higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS
NQF LEVEL 2
(Second paper)

(10501042)

19 February 2024 (X-paper)
09:00–12:00

Nonprogrammable scientific calculators and protractors may be used.

This question paper consists of 9 pages, a formula sheet of 2 pages and 2 answer sheets.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
MATHEMATICS
NQF LEVEL 2
PAPER 2
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. Start each question on a new page.
5. Round off answers to THREE decimal places unless stated otherwise.
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 Sample size

1.1.2 Modal value

(2 × 2) (4)

1.2 The following are the Mathematics marks of 20 NCV Level 2 students in a TVET college:

15	39	50	28	56	34	57	37	30	57
50	57	35	47	57	37	44	55	57	25

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

1.2.2 Determine the mean of the given data. (2)

1.2.3 Determine the median value of the given data. (2)

1.2.4 Write down the modal value of the given data. (2)

1.3 A large company in a city started a fitness campaign at the workplace. They weighed each person and recorded their masses. The following are the masses of the 12 employees in kilograms:

81	77	67	75	88	80
71	66	65	72	74	66

1.3.1 Determine the lower quartile. (2)

1.3.2 Determine the upper quartile. (2)

1.3.3 Determine the interquartile range. (2)

1.3.4 Determine the range of the data. (1)

1.3.5 Determine the 68th percentile of the data. (3)

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1.4 The following data shows the different types of sports the learners in a TVET college support:

CRICKET	TENNIS	TENNIS	GOLF
CRICKET	HOCKEY	HOCKEY	TENNIS
SOCCER	CRICKET	SOCCER	TENNIS
SOCCER	GOLF	TENNIS	HOCKEY
HOCKEY	SOCCER	HOCKEY	SOCCER
HOCKEY	CRICKET	SOCCER	HOCKEY
GOLF	HOCKEY	GOLF	HOCKEY
SOCCER	CRICKET	TENNIS	SOCCER
GOLF	TENNIS	CRICKET	TENNIS
SOCCER	SOCCER	SOCCER	SOCCER

1.4.1 Use the given data to complete the tally and frequency table on ANSWER SHEET A (attached). (5)

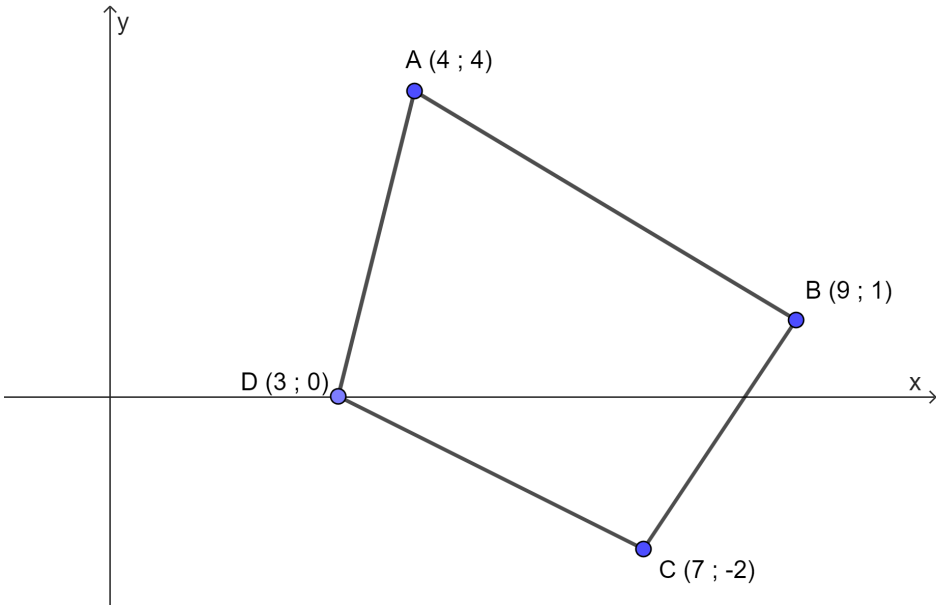
1.4.2 Draw a bar graph on ANSWER SHEET A (attached) using the given information. (5)

1.4.3 Use the frequency table to construct a pie chart as degrees on ANSWER SHEET A (attached). Show all calculations. (5)

[40]

QUESTION 2

2.1 The quadrilateral below has vertices A (4; 4), B (9; 1), C (7; -2) and D (3; 0).



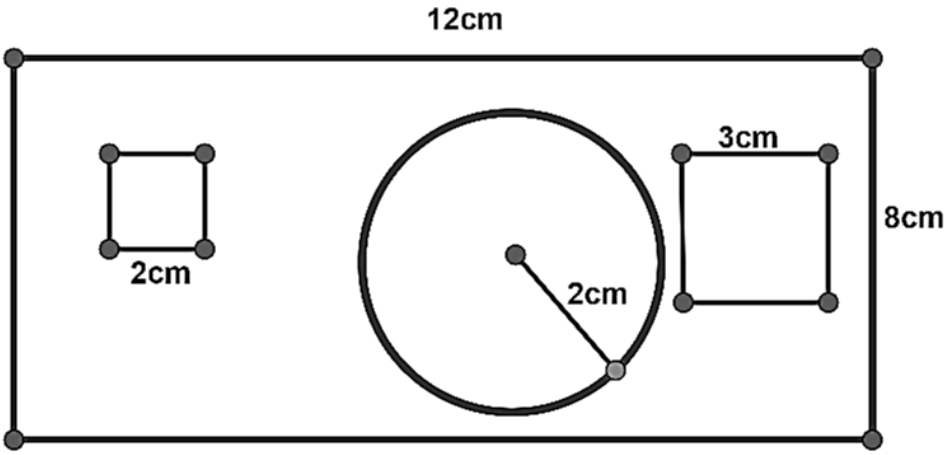
2.1.1 Calculate the distance of line segment AB. (3)

2.1.2 If M is the midpoint of BC, determine the coordinates of M. (2)

2.1.3 Calculate the gradient of line segment CD. (2)

2.1.4 Determine the equation of line BC. (4)

2.2 The following diagram shows a metal plate. From the plate a circle and two squares with the dimensions shown below were cut out.



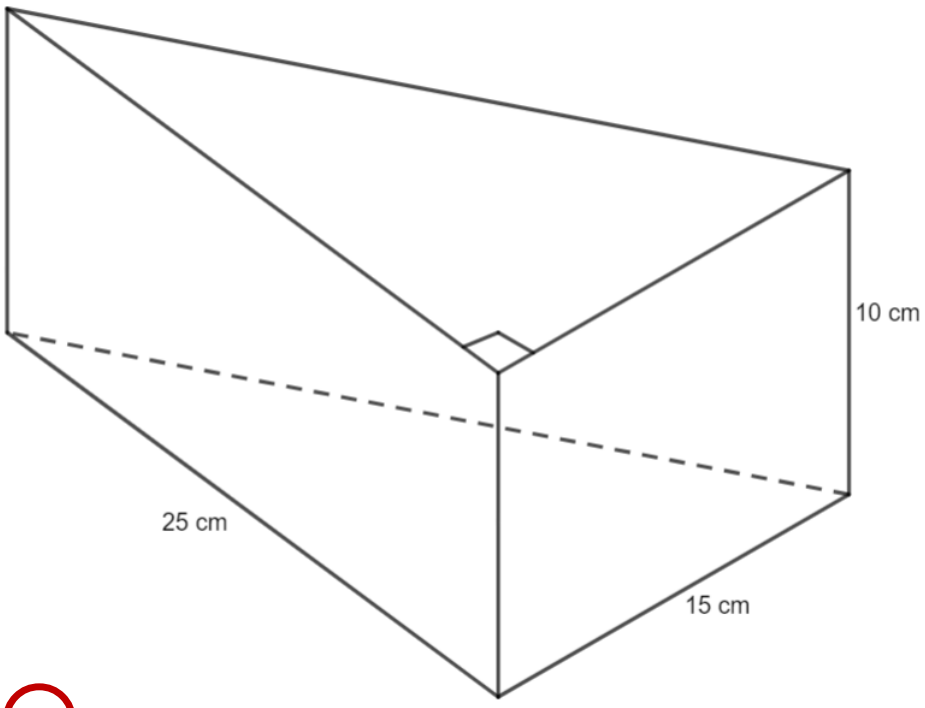
2.2.1 Calculate the area of the circular plate. (2)

2.2.2 Calculate the area of the two squares. (4)

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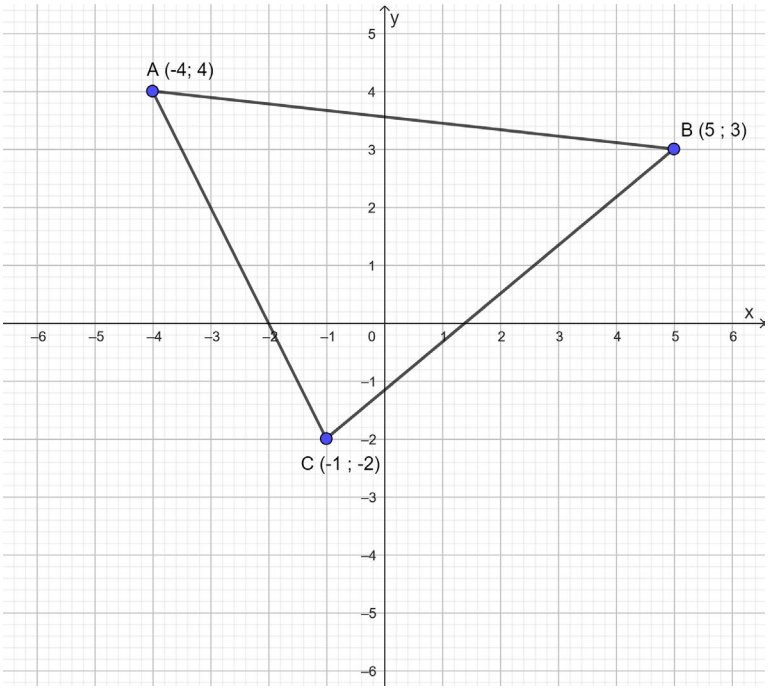
2.2.3 Calculate the area of the rectangular metal plate after cutting the squares and circle out. (3)

2.3 Calculate the volume of the triangular prism shown below.



(4)

2.4 Given below is a triangle with vertices A (-4 ; 4) , B(5 ; 3) and C (-1 ;-2).



2.4.1 Determine the co-ordinates of point C if the point moves 3 units to the left and 2 units down.

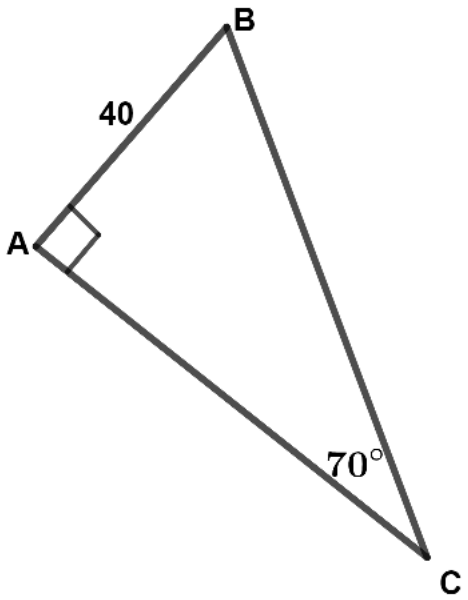
2.4.2 Determine the co-ordinates of point B if the point is reflected about the x-axis.

2.4.3 Determine the co-ordinates of point A if the point is reflected about the line $y = x$. (3 × 2) (6)

[30]

QUESTION 3

3.1 Given below is triangle ABC with AB = 40 units, $B\hat{A}C = 90°$ and $A\hat{C}B = 70°$.



Calculate:

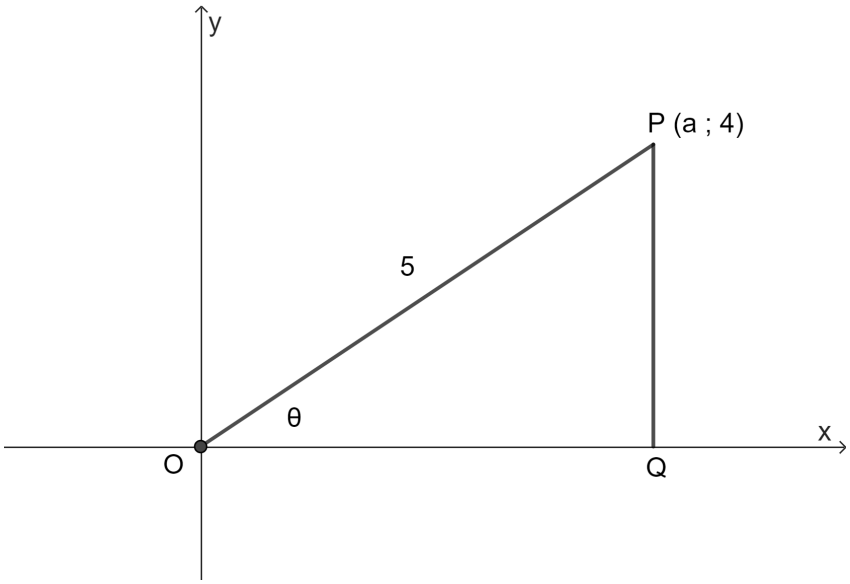
3.1.1 BC

3.1.2 $1 - \sin^2 70°$

3.1.3 $\tan 70°$

(3 × 3) (9)

3.2 In the diagram below, O is the origin, OP is 5 units and the coordinates of point P is (a ; 4).



3.2.1 Calculate the value of a. (3)

3.2.2 Calculate the coordinate of Q. (2)

3.3 3.3.1 Draw the graph of $f(x) = 2\sin(x) - 1$ and $g(x) = -3\cos(x)$ on the same system of axes where $0^0 \leq x \leq 360^0$ on ANSWER SHEET B (attached). (6)

3.3.2 Determine the domain of $g(x) = -3\cos x$. (2)

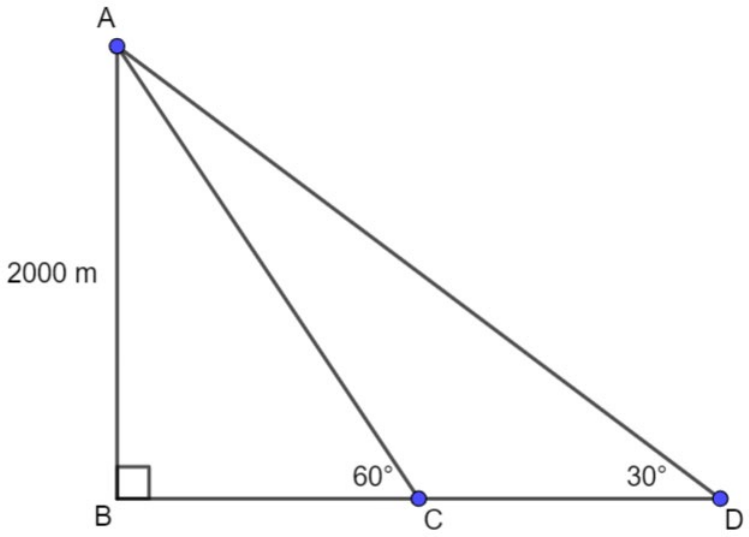
3.3.3 Determine the range of $g(x) = -3\cos x$. (2)

3.3.4 Determine the amplitude $f(x) = 2\sin x - 1$. (1)

3.3.5 Determine the period of $f(x) = 2\sin x - 1$. (1)

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3.4 An aeroplane at an altitude of 2 000 m (point A) finds that two boats at points C and D sailing in the same direction. The angles of elevation from the boats to the aeroplane are 60° and 30° respectively.



Calculate the distance between the two boats (CD). (4)

[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. $A_{cylinder} = \pi r^2 h$

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)

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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 = $\frac{1}{2}(upperquartile - lowerquartile) = \frac{Q_3 - Q_1}{2}$

22. $P_{jposition=\frac{j}{100}}(n+1)$

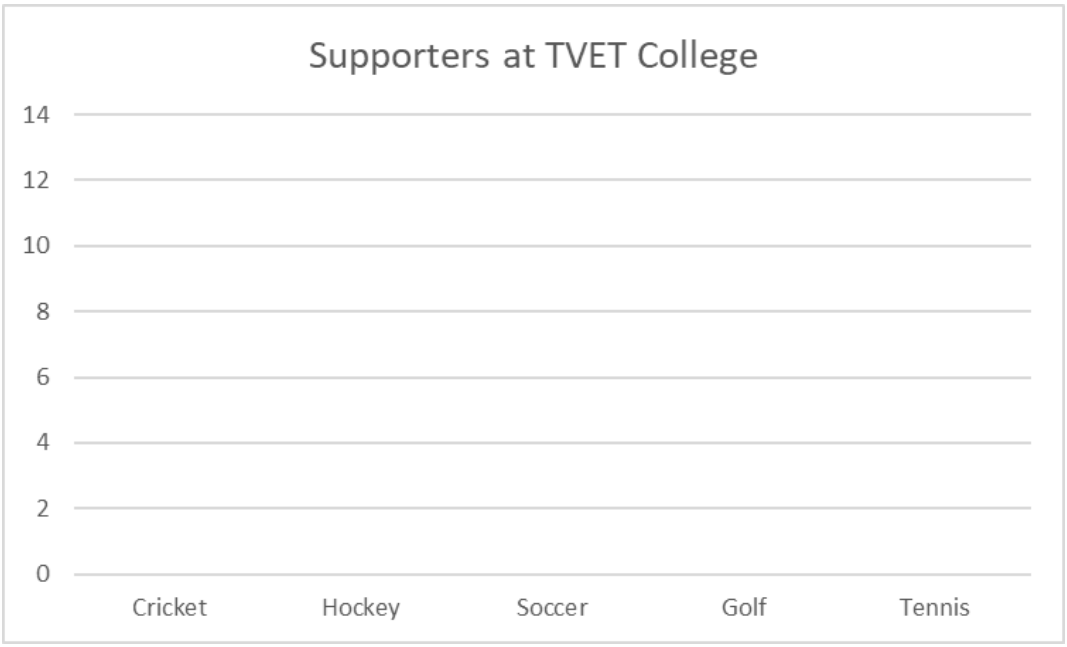
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ANSWER SHEET A

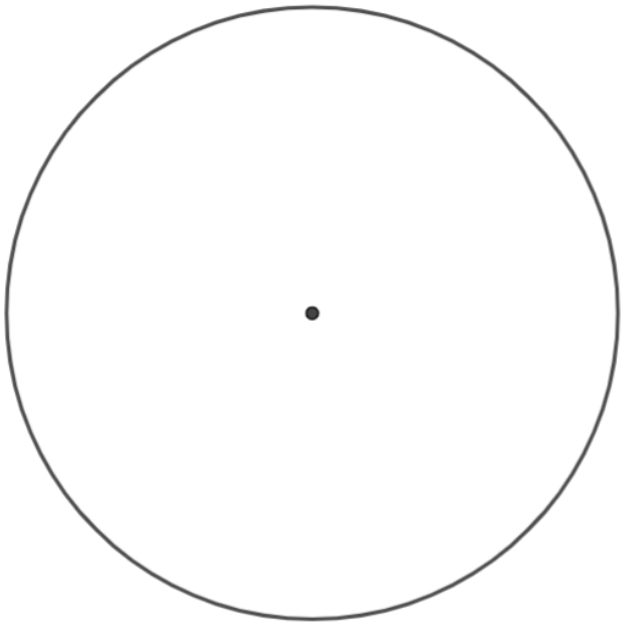
1.4 1.4.1

SPORTS	TALLY	FREQUENCY
	TOTAL:	

1.4.2



1.4.3

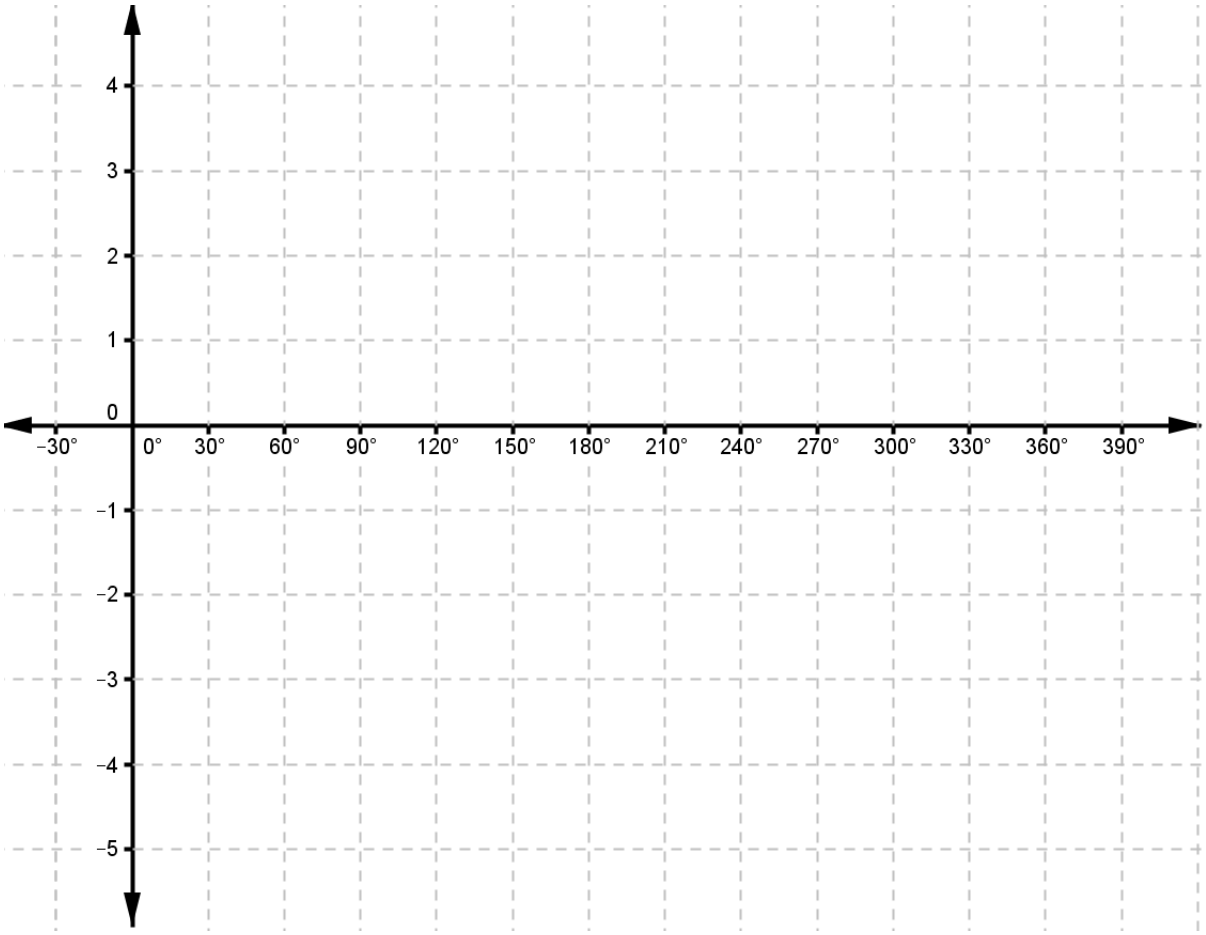


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ANSWER SHEET B

3.4 3.4.1

x	**0°**	**30°**	**60°**	**90°**	**12**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	**360°**
$f(x) = 2\sin x - 1$													
$g(x) = -3\cos x$													



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