 6-2(4)$ $y = -2$	**OR/OF** ✓ $(Eq\ 3)$ ✓Substitution of $(Eq\ 3)$ into $(Eq\ 1)$ ✓ x-value ✓ substitution of x back into Eq ✓ y-value (5)
4.2.1	$-9 \le 2x+3 < 5$ $-12 \le 2x < 2$ $-6 \le x < 1$	✓ $2x$ ✓ -6 ✓1 (3)
4.2.2		✓ answer (1)
4.2.3	$x \in [-6;1)$	✓ answer (1)
4.3	Let the first number $= x$ $\therefore$ second number $= 2x-4$ and third number $= 4x+2$ $\therefore \frac{x+(2x-4)+(4x+2)}{3} = 25$ $x+2x-4+4x+2 = 75$ $7x-2 = 75$ $7x = 77$ $x = 7$ The smallest number is therefore 7.	✓ $2x-4$ ✓ $4x+2$ ✓ equation for mean ✓ answer (4)
		[14]

QUESTION 5

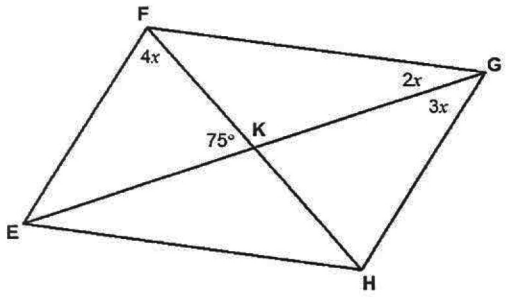
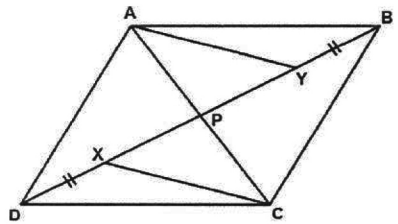
		
5.	$w = 53°$ (corresponding ∠s; AD // FE $x = 53°$ (angle sum Δ $y = 74°$ (corresponding ∠s; AB // FD $z = 16°$ (angle sum Δ)	✓ S/R ✓ S/R ✓ S/R ✓ S/R **[4]**

QUESTION 6

6.1.1	Kite	✓ answer (1)
6.1.2	Parallelogram **OR** Rectangle **OR** Square	✓ answer (any one) (1)
6.2	Rhombus **OR** Square	✓ answer (any one) (1)
6.3	Rectangle	✓ answer (1)
		[4]

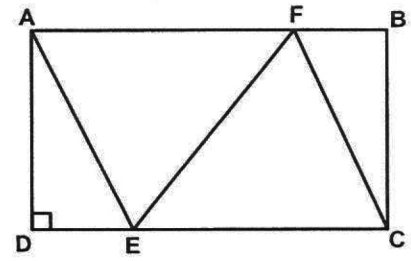
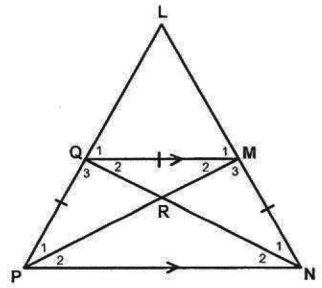
GRADE 10 MEMORANDUM

QUESTION 7

7.1		
7.1.1	$F\hat{E}G = 3x$ (alternate $\angle s$; $FE // GH$) *In* ΔFEK : $4x+3x+75^\circ = 180^\circ$ (angle sum Δ) $7x = 105^\circ$ $x = 15^\circ$	✓ S/R ✓ S/R ✓ answer (3)
7.1.2	$F\hat{G}H = 5x$ $F\hat{G}H = 5(15^\circ) = 75^\circ$ $\therefore G\hat{H}E = 105^\circ$ (co – intererior $\angle s$; $FE // GH$)	✓ $F\hat{G}H = 75^\circ$ ✓ answer (2)
7.2		
	$BP = DP$ (diagonals of parm) But $BY = DX$ (given) $\therefore XP = YP$ $AP = CP$ (diagonals of parm) $\therefore AYCX$ is a parm (diagonals of parm bisect each other)	✓ S/R ✓ S/R ✓ S/R (3)
		[8]

GRADE 10 MEMORANDUM

QUESTION 8

8.1		
	Let $BF = x$ $AF = AB - BF$ $\therefore AF = 16 - x$ $\therefore CF = 16 - x$ (adjacent sides of fhombus) In ΔBCF: $CF^2 = BC^2 + BF^2$ (Pythag) $(16-x)^2 = 12^2 + x^2$ $256 - 32x + x^2 = 144 + x^2$ $-32x = -112$ $x = \frac{7}{2}$ $\therefore CF = 16 - \frac{7}{2}$ $CF = 12,5\,cm$	✓ S ✓ S ✓ S/R ✓ S/R ✓ $256 - 32x + x^2 = 144 + x^2$ ✓ $x = \frac{7}{2}$ ✓ answer (7)
8.2		
8.2.1	*Let* $\hat{P}_1 = x$ $\therefore \hat{M}_2 = x$ (angles opposite = sides) $\therefore \hat{P}_2 = x$ (alternate $\angle s$; QM // PN) $\therefore \hat{M}_2 = \hat{P}_2$ $\therefore MP$ bisects $\hat{P}$	✓ S/R ✓ S/R ✓ S (3)

GRADE 10 MEMORANDUM

8.2.2	*In* ΔPRN *and* ΔQRM $\hat{P} = \hat{M}_2$ (*alternate* $\angle s$; QM // PN) $\hat{N}_2 = \hat{Q}_2$ (*alternate* $\angle s$; QM // PN $P\hat{R}N = M\hat{R}Q$ (*vertically opposite* $\angle s$) $\therefore \Delta PRN$ /// ΔQRM ($\angle\angle\angle$)	✓ S/R ✓ S/R ✓ S/R (3)
		[13]
		TOTAL: 75

GRADE 10 MEMORANDUM

GEOMETRY • *MEETKUNDE*	
S	**A mark for a correct statement** **(A statement mark is independent of a reason)**
	'n Punt vir 'n korrekte bewering ***('n Punt vir 'n bewering is onafhanklik van die rede)***
R	**A mark for the correct reason** **(A reason mark may only be awarded if the statement is correct)**
	'n Punt vir 'n korrekte rede ***('n Punt word slegs vir die rede toegeken as die bewering korrek is)***
S/R	**Award a mark if statement AND reason are both correct**
	Ken 'n punt toe as die bewering EN rede beide korrek is