BERGVLIET HIGH SCHOOL

MATHEMATICS DEPARTMENT

NOVEMBER EXAMINATION

GRADE 10

MATHEMATICS NOVEMBER P2 2021

MARKS: 100 **SET BY: Z Orgill**

TIME: 2 HRS **MODERATOR: C Smith**

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 8 questions. Answer **ALL** questions in the answer booklet provided.
2. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answers.
3. Answers only will not necessarily be awarded full marks.
4. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
5. If necessary, round off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. Number the questions correctly according to the numbering system used in this question paper.
8. **The following formulae are provided for you:**

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \text{M}\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right) \qquad m = \tan\theta$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1}$$

"Success is not final: failure is not fatal: It is the courage to continue that counts."
— Winston S. Churchill

QUESTION 1

In each of the following questions, choose the correct answer only.

1.1 A list of 5 pulse rates is: 64,70, 74, 80, 92.

A The median is 74 and the mean is 76

B The median is 74 and the mean is 74

C The range is 28 and the median is 77

D The mode is 74 and the median is 70

1.2 While out walking, Ryan and Jordan stopped abruptly when a skunk crossed their path. They ran in opposite directions, each running the same distance before coming to a stop. On an imaginary Cartesian plane, Ryan would be stopped at the point $(23;\ 35)$ and Jordan would be stopped at the point $(-54;\ 17)$. What are the coordinates of the point at which they first would have seen the skunk?

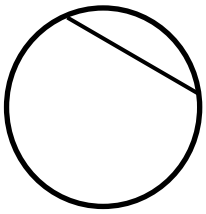
A $(-31; 52)$

B $(38{,}5; 9)$

C $(-15{,}5; 26)$

D $(38{,}5; 26)$

1.3 The straight line is an example of a/an



A Arc

B Diameter

C Tangent

D Chord

1.4 Azalea sees a bird on top of a 12m high light pole. Azalea is standing 20m from the base of the pole. At what angle must she incline her camera to take a picture of the bird?

A $30{,}96^{\circ}$

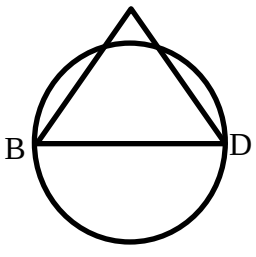
B 53.13°

C 59.04°

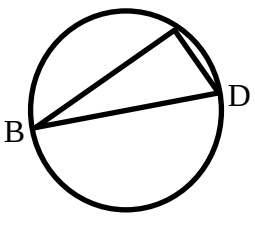
D 36.86°

1.5 If BD is the diameter, which of the following diagrams has an angle of 90°?

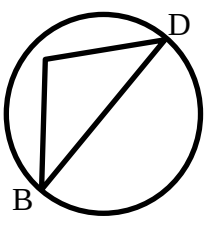
A)



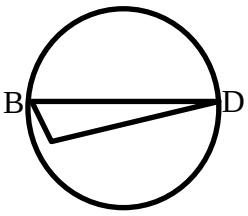
B)



C)



D)



[5]

QUESTION 2

2.1 The following table shows the test marks (in %) of Grade 10 learners in Bergvliet High School.

INITERVAL OF TEST MARKS	MIDPOINT	NUMBER OF LEARNERS	MIDPOINT $\times$ FREQUENCY
$0 \le x < 20$		4	
$20 \le x < 40$		5	
$40 \le x < 60$		9	
$60 \le x < 80$		13	
$80 \le x < 100$		10	
Totals		41	

2.1.1 Complete the table above. (3)

2.1.2 Write down the modal class. (1)

2.1.3 Calculate the estimated mean. (2)

2.2 The scores of the BHS rugby team over the last year are given below (ignoring the opposition score):

19 22 16 23 6 15 21 64 10 21 12 29 54

2.2.1 Determine the 5-number summary for the above data set. (5)

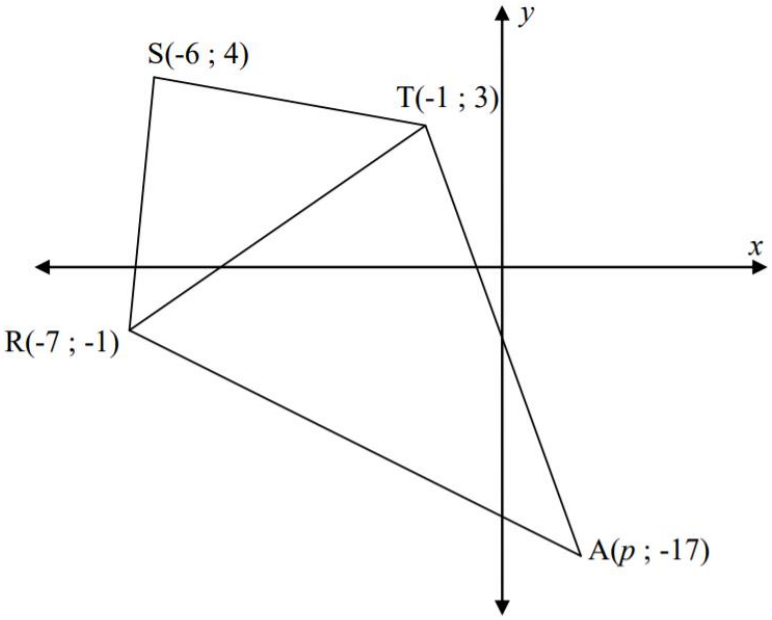
2.2.2 Using the data determined in 2.2.1, draw a box and whisker plot of the BHS rugby team scores. (3)

2.2.3 Calculate the inter-quartile range. (2)

[16]

QUESTION 3

In the diagram below, RATS is a quadrilateral with vertices $S(-6;4)$, $T(-1;3)$, $A(p;-17)$ and $R(-7;-1)$. B is the midpoint of RT. SBA is a straight line.



3.1 Show that ΔRST is isosceles. (4)

3.2 Show that the co-ordinates of B is $(-4;1)$. (2)

3.3 Determine the equation of line SA. (3)

3.4 Hence, determine the value of p. (3)

3.5 Determine whether $RT \perp SA$. (2)

3.6 Determine the co-ordinates of D, such that, SRDT is a rhombus. (2)

[16]

QUESTION 4

4.1 Solve for x in each of the following equations where $0^\circ \le x \le 90^\circ$.

4.1.1 $6\sin x = 1$ (2)

4.1.2 $4\sec x - 3 = 5$ (3)

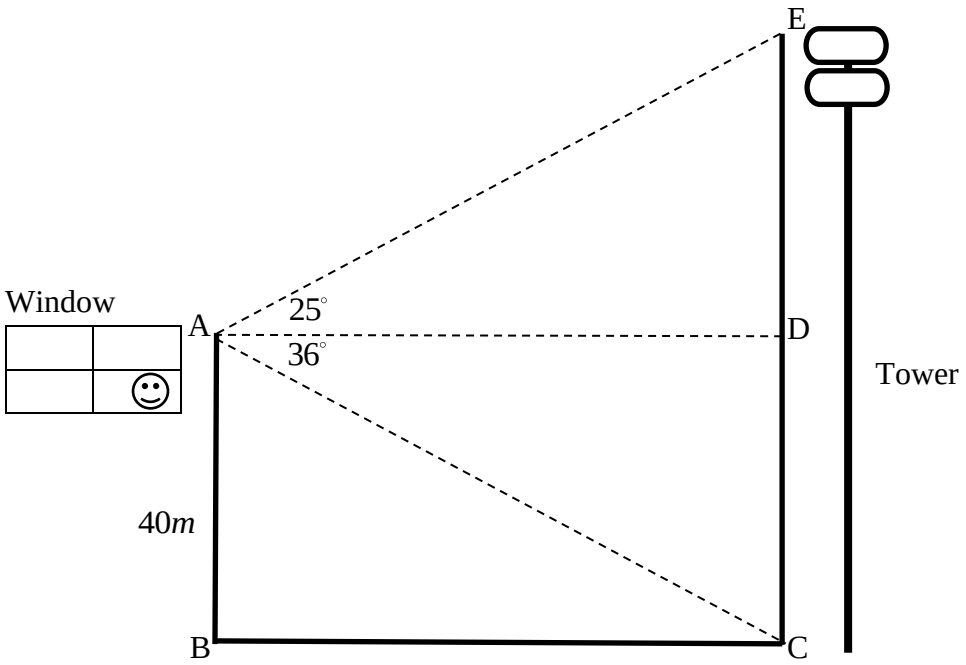
4.2 Determine, without the use of a calculator and with the aid of a diagram, the value of the following:

4.2.1 $\dfrac{\sin 30^\circ \cdot \cos 45^\circ}{\tan 60^\circ}$ (5)

4.2.2 $\tan^2 30^\circ - \cos^2 30^\circ$ (3)

4.3 If $\sin 22^\circ = \dfrac{k}{p}$, determine, without the use of a calculator the value of $\tan 68^\circ$ in terms of k and p. (3)

4.4 Tao stands at a window on the 9th floor of an office building. She measures the angle of elevation to be 25° and the angle of depression to be 36° of the top and the base of a tower. She knows that she made the measurements 40m above the ground.



4.4.1 Determine the length of AD, the distance from the tower. (3)

4.4.2 Determine the height of the tower CE. (3)

[22]

QUESTION 5

5. 1 Given the function: $y = \frac{1}{2}\tan x$

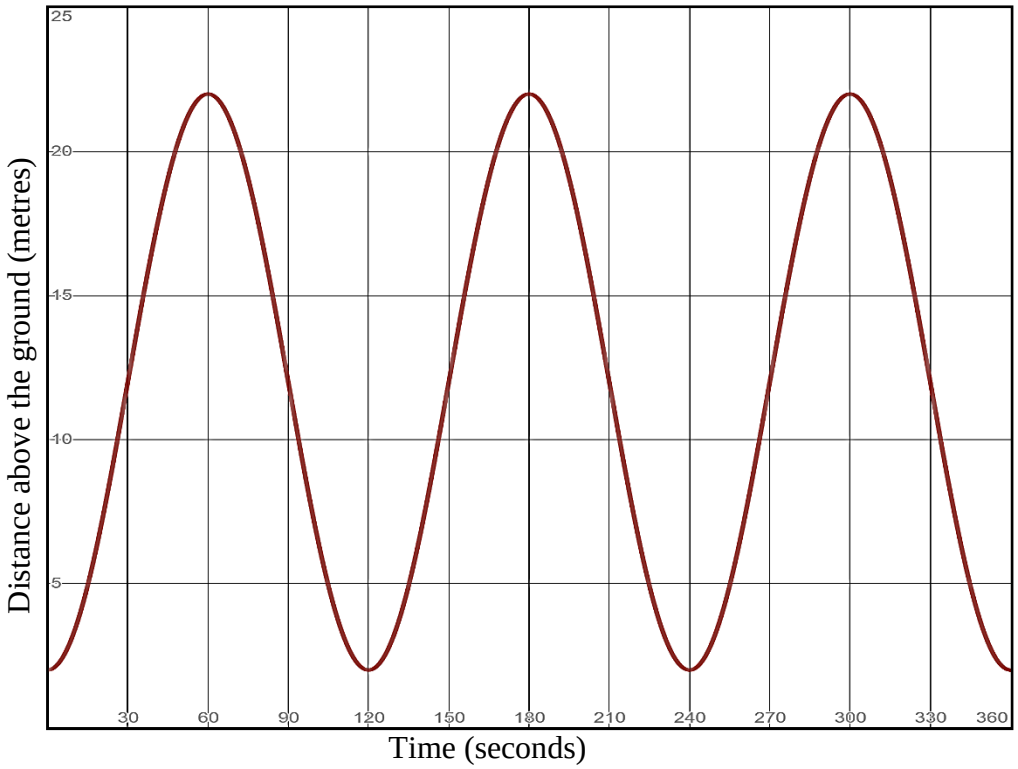
5.1.1 Make a neat sketch of $y = \frac{1}{2}\tan x$ for $0^\circ \le x \le 360^\circ$. Clearly indicate on your sketch the intercepts with the axes and the asymptotes. (4)

5.1.2 Write down the period of the graph. (1)

5.1.3 If the graph $y = \frac{1}{2}\tan x$ is shifted down by 1 and reflected about the $x-$axis, write down the new equation obtained after these transformations. (2)

5.4 Kenzo loved his ride on the Ferris wheel and decided to plot the comparison between the distance above ground and time (seconds). The height, h, in metres above the ground of Kenzo can be modelled by:

$$h(t) = 10\sin[3(t - 30^\circ)] + 12$$



5.4.1 Determine the maximum and minimum height of the Ferris wheel. (3)

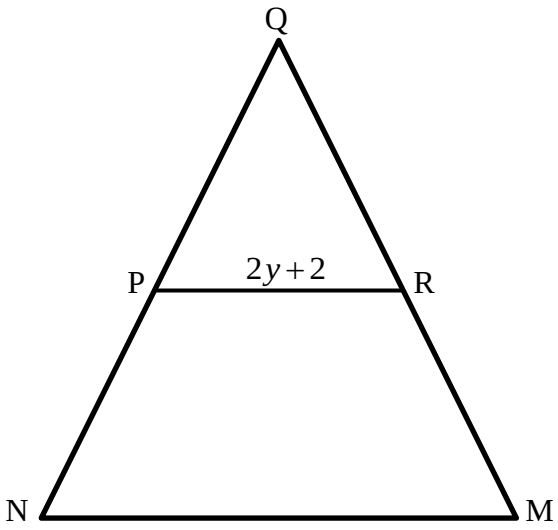
5.4.2 Write down the range of the Ferris wheel. (1)

5.4.3 How long did it take for one revolution to occur? (1)

[12]

QUESTION 6

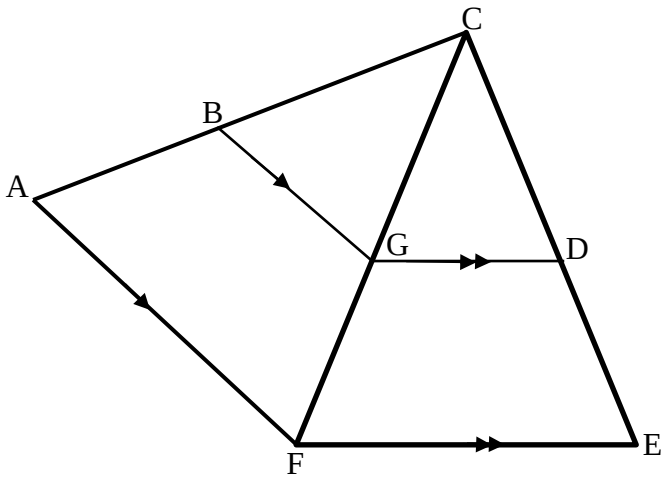
6.1 In the diagram below, P is the midpoint of NQ and R is the midpoint of MQ. PR has a length of $2y+2$.



6.1.1 Determine the length of MN in terms of y. Give a reason for your answer. (2)

6.1.2 If MN has a length of 18, determine the length of y. (2)

6.2 In ΔACF, $AF \parallel BG$ and in ΔCEF, $EF \parallel DG$. $ED = 22\text{cm}$, $DC = 33\text{cm}$, $BC = 15\text{cm}$ and $AB = x$. Calculate, with reasons the value of x. (4)

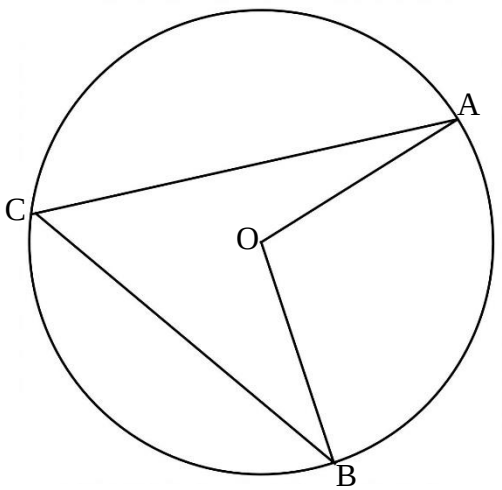


[8]

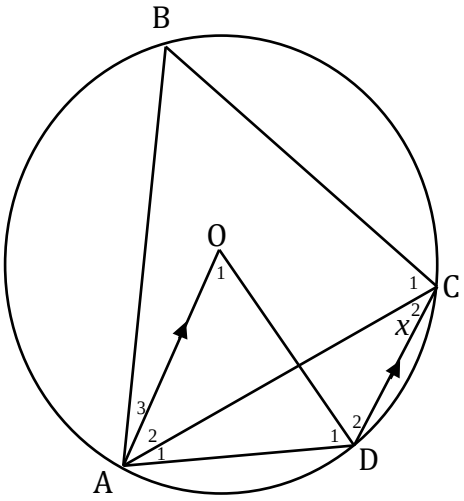
For question 7 and 8, remember to write on the diagrams in your <u>answer booklet</u> and not on the question paper!

QUESTION 7

7.1. In the circle below, O is the centre of the circle with A, B and C points on the circumference. Prove that $B\hat{O}A(\text{obtuse}) = 2\hat{C}$ (5)



7.2 In the diagram below, O is the centre of circle *ABCD*. $AO \parallel DC$ and let $\hat{C}_2 = x$.

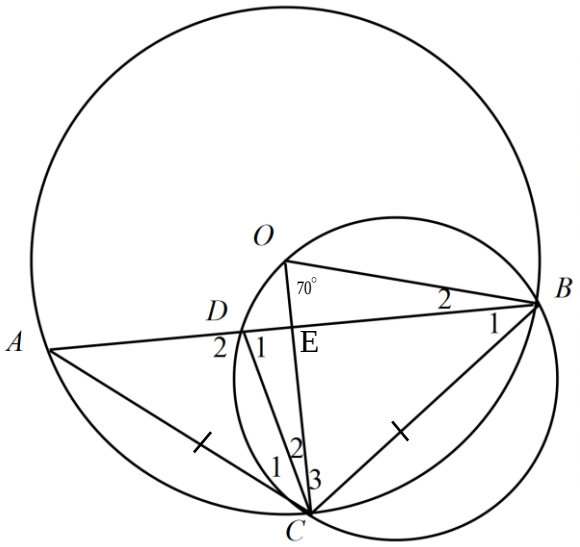


Complete the missing information below:

Statement	Reason	
$\hat{A}_2 = x$	**7.2.1**	(1)
7.2.2	$\angle$ at centre $2\times$ $\angle$ at circumference	(1)
$\hat{D}_1 = 90^\circ - x$	**7.2.3**	(1)
$\hat{A}_1 =$ **7.2.4**		(2)
		[10]

QUESTION 8

Circle ABC with centre O and circle DOBC intersect at B and C. $AB \perp OC$ and $AC = CB$. Let $B\hat{O}C$ (acute) $= 70^\circ$



8.1 Determine each of the following, with reasons.

8.1.1 $\hat{D}_1$ (2)

8.1.2 $\hat{A}$ (2)

8.1.3 $\hat{B}_1$ (2)

8.2 If the length of OB is 5cm, calculate, with reasons the length of AB. (5)

[11]