BERGVLIET HIGH SCHOOL

MATHEMATICS DEPARTMENT

NOVEMBER EXAMINATION

GRADE 10

MATHEMATICS PAPER 2
NOVEMBER 2022

MARKS: 100

TIME: 2 HOURS

SET BY: Z. Ebersohn

MODERATOR: K. Grebe

NAME: _____

MATHEMATICS TEACHER: EB ST JN JO GR OR SM

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 8 questions and 18 pages.

2. Answer ALL the questions on the QUESTION PAPER.

3. Clearly show ALL calculations, diagrams, graphs, et cetera that 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), for all questions EXCEPT if otherwise instructed.

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

7. Diagrams are NOT necessarily drawn to scale.

9. Write neatly and legibly.

The following formulas are provided:

$$d = \sqrt{\left(x_2 - x_1\right)^2 + \left(y_2 - y_1\right)^2}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$y = mx + c$$

QUESTION 1

A school held a Sports Day and one of the items on the program was an obstacle race.
Teams of 13 parents and learners participated in the race.
Listed below are the times, taken in minutes, by each member of a particular team to complete the race:

4 11 12 13 16 17 18 20 21 22 22 22 25

1.1 Determine the median time of the members of this particular team. (1)

_____

1.2 Calculate the interquartile range (IQR). (3)

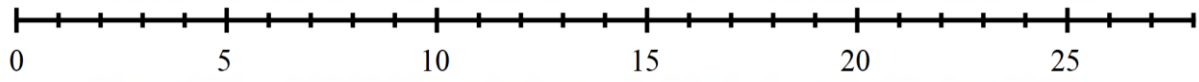
_____

_____

_____

_____

1.3 Draw a box – and – whisker diagram for the given data. (3)



1.4 Determine the mean time of the team. (2)

_____

_____

_____

_____

1.5 It took another team $x+5$ minutes to complete the race. Calculate the value of x if the overall mean of the two teams combined was 18 minutes. (2)

_____

_____

_____

_____

_____

[11]

QUESTION 2

A survey was conducted on the ages of 50 soccer players at a soccer tournament. The results are shown in the frequency table below:

Class Interval	**Frequency**	**Midpoint**	**F × Midpt**
$15 \leq x < 20$	4		
$20 \leq x < 25$	9		
$25 \leq x < 30$	24		
$30 \leq x < 35$	10		
$35 \leq x < 40$	3		

2.1 Complete the table above. (2)

2.2 Determine the estimated mean. (2)

_____

_____

_____

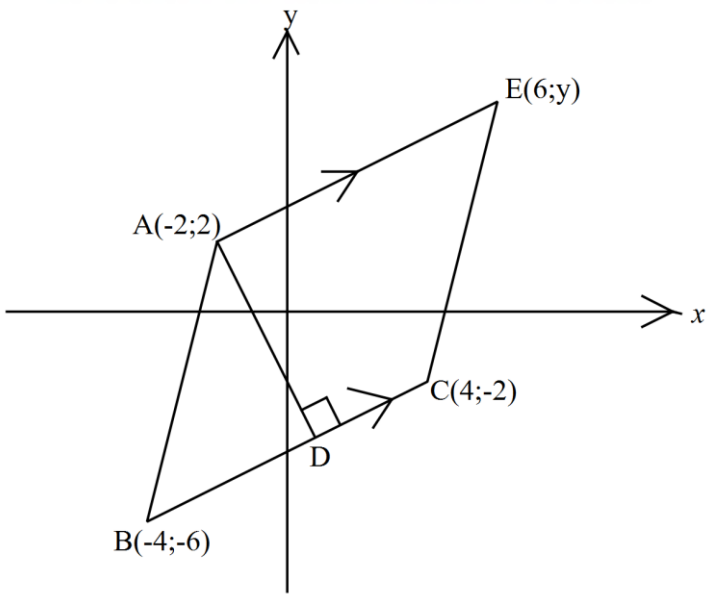
2.3 What percentage of the soccer players were 30 years or older? (1)

_____

_____

QUESTION 3

In the diagram, $A(-2;2)$, $B(-4;-6)$, $C(4;-2)$ and $E(6;y)$ are vertices of a quadrilateral having AE $\parallel$ BC. D lies on BC such that AD $\perp$ BC and AC is drawn.
$M(x;2)$ is a point on EC.



3.1 Calculate the gradient of BC. (2)

3.2 If M is the midpoint of EC, determine the values of x and y. (2)

3.3 Calculate the length of BC. (2)

3.4 If it is further given that $AE = \sqrt{80}$, classify (with reasons) quadrilateral ABCE. (1)

3.5 Determine the equation of AD in the format $y = mx + c$. (3)

3.6 Calculate the coordinates of D. (5)

[15]

QUESTION 4

4.1 Given that $A = 28,3°$ and $\beta = 42,6°$, calculate

$3\cos ec\beta - \tan^3 \theta$ (2)

_____

_____

4.2 Determine the size of θ in each of the following (θ is an acute angle).

4.2.1 _____ (2)

_____

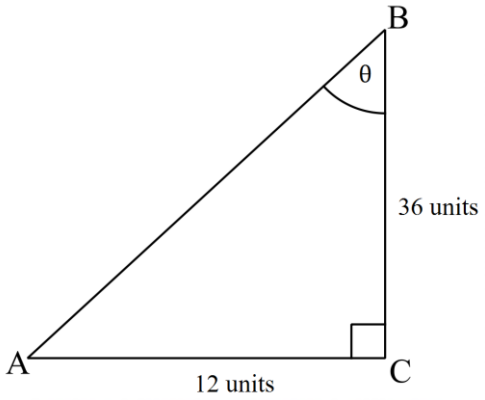
_____

_____

_____

_____

_____



4.2.2 $2\cos(\theta - 40°) = 1,63$ (3)

_____

_____

_____

_____

4.3 Use the special triangles, or the unit circle, to determine without a calculator the value of: (4)

$$\frac{2\sin^2 45°\cot 60°}{\tan 30°}$$

4.4 If $4\tan\theta - 5 = 0$ and θ is an acute angle, determine, WITHOUT a calculator and **using a sketch**, the value of:

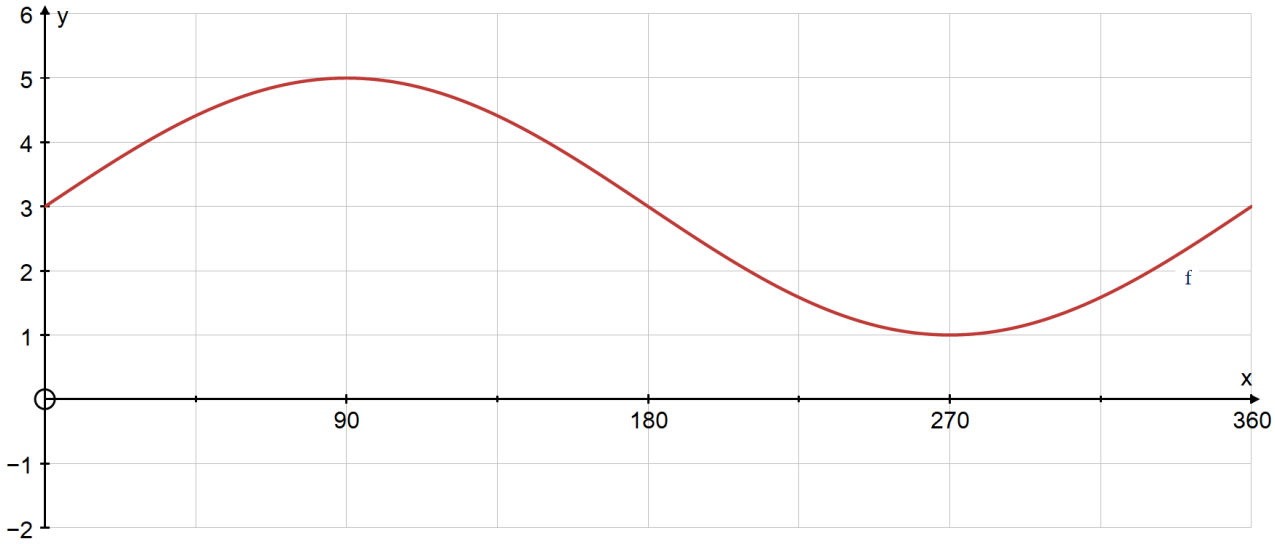
4.4.1 $\sin\theta.\cos\theta$

4.4.2 If it is further given that θ and β are complementary angles, determine the value of $\sin^2\beta - \cos^2\beta$.

[18]

QUESTION 5

Given: $f(x) = a\sin x + q$ for $x \in [0°;360°]$



5.1 Write down the values of a and q. (2)

_____

5.2 Draw the graph of $g(x) = 3\cos x + 1$, $x \in [0°;360°]$, **on the same set of axes as *f*** , clearly showing all turning points and intercepts with the axes. (3)

5.3 Write down the range of $g(x)$. (1)

_____

5.4 Write down the amplitude of $g(x)$. (1)

_____

5.5 Determine, from the graph, the value(s) of x for which f and g will be increasing at the same time. (2)

_____

5.6 If $(x;2,8)$ is on $g(x)$, determine the value of x. (2)

_____

_____

5.7 If $h(x) = 3\cos x + 1 + k$, for which value(s) of k will $h(x)$ have turning point where $y < 0$? (2)

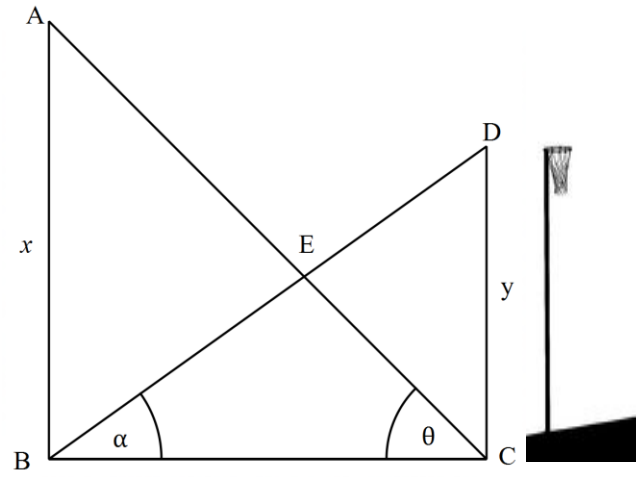
_____

[13]

QUESTION 6

In the diagram given the height of the goal post AB is x units and the height of the goal post CD is y units. $D\hat{B}C = \alpha$ and $A\hat{C}B = \theta$.

Show that $\frac{x}{y} = \frac{\tan\theta}{\tan\alpha}$



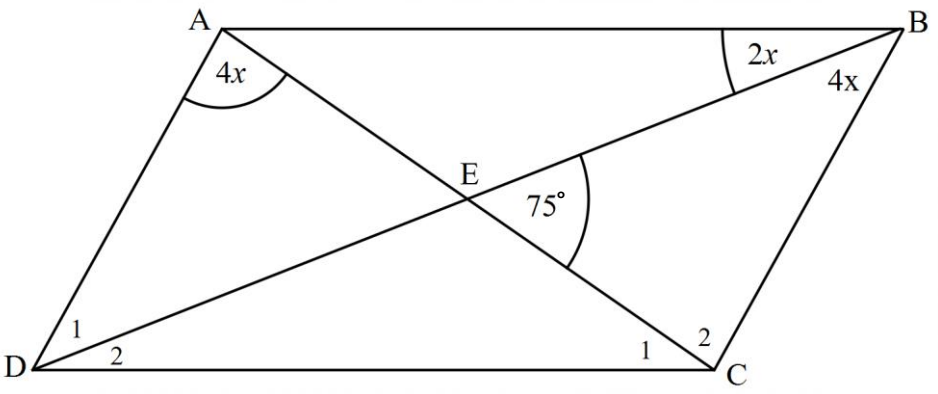
(4)

[4]

QUESTION 7

7.1 Study the diagram below and answer all the questions, providing reason(s) where necessary. The following is given:

- ABCD is a parallelogram.
- $D\hat{A}C = 4x$
- $A\hat{B}D = 2x$
- $D\hat{B}C = 3x$ and
- $B\hat{E}C = 75°$



7.1.1 Express $\hat{D}_1$ in terms of x. (3)

_____

_____

_____

7.1.2 Determine the value of x. (4)

_____

_____

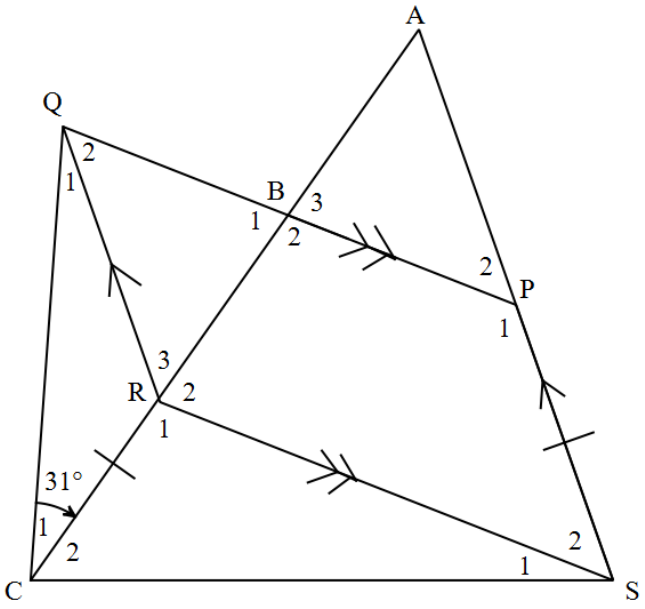
_____

_____

_____

_____

7.2 ΔACS is given with P on AS and R on AC. PSRQ is a parallelogram.
QC is drawn.
CR = PS and $\hat{C}_1 = 31°$.



(5)

Determine the size of $\hat{A}$.

_____

_____

_____

_____

_____

_____

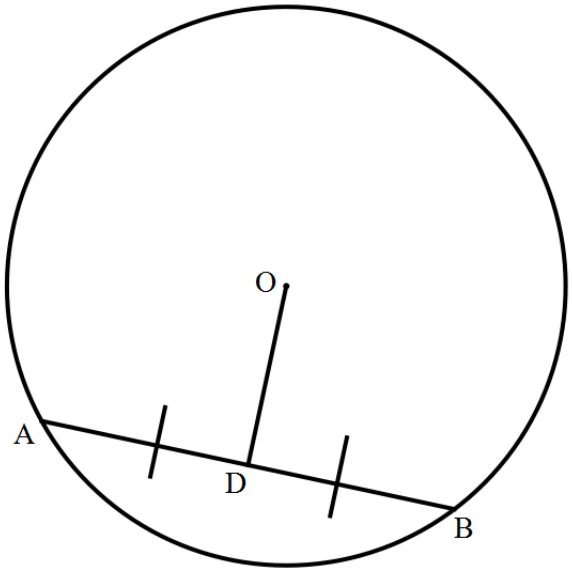
_____

_____

[11]

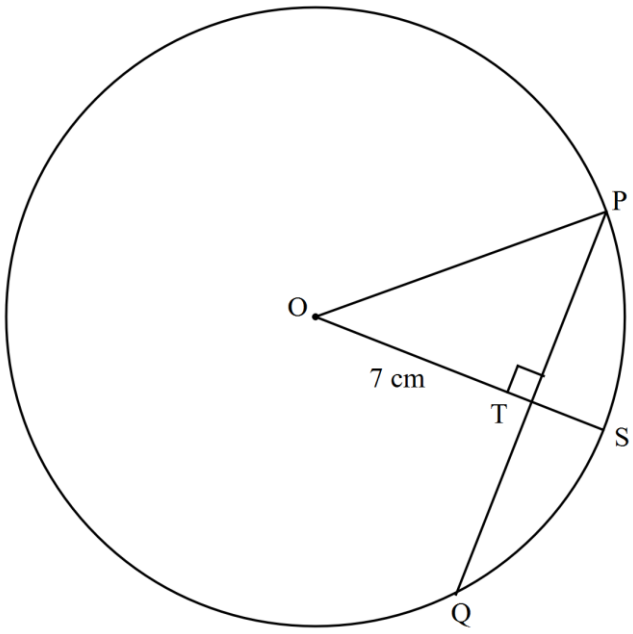
QUESTION 8

8.1 In the diagram, O is the centre of the circle. OD bisects chord AB. (5)



Prove the theorem that states that the line from the centre of the circle that bisects a chord is perpendicular to the chord, ie that $O\hat{D}B = 90°$.

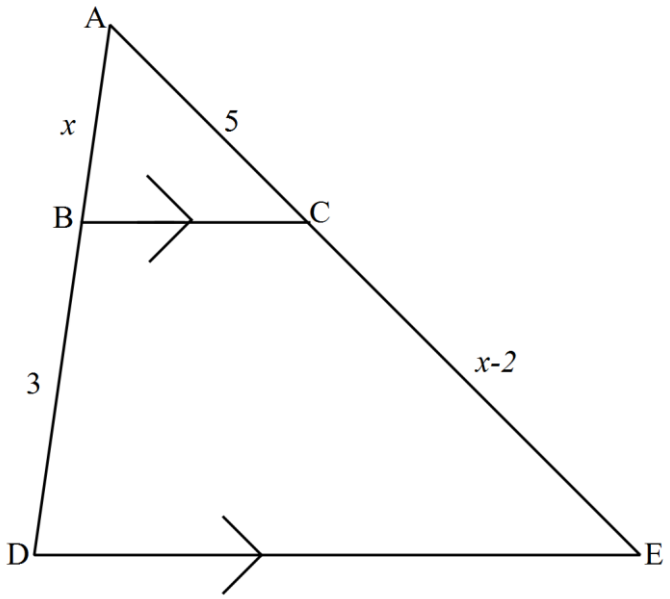
8.2 In the diagram, O is the centre of the circle PSQ. $OS \perp QP$ at T.
OT = 7 cm and QP = 48 cm.



8.2.1 Determine the length of OP. (3)

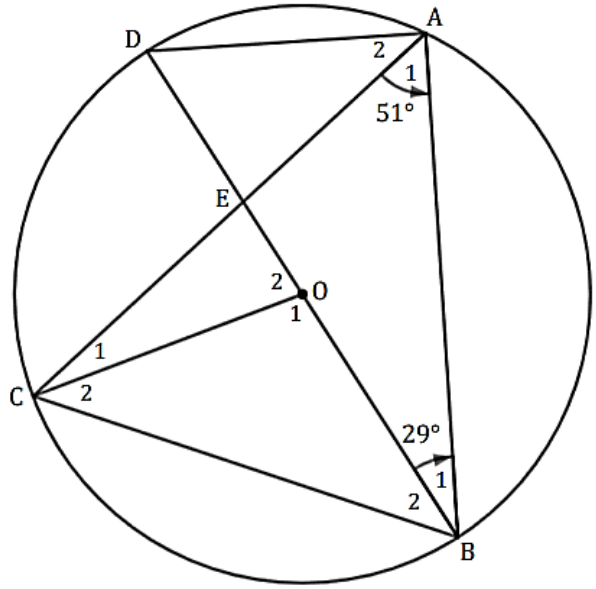
8.2.2 Hence, or otherwise, determine the length of TS. (1)

8.3 The following diagram is given with:
AB = x units
BD = 3 units
AC = 5 units
CE = x – 2 units
BC || DE



Determine the value of x. (5)

8.4 In the diagram, O is the centre of the circle.
Points A, B, C and D lie on the circumference of the circle. BOD is a diameter.
AC and BD intersect at E.
$\hat{A} = 51°$ and $\hat{B}_1 = 29°$



Determine, with reasons, the size of:

8.4.1 $\hat{O}_1$ (2)

_____

_____

8.4.2 $\hat{A}_2$ (2)

_____

_____

8.4.3 $\hat{D}$ (2)

_____

_____

8.4.4 $\hat{C}_2$ (2)

_____

_____ **[22]**

TOTAL 100