# Bergvliet High School

## GRADE 10

## MATHEMATICS P2

## 25 NOVEMBER 2024

Name: _____

Maths Teacher: Eb Jo Le Sm Vi Wh
Circle one

All your answers must be written on this question paper.

MARKS: 100
TIME: 2 hours

Examiner: C Smith
Moderator: Z Eberson

**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of 8 questions.
2. Answer ALL the questions.
3. **Answer all the questions on the question paper**. There is extra space on the last two pages should you need it.
4. You may use an approved scientific calculator (non-programmable and non-graphic), unless stated otherwise.
5. Show ALL calculations clearly.
6. Answers only will not necessarily be awarded full marks.
7. Round off ALL final answers to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Write neatly and legibly.

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## Some formulae you may need

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

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

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

$$y = mx + c$$

## Question 1

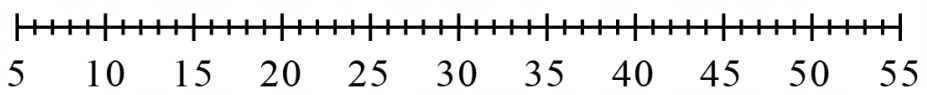
1.1. The table below shows the tip earned in Rands, from their first customer, by 17 waiters at a restaurant.

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 12 | 15 | 16 | 20 | 31 | 35 | 37 | 40 | 41 | 42 | 43 | 43 | 43 | 48 | 49 | 50 |

1.1.1. Determine the mean amount earned. Give your answer correct to TWO decimal places. (2)

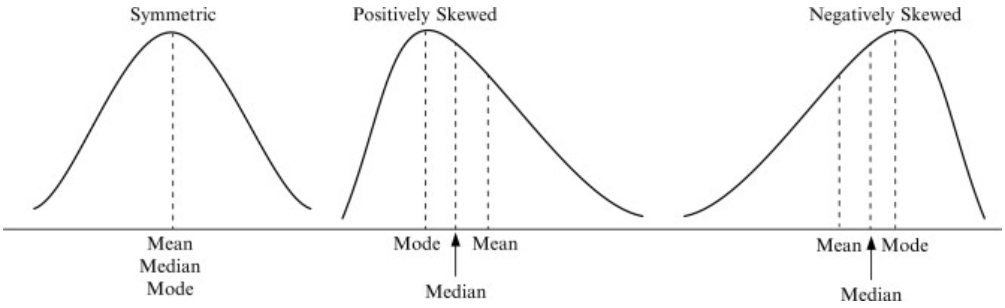
1.1.2. Write down the FIVE number summary. (4)

1.1.3. Hence, or otherwise, draw a box and whisker diagram for the above data. (3)




1.1.4. Calculate the value of the IQR. (2)

1.1.5. Use the information in the diagram below to determine if the above data is, 'Symmetric', 'Positively Skewed', or 'Negatively Skewed'? Write down only your answer. (1)




1.2. The results of a test for 100 students are given in the table below.

| Class Interval | Frequency | Class Mid-Point | $f \times m$ |
|---|---|---|---|
| $16 \leq x < 22$ | 10 | | |
| $23 \leq x < 29$ | 15 | | |
| $30 \leq x < 36$ | 40 | | |
| $37 \leq x < 43$ | 20 | | |
| $44 \leq x < 50$ | 15 | | |
| **TOTAL:** | **100** | | |

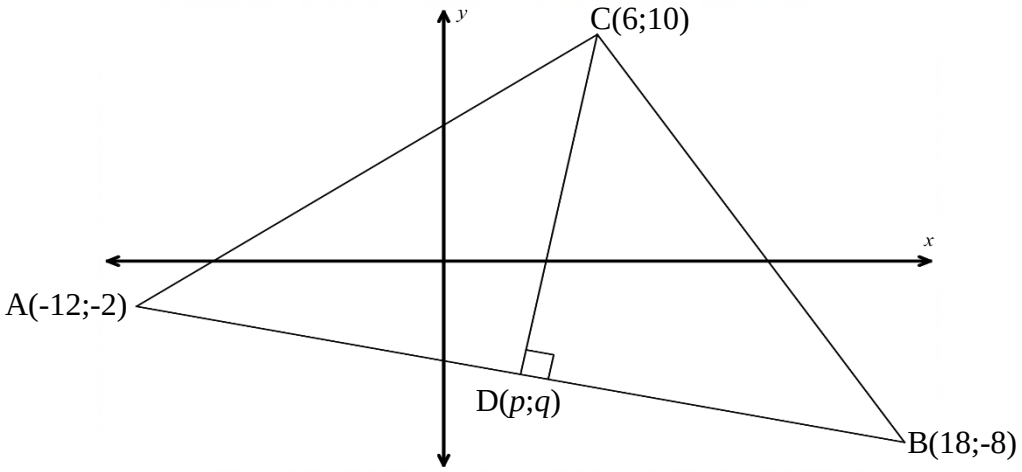
1.2.1. Complete the last two columns and hence, or otherwise, calculate the estimated mean for the test. (4)

1.2.2. If the real mean (using the raw data) was 34,29 calculate the <u>percentage difference</u> between the real mean and the estimated mean. (2)

[18]

## Question 2

In the diagram below, A(-12;-2), B(18;-8) and C(6;10) are the vertices of a triangle. D($p$;$q$) is a point where line CD is perpendicular to AB. CD is joined.

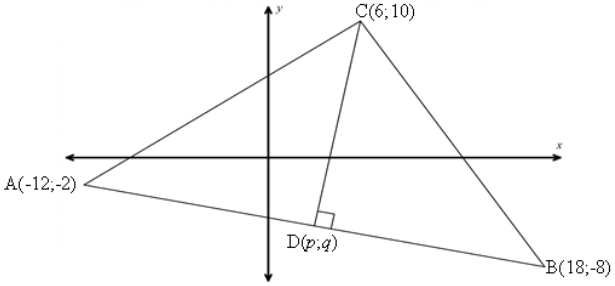



2.1. Calculate the length of AC. Leave your answer in surd form. (3)

2.2. Hence, or otherwise, show that ΔABC is an isosceles triangle. (2)

2.3. Calculate the gradient of AB. (2)

2.4. Determine the equation of line CD.




*The diagram has been reproduced here for convenience.*

(3)

2.5. Show that the line CD passes through the midpoint of AB. (3)

[13]

## Question 3

3.1. If $\alpha$ is an obtuse angle and $\beta$ is an angle in the 4th quadrant, state whether the following values will be positive or negative. You need only write down the word 'Positive' or 'Negative'.

3.1.1. $\sin\alpha$ (1)

3.1.2. $\tan^2\beta$ (1)

3.1.3. $\sec(\beta-\alpha)$ (1)

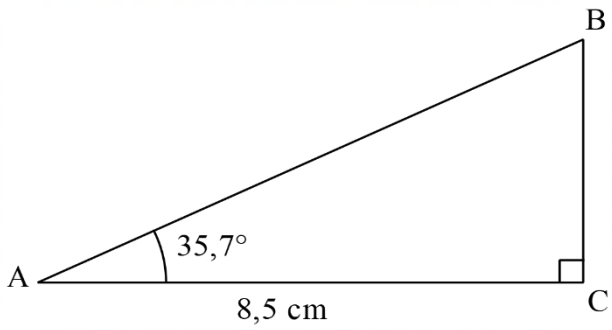
3.2. If $A = 67°$, give the value of each of the following, correct to TWO decimal places.

3.2.1. $\sin(2A + 42°)$ (2)

3.2.2. $\dfrac{1}{\tan^2 A}$ (1)

3.3. Calculate the value of $B$ if $\text{cosec}B = 1{,}1$ (2)

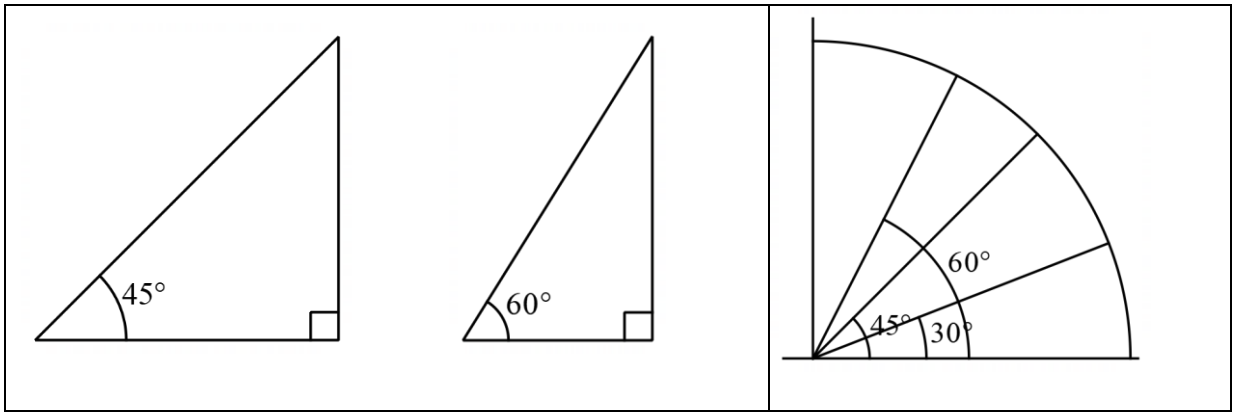
3.4. Calculate the length of AB, in the triangle below. (3)




[11]

## Question 4

4.1.1. Use the space below to complete EITHER the unit circle with the associated angles OR the standard triangles. (2)




4.1.2. WITHOUT the aid of a calculator, and showing all your work, determine the value of

$$\frac{2\sin 30° \times \cos 45°}{2 + \tan^2 60°}$$ (5)

4.2 For each of the following write down the quadrant in which you will find angle $\alpha$. You need only write down the number, 1, 2, 3 or 4.

4.2.1. $\sin\alpha > 0$ and $\alpha > 90°$. (1)

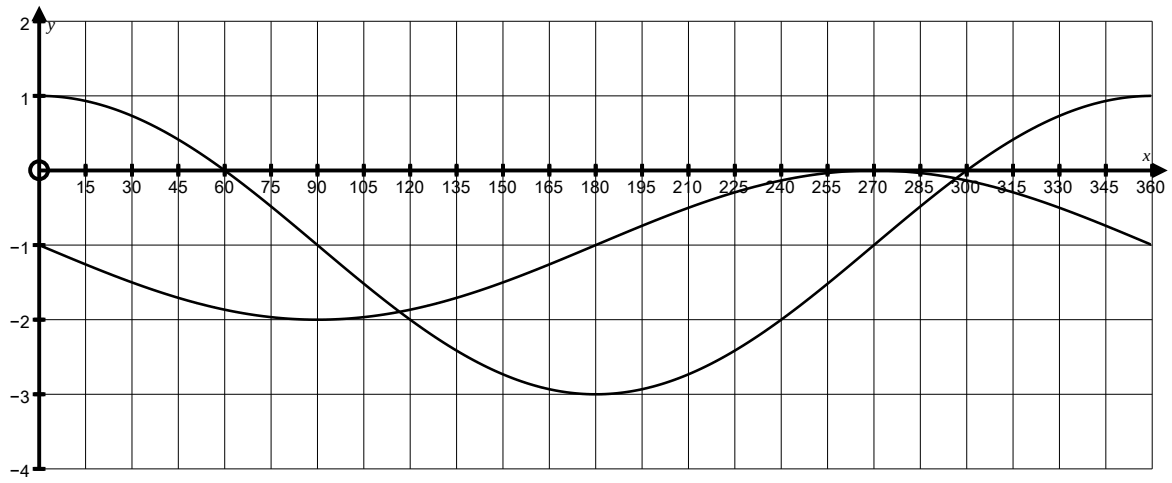
4.2.2. $\tan\alpha < 0$ and $\sin\alpha < 0$. (1)

4.2.3. $\cos\alpha > 0$ and $\tan\alpha > 0$ (1)

[10]

## Question5

The graph below shows the functions
$f(x) = a\sin x - 1$
$g(x) = b\cos x + c$




5.1. Write down the values of *a*, *b* and *c*. (3)

*a* =

*b* =

*c* =

5.2. Write down the range of *f(x)*. (2)

5.3. Write down the values of *x* for which BOTH graphs are increasing. (2)

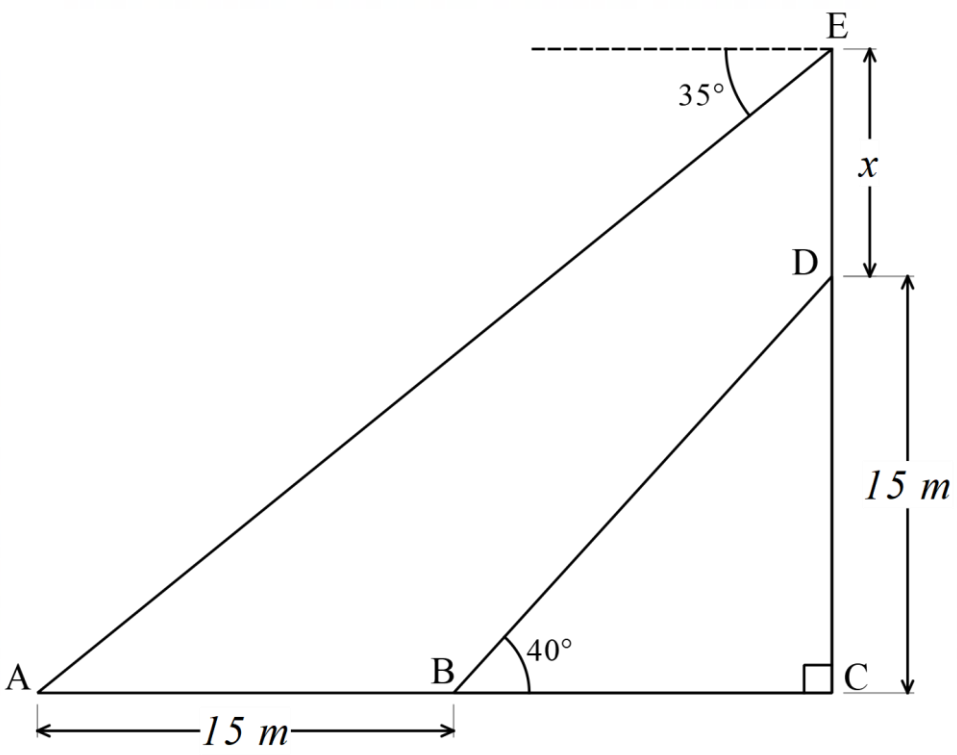
5.4. Write down the values of *x* for which $f(x) - g(x) = 2$ (2)

5.5. Write down the values of *x* for which $f(x) \times g(x) \leq 0$. (3)

[12]

## Question 6

In the diagram below, the angle of depression, from E, to a person at point A is 35°.
A person 15 m closer to the building (point B) notes that a point on the building (point D) is 15 m above the ground. The angle of elevation from B to D is 40°.




6.1. Calculate the length of BC. (2)

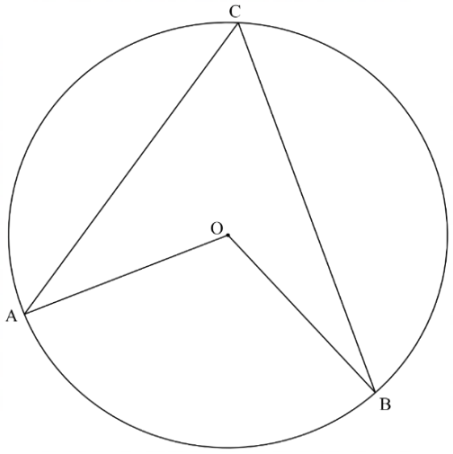
6.2. Write down the size of A, giving a reason for your answer. (1)

6.3. Determine the length of $x$. (4)

[7]

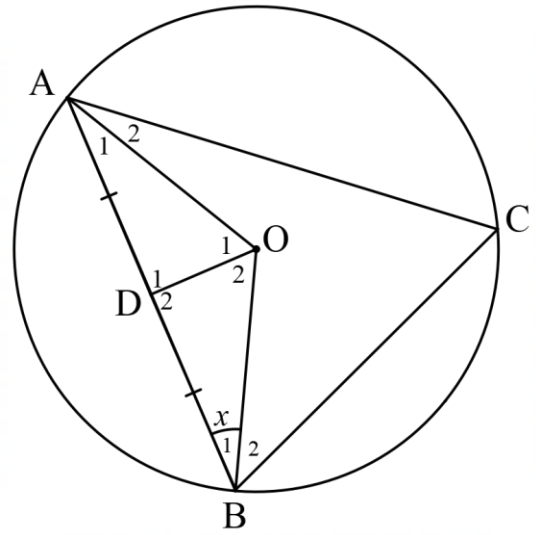
## Question 7

7.1. Use the diagram below to prove the theorem which states "the angle subtended by a chord or arc, at the centre of the circle, is double the angle subtended by the chord or arc at the circumference." (5)




RTP: $A\hat{O}B = 2 \times A\hat{C}B$

7.2. In the diagram below A, B and C are points on the circumference of a circle with centre O. D is the midpoint of AB. $\hat{B}_1 = x$




7.2.1. Give the reason why $\hat{D}_2 = 90°$. (1)

7.2.2. Write down $\hat{O}_2$ in terms of $x$. (1)

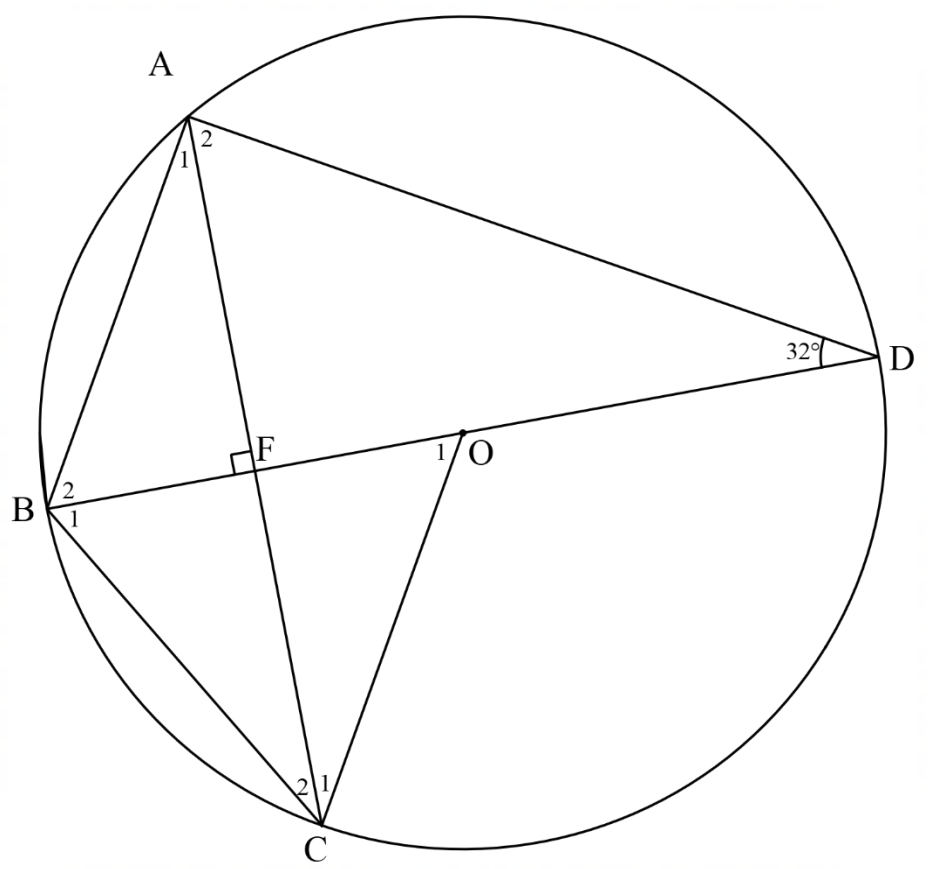
7.2.3. Give the reason why $\hat{A}_1 = x$. (1)

7.2.4. Show, giving reasons, that $\hat{O}_2 = \hat{C}$. (3)

[11]

## Question 8

8.1. In the diagram below BD is the diameter of the circle with centre O. AC is perpendicular to BD. $\hat{D} = 32°$




Determine the magnitude (size) of each of the following, **giving reasons for your statements**.

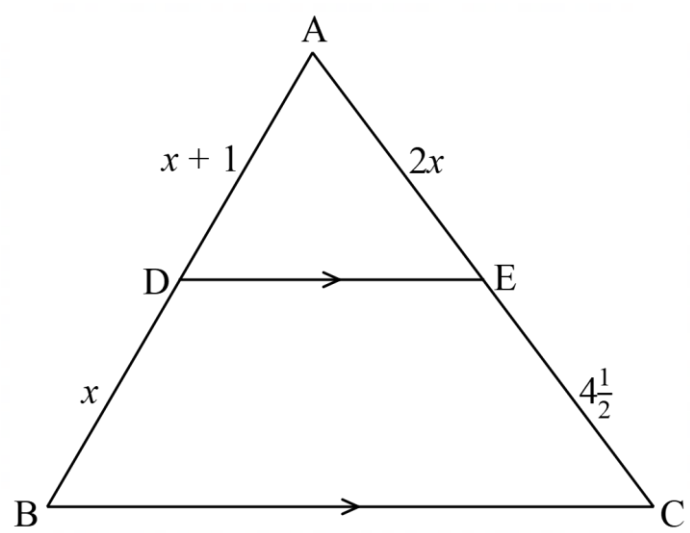
8.1.1. $B\hat{A}D$ (2)

8.1.2. $\hat{A}_2$ (1)

8.1.3. $\hat{O}_1$ (3)

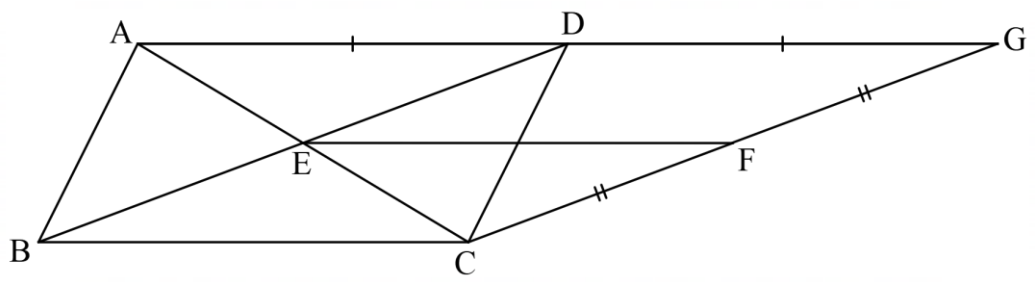
8.1.4. $\hat{B}_1$ (2)

8.2. In ΔABC below, BC | | DE. The lengths of the sides are AD = $x + 1$, AE = $2x$, DB = $x$ and EC = 4,5 units. Calculate the value of $x$. **Show all steps, with reasons where necessary.**




(5)

8.3. In the diagram below ABCD is a parallelogram. AD is extended to G such that AD = DG. F, the midpoint of CG is joined to E. Prove, giving reasons, that BCFE is a parallelogram. (5)




[18]

Extra space – if you use this space remember to write down the question number.

| Question number | | |
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