



education

Department:
Education
PROVINCE OF KWAZULU-NATAL

**NATIONAL
SENIOR CERTIFICATE**

GRADE 10

**MATHEMATICS
COMMON TEST
SEPTEMBER 2018**

MARKS: 75

TIME: 1½ hours

This question paper consists of 7 pages.

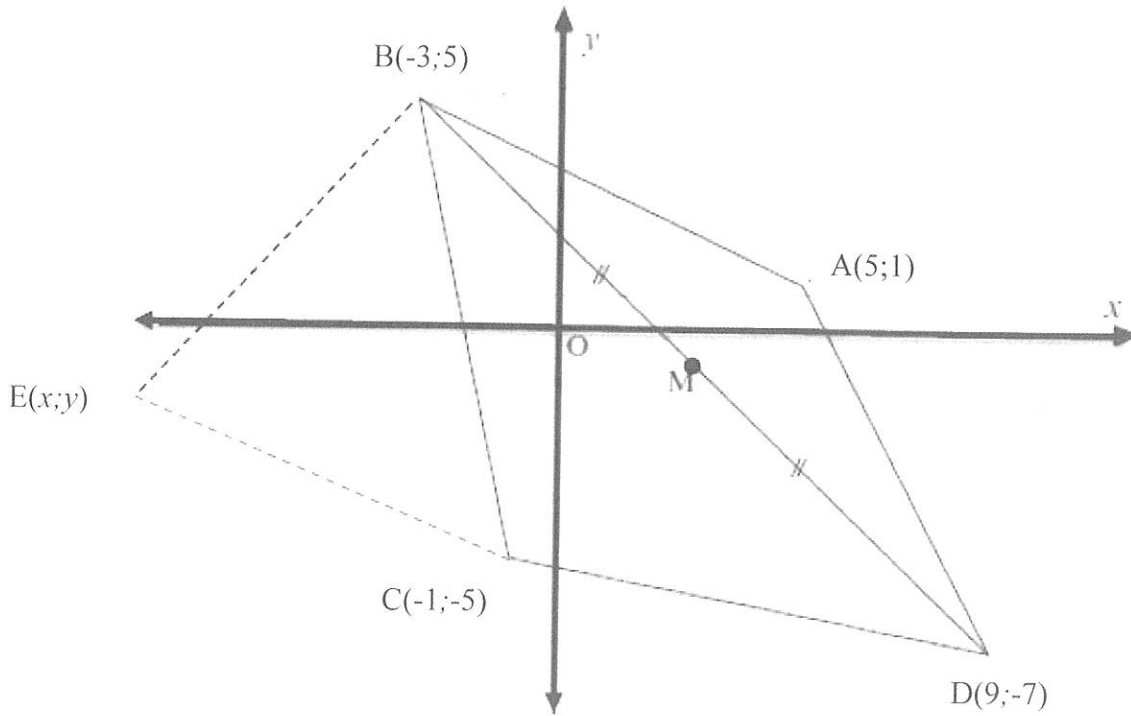
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

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

QUESTION 1

ABCD is a quadrilateral with vertices $A(5; 1)$, $B(-3; 5)$, $C(-1; -5)$ and $D(9; -7)$.



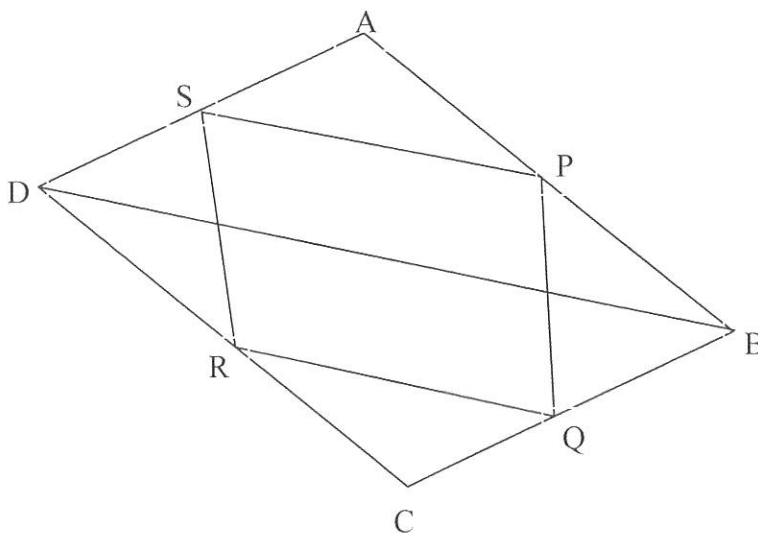
- 1.1 Determine the distance AB. (2)
 - 1.2 Calculate the gradient of BD. (2)
 - 1.3 Determine the equation of BD in the form $y = \dots$ (3)
 - 1.4 Determine the co-ordinates of M, the midpoint of BD. (3)
 - 1.5 Prove that $\hat{AMB} = 90^\circ$. (3)
 - 1.6 Find the co-ordinates of $E(x; y)$ such that ABEC is a parallelogram. (4)
- [17]**

QUESTION 2

- 2.1 A newly married couple bought furniture and kitchen appliances, on hire-purchase, for R70 000. They paid a cash deposit of 20%. The balance will be paid off over 5 years at an interest rate of 22% p.a. and a monthly insurance fee of R120.
Calculate their monthly repayments. (4)
- 2.2 Calculate how many years it will take for an investment, earning 7.5% p.a. simple interest to triple in value. (4)
- 2.3 In a certain country, the rate of inflation has remained unchanged for the past 8 years. Currently, a 100g bar of chocolate costs R10.98. 8 years ago the same bar of chocolate cost R7.25. What is the rate of inflation, as a percentage, in this country. (3)
- 2.4 Use the given exchange rates to answer the questions:
\$ 1 : R9,10 and £ 1 : R11,25
Calculate:
2.4.1 how many rand (R) is \$ 152 (1)
2.4.2 how many pounds (£) is R3500 (1)
2.4.3 how many dollars (\$) is £ 250 (2)
[15]

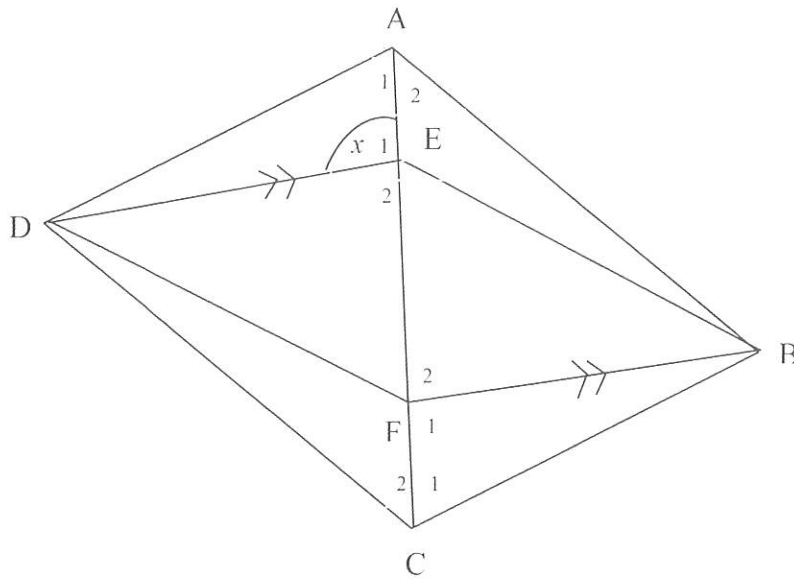
QUESTION 3

- 3.1 P, Q, R and S are the midpoints of AB, BC, CD and DA, respectively. BD is drawn. Give reasons for all statements.



Prove that $PS \parallel QR$ (4)

3.2 ABCD is a parallelogram. Let: $\hat{E}_1 = x$



Prove:

3.2.1 $\hat{E}_1 = \hat{F}_1$ (3)

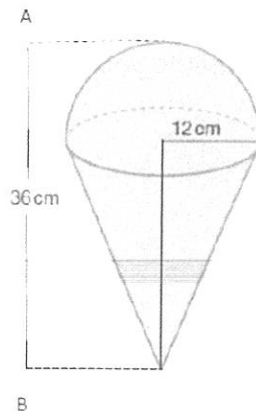
3.2.2 $\triangle AED \equiv \triangle CFB$ (4)

3.2.3 DEBF is a parallelogram (3)
[14]

QUESTION 4

An ice-cream vendor wants to paint the model of an ice-cream cone that is attached to the roof of his van. It consists of a hemisphere and a cone. $AB = 36\text{cm}$.

Surface Area of Sphere = $4\pi r^2$
Surface Area of Cone = $\pi r^2 + \pi rs$



Calculate the total surface area of the ice-cream cone that he will need to paint

[6]

QUESTION 5

5.1 The table contains the maths results for Class A:

Exam percentage	Frequency
$0 \leq x < 20$	5
$20 \leq x < 40$	9
$40 \leq x < 60$	12
$60 \leq x < 80$	15
$80 \leq x < 100$	8

- 5.1.1 Write down the modal class. (1)
- 5.1.2 Write down the interval containing the median for the data. (1)
- 5.1.3 Construct a histogram to represent the information. (3)

5.2 The data set shows the June Exam marks (in percentages) of a Grade 10 class.

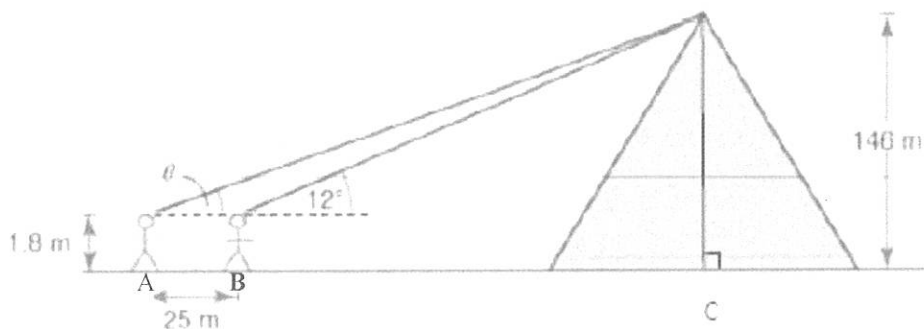
73; 63; 50; 55; 79; 59; 66; 72; 72; 64; 78; 80

- 5.2.1 Calculate the range of the data set. (1)
- 5.2.2 Determine:
- 5.2.2.1 the median (1)
- 5.2.2.2 1st and 3rd quartiles. (2)
- 5.2.3 Write down the 5 number summary. (2)
- 5.2.4 Draw a box and whisker diagram for the given data set. (2)
- 5.2.5 Determine in which percentile you would find the learner that obtained a mark of 73%. (2)

[15]

QUESTION 6

The Great Pyramid at Giza is 146m high. Two people A and B are looking at the top of the pyramid the angle of elevation of the top of the pyramid from B is 12° . The distance between A and B is 25m.



If both A and B are 1.8m tall, calculate:

- 6.1 the distance on the ground from B to the centre of the base of the pyramid, indicated as point C. (4)
- 6.2 the angle of elevation, θ of the top of the pyramid from A. (4)
- [8]

TOTAL MARKS: 75



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GRADE 10

**MATHEMATICS
COMMON TEST
SEPTEMBER 2018
MEMORANDUM**

MARKS: 75

TIME: 1½ hours

This memorandum consists of 6 pages.

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MATH GR10 + GR11

Mathematics

2
GRADE 10
Marking Guideline

Common Test September 2018

QUESTION 1

1.1	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(-1 - 5)^2 + (5 - 1)^2}$ $= \sqrt{80}$	\checkmark^a correct sub into dist. formula \checkmark^{ca} answer (2)
1.2	$m = \frac{y_2 - y_1}{x_2 - x_1}$ $m_{AC} = \frac{-3 - 9}{-3 - 9}$ $= -1$	\checkmark^a correct sub into grad. formula \checkmark^{ca} answer (2)
1.3	$y - y_1 = m(x - x_1)$ $y + 7 = -1(x - 9)$ $y = -x + 2$	\checkmark^a correct sub into equation formula \checkmark^{ca} answer (3)
1.4	$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ $M_{BD} = \left(\frac{-3 + 9}{2}, \frac{5 - 7}{2}\right)$ $M_{BD} (3; -1)$	\checkmark^a midpoint formula \checkmark^a correct sub into midpoint formula \checkmark^{ca} answer (3)
1.5	$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\frac{1 + 1}{5 - 3}$ $m_{AM} = \frac{1 + 1}{5 - 3}$ $= 1$ $m_{AM} \cdot m_{BM} = (-1)(1)$ $= -1$ $\therefore AM \perp BD$ $\angle AMB = 90^\circ$	\checkmark^{ca} gradient \checkmark^{ca} $m_{AM} \cdot m_{BM} = -1$ \checkmark^{ca} conclusion (3)
1.6	$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ $M_{BC} = \left(\frac{-3 + 1}{2}, \frac{5 - 5}{2}\right)$ $M_{BC} (-1; 0)$ $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ $M_{AB} = \left(\frac{-3 + 5}{2}, \frac{5 - 7}{2}\right)$ $\frac{x + 5}{2} = -1 \quad \frac{y + 1}{2} = 0$ $x = -7 \quad y = -1$ $E(-7; -1)$	\checkmark^a midpoint of BC \checkmark^{ca} equating x-co-ordinates and y-co-ordinates \checkmark^{ca} answer (4)

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QUESTION 2

2.1	$\frac{80}{100} \times 70000 = R56000$ $A = P(1+in)$ $= 56000(1 + \frac{22}{100} \times 5)$ $= R117600$ $\text{Monthly instalments} = \frac{117600}{60} + 120$ $= R2080,00$	R56000 ✓ ^a loan amount R117600 ✓ ^{ca} final amount 60 ✓ ^a no. of payments R2080,00 ✓ ^{ca} answer (4)
2.2	Let $P = x$ $\therefore A = 3x$ $A = P(1+in)$ $3x = x(1 + \frac{7.5}{100}n)$ $3 = 1 + \frac{7.5}{100}n$ $2 = \frac{7.5}{100}n$ $= 26.27 \text{ years}$ $= 27 \text{ years}$	✓ ^a $A = 3P$ ✓ ^a correct sub. into simple interest formula ✓ ^{ca} simplification 27 years ✓ ^{ca} answer (4)
2.3	$A = P(1+i)^n$ $10.98 = 7.25(1+i)^8$ $t = \sqrt[8]{\frac{10.98}{7.25}} - 1$ $= 0.0533$ $r = 5.33\%$	✓ ^a correct sub. into compound interest formula ✓ ^{ca} simplification ✓ ^{ca} answer (3)
2.4.1	$\$152 \times R9,10 = R1383,20$	R1383,20 ✓ ^a answer (1)
2.4.2	$\frac{R3500}{R11,25}$ $= \text{£}311,11$	£311,11 ✓ ^a answer (1)
2.4.3	$\frac{250 \times 11,25}{9,10} = R309,07$	$\frac{250 \times 11,25}{9,10}$ ✓ ^a R309,07 ✓ ^{ca} answer (2) 1151

QUESTION 3

3.1	In $\triangle ABD$ AS = DS (given) AP = BP (given) $\therefore PS \parallel BD$ (midpt th) In $\triangle BCD$ CR = DR (given) CQ = BQ (given) $\therefore QR \parallel BD$ (midpt th) $\therefore PS \parallel QR$	✓ ^a both statements ✓ ^a S & R ✓ ^a both statements ✓ ^a S & R (4)
3.2.1	$\hat{E}_1 = x$ $\hat{E}_2 = 180^\circ - x$ (adj. angles str. line) $F_2 = 180^\circ - x$ (alt. angles $DE \parallel BF$) $F_1 = x$ (adj. angles str. line) $\therefore \hat{E}_1 = \hat{F}_1$	✓ ^a S & R ✓ ^a S & R ✓ ^a S & R (3)
3.2.2	In $\triangle AED$ and $\triangle CFB$ $\hat{A}_1 = \hat{C}_1$ (alt. angles $AD \parallel BC$) $\hat{E}_1 = \hat{F}_1$ (proven) $AD = BC$ (opp. sides parm) $\therefore \triangle AED \cong \triangle CFB$ (A, A, S)	✓ ^a S & R ✓ ^a S & R ✓ ^a S & R ✓ ^a S & R (4)
3.2.3	DE \parallel BF (given) DE = BF (corres. sides \cong Δs) \therefore DEBF is a parm (one pair opp sides both = &)	✓ ^a statement ✓ ^a S & R ✓ ^a reason (3) 141

QUESTION 4

Surface area of hemisphere = $\frac{4\pi r^2}{2}$ = $\frac{4\pi(12)^2}{2}$ = 904,78 cm	$\frac{4\pi(12)^2}{2}$ ✓ sub. into correct formula ✓ 904,78 cm ✓ 24 ✓ pythagorus ✓	sub. into correct formula ✓ answer ✓
Slant height (s) of Cone = $\sqrt{(24)^2 + (12)^2}$ = 26,83 cm	$\pi \times 12 \times 26,83$ ✓ 1011,47 ✓	sub. into correct formula ✓ answer ✓
Surface Area of Cone = πrs = $\pi \times 12 \times 26,83$ = 1011,47	$\pi \times 12 \times 26,83$ ✓ 1011,47 ✓	sub. into correct formula ✓ answer ✓
Total Surface Area = 904,78 + 1011,47 = 1916,25cm	1916,25cm ✓	answer ✓

QUESTION 5

5.1.1	$60 \leq x < 80$	✓ answer (1)
5.1.2	$50 \leq x < 60$	✓ answer (1)
5.1.3		x-axis ✓ y-axis ✓ shape ✓ (3)
5.2.1	Range = 80-50 = 30	30 ✓ answer (1)
5.2.2.1	Median = $\frac{66+72}{2}$ = 69	69 ✓ answer (1)

5.2.2.2	$Q_1 = \frac{59+63}{2}$ = 61 $Q_3 = \frac{73+78}{2}$ = 75,5	61 ✓ ca answer 75,5 ✓ ca answer (2)
5.1.3	Min. Value: 50 Q ₁ : 61 Median: 69 Q ₃ : 75,5 Max. Value: 80	80 max ✓ ca 50 min ✓ ca (2)
5.1.4		✓ ca box ✓ ca whisker (2)
5.1.5	$\frac{9}{12} \times 100$ = 75 75 th percentile	$\frac{9}{12}$ ✓ ca 75 ✓ ca answer (2)

QUESTION 6

6.1	$\tan(12^\circ) = \frac{139,2}{dist}$ $dist = \frac{139,2}{\tan(12^\circ)}$ = 654,88 m	139,2 ✓ a using tan ✓ a $\tan(12^\circ) = \frac{139,2}{dist}$ ✓ ca substitution 654,88 m ✓ ca answer (4)
6.2	$\tan \theta = \frac{139,2}{679,88}$ $\theta = 11,58^\circ$	679,88 ✓ ca using tan ✓ a $\tan \theta = \frac{139,2}{679,88}$ ✓ ca substitution 11,58° ✓ ca answer (4)

TOTAL MARKS: 75

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