

Domino Servite School



Accreditation Number 13SCH0100008 Registration Number 122581

Mathematics Paper II

Grade 12

2017 Trial Examination

Name:

Time: 3 hours
Examiner: H Pretorius

Total: 150
Moderators: B Hlongwane
J Bebb

Instructions

1. This is a fill-in paper. Please ensure that you have written your name on the cover.
2. You have been given enough space in which to write. If you need more paper you can use the empty pages at the end of the paper. Ensure that you have marked your answers clearly if you do so.
3. This question paper consists of **17** questions and **32** pages. Please ensure that your question paper is complete.
4. Unless otherwise required, round your final answers to one decimal place, or leave them in simplified surd form.
5. Whenever geometrical statements are made, reasons must be provided.
6. Write in black or blue pen. You may use pencil only for sketches. Any other work done in pencil will be considered rough work and will be marked as such.
7. Follow instructions precisely. Marks can be lost if instructions are not followed.

Question 1

[8 marks]

Eight students entered a juggling competition. Their performances were scored by two judges. The scores (out of 20) are given in the table below.

Student	1	2	3	4	5	6	7	8
Judge 1 (x)	18	4	6	8	5	12	10	14
Judge 2 (y)	15	6	3	5	5	14	8	15

- a) Determine the equation of the line of best fit of the scores given by the two judges. Round off to the third decimal place. (2)

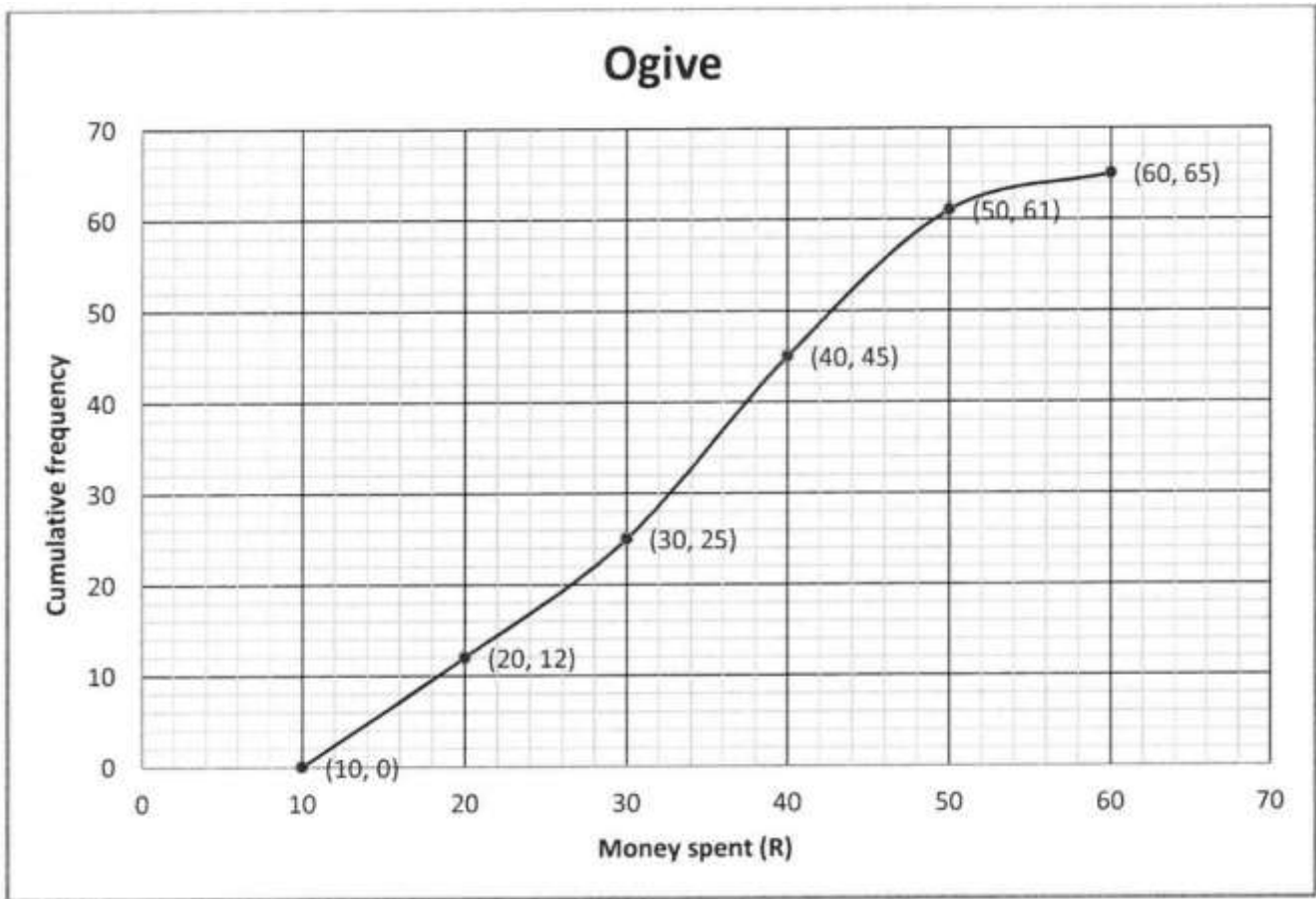
- b) A ninth student entered late for the competition and received a score of 15 from Judge 2. Estimate the score that might have been assigned by Judge 1. (3)

- c) Comment on whether the judges are consistent in assigning scores to the performance of the students. Provide your answer with some evidence from the statistics. (3)

Question 2

[6 marks]

The amount of money, in rands, that learners spent while visiting a tuck shop at school on a specific day was recorded. The data is represented in the ogive below.



An incomplete frequency table is also given for the data.

Amount of money (in R)	$10 \leq x < 20$	$20 \leq x < 30$	$30 \leq x < 40$	$40 \leq x < 50$	$50 \leq x < 60$
Frequency	a	13	20	b	4

- a) How many learners visited the tuck shop on that day? (1)

- b) Determine the values of a and b in the frequency table. (2)

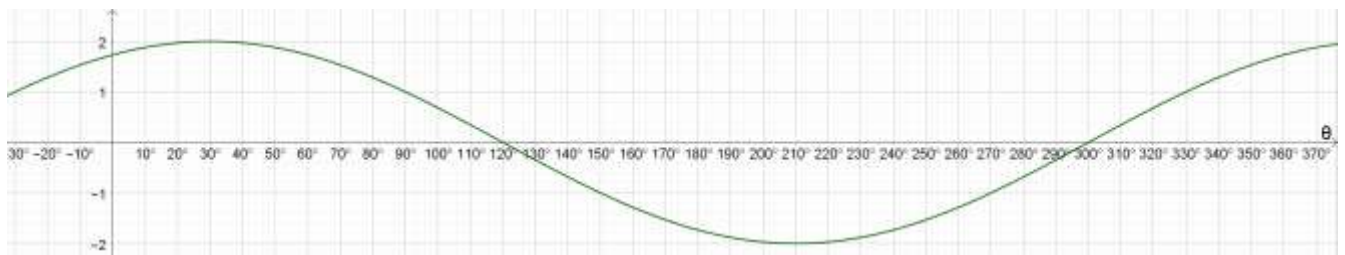
c) Write down the modal class of this data. (1)

d) Use the ogive to estimate the number of learners who spent at least R45 on the day the data was recorded at the tuck shop. (2)

Question 3

[23 marks]

a) Find the equation for the graph shown below:



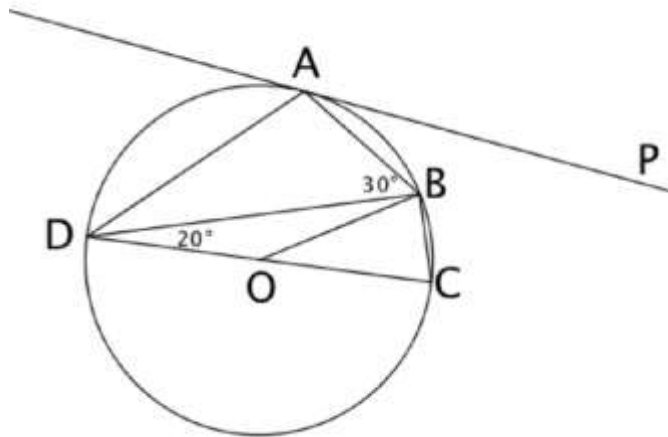
(3)

b) Express $\cos 110^\circ$ in terms of p if $\sin 20^\circ = p$. (3)

Question 4

[10 marks]

- a) In the given diagram, DOC is a diameter of the circle, and a tangent line AP is drawn at A . $\widehat{O\hat{D}B} = 20^\circ$ and $\widehat{A\hat{B}D} = 30^\circ$. $DABC$ is a cyclic quadrilateral.



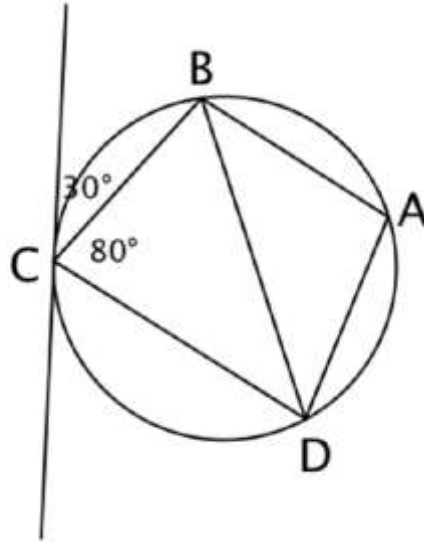
- (1) Determine the magnitude of $\widehat{D\hat{B}C}$. (1)

- (2) Determine the magnitude of $\widehat{A\hat{D}B}$. (2)

- (3) Determine the magnitude of $\widehat{D\hat{A}B}$. (2)

- b) The diagram shows a tangent to the circle at C, making an angle of 30° with chord BC. BADC is a cyclic quadrilateral.

If chord BA is **parallel** to chord CD and $\widehat{BCD} = 80^\circ$, find the size of \widehat{ADB} .

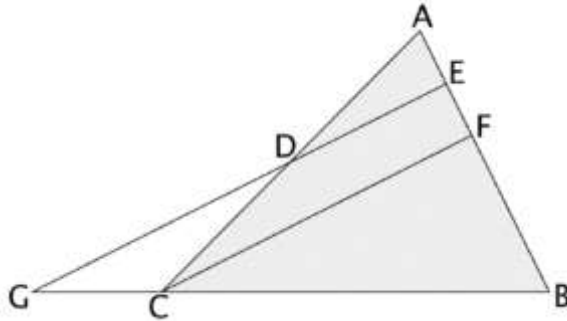


(5)

Question 5

[10 marks]

a) In the given figure, $AE = DC = 3$, $AB = 10$ and $AD = 4.5$. Line GDE is **parallel** to CF ,

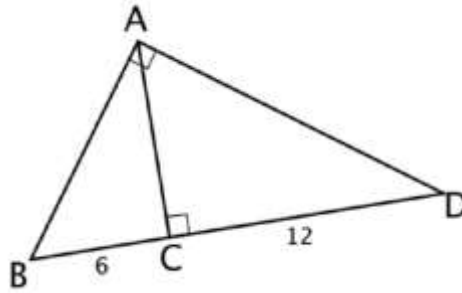


(1) Name a triangle which is similar to triangle BFC . (1)

(2) Calculate the length of EF . (2)

(3) Find $FC : EG$. (2)

- b) In the given diagram, angles BAD and ACD are right angles, $BC = 6$ and $CD = 12$. Find the length of AC.



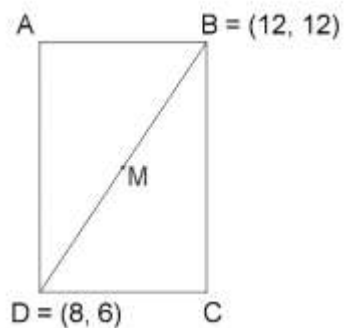
(5)

Question 6

[10 marks]

- a) A circle of radius 13 has its centre at the point O $(4; -2)$. If the point P $(-1; b)$ lies on the circumference of the circle, find the possible values of b . (5)

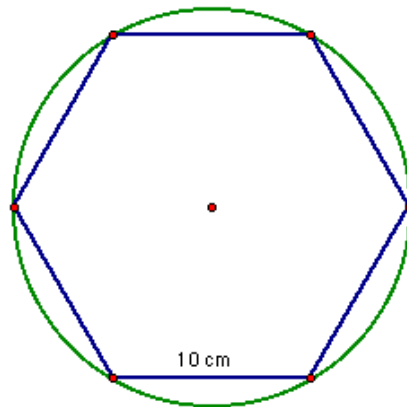
- b) Rectangle ABCD is drawn in the Cartesian plane with sides parallel to the x - and y -axes and one diagonal through the points B (12; 12) and D (8; 6). Find the equation of the circle with diameter AC. (5)



Question 7

[5 marks]

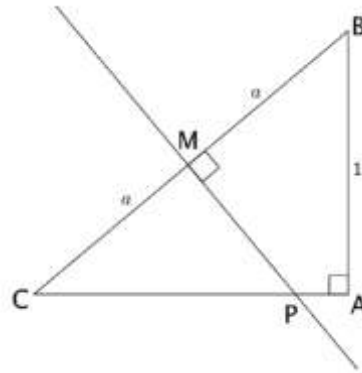
A regular hexagon is drawn inside a circle, with all vertices on the circumference. Find an expression for the radius of the circle if the hexagon has a perimeter of 50 cm.



Question 8

[13 marks]

a) In the diagram, MP is the perpendicular bisector of CB so that $CM = MB = a$. $AB = 1$ unit.



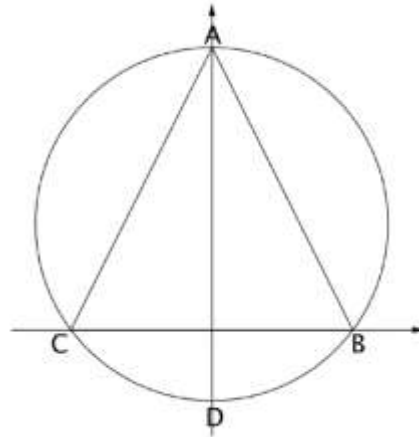
(1) Express AC in terms of a . (2)

(2) Prove that $\triangle MCP \parallel \triangle ACB$. (3)

(3) Find the length of MP.

(2)

- b) A circle passes through the points $A(0; 8)$ and $D(0; -2)$, and has x -intercepts at B and C . If AD is a diameter of the circle, find the length of AC .

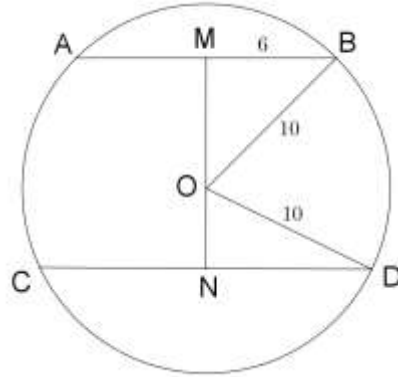


(6)

Question 9

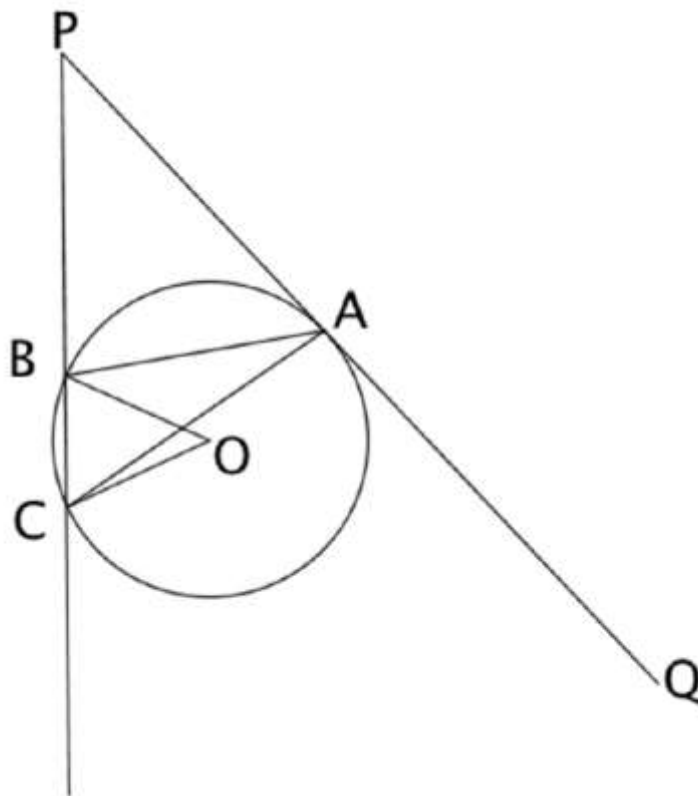
[12 marks]

- a) Two **parallel** chords AB and CD lie 14 cm apart on opposite sides of the centre of a circle of radius 10 cm (i.e. $MN = 14$ cm). If AB is 12 cm long, find the length of CD.



(6)

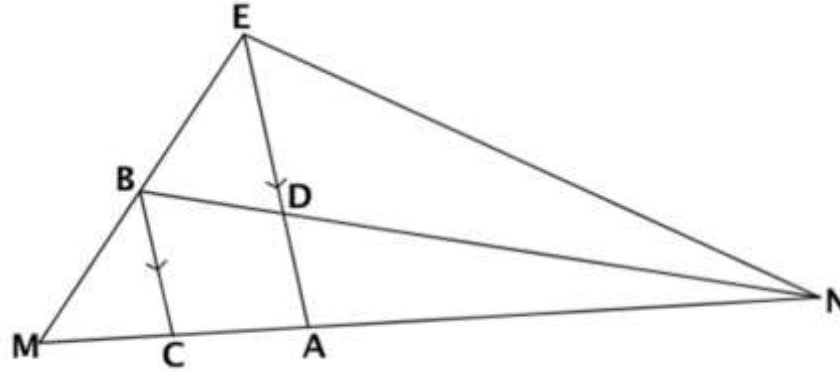
- b) In the diagram (not drawn to scale), PAQ is a tangent to the circle centre O at A , PBC is a secant to the circle, and $PB = BA$. If $\widehat{CAQ} = 100^\circ$, find the size of \widehat{BOC}



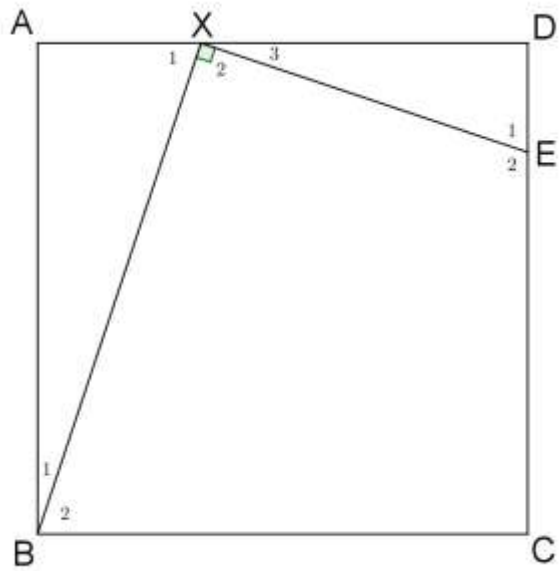
(6)

Question 10**[7 marks]**

- a) In the diagram (not drawn to scale), BC is parallel to EA , $MA = \frac{3}{8}MN$ and $2MB = BE$. Find the value of $BD:DN$. (3)



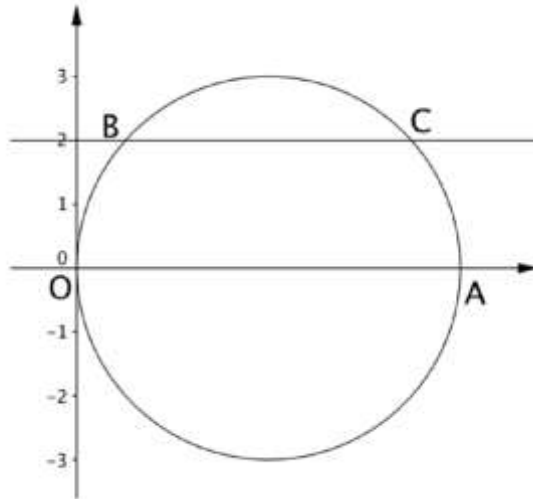
- a) ABCD is a square. Given $BX \perp XE$, prove that $\triangle BAX \parallel \triangle XDE$. (4)



Question 11

[6 marks]

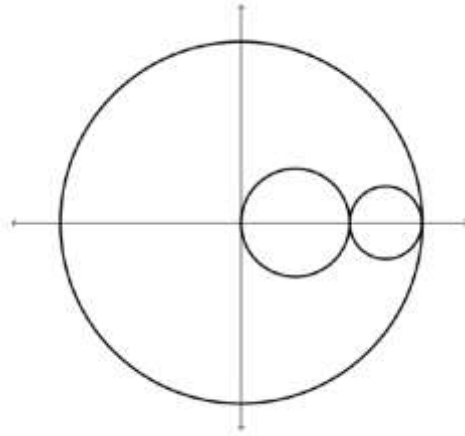
The diagram shows a circle in the Cartesian plane with diameter OA , where O is the origin and A is the point $(6; 0)$. The horizontal line through the point $(0; 2)$ intersects the circle at B and C . Find the x -coordinate of point C .



Question 14

[5 marks]

The diagram shows two tangential circles with their centres on the x -axis. These circles fit within the larger circle defined by $x^2 + y^2 = 144$, as shown. If the radius of the smallest circle is half the radius of the middle-sized circle, find the equation of the smallest circle.



Question 15

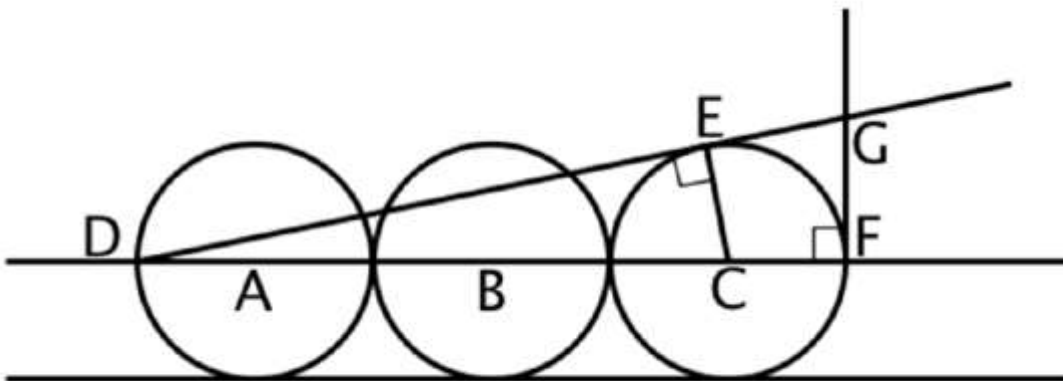
[5 marks]

In a group of boys and girls, the average height of all the children in the group is 165 cm, the average height of the boys is 172 cm and the average height of the girls is 160 cm. Find the ratio of the number of boys to girls in the group.

Question 16

[7 marks]

Three circles with centres A, B and C are tangent to each other. Each circle has a radius of 5 cm. Lines DE and FG are tangent to circle C and intersect at G. Find the length of FG.



Question 17

[6 marks]

Triangle ABC is a right-angled isosceles triangle with $AC = BC = 1$. A semi-circle is drawn with its diameter on BC, so that AB and AC are tangents to the semi-circle. X is the point of contact of AB to the semi-circle. Determine the radius of the semi-circle.

