Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 10

NOVEMBER 2019

ÉcoleBooks

TECHNICAL MATHEMATICS P2

MARKS: 100

TIME: 2 hours

XTMATE2

This question paper consists of 10 pages and a special answer book.

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

1.   This question paper consists of EIGHT questions.

2.   Answer ALL the questions in the SPECIAL ANSWER BOOK provided.

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) unless stated otherwise.

6.   If necessary, round off your answers to TWO decimal places, unless stated otherwise.

7.   Diagrams are not necessarily drawn to scale.

8.   Write neatly and legibly.

QUESTION 1

In the diagram below $P(4; 3), Q(-4: -1)$ and $R(2; -3)$ are vertices of the ΔPQR, T is a midpoint of PR.
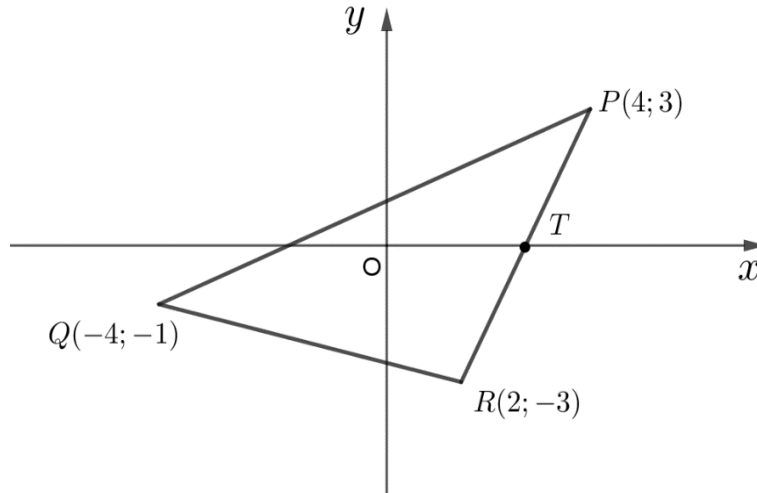
1.1   Calculate the gradient of PQ.   (2)

1.2   Determine the coordinates of T, the midpoint of PR.   (3)

1.3   Calculate the length of QR.   (3)

1.4   Calculate the equation of the line perpendicular to PQ and passing through T.   (4)

1.5   Calculate the coordinates D, the point of intersection between the line in QUESTION 1.4 and PQ.   (3)

[15]

QUESTION 2

2.1   Given that $x = 27,5^{\circ}$, $y = 52^{\circ}$ and $z = 43,2^{\circ}$. Using a calculator, evaluate the following:

        2.1.1 $\cos(x + y) - \sin z$ (2)

        2.1.2 $\dfrac{\operatorname{cosec} x}{\tan y + \tan z}$ (2)

2.2   If $2\cot\theta + 4 = 7$ *for* $\theta \in [180^{\circ}; 360^{\circ}]$ with $\sin\theta < 0$, **with the aid of a sketch determine the value of the following:**

        2.2.1 $\sin\theta$ (4)

        2.2.2 $\cos\theta + 2\tan\theta$ (3)

2.3   Solve for β if $2\cos\beta = 3 - \operatorname{cosec} 27^{\circ}$ for $\beta \in [0^{\circ}; 90^{\circ}]$.   (3)

                                                                        [14]

QUESTION 3

Mr Mampofu a local businessman who recently bought a spaza shop, decided to put a veranda on his new spaza shop. The height of the back wall for the spaza shop is 4,2 m. He wants to place the veranda roof BD at an angle of $37°$ from the veranda pillar DE. The roof AH of the spaza shop is also at an angle of $37°$ to HB. C and B are on AF. The pillar DE is 1,8 m from the wall CF. Below is the picture of the spaza shop with its veranda.

Below is the model of the above picture:
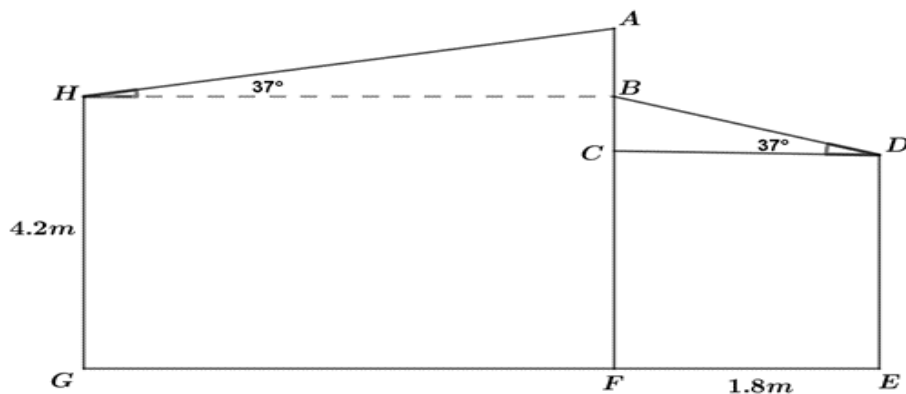
3.1   What should be the length of roof sheet *BD* for the veranda?   (2)

3.2   How high must he build the supporting pillar *DE*?   (4)

3.3   His other intention is to write the name of his spaza shop on the space *AB*. If the length of the roof *AH* is 2,5 m, what is the height of *AB*?   (2)

3.4   Mr Mampofu wants to paint the wall represented by *AFGH* with a different colour. How many litres of paint must he buy to cover the whole area AFGH, if ½ *litre* is required to paint 1 m^2 (round off your answer to the nearest litre).   (3)

   **[11]**

QUESTION 4

Given: $f(x) = 2\sin x$ and $g(x) = \cos x - 1$

4.1   Draw the graph of f and g on the same system of axis provided in your ANSWER
        BOOK, using the interval $x \in [0^{\circ}; 360^{\circ}]$.   (5)

4.2   Write down the amplitude of f.   (1)

4.3   Write down the period of f.   (1)

4.4   Write down the range of g.   (2)

4.5   For which value(s) of x will $f(x) - g(x) = 0$.   (3)
   **[12]**

QUESTION 5

$LMNO$ below is a kite such that $MN = NO, ML = LO$ and the diagonals intersect at P. It is also given that $OP = 4\ cm, M\hat{N}P = 33°$ and $O\hat{L}P = 52°$.
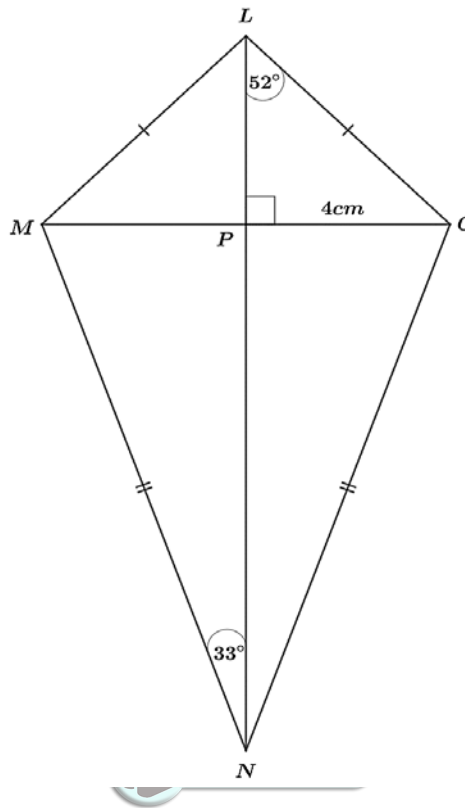
5.1. Calculate the length of MN to the nearest whole number. (2)

5.2 Calculate the length of LN to the nearest whole number. (3)

5.3 Calculate the size of angle $N\hat{M}L$. (4)

[9]

QUESTION 6

In the diagram below HIJK is parallelogram with $J\hat{L}K = 90^\circ$, $H\hat{L}I = 35^\circ$ and

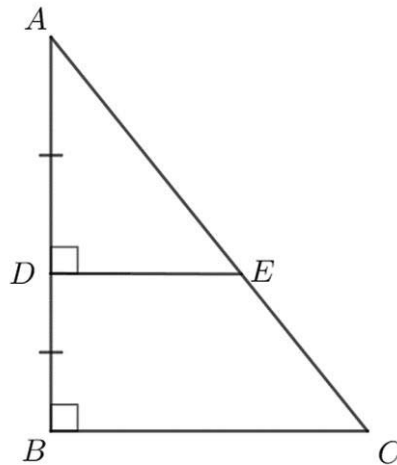$L\hat{K}I = 21^\circ$. Point M is the intersection on the diagonals HJ and IK.
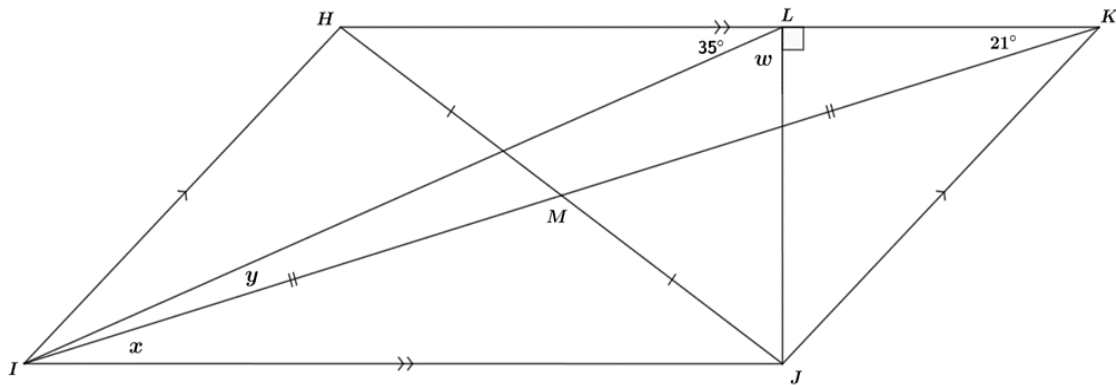
6.1   Calculate the sizes of w, x and y (give reasons for your answer).   (5)

6.2   Classify the quadrilateral $IJKL$.   (2)

6.3   Show that $\Delta IMH \equiv \Delta JMK$.   (3)

                                                        [10]

QUESTION 7

7.1   Given: $AD = DB$ and $A\hat{D}E = D\hat{B}C = 90^\circ$.

7.1.1   Give the reason why $AE = EC$.   (1)

7.1.2   If $DE = 8$ cm and $AE = 14$ cm. Calculate the length of:

(i) BC (3)

(ii) AB (4)

7.2   Two isosceles triangles ΔABC and ΔXYZ of different sizes have both an apex angle equal to x.

7.2.1   Show that these two triangles are similar.   (4)

7.2.2   If $x = 40^\circ$ what are the sizes of the other two angles in ΔXYZ?   (2)

[14]

QUESTION 8

8.1　The alignment done on a car showed the following results:

Front caster: $28°34'62"$

Rear camber: $131,42°$

Using the above information convert:

8.1.1　Front caster to degrees　　　　　　　　　　　　　　　　　　(3)
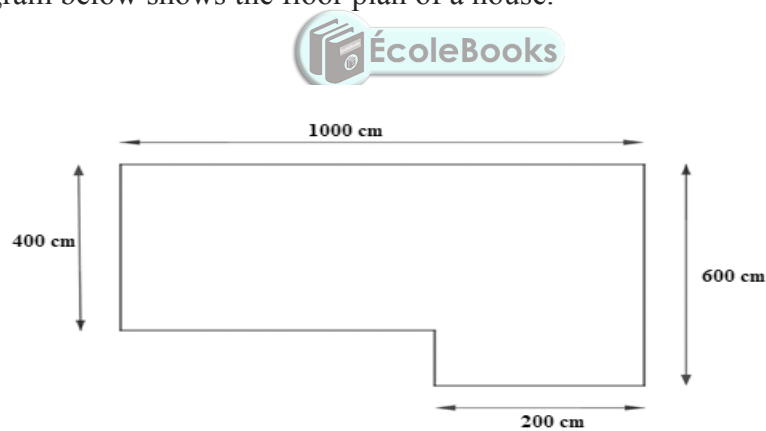
8.1.2　Rear camber to degrees, minutes and seconds.　　　　　　　(3)

8.2　Simplify the given expression and write answer in radians:

$$63° + \frac{4\pi}{3} - 100°$$

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(3)

8.3　A circle with radius 7 *cm* and central angle $\frac{2\pi}{3}$. Calculate the arc length of the sector.　　　　(3)

8.4　The diagram below shows the floor plan of a house.

Calculate the area of the floor plan and give your answer in m^2.　　(3)

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[15]

　　　　　　　　　　　　　　　　　　　　　　　TOTAL:　100