KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA



NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS

COMMON TEST

SEPTEMBER 2022



MARKS: 75

TIME: 1½ hour

This question paper consists of 8 pages and 1 diagram sheet.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 6 questions.
2. Answer ALL the questions.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. A DIAGRAM SHEET for QUESTION 3.3.1 and QUESTION 4.1 is attached at the end of this question paper. Detach the DIAGRAM SHEET and hand it in together with your ANSWER BOOK.
10. Write neatly and legibly.

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QUESTION 1

1.1 A survey was conducted among 560 drivers about the number of accidents they were involved in during one calendar year. The results are summarised in the table below.

Age of driver	Number of accidents		Total
	Two or fewer	More than two	
30 years and younger	157	51	208
Older than 30 years	304	48	352
Total	461	99	560

1.1.1 Use the information in the table to calculate the probability that a driver selected at random from this group:

(a) is older than 30 years. (2)

(b) was involved in more than two accidents in the year. (1)

(c) is older than 30 years and was involved in more than two accidents in the year. (2)

1.1.2 Are the events "being involved in more than two accidents in the year" and "being older than 30 years" independent of each other? Motivate your answer by means of relevant calculations. (3)

1.2 For two events, A and B, in the sample space S, it is given that:

- P(A) = 0,55
- P(B) = 0,6
- P(A and B) = 0,25

1.2.1 Draw a Venn diagram to represent this information. (4)

1.2.2 Determine P[not(A or B)]. (1)

1.2.3 Determine P[A and (not B)]. (1)

1.3 During a virus pandemic Khanyi decides to visit her friend Nozipho. Neither of them knew that Nozipho had contracted the virus.

- The probability that both of them will be wearing masks during the visit is 82%.
- If they are wearing masks during the visit, the probability that Khanyi will contract the virus is 8%.
- If they are not wearing masks during the visit, the probability that Khanyi will not contract the virus is 27%.

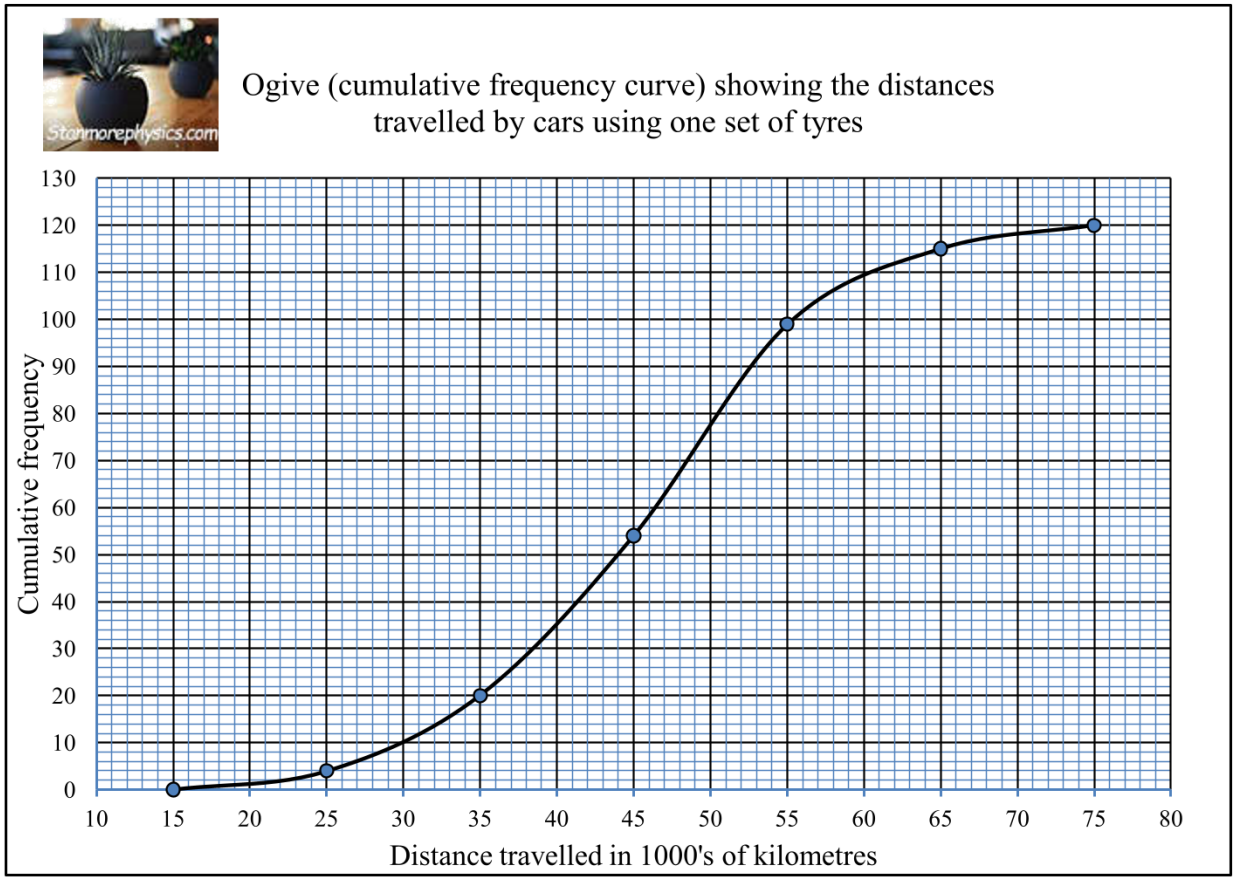
What is the probability that Khanyi will contract the virus because of the visit to Nozipho? (5)

[19]

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QUESTION 2

A tyre manufacturer collected data on how far cars could travel using one set of tyres. The distances, in 1000's of kilometres, covered by cars using one set of tyres are shown in the ogive (cumulative frequency curve) below.



2.1 What is the total number of cars on which data was collected? (1)

2.2 Write down the modal class of the data. (2)

2.3 Use the ogive to determine the median number of kilometres travelled before new tyres were required. (2)

2.4 In the survey, what percentage of the cars travelled more than 50 000 km with one set of tyres? (3)

[8]

QUESTION 3

The data listed below shows the distance (in kilometres) travelled by cyclists on each day of a twelve day cycle tour:

82	89	94	100	113	121
123	128	128	132	135	140

3.1 Determine

3.1.1 the mean distance travelled per day (2)

3.1.2 the standard deviation of the data (1)

3.2 On how many days do the cyclists travel a distance that is outside of one standard deviation from the mean? Show all your calculations. (3)

3.3 The 5-number summary for the data is as follows:



(82 ; 97 ; 122 ; 130 ; 140).

3.3.1 Use the scaled line on the DIAGRAM SHEET to draw a box-and-whisker diagram for this set of data. (3)

3.3.2 Comment on the skewness of the data. (1)

3.4 Before the start of each day's section of the tour, the cyclists had an additional warm-up ride of x km. If this is also taken into account, write down, in terms of x (where applicable)

3.4.1 the mean distance travelled per day (2)

3.4.2 the standard deviation (1)

[13]

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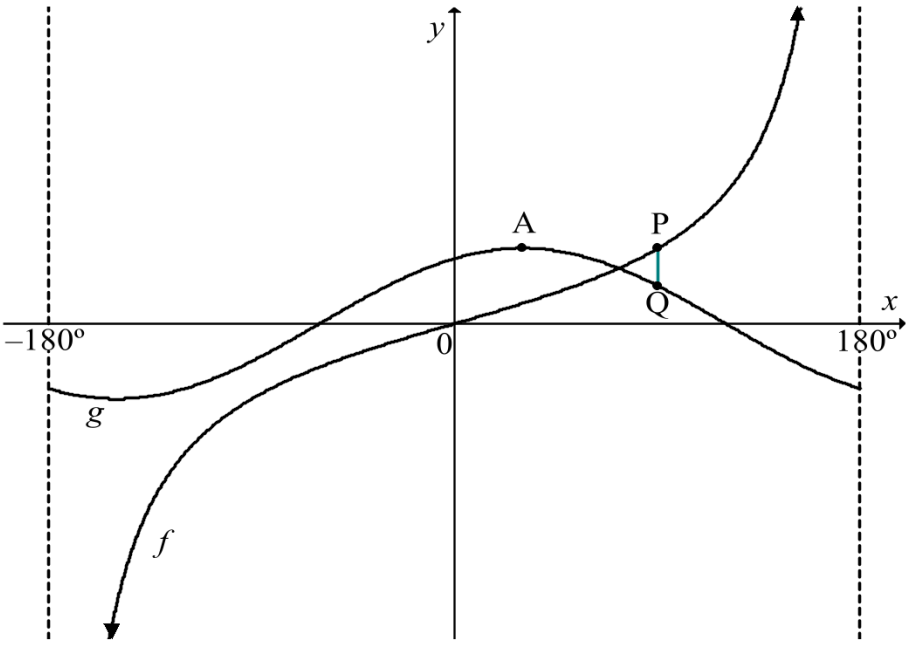
QUESTION 4

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4.1 Draw the graph of $y = -2\sin x$, for $x \in [-90^\circ ; 270^\circ]$ on the set of axes provided on the DIAGRAM SHEET. Clearly indicate all intercepts with the axes, turning points and end points. (4)

4.2 In the diagram, the graphs of $f(x) = \tan bx$ and $g(x) = \cos(x - 30^\circ)$ are drawn on the same set of axes for $x \in [-180^\circ ; 180^\circ]$.

P$(90^\circ ; 1)$ lies on f and Q lies on g, such that PQ is parallel to the y-axis.
A is a turning point of g.



Use the diagram to answer the following questions:

4.2.1 Write down the value of b. (1)

4.2.2 Write down the coordinates of A, the turning point of g. (2)

4.2.3 Write down the coordinates of Q. (2)

4.2.4 Write down the equation of the asymptote of $y = \tan b(x + 20^\circ)$ for $x \in [-180^\circ ; 180^\circ]$. (1)

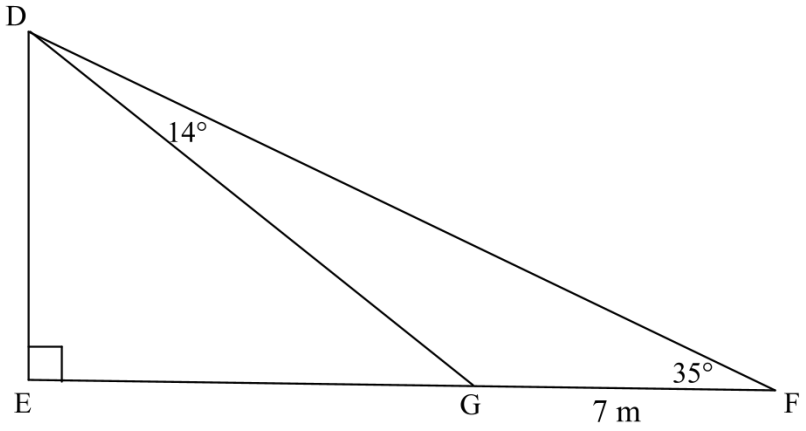
4.2.5 Determine the range of h if $h(x) = g(x) + 3$. (2)

4.2.6 For which values of x, in the interval $x \in [0^\circ , 180^\circ]$, will $f(x).g(x) \leq 0$? (3)

[15]

QUESTION 5

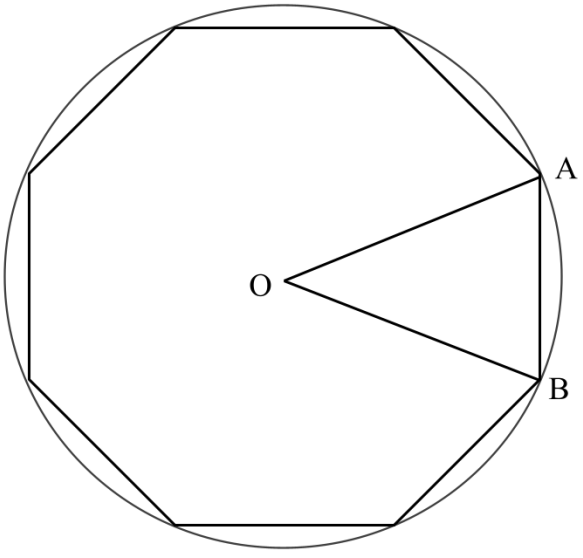
5.1 In the diagram below, $\hat{F} = 35^\circ$, $\hat{E} = 90^\circ$, $G\hat{D}F = 14^\circ$ and FG = 7 m.



5.1.1 Write down the size of $E\hat{G}D$. (1)

5.1.2 Calculate the length of DE. (5)

5.2 The diagram below shows a regular octagon inscribed in a circle of radius r cm and with centre O. A and B are two vertices of the octagon. AO, BO and AB are drawn.



5.2.1 Show that the area of the octagon is $2\sqrt{2}r^2$ cm^2. (4)

5.2.2 If $r = 5$ cm, calculate the perimeter of the octagon. (3)

[13]

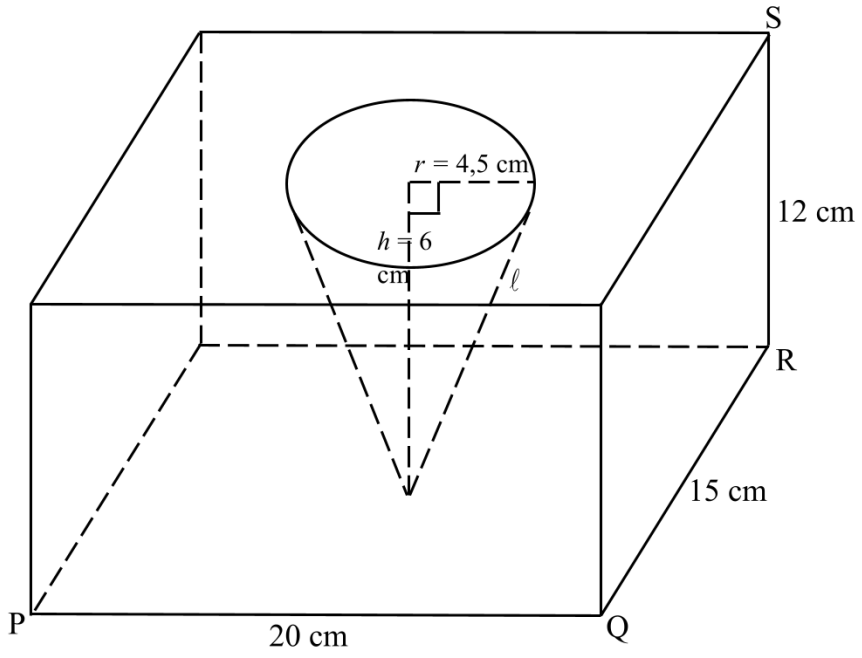
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QUESTION 6

The solid below was made by drilling a right circular cone out of a right rectangular prism (i.e. the cone is removed from the prism).
P, Q, R and S are vertices of the prism such that PQ = 20 cm, QR = 15 cm, RS = 12 cm.
The radius of the cone, r, is 4,5 cm and the height of the cone, h, is 6 cm.
The slant height of the cone is ℓ.

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Total surface area of a cone = $\pi r^2 + \pi r\ell$



Calculate the total surface area of the solid. **[7]**

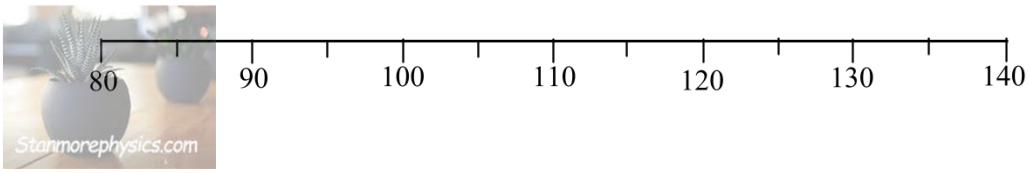
TOTAL: 75

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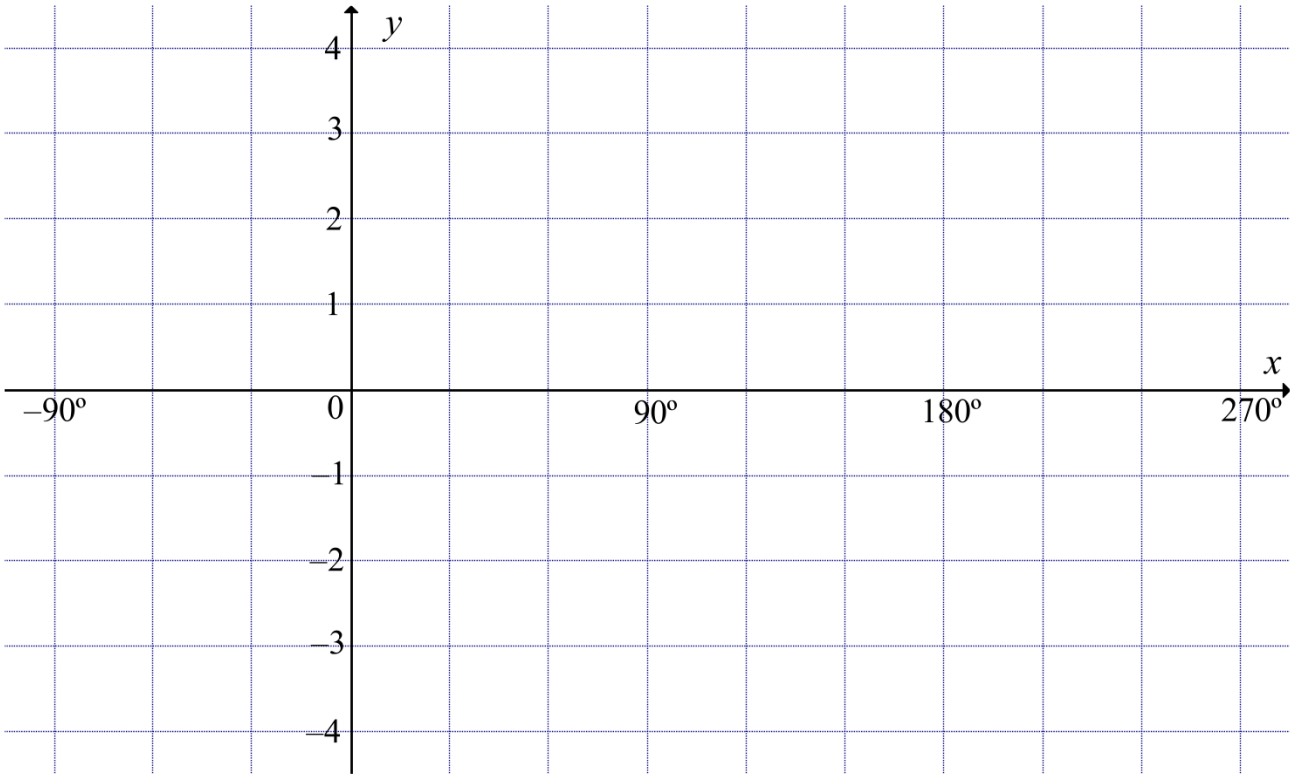
NAME & SURNAME:

DIAGRAM SHEET

QUESTION 3.3.1



QUESTION 4.1



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