higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS

(Second paper)

NQF LEVEL 2

(10501042)

28 November 2022 (Y-paper)
13:00–16:00

Nonprogrammable scientific calculators may be used.

This question paper consists of 8 pages, 1 formula sheet and 2 addenda.

587Q2N2228

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TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Round off answers to THREE decimals unless stated otherwise.
5. Start each question on a new page.
6. Use only a black or blue pen.
7. Write neatly and legibly.

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QUESTION 1

1.1 Define each of the following terms used in data handling:

1.1.1 Raw data

1.1.2 Frequency

(2 × 2) (4)

1.2 The following table shows the number of Covid-19 vaccinations done in a district clinic for 20 days in June 2021:

59	85	97	50	86	70	98	69	95	63
65	92	77	93	57	70	99	57	70	74

1.2.1 Construct a stem-and-leaf diagram. (5)

1.2.2 Determine the mean of the data. (2)

1.2.3 Determine the median of the data. (2)

1.2.4 Write down the mode of the data. (1)

1.3 The following table shows the number of hours that 11 nurses worked giving Covid-19 vaccinations:

35	50	61	59	44	48	38	47	30	39	56

1.3.1 Find the range of the data. (1)

1.3.2 Determine the lower quartile. (2)

1.3.3 Determine the upper quartile. (2)

1.3.4 Determine the interquartile range. (2)

1.3.5 Determine the semi-interquartile range. (1)

1.3.6 Determine the 37th percentile of the data. (3)

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1.4 The following were the number of days 32 recovered Covid-19 patients spent in hospital in December 2020 before they were discharged:

14	23	14	13
7	21	17	24
10	13	25	20
21	14	30	12
9	8	15	17
26	22	11	15
11	18	16	22
15	9	14	19

1.4.1 Use the data to complete the tally and frequency columns of the frequency distribution table in ADDENDUM A (attached). (5)

1.4.2 Use the data to draw a histogram in ADDENDUM A (attached). (5)

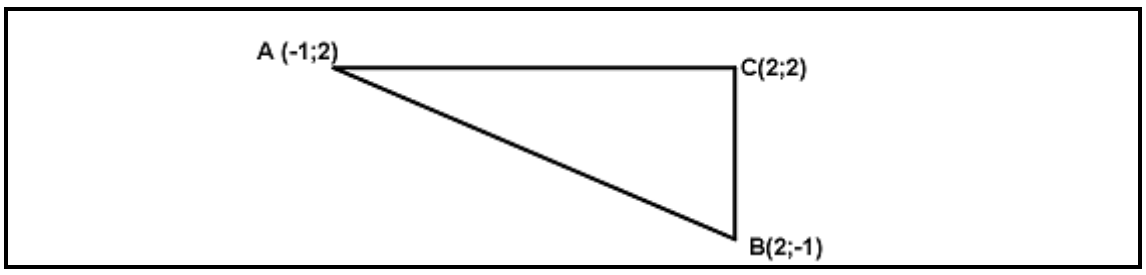
1.4.3 Give the modal class. (1)

1.4.4 Construct a frequency polygon on the histogram in ADDENDUM A. (4)

[40]

QUESTION 2

2.1

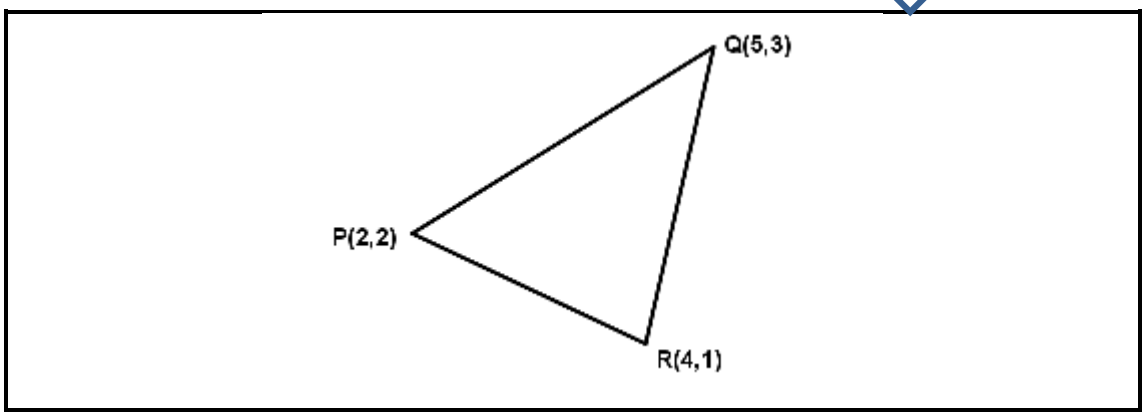


2.1.1 Calculate the length of the line segment BC. Leave the answer in surd form. (3)

2. 1.2 Determine the coordinates of the midpoint (M) of the line segment AC. (2)

2. 1.3 Determine the gradient of the line segment AB. (2)

2.2 Given ΔPQR with vertices $P(2;2)$, $Q(5;3)$ and $R(4;1)$.

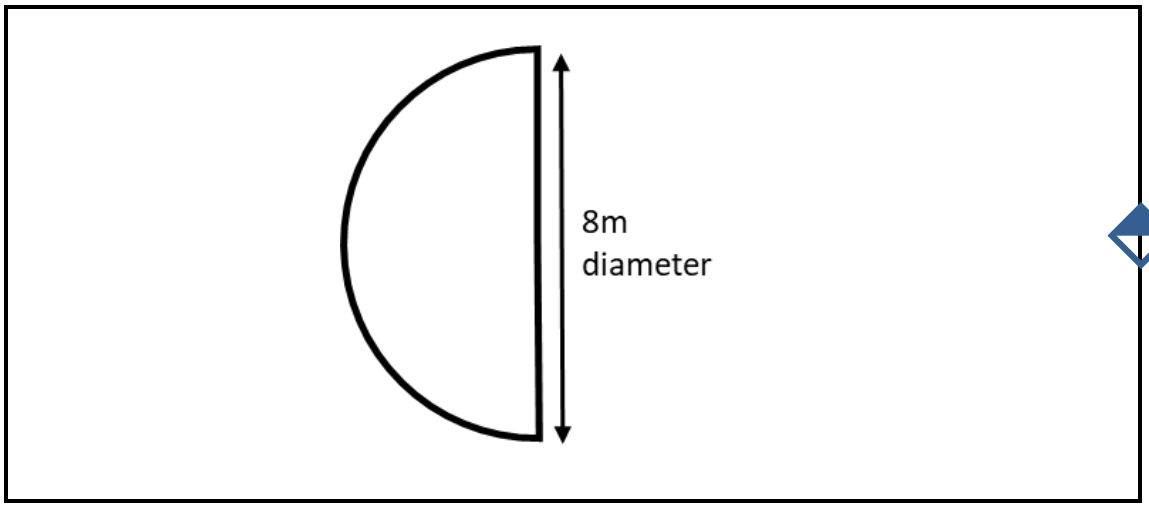


2.2.1 Translate points P, Q and R by 1 unit right and 4 units down. (6)

2.2.2 Determine point P if it is reflected about $y = -x$. (2)

2.2.3 Determine the coordinates of point Q if it is reflected about $y = x$. (2)

2.3 The following plan is for a vegetable garden that is to be enclosed by a fence. The garden is in the shape of a semi-circle, with a diameter of 8 metres.



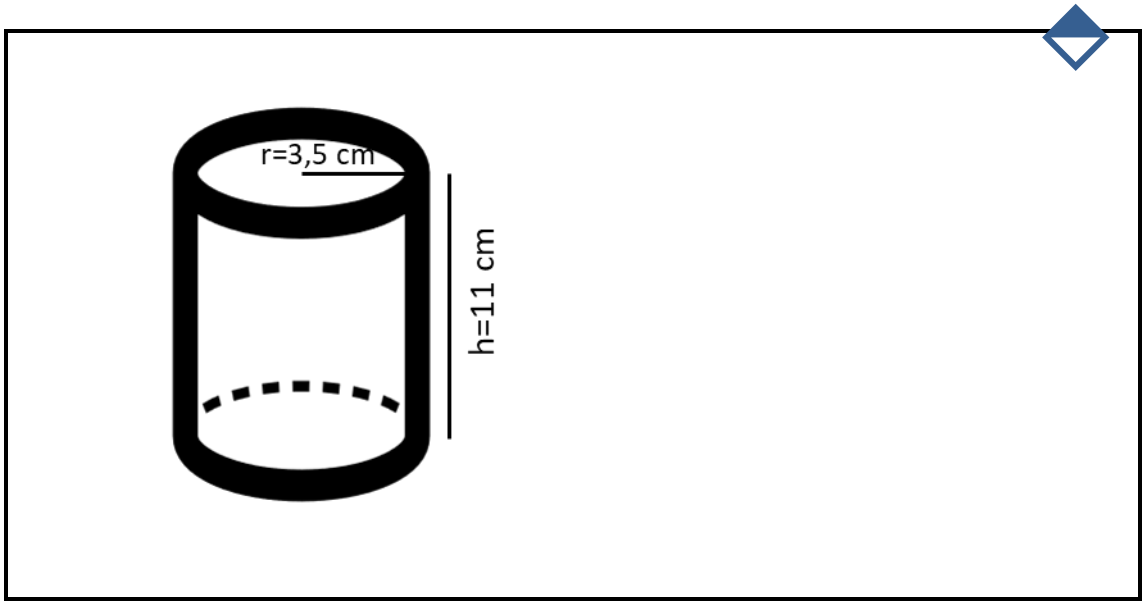
2.3.1 Calculate the area of the vegetable garden. (3)

2.3.2 Determine the perimeter of the garden. (3)

2.3.3 What is the cost of placing a picket fence around the perimeter if it costs R290 per running metre, rounded up to the nearest whole metre? (2)

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2.4 A cylindrical tin of baked beans has a height of 11 cm and a radius of 3,5 cm.



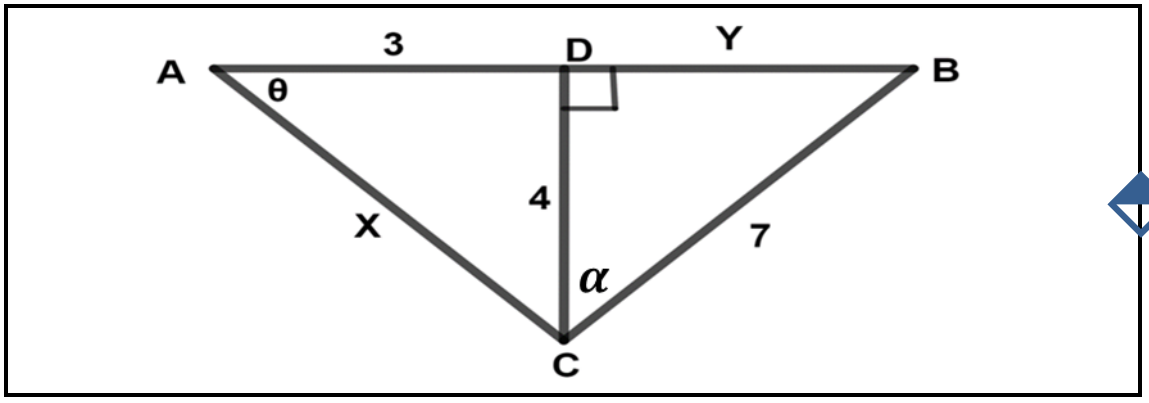
2.4.1 Calculate the surface area of the baked bean tin. (3)

2.4.2 Calculate the volume the baked bean tin can hold. (2)

[30]

QUESTION 3

3.1 The following diagram shows ΔABC.

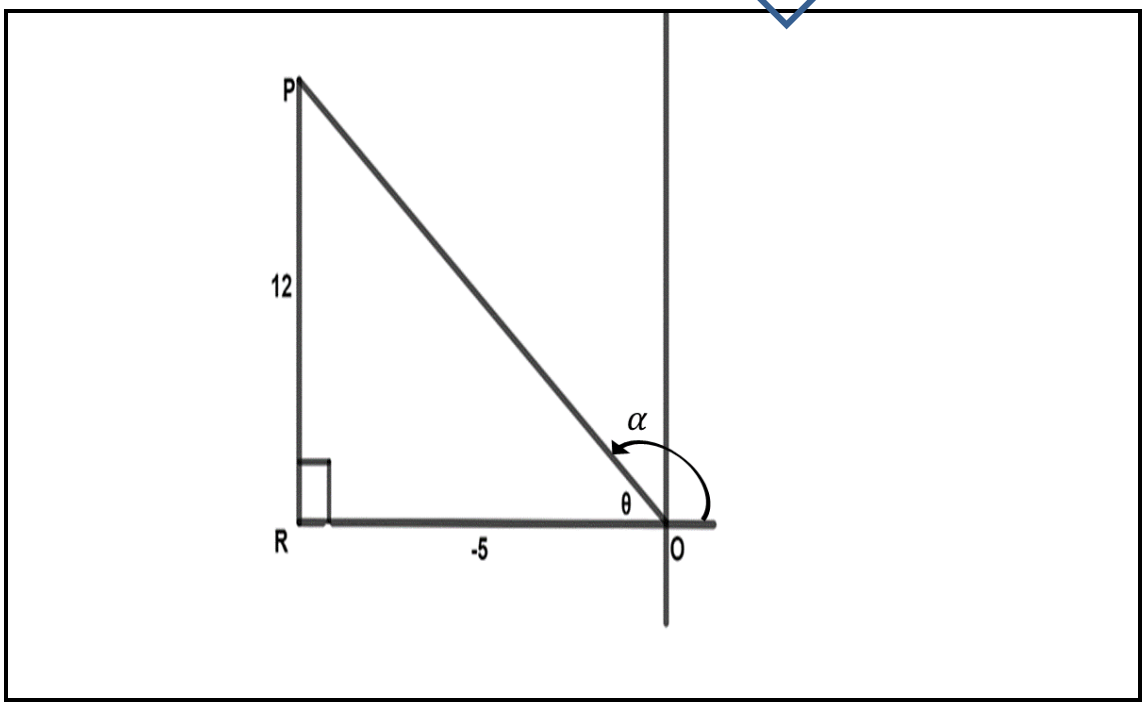


3.1.1 Calculate the value of θ in degrees. (3)

3.1.2 Determine the value of DB. Leave the answer in surd form. (2)

3.1.3 Calculate the value of α in degrees. (3)

3.2 Given $\tan\alpha = \frac{12}{-5}$ and $90° \leq \alpha \leq 180°$.



3.2.1 Calculate the length of PO. (2)

3.2.2 Calculate the value of $\sin\alpha + \cos\alpha$. (3)

3.2.3 Calculate the value of α. (3)

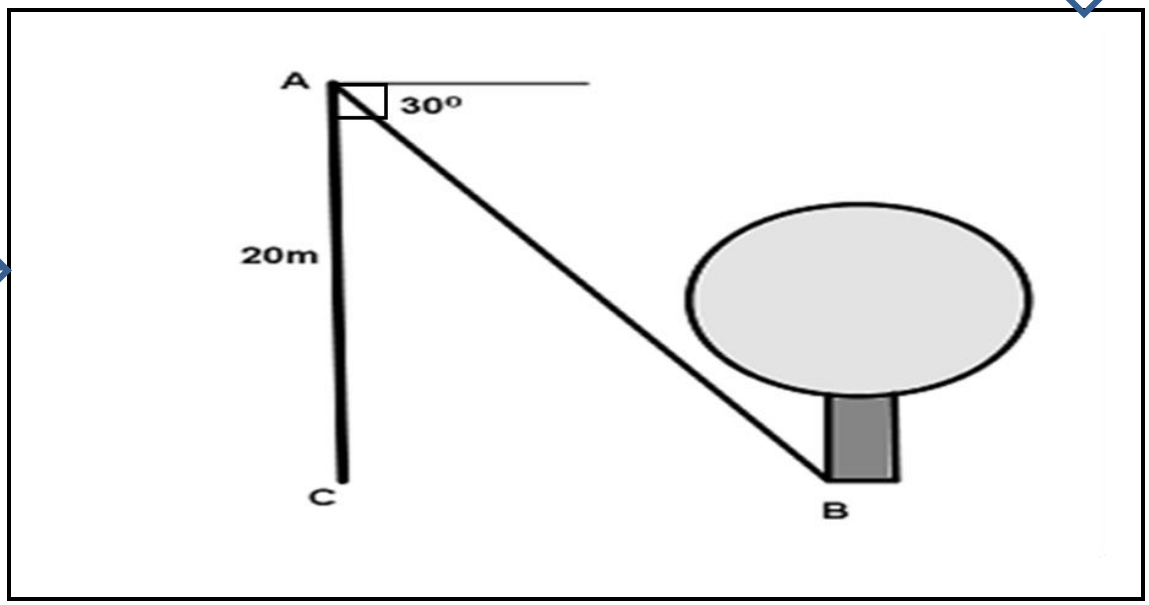
3.3 3.3.1 Draw the graph of $f(x) = \cos x$ and $g(x) = 2\sin x$ on the same system of axes where $0° \leq x \leq 360°$ on ADDENDUM B (attached). It is optional for you to use the table to determine values for $f(x)$ and $g(x)$ to help you draw the graph. (6)

3.3.2 What is the period of $f(x) = \cos x$? (1)

3.3.3 What is the range of $g(x) = 2\sin x$? (2)

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3.4 John was repairing a cable post with a height of 20 m from the top of the post. He noticed a gate light at a certain distance at an angle of depression 30°.



3.4.1 Calculate the distance BC. (3)

3.4.2 Calculate the distance between point A and point B. (2)

[30]

TOTAL: 100

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FORMULA SHEET

1. $A_{square} = l \times l = l^2$
2. $A_{rectangle} = l \times w$
3. $A_{triangle} = \frac{1}{2} b \times h$
4. $A_{circle} = \pi r^2$
5. $C = 2\pi r$
6. Area of parallelogram = base × perpendicular height
7. $A_{hexagon} = \frac{3\sqrt{3}}{2} L^2$
8. $A_{hexagon} = \frac{\sqrt{3}}{2} W^2$
9. $A_{cylinder} = 2\pi r(h + r)$
10. Volume = Area of base × perpendicular height
11. $V_{cylinder} = \pi r^2 h$
12. Total surface area of a triangular prism = (height of prism × perimeter of base) + 2(area of base)
13. $m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$
14. $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
15. $M = \left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$
16. $\theta = tan^{-1} m$
17. $\bar{x} = \sum \frac{f_i x_i}{n}$ or mean = (total or sum of all items) ÷ (number of items)
18. $R = X_n - X_1$ or range = highest value – lowest value
19. $Q_{jposition} = \frac{j}{4}(n + 1)$
20. Interquartile range = upper quartile – lower quartile = $(Q_3 - Q_1)$
21. Semi-interquartile range $= \frac{1}{2}$(upper quartile − lower quartile) $= \frac{Q_3 - Q_1}{2}$
22. $P_{jposition} = \frac{j}{100}(n + 1)$

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ADDENDUM A

EXAMINATION NUMBER:

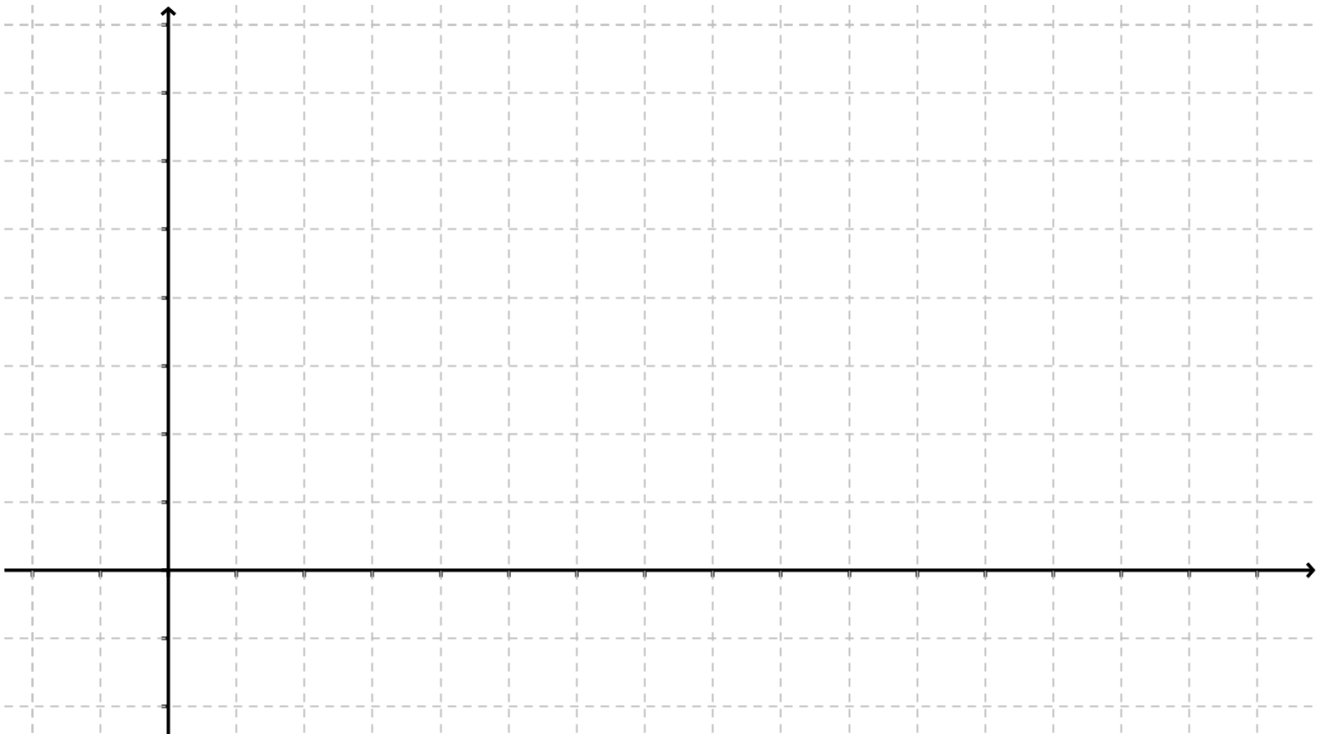
Detach ADDENDUM A and hand it in with the ANSWER BOOK.

QUESTION 1

1.4 1.4.1

DAYS (n) HOSPITALIZED	**TALLY**	**FREQUENCY**
$\mathbf{5 < n \leq 10}$		
$\mathbf{10 < n \leq 15}$		
$\mathbf{15 < n \leq 20}$		
$\mathbf{20 < n \leq 25}$		
$\mathbf{25 < n \leq 30}$		
	TOTAL	**32**

1.4.2



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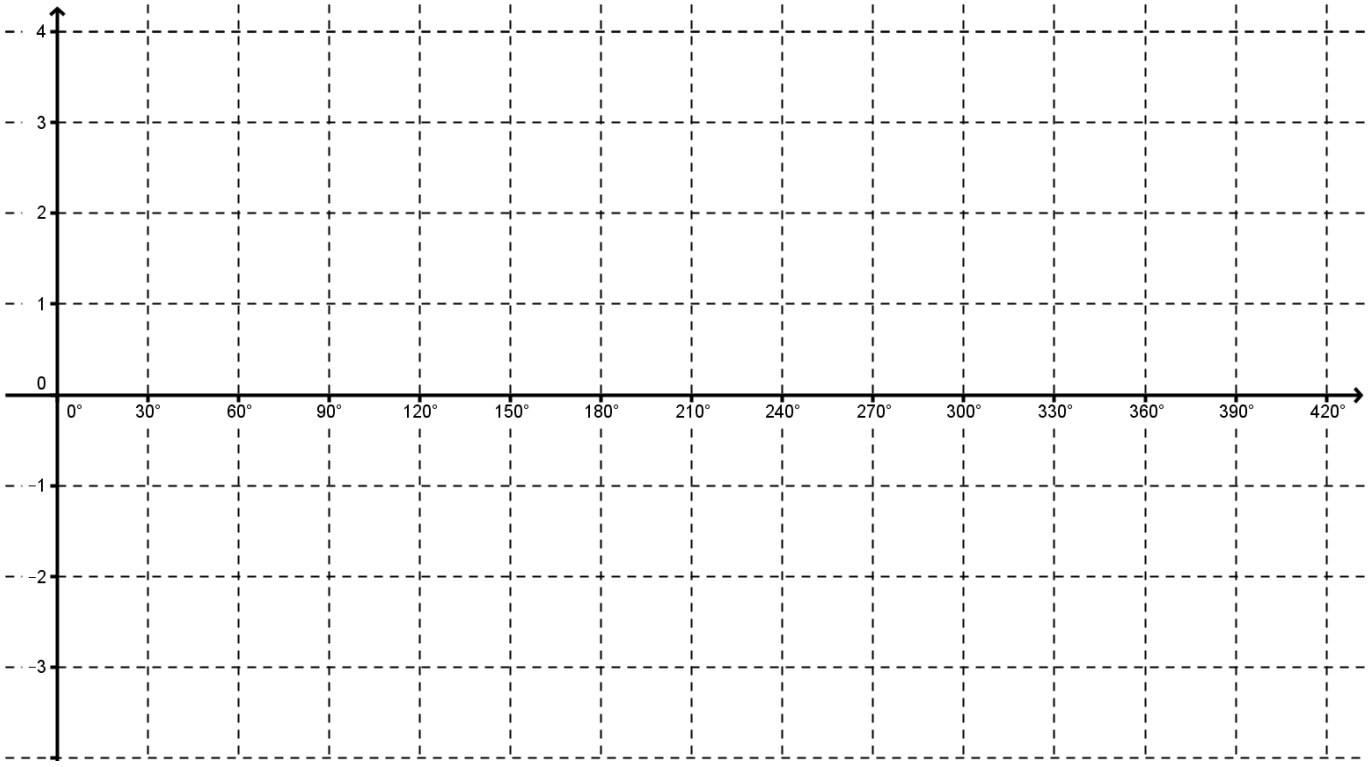
ADDENDUM B

EXAMINATION NUMBER:

Detach ADDENDUM B and hand it in with the ANSWER BOOK.

3.3 3.3.1

x	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	300°	360°
$f(x) = \cos x$													
$g(x) = 2\sin x$													



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