Easy Going

Mathematics (Higher)

YEAR 11

BOOK 2

New specification

YEAR 11

(9 - 1)

Practice book

9 - 1

M.NAT

Acknowledgements

First and foremost I would like to thank god who has given me the guidance and knowledge to make this series of book. My heartfelt thanks goes to my family for their tremendous support and encouragement throughout the making of this book.

I express my gratitude towards Sharugi who has provided her valuable time to proof read and design this book . Last but not least I express my gratitude towards my students for their inspiration and progressive feedback which has only led me to improve this book.

M.Nat

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Designed by LEC direct.

GCSE (9 – 1)

Mathematics

Higher

YEAR 11

BOOK 2

M. Nat

LEC Publications

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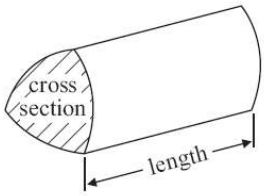
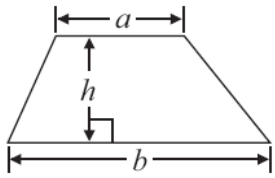
GCSE Mathematics Formulae: Higher Tier

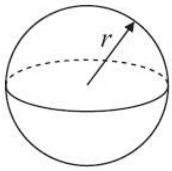
Volume of prism = area of cross section × length



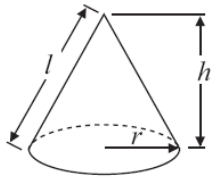
Area of trapezium = $\frac{1}{2}(a+b)$



Volume of sphere $\frac{4}{3}\pi r^3$



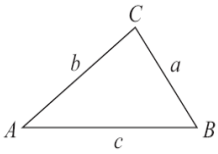
Volume of cone $\frac{1}{3}\pi r^2 h$



Surface area of sphere = $4\pi r^2$

Curved surface area of cone = πrl

In any triangle ABC



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Sine Rule

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$

The Quadratic Equation

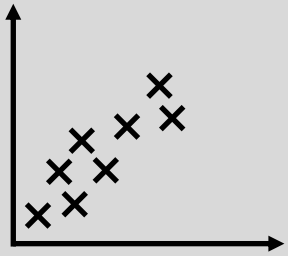
The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

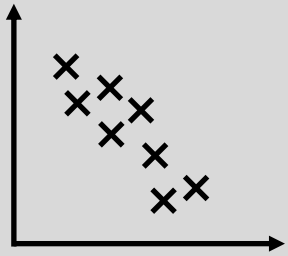
$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Scatter graphs & Line of best fit

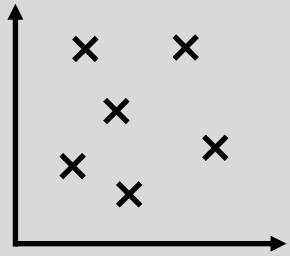
Finding the relationship between two variables.



Positive correlation



Negative correlation



No correlation

Interpolation

Using a line of best fit to predict data values within a range of the data given is called interpolation.

Extrapolation

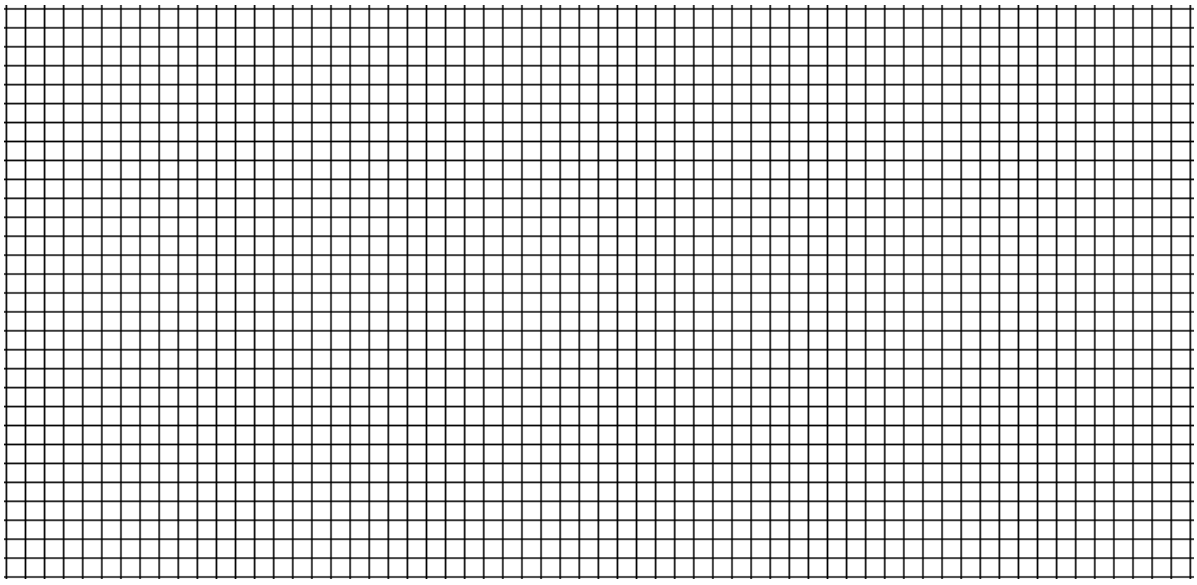
Using a line of best fit to predict data values outside the range of data given is called extrapolation.

Exercise 1A **Scatter Graphs**

Q1 A set of pupils sat an end of term Maths examinations. The marks obtained by the pupils in their end of term examination and their final examination are given below:

Pupil	P	Q	R	S	T	U	V	W	X	Y
End of term	20	25	35	40	50	55	37	32	28	25
Final	40	50	70	80	100	100	74	64	56	50

i) Plot the marks for the End of term and Final examinations on a scatter graph. (Hint: Use different colours for each examinations)



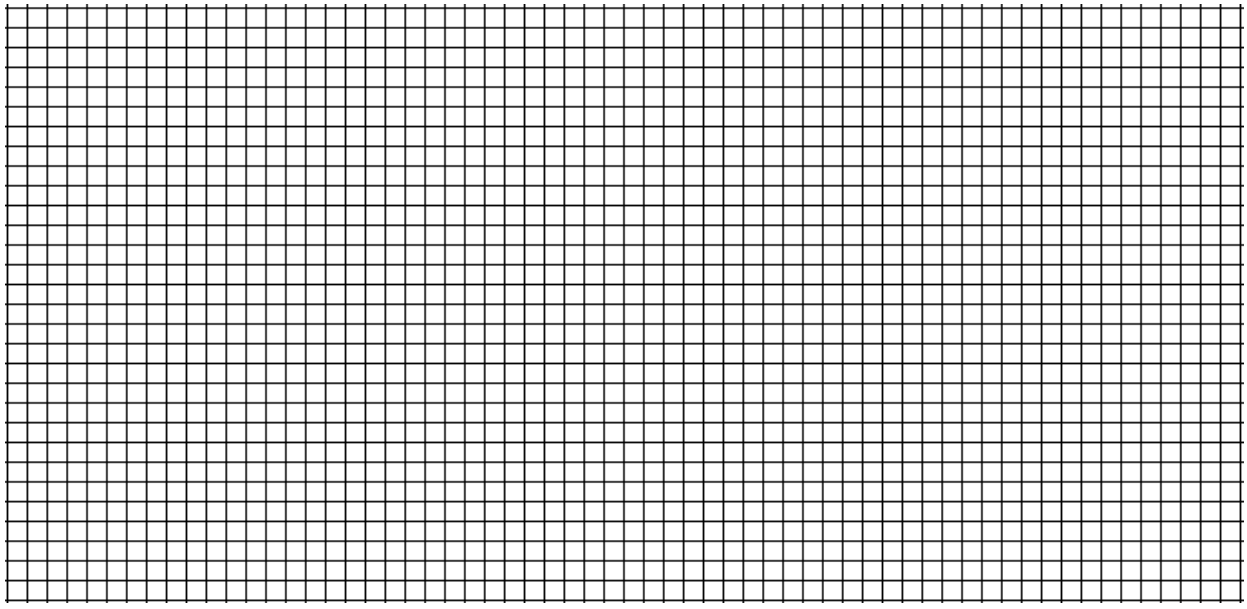
ii) Is there any relationship in between the End of term marks and Final marks?

_____

Q2 A group of men at a fitness club are weighed and also have their height measured.

i) Draw a scatter graph of height against weight.

Name	A	B	C	D	E	F	G	H	I	J
Weight (kg)	76	80	83	84	89	91	96	98	102	114
Height (cm)	170	167	175	182	180	177	182	183	181	187



ii) Draw a line of best fit for the points.

iii) Use your line of best fit to estimate the height of a man with a weight of 72kg.

_____

iv) Use your line of best fit to estimate the weight of a man with height of 172cm.

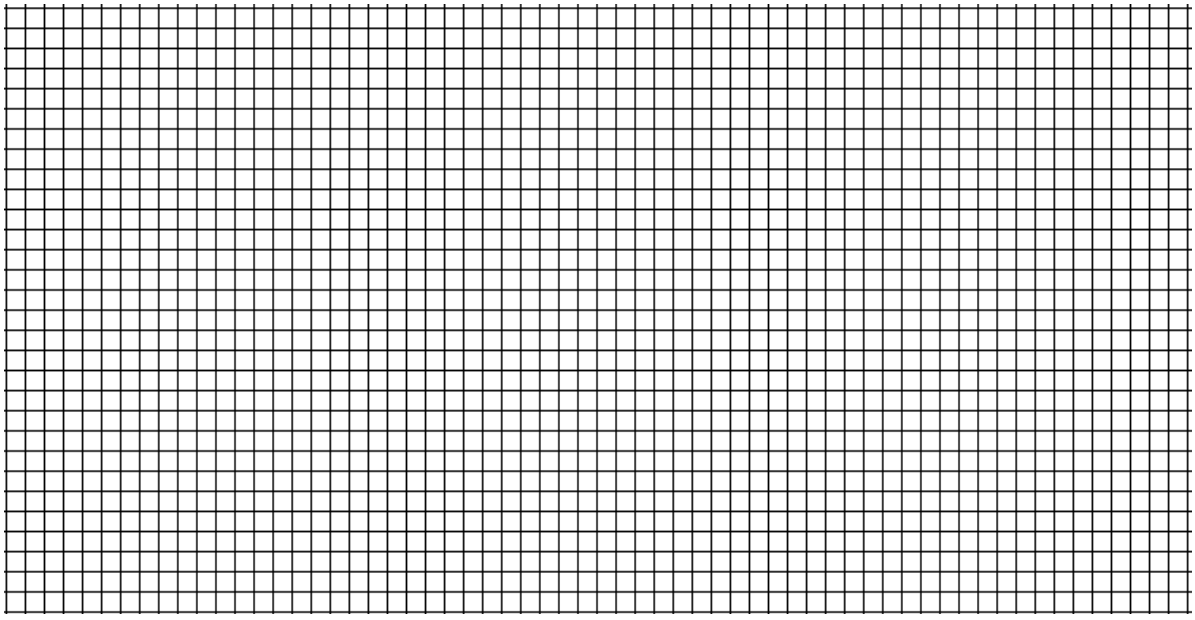
_____

v) State the type of correlation between the height and weight.

_____

Q3 The shop keeper of an ice-cream shop, notes the approximate number of cups of ice-cream sold against the average temperature of that day.

Date	14th April	21st April	28th April	3rd May	10th May	17th May
Average temp. (°C)	6	14	12	0	7	10
Cups	52	22	27	72	47	37



i) Plot the points on the scatter diagram

ii) Draw the line of best fit.

iii) Use the line of best fit to estimate

a) the temperature when the sales reach zero _____

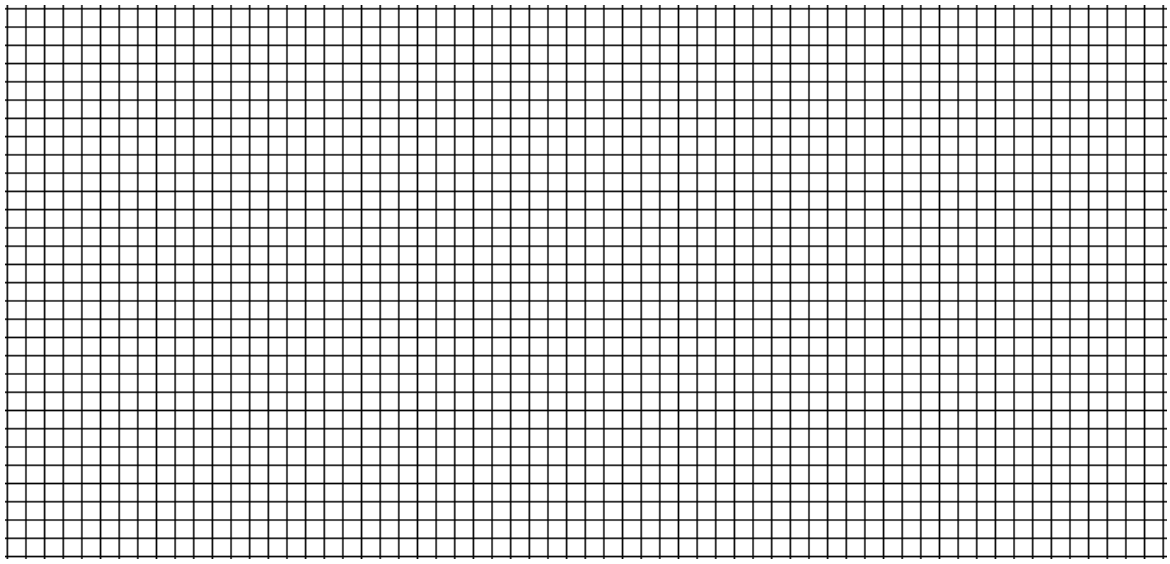
b) the sale at –7°C _____

iv) State the type of correlation _____

Q4 An Aptitude test was given to nine girls of different ages with the following results.

Girl Name	P	Q	R	S	T	U	V	W	X
Age	13.5	15	15.5	17	18	19	19	18	17
Correct Answer	20	25	27	26	35	34	42	38	36

i) Plot a scatter diagram



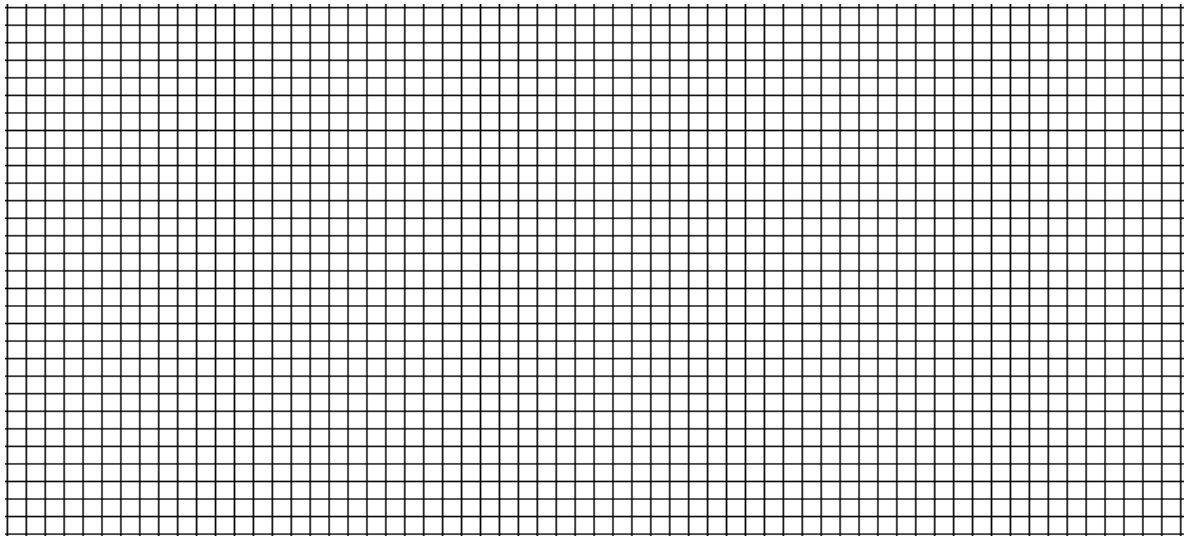
ii) Is there any relationship between the age and the number of correct answers.

_____

Q5

Students	A	B	C	D	E	F
Height, x (cm)	63	47	53	50	55	58
Weights, y (kg)	39	32	34.5	34	36	38

The height and weight of six students in a class have been recorded in the table above.



i) Draw a scatter diagram of the heights and the weights of the students.

ii) Deduce the correlation between height and weight

_____

iii) Draw the line of best fit.

Exercise 1B

Averages and ranges

Q1 The frequency table shows the test results for a class of 40 students.

Marks	2	3	5	8	9	13
Frequency	3	7	8	8	9	5

i) What was the modal marks? _____

ii) Calculate the mean? _____

iii) Calculate the median? _____

iv) Calculate the range? _____

Q2 State whether it is better to use the mean, median or mode for these data sets. Give reasons for your answers.

i) The marks for five students: 7, 26, 31, 27, 31.

_____

_____

_____

ii) Wall colour: red, red, grey, black, black, black, blue.

_____

_____

_____

Q3 The table shows the marks, M, scored by 100 students in a class.

M	Frequency
$0 \leq M < 20$	16
$20 \leq M < 40$	57
$40 \leq M < 60$	27

i) Estimate the mean

_____

ii) Explain why the mean is only an estimate.

_____

_____

_____

Q4 A one pound shop owner needs to sell 32 pots. Their weights in kg are:

42, 42, 43, 44, 54, 55, 45, 46, 47, 47, 58, 57, 56, 78, 65, 76,
48, 44, 56, 50, 53, 81, 49, 45, 56, 56, 50, 41, 56, 45, 45, 78.

On the telephone to a potential buyer, the shop keeper describes the pots and says the average weight is 'over 57kg'.

i) Find the mean and median of the data

Mean : _____

Median: _____

ii) Which average has the shop keeper used to describe his pots?

_____

Q5 Read the information carefully and answer them.

i) The mean of 4, 8, 9, 10 and x is 7. Find x. _____

ii) The mean of 4, 4, 7, 9, 11, x and x is 7. Find x. _____

Q6 Find the five numbers so that the mean, median, mode and range are all 4.

_____, _____, _____, _____, _____.

Q7 Six numbers, 3.2, 4.5, x, 6.0, 7.6 and 8.5, have been used to calculate the median as 5.5.

i) Find x. _____

ii) Find the mean. _____

Q8 Twenty people decided to buy some tickets. Some of the people bought more than one ticket.

No. of tickets	Number of people
1	7
2	6
3	5
4	2

Calculate:

i) Mean _____

ii) Mode _____

iii) Median _____

iv) Range _____

Sampling

Key Definitions:

- **Population:** It is the set of items that you need.
- **A census:** It is a survey of the whole population.
- **A sample:** It is a selected number of items from the population.
- **Random sample:** Each item has the same chance of being chosen.
- **Stratified sample** (representative sample)**:** The number of people taken from each group is proportional to the group size.
- **Biased sample:** A sample where the population would not have an equal chance of being chosen.

Capture-recapture method:

N: the estimated size of a population
n: sample size (capture)
M: another sample size (recapture)
m: the number marked

$$\frac{n}{N} = \frac{m}{M}$$

Exercise 1C

Sampling

Q1 Decide whether a sample has to be used to obtain information about each of the following case. Give reasons for your decision.

i) The weights of white crows

_____

_____

_____

ii) The size of prawns on a beach

_____

_____

_____

iii) The life of light bulbs sold under a supermarket brand name

_____

_____

_____

iv) The time spent on the physics coursework by all the pupils entering GCSE this year.

_____

_____

_____

Q2 There are 700 students enrolled at University of London for a three year course in Mathematics. Describe how you would select 10% of these students to make a random sample.

_____

_____

_____

Q3 There are 200 pupils on the register at Hayes primary school. The table shows the number of pupils in each year.

Year	1	2	3	4	5	6
Number	30	33	39	38	36	24

How many students need to be selected from each year to give

i) a 10% representative sample _____

ii) a representative sample of 30 pupils _____

Q4 The order of 3700kg meat is delivered to a restaurant. The categories and amount of meat is given in the table.

Category	Lamb	Chicken	Pork	Beef
Amount (kg)	1200	2000	300	200

i) How much of each type of meat should be selected to give a representative sample that is 5% of the order?

Lamb: _____

Chicken: _____

Pork: _____

Beef: _____

Q5 The table shows the number of students enrolled in a University.

Department	Maths	Engineering	Pharmacy	Technology	Medicine
No. of students	600	300	750	50	700

i) How many students should be chosen from each department to give a 10% representative sample?

Maths _____

Engineering _____

Pharmacy _____

Technology _____

Medicine _____

Exercise 1D

Cumulative frequency - 1

Q1 The table shows information about the number of people, who passed a church at a particular age. The sample amount of people is 80.

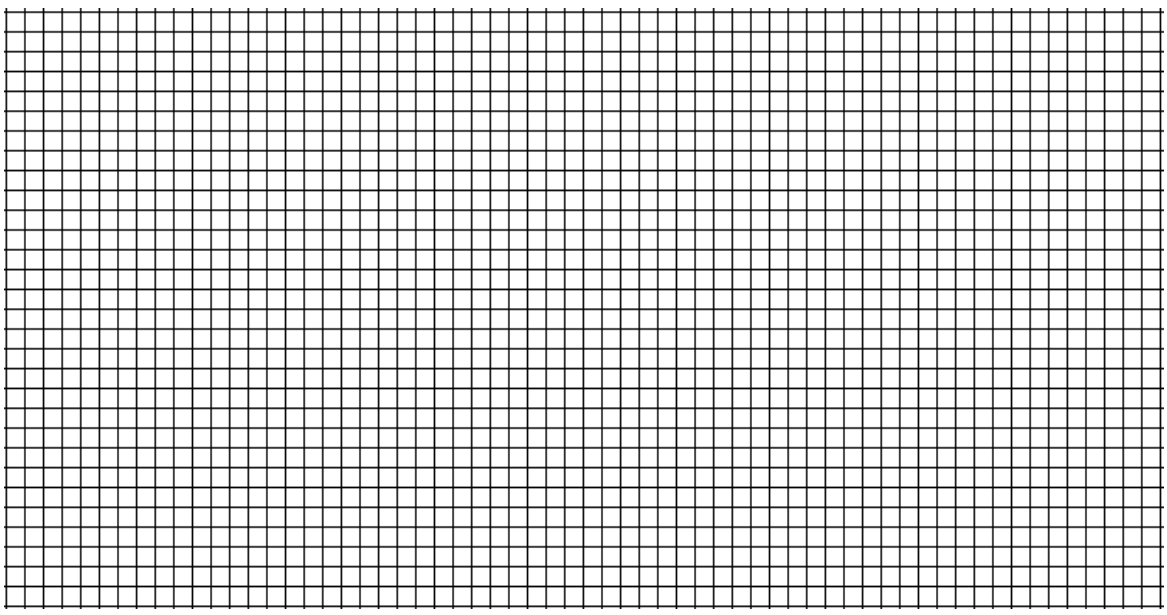
People (Age)	Frequency	Cumulative frequency
$0 < P \leq 10$	10	
$10 < P \leq 20$	15	
$20 < P \leq 30$	5	
$30 < P \leq 40$	25	
$40 < P \leq 50$	20	
$50 < P \leq 60$	5	

i) Work out an estimate for the mean number of people who used that road. *Give your answer correct to two decimal places.*

_____

ii) Complete the cumulative frequency column.

iii) Using the above data, create a cumulative frequency graph.

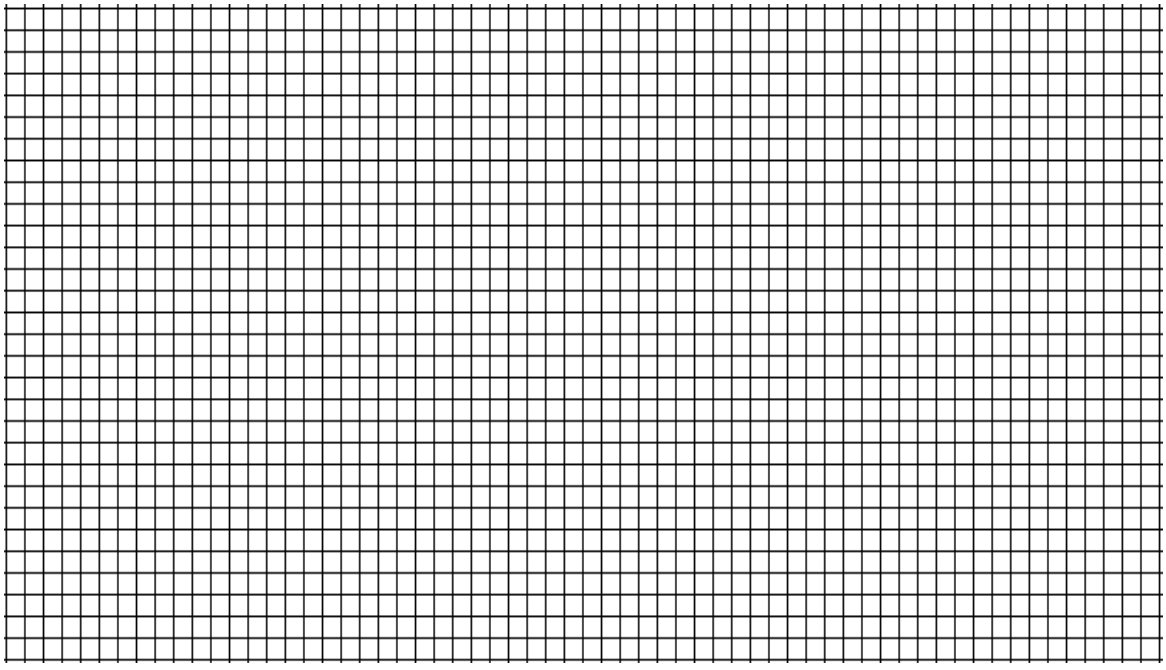


Q2 The table shows information about the heights of 50 students in a school.

Height(h cm)	Frequency	Cumulative frequency
$40 < h \leq 50$	10	
$50 < h \leq 60$	5	
$60 < h \leq 70$	7	
$70 < h \leq 80$	8	
$80 < h \leq 90$	8	
$90 < h \leq 100$	12	

i) Complete the cumulative frequency column.

ii) Using the above data, create a cumulative frequency graph.



Exercise 1E

Cumulative frequency - 2

Q1 For the scores 10, 14, 15, 16, 18, 19, 19, 21, 24, 25. What is the:

i) Lower quartile _____

ii) Upper quartile _____

iii) Interquartile range _____

Q2 For the scores 156, 163, 164, 168, 170, 171, 172, 174, 176, 178, 180. Find the:

i) Median _____

ii) Lower quartile _____

iii) Upper quartile _____

iv) Interquartile range _____

Q3 Consider the following scores and answer the questions:

6, 14, 8, 10, 2, 15, 10, 5, 10, 5, 17, 10, 8, 3, 13

i) Find the median _____

ii) Find the lower quartile _____

iii) Find the upper quartile _____

iv) Find the interquartile range _____

Q4 Consider the scores: 33, 36, 25, 39, 31, 32, 41, 30, 39, 35, 24, 32. Answer the questions.

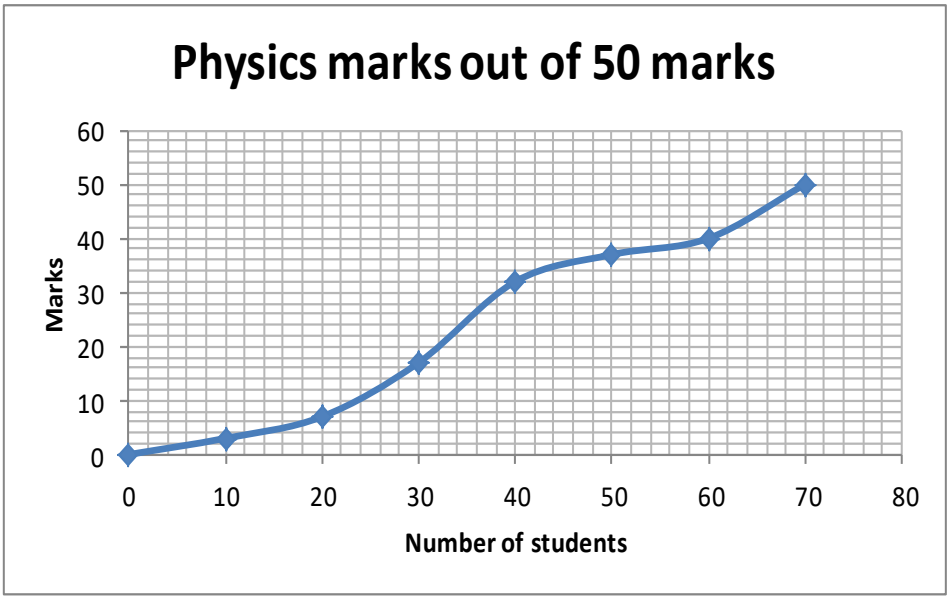
i) Find the median _____

ii) Find the lower quartile _____

iii) Find the upper quartile _____

iv) Find the interquartile range _____

Q5 The graph shows the cumulative frequency curve for the physics marks of 50 students in an examination.



From the graph estimate:

i) the median mark

_____

ii) the mark at the lower quartile and upper quartile

_____ _____

iii) the interquartile range

_____

iv) the pass mark if 1/5 of the students passed.

_____

Q6 Using the data: 3, 11, 14, 15, 16, 17, 17, 17, 18, 18, 19, 20, 20, 21, answer the following answer

a) What is the range? _____

b) What is the interquartile range? _____

c) Which is the better measure of the spread of the scores? Justify your answers.

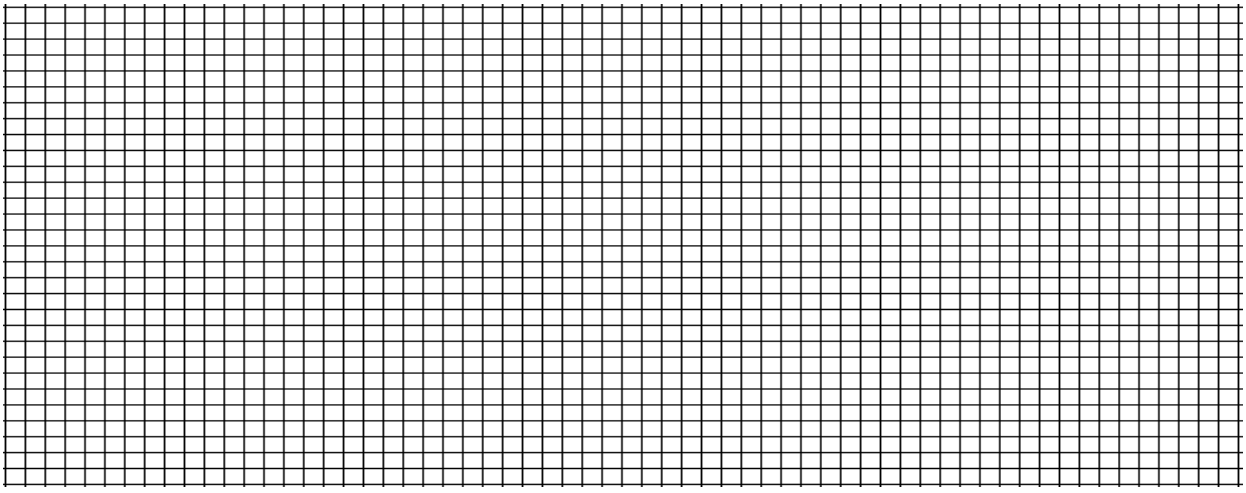
_____

Q7 The marks of students in maths examination out of 50 is as follows:

Marks (M)	Frequency	Cumulative Frequency
$10 < M \leq 15$	3	
$15 < M \leq 20$	2	
$20 < M \leq 25$	8	
$25 < M \leq 30$	12	
$30 < M \leq 35$	8	
$35 < M \leq 40$	16	
$40 < M \leq 45$	14	
$45 < M \leq 50$	7	

i) Complete the above table

ii) Draw the cumulative frequency curve



iii) Calculate the median _____

iv) Calculate the lower quartile _____

v) Calculate the upper quartile _____

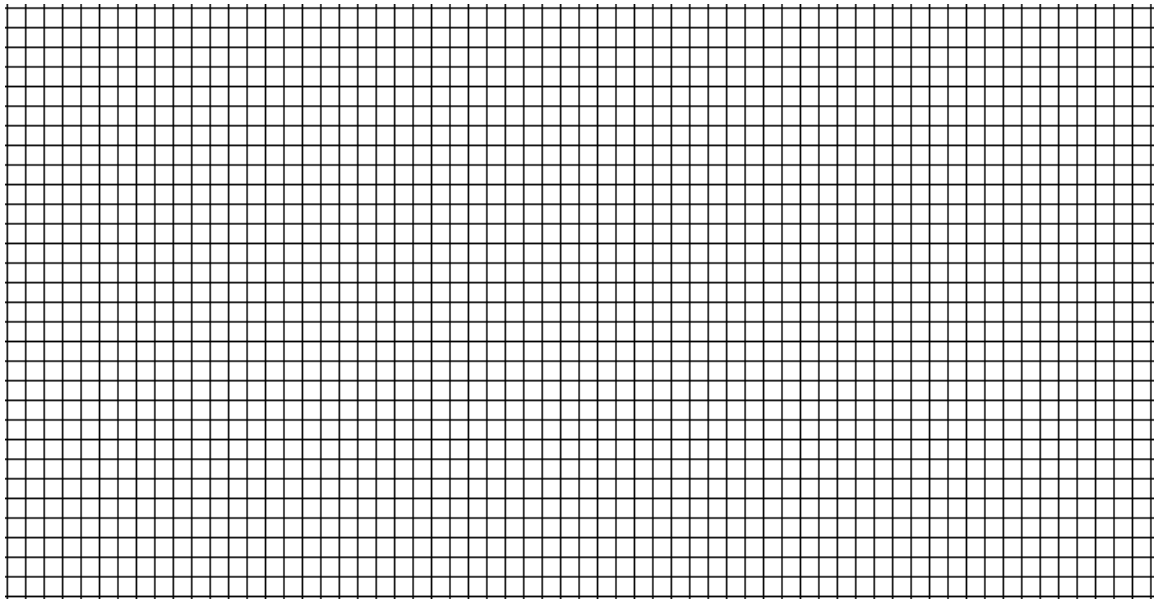
vi) Calculate the interquartile range _____

Q8 The weight for each of the potatoes bags are given below.

Weight (kg)	Frequency	Cumulative frequency
$95 < M \leq 96$	2	
$96 < M \leq 97$	3	
$97 < M \leq 98$	5	
$98 < M \leq 99$	1	
$99 < M \leq 100$	4	
$100 < M \leq 101$	3	
$101 < M \leq 102$	21	
$102 < M \leq 103$	20	
$103 < M \leq 104$	14	
$104 < M \leq 105$	4	

i) Complete the table.

ii) Draw the cumulative frequency curve.



iii) Calculate the median _____

iv) Calculate the lower quartile _____

v) Calculate the upper quartile _____

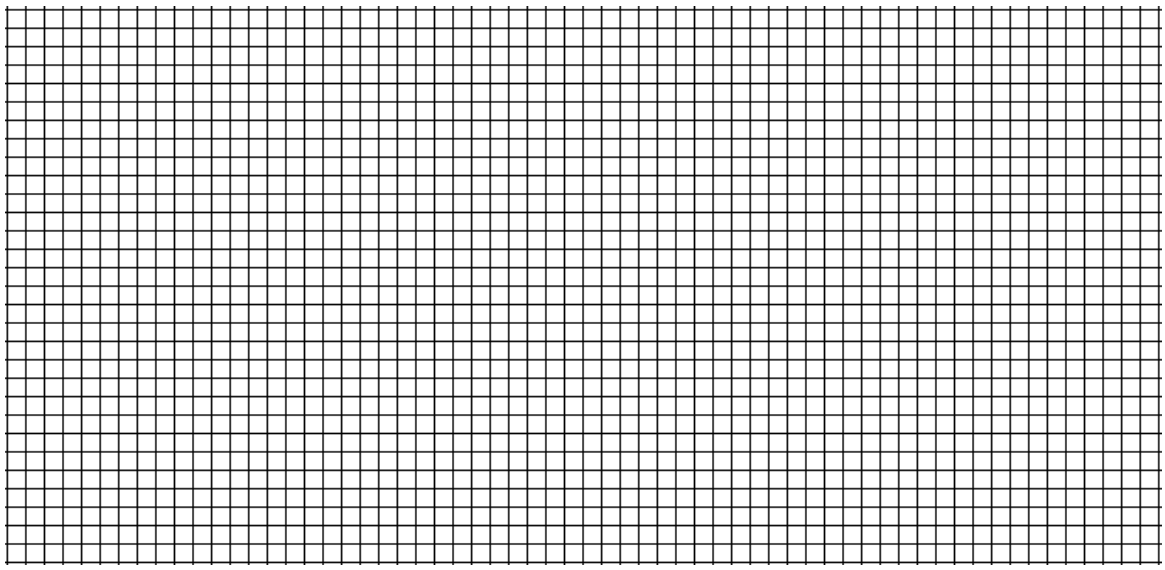
vi) Calculate the interquartile range _____

Q9 The marks of a group of students who sit examinations in physics and chemistry are displayed in the table.

Marks (M)	Physics	CF for Physics	Chemistry	CF for Chemistry
$0 < M \leq 15$	4		3	
$15 < M \leq 30$	3		4	
$30 < M \leq 45$	5		4	
$45 < M \leq 60$	2		5	
$60 < M \leq 75$	12		11	
$75 < M \leq 90$	4		3	

i) Complete the above table.

ii) Draw the cumulative frequency curve. *(Hint: Use different colours for the subjects)*



iii) Calculate the median for:

Chemistry: _____ Physics: _____

iv) Calculate the lower quartile for:

Chemistry: _____ Physics: _____

v) Calculate the upper quartile for:

Chemistry: _____ Physics: _____

vi) Calculate the interquartile range for:

Chemistry: _____ Physics: _____

vii) Compare the medians and interquartile range for both the subjects.

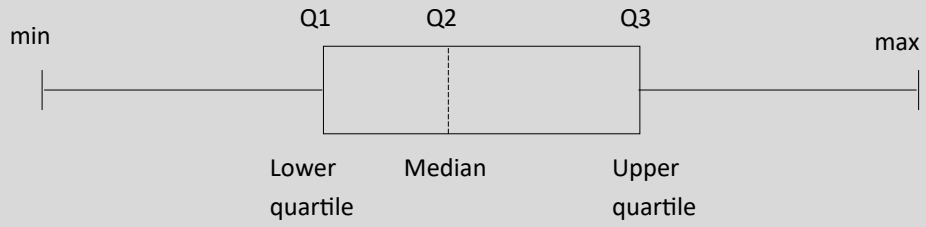
_____

_____

_____

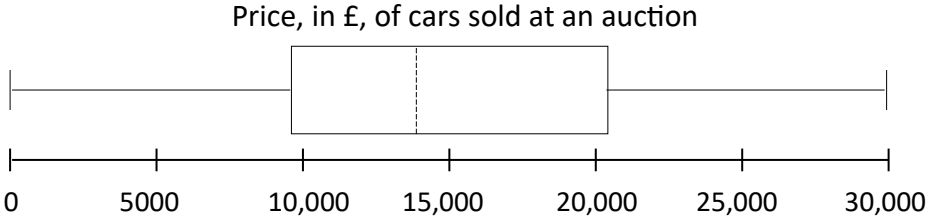
Box Plots

A box and whisker plot is constructed by drawing a number line showing the values of the variable then drawing a rectangle between a upper quartile and lower quartile to represent the middle 50% of the distribution.



Exercise 1F **Box Plots**

Q1 Using the box plot diagram, answer the following questions.



i) What was the median price? _____

ii) What was the highest price? _____

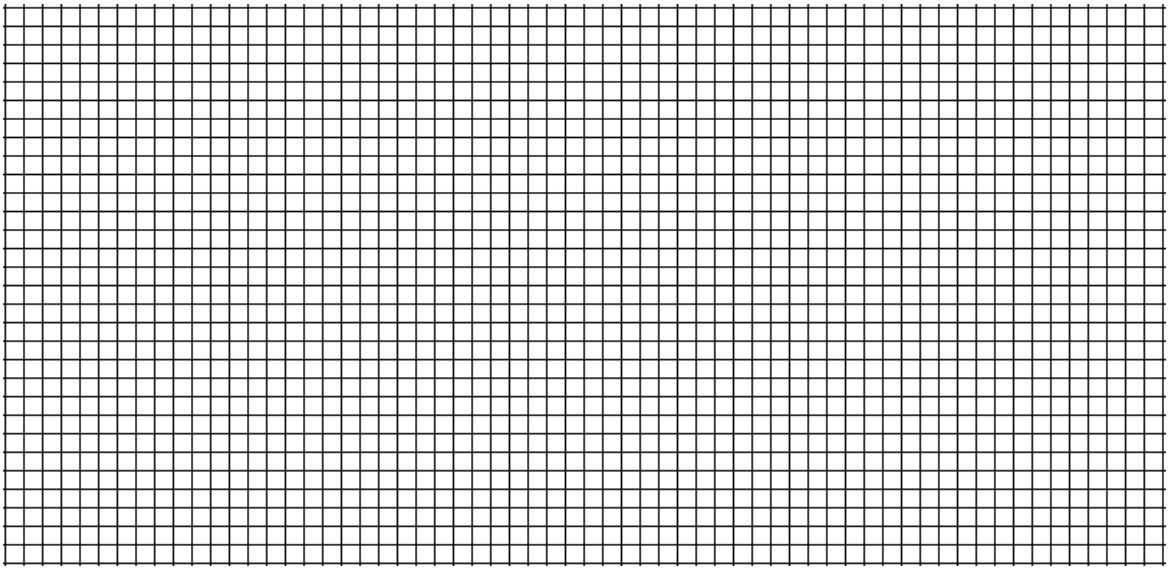
iii) 500 cars were sold at this auction. How many cars were sold for the lower quartile price?

_____

Q2 The table below shows the information scored in a Maths test paper by two groups.

	Minimum	Lower quartile	Median	Upper quartile	Maximum
Group P	48	55	63	68	72
Group Q	36	47	68	80	93

i) Draw a comparative box plots for the groups.



ii) Compare the two groups.

_____

_____

_____

_____

Q3 Peter measured the weights of students from two classes in a school. One was year 7 and the other was year 8.

Year 7	Year 8
Range: 30lb—65lb	Range: 35lb—63lb
Lower quartile: 38lb	Lower quartile: 48lb
Upper quartile: 58lb	Upper quartile: 59lb
Median: 48lb	Median: 54lb

i) Using the information provided, draw the box plots for each of the group.

ii) Give two comparisons between the weight of the two classes.

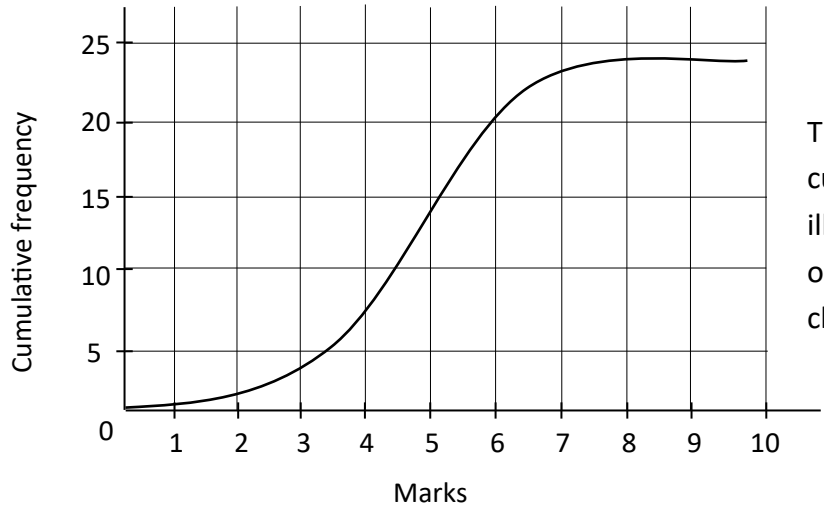
_____

_____

_____

_____

Q4



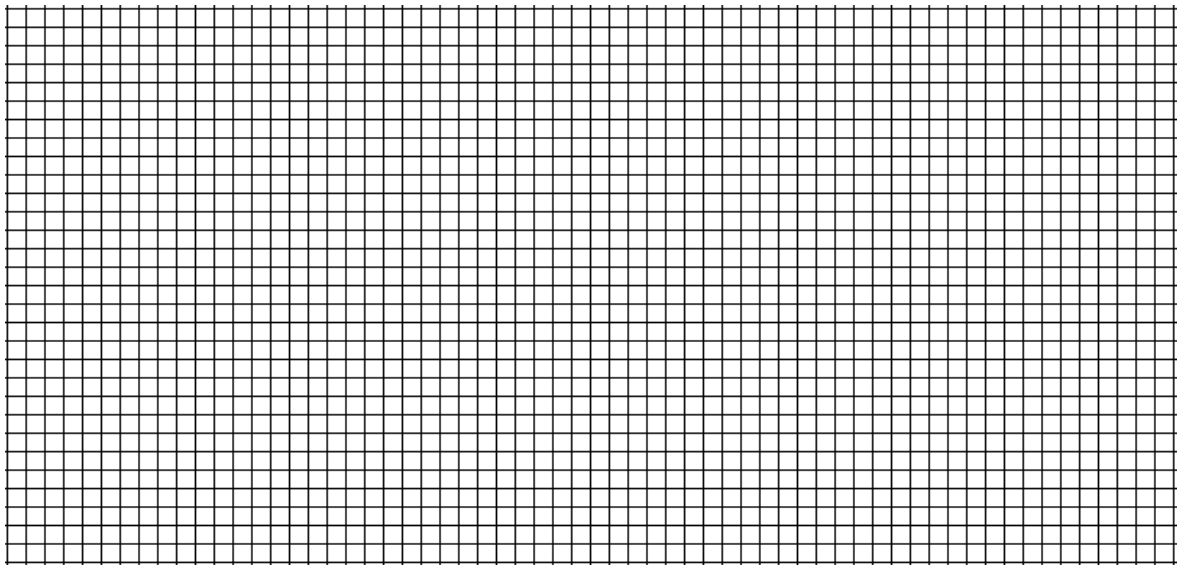
The cumulative frequency curve on the left illustrates the distribution of the marks of a chemistry class in year 7.

i) Use the curve to estimate the median marks and the interquartile range of the marks.

Median: _____

Interquartile Range: _____

ii) Draw a box plot to illustrate this distribution.

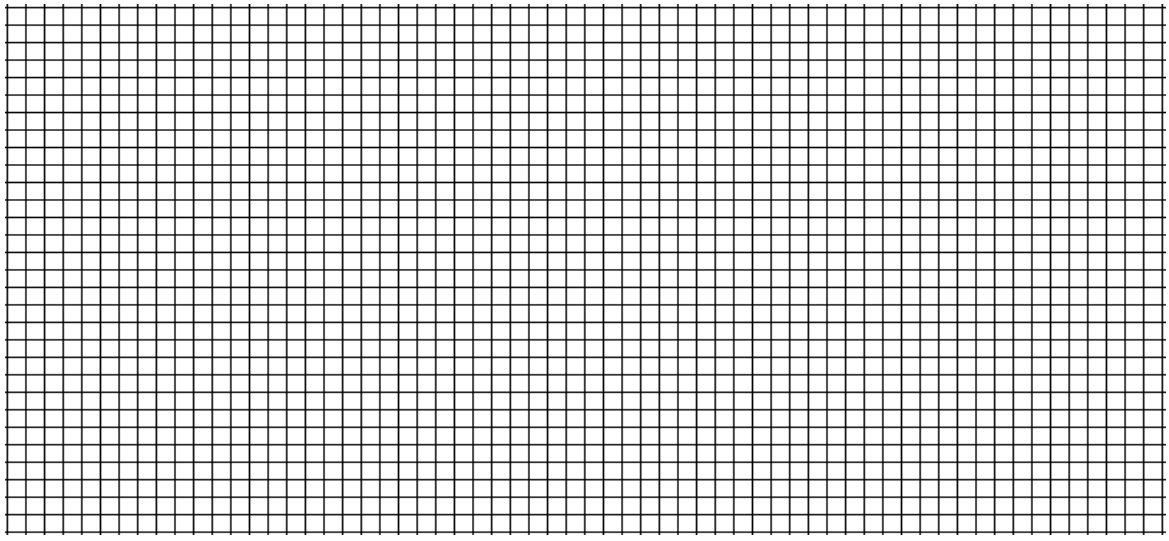


Q5 Students marks are grouped in different ranges for analysing purposes. The results are recorded in the table below.

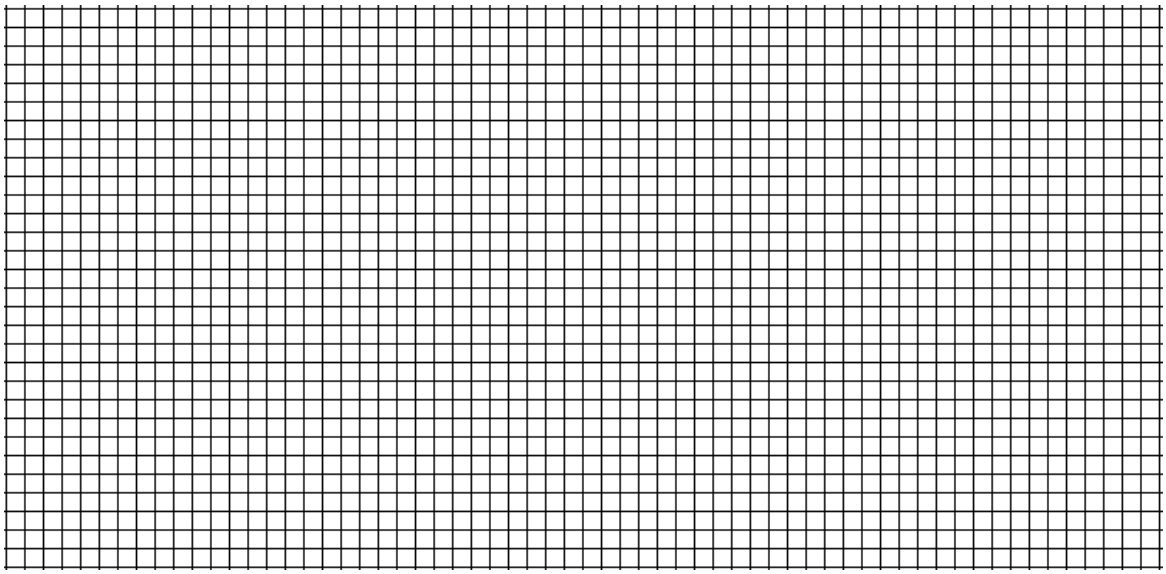
Marks (M)	Frequency	Cumulative frequency
$0 \leq M < 10$	2	
$10 \leq M < 15$	3	
$15 \leq M < 20$	2	
$20 \leq M < 25$	4	
$25 \leq M < 30$	8	
$30 \leq M < 35$	5	
$35 \leq M < 40$	3	
$40 \leq M < 45$	2	
$45 \leq M < 50$	1	

i) Complete the table.

ii) Construct a cumulative frequency curve.



iii) Construct a box plot to illustrate this information.



iv) Would you use the range or the interquartile range to describe the spread of the marks. Justify your answer.

_____

_____

_____

_____

Histogram

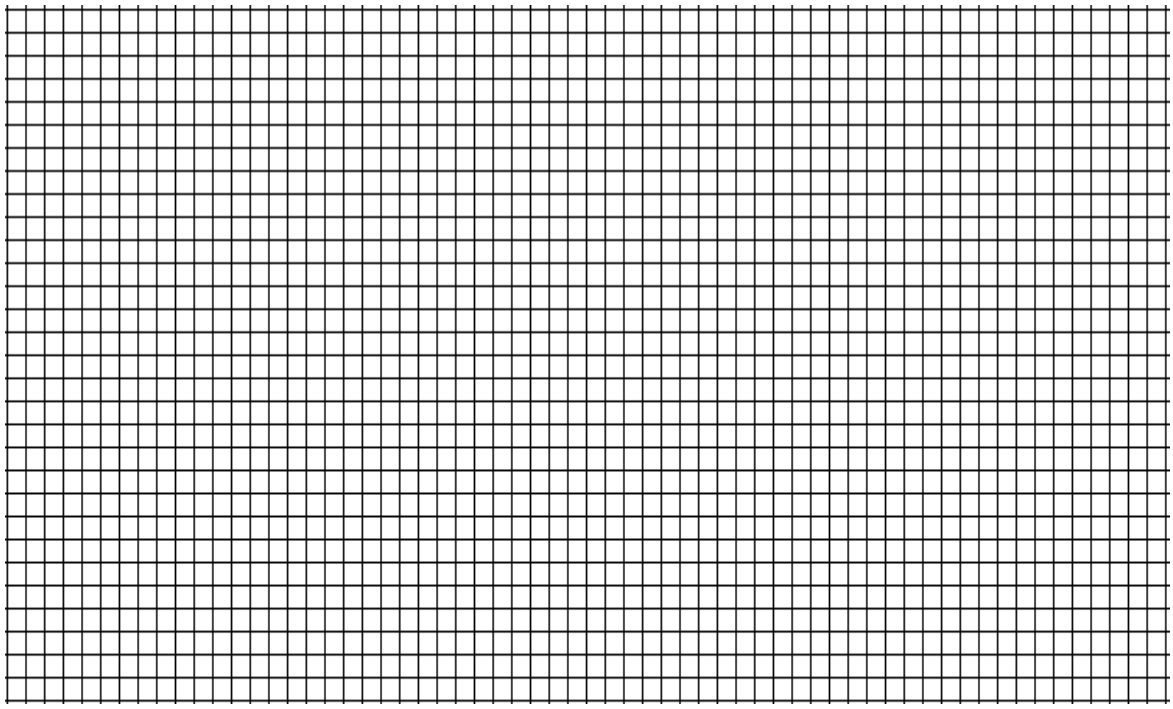
Frequency Density = $\frac{\text{frequency}}{\text{class width}}$

Q1 Forty students in a class are weighed and the information is shown below.

Weight, w (kg)	Frequency	Frequency density
$35 < w \leq 40$	10	
$40 < w \leq 45$	8	
$45 < w \leq 50$	5	
$50 < w \leq 55$	12	
$55 < w \leq 60$	5	

i) Complete the table above

ii) Using the information provided in the table, draw a histogram.



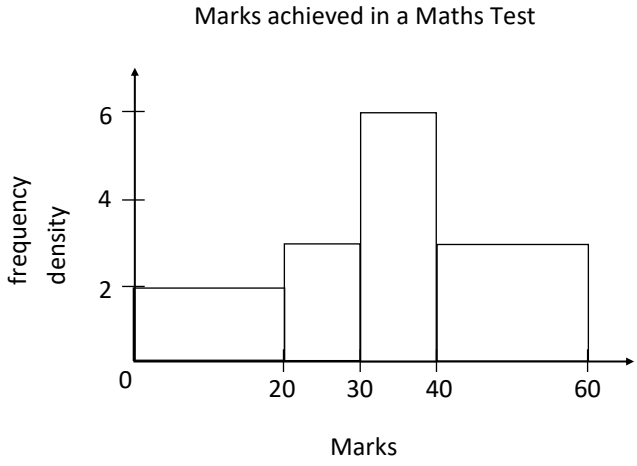
Q2 The table shows the marks of Mathematics test in a class of 30 students.

Marks, m	Frequency	Frequency density
$0 < w \leq 30$	10	
$30 < w \leq 50$	2	
$50 < w \leq 80$	8	
$80 < w \leq 100$	10	

i) Complete the table above

ii) Using the information provided in the table, draw a histogram.

Q3 Using the graph below, answer the following questions.



i) Find the frequency of the following intervals

a) 20– 40 _____

b) 40– 60 _____

ii) What is the total number of students who took the test?

_____

Q4 A teacher takes a sample of 100 students' height in a school. The table below represents the data collected by the teacher.

Height, h	Frequency	Frequency density
$80 < h \leq 100$	30	
$100 < h \leq 120$	25	
$120 < h \leq 130$	20	
$130 < h \leq 160$	15	
$160 < h \leq 170$	10	

i) Complete the table

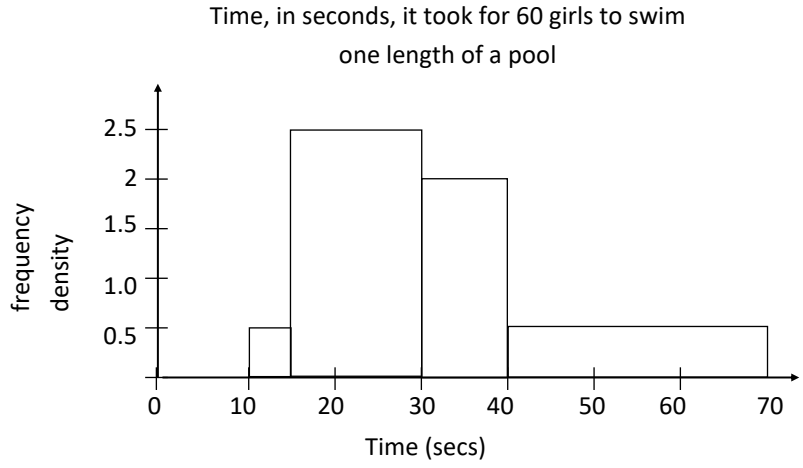
ii) The teacher draws a 4cm height bar to represent the students in the interval of $80 < h \leq 100$. What will be the height of the following intervals:

a) $100 < h \leq 120$ _____

b) $130 < h \leq 160$ _____

c) $160 < h \leq 170$ _____

Q5 The histogram shows the time, in seconds, it took for 60 girls to swim one length of a pool.



i) How many girls took 30 seconds or longer to swim one length?

_____

Exercise 2A | **Reflection, translation & rotation**

Q1 A triangle ABC has the coordinates of A (-4 , 10), B (0 , 10), C (0 , 8).

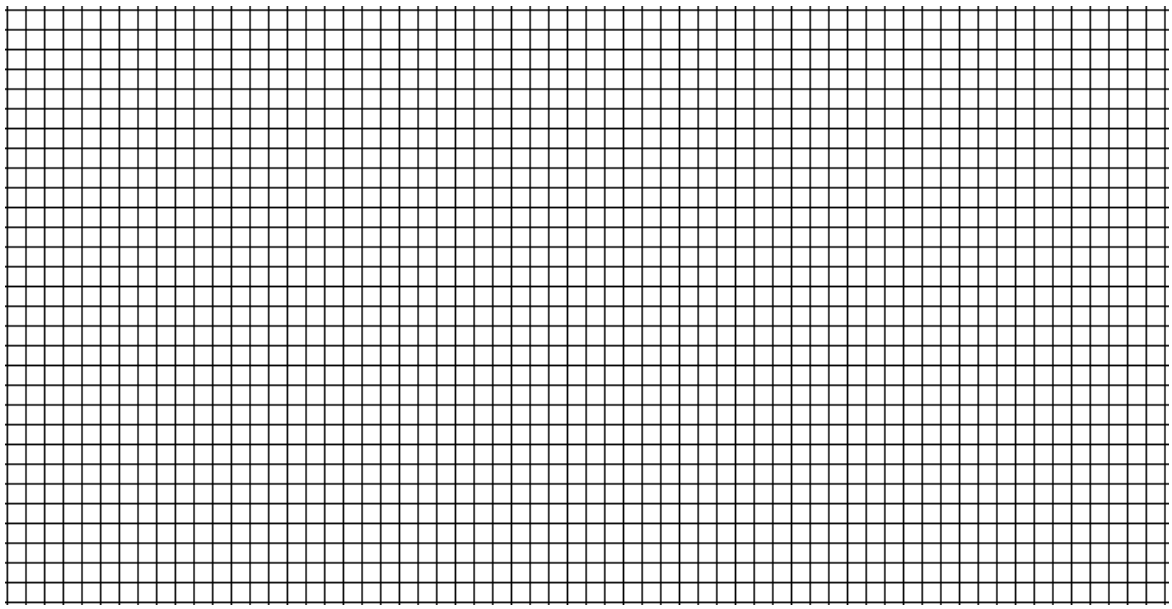
Draw the triangle ABC and the new triangles after it has been reflected in:

i) The line x = 1, label the transformed triangle DEF

ii) The line y = x, label the transformed triangle GHI

iii) The line y = -x , label the transformed triangle KLM

Hint: Draw the lines ($x = 1$, $y = x$, $y = -x$) first and then do the reflection.



iv) Write the translated coordinates of point A for:

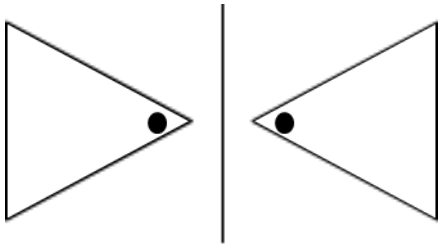
a) Triangle DEF (_____ , _____)

b) Triangle GHI (_____ , _____)

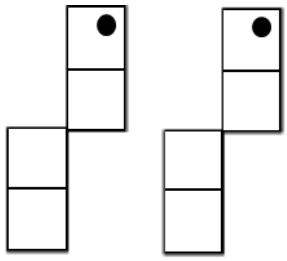
c) Triangle KLM (_____ , _____)

Q2 Write translation, rotation or reflection to determine the transformation of the left shape to the right shape.

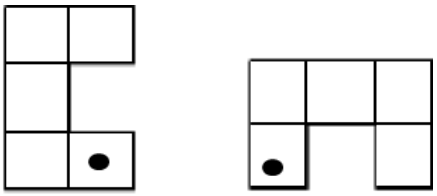
i)



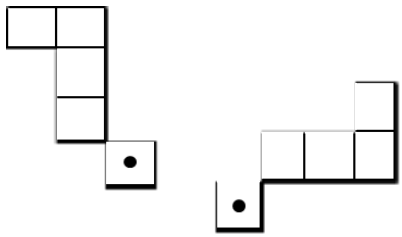
ii)



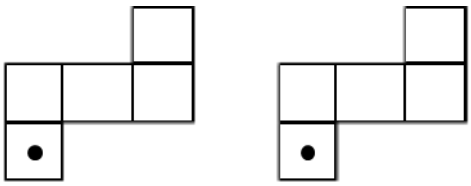
iii)



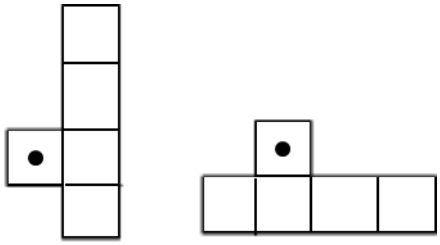
iv)



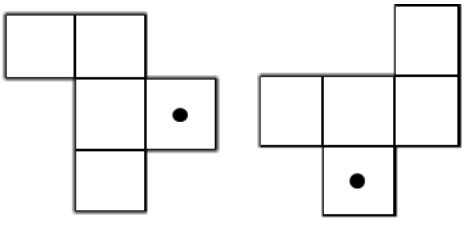
v)



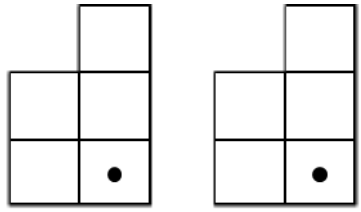
vi)



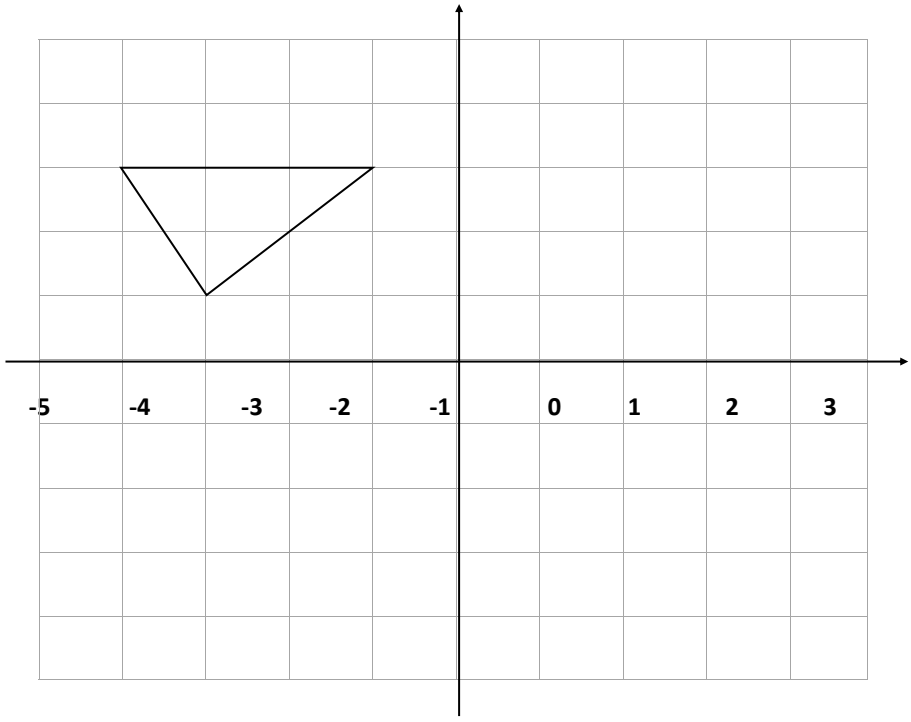
vii)



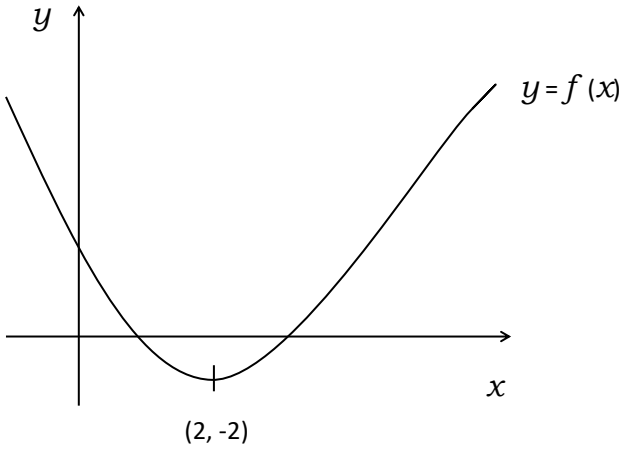
viii)



Q3 Translate the triangle by 3 units right and 2 units down.



Q4 The graph below is part of a curve with the equation $y = f(x)$. The minimum point of the curve is at (2, -2).



i) Write down the co-ordinates of the minimum point with the equation:

a) $y = f(x-1)$ (_____ , _____)

b) $y = 3f(x)$ (_____ , _____)

c) $y = f(3x)$ (_____ , _____)

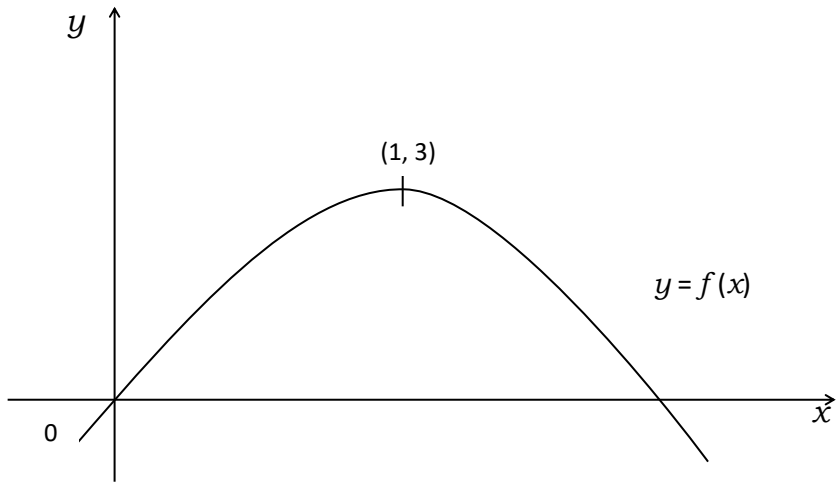
ii) The curve $y = f(x)$ is reflected in the y axis. Find the equation of the curve following this transformation.

_____

iii) The curve with the equation $y = f(x)$ has been transformed to give the curve the equation $y = f(x) + 1$. Describe the transformation.

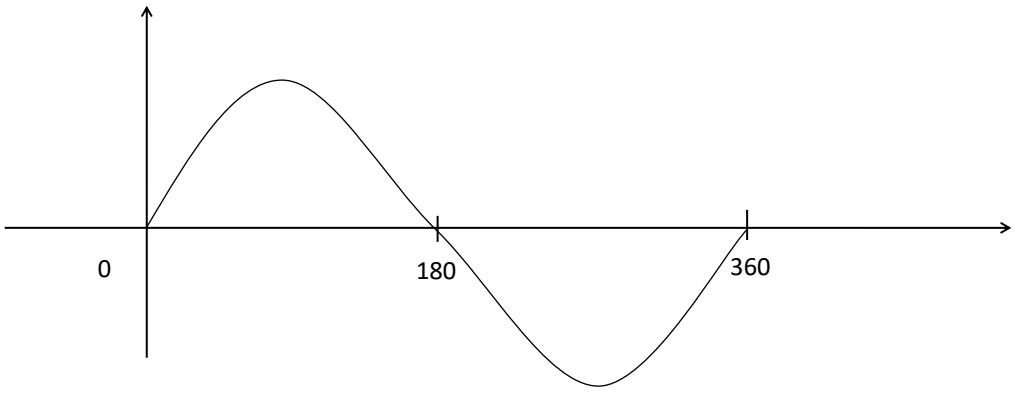
_____

Q5 The diagram shows part of the curve with equation $y = f(x)$. The co-ordinates of the maximum point of the curve is (1 , 3).



i) $y = f(x - 1)$ (_____ , _____) ii) $y = 2f(x)$ (_____ , _____)

Q6 The diagram shows a sketch of the curve $y = \sin(x)$ for $0° \leq x \leq 360°$.



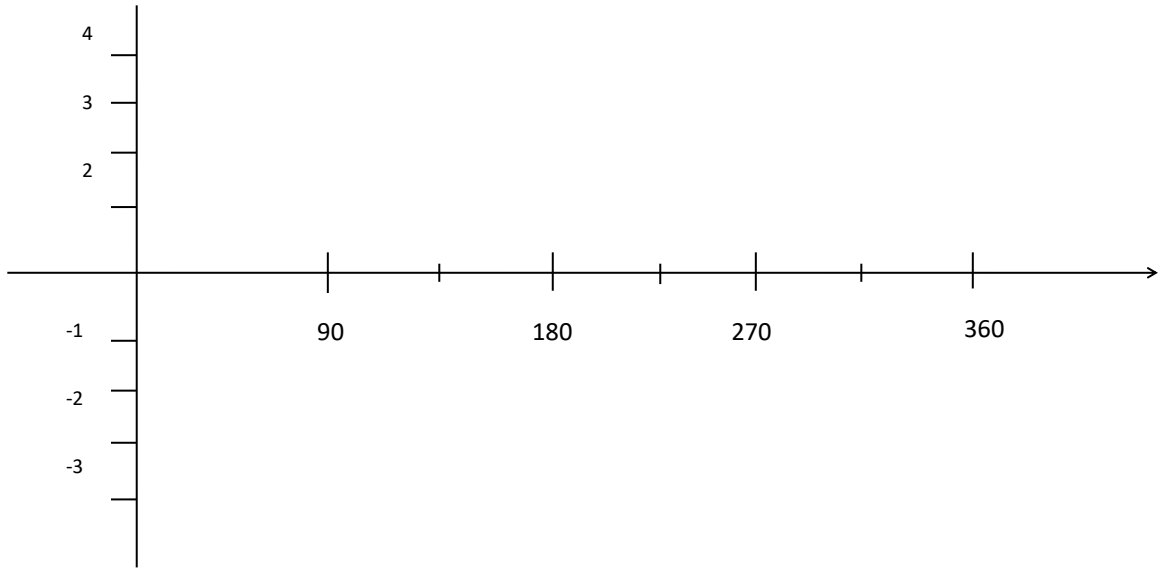
The exact value of sin 60˚= $\sqrt{\frac{3}{2}}$

i) Write down the exact value of:

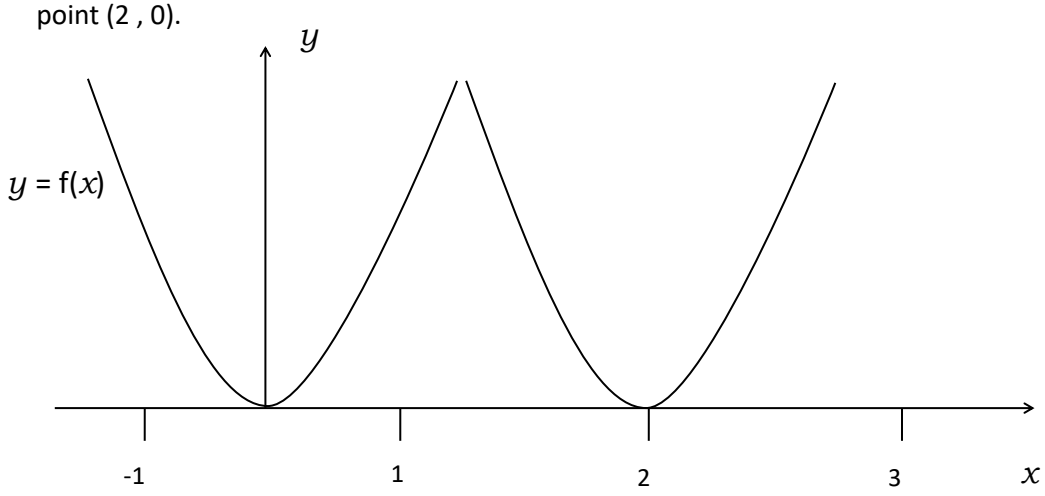
a) sin 120˚ _____

b) sin 300˚ _____

ii) On the grid below, sketch the graph of $y = 3\sin(2x)$ for $0° \le x \le 360°$.



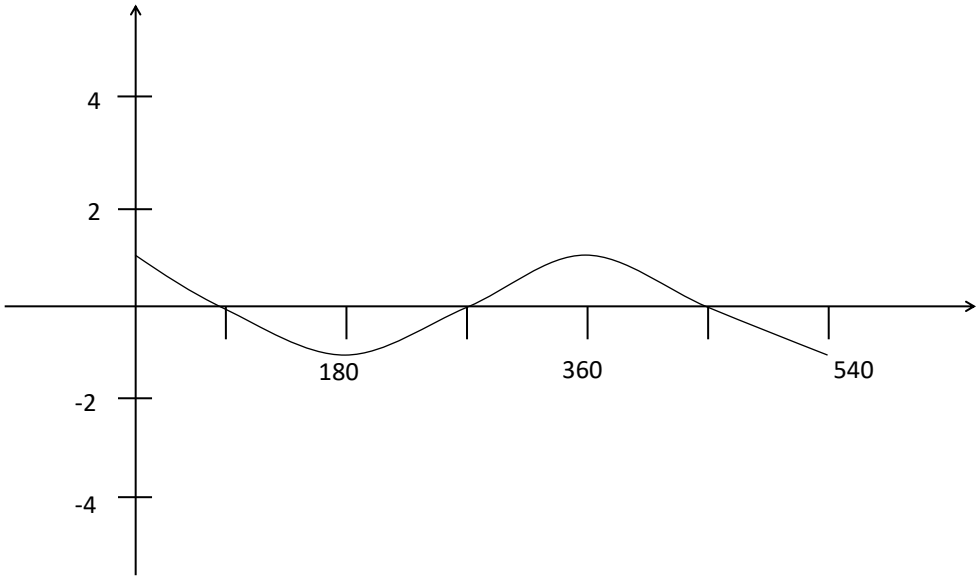
Q7 The curve with the equation $y = f(x)$ is translated so that the point at (0 , 0) is mapped onto the point (2 , 0).



i) Find the equation of the translated curve.

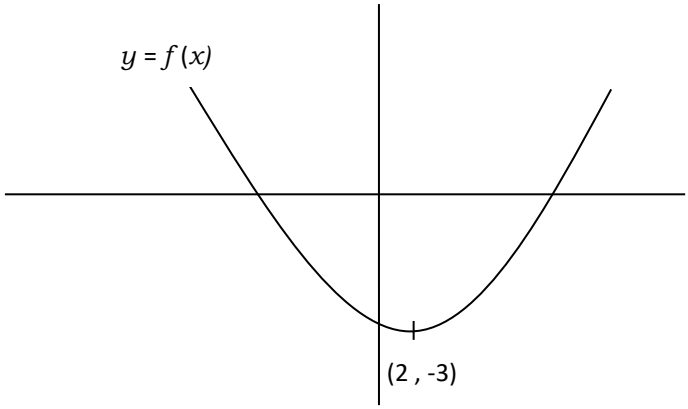
_____

Q8 The grid shows the graph of $y = \cos(x)$ for values of x from 0° to 540°.



i) On the grid, sketch the graph of $y = 2\cos(2x)$ for values of x from 0° to 540°.

Q9 This is a sketch of the curve with the equation $y = f(x)$. The only minimum point of the curve is at P(2 , -3).



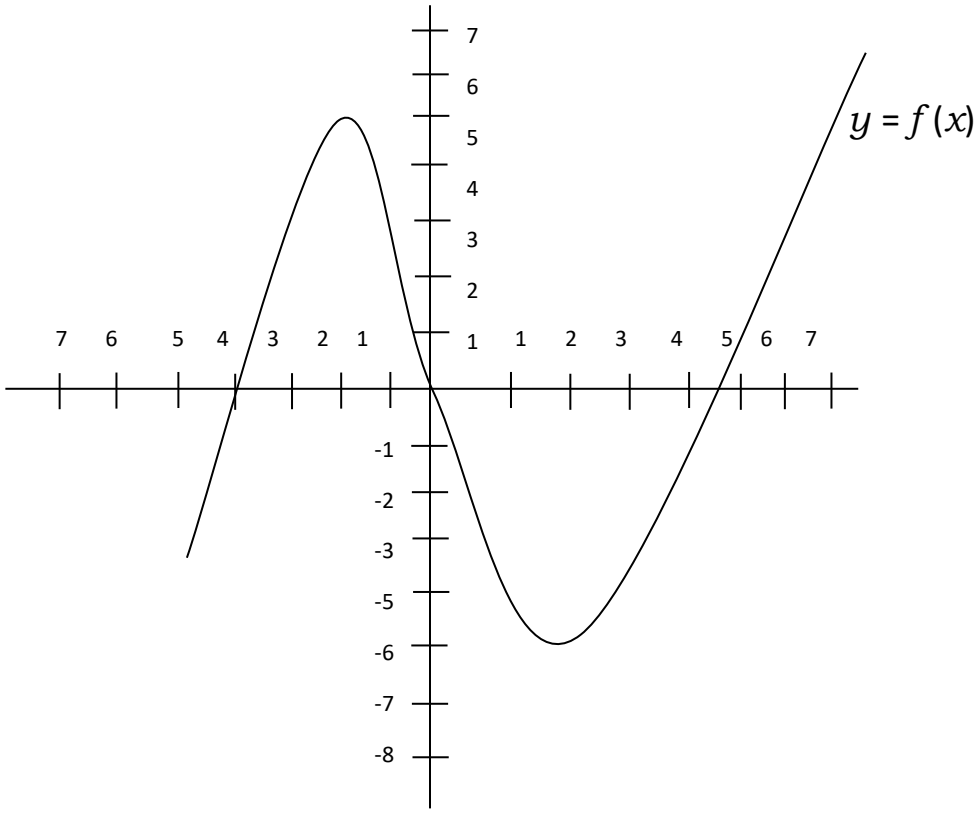
i) Write down the co-ordinates of the minimum point of the curve with the equation $y = f(x - 3)$.

(_____ , _____)

ii) Write down the co-ordinate of the minimum point of the curve with the equation $y = f(x + 3) + 2$.

(_____ , _____)

Q10 Draw the transformed graph using the graph $y = f(x)$. Use the colours indicated for each questions to see the difference between them clear.



i) $y = f(x) + 2$ (red)

ii) $y = f(x) - 2$ (green)

iii) $y = f(x + 2)$ (purple)

iv) $y = f(x - 2)$ (blue)

v) $y = f(2x)$ (orange)

vi) $y = f\left(\frac{x}{2}\right)$ (pink)

Exercise 3A

Solving Linear equations

Q1 Solve the following linear equations.

i) $x + 8 = 12$ _____

ii) $2x + 8 = 12$ _____

iii) $3x - 1 = 11$ _____

iv) $4x + 1 = 17$ _____

v) $5x - 3 = 12$ _____

vi) $5x + 7 = 2$ _____

vii) $9x - 1 = 17$ _____

viii) $8x - 2 = 22$ _____

ix) $11x - 1 = 10$ _____

x) $12x - 3 = 33$ _____

Q2 Solve the following linear equations.

i) $2x + 1 = x + 5$ _____

ii) $3x - 1 = 29$ _____

iii) $4x - 2 = 2x + 12$ _____

iv) $7x - 1 = 5x + 13$ _____

v) $10x - 3 = 7x + 21$ _____

vi) $11x - 4 = 2x + 14$ _____

vii) $33 = -11y$ _____

viii) $\frac{x}{5} = 3$ _____

ix) $\frac{a}{29} = 5$ _____

x) $-10 = y - 21$ _____

Q3 Solve the following linear equations.

i) $5\frac{1}{2}+x=7$ _____ ii) $x-1\frac{1}{2}=-\frac{5}{4}$ _____

iii) $y-\frac{1}{2}=1\frac{3}{4}$ _____ v) $5\frac{2}{7}+x=2\frac{27}{70}$ _____

v) $x + 7 = 15.2$ _____ vi) $2x + 3.9 = 0.7$ _____

vii) $2x + 0.1 = x + 0.9$ _____ viii) $18 = 3(2x - 2)$ _____

ix) $2(2x - 1) = 3(x - 5)$ _____ x) $2(x - 7) = 3(x - 5)$ _____

Solve the following linear equations.

Q4

i) $2x - 5 = 3(x - 1)$ _____ ii) $7(x - 5) = 2(2x - 1)$ _____

iii) $7x - 5 = 2(4x - 3)$ _____ iv) $3(x-7)=4(\frac{x}{2}-3)$ _____

v) $3(2x - 3) = 2x - 4$ _____ vi) $\frac{x}{25}=3$ _____

vii) $3(3x - 7) = 2(2x - 8)$ _____ viii) $9(x - 5) = 2(x - 3)$ _____

ix) $7(x - 7) = 6(x - 5)$ _____ x) $\frac{x}{2}+\frac{3x}{2}=4$ _____

Q5 Solve the following linear equations.

i) $\frac{x}{5}+2=7$ _____ ii) $\frac{x}{7}-3=9$ _____

iii) $\frac{x}{9}-7=12$ _____ iv) $2x - 5 = 7x - 20$ _____

v) $3(x - 3) = 2(x - 7)$ _____ vi) $2(x - 5) + 5 = 3(x - 1) - 1$ _____

vii) $3(x - 4) - 5 = x + 7$ _____ viii) $9(x - 7) - 3(x - 2) = 15$ _____

ix) $2(x - 4) - (x - 5) = 14$ _____ x) $2x - 7 = x - 12$ _____

Exercise 3B

Solving Quadratic equations (factorising)

Q1 Solve the quadratic equations by factorising them first.

i) $x^2 + 3x + 2 = 0$ _____

ii) $x^2 + 5x + 6 = 0$ _____

iii) $x^2 - 7x + 10 = 0$ _____

iv) $x^2 - 5x - 6 = 0$ _____

v) $2x^2 + 14x + 20 = 0$ _____

vi) $6x^2 - 13x + 6 = 0$ _____

vii) $3x^2 + 11x - 4 = 0$ _____

viii) $4x^2 - 23x + 28 = 0$ _____

ix) $x^2 + 7x + 6 = 0$ _____

x) $x^2 - 9x + 8 = 0$ _____

Q2 Solve the quadratic equations by factorising them first.

i) $6x^2 + 7x = 3$ _____

ii) $9x^2 - 29x = -6$ _____

iii) $5x^2 - 3x = 2$ _____

iv) $7x^2 - 11x = -4$ _____

v) $3x^2 + 9x + 6 = 0$ _____

vi) $7x^2 + 5x - 2 = 0$ _____

vii) $39x^2 + 46x - 8 = 0$ _____

viii) $22x^2 - 89x + 42 = 0$ _____

ix) $56x^2 - 5x - 6 = 0$ _____

x) $44x^2 - 19x + 2 = 0$ _____

Exercise 3C **Solving Quadratic equations (formula)**

Solving quadratic equations using formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

All quadratic equations can be solved using the above formula, for this follow the three steps.

1. Write the quadratic equation in **standard form**: $ax^2 + bx + c = 0$
2. Determine the value of ***a, b and c***
3. Substitute the values into quadratic formula and work the answer out

Q1 Solve the quadratic equations by using the formula.

i) $x^2 + 3x - 5 = 0$ _____

ii) $x^2 + 7x + 7 = 0$ _____

iii) $x^2 - 4x - 7 = 0$ _____

iv) $2x^2 + 5x - 3 = 0$ _____

v) $2x^2 - 3x - 3 = 0$ _____

vi) $x^2 - 9x + 11 = 0$ _____

vii) $4x^2 - 3x - 7 = 0$ _____

viii) $x^2 - 7x + 1 = 0$ _____

ix) $9x^2 - 2x - 9 = 0$ _____

x) $7x^2 - 9x + 2 = 0$ _____

Q2 Solve the quadratic equations by using the formula.

i) $5x^2 - 3x = 3$ _____

ii) $x^2 + 7x + 6 = 0$ _____

iii) $x^2 - 9x - 7 = 0$ _____

iv) $7x^2 + 5x - 3 = 0$ _____

v) $3x^2 - 5x - 8 = 0$ _____

vi) $9x^2 - 7x - 3 = 0$ _____

vii) $2x^2 - 7x - 7 = 0$ _____

viii) $x^2 - 5x - 7 = 0$ _____

ix) $x^2 - 9x + 5 = 0$ _____

x) $2x^2 - 5x = 7$ _____

Exercise 3D

Solving Quadratic equations (Completing the square)

Q1 Solve the equations by completing the square.

i) $x^2 + 14x - 38 = 0$ _____

ii) $x^2 + 6x - 59 = 0$ _____

iii) $x^2 + 7x + 8 = 0$ _____

iv) $x^2 - 2x - 3 = 0$ _____

v) $x^2 + 14x - 15 = 0$ _____

vi) $x^2 + 8x = -10$ _____

vii) $x^2 - 4x - 91 = 0$ _____

viii) $y^2 - 4y + 1 = 0$ _____

ix) $y^2 + 12y - 11 = 0$ _____

x) $x^2 + 20x = -91$ _____

Q2 Solve the equations by completing the square.

i) $y^2 = 18y + 40$ _____

ii) $6y^2 - 48 = -12y$ _____

iii) $9x^2 - 79 = -18x$ _____

iv) $2x^2 = -6 + 8x$ _____

v) $2y^2 - 5y - 67 = 0$ _____

vi) $7x^2 - 16x - 100 = 0$ _____

vii) $4p^2 + 4p - 17 = 0$ _____

viii) $8q^2 + 16q = 42$ _____

ix) $5x^2 = 60 - 2x$ _____

x) $9x^2 - 60 = -15x$ _____

Exercise 3E

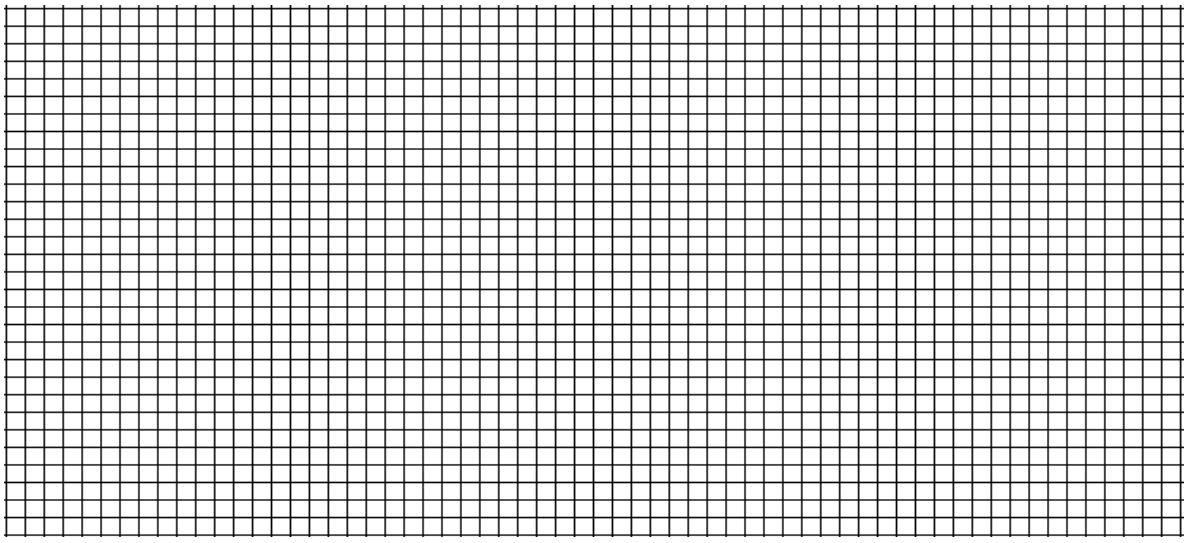
Solving Quadratic equations (by graph)

Q1 Answer the following questions.

i) Complete the table of values for $y = x^2 + 5x - 2$

x	-2	-1	0	1	2	3
y			-2			

ii) Plot the graph using the information.

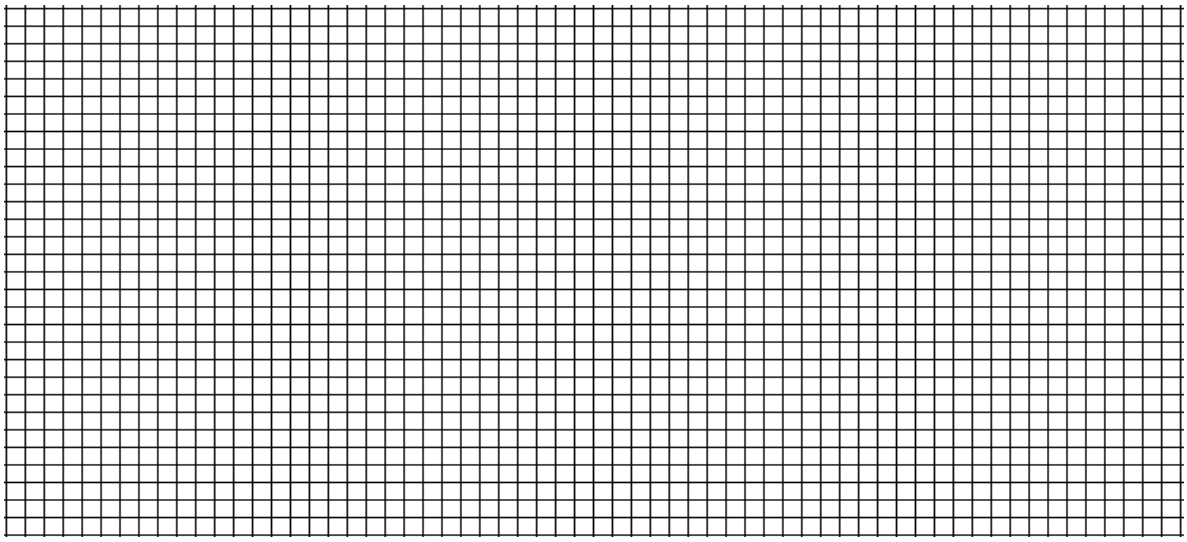


iii) From the graph, estimate the roots of the equation $y = x^2 + 5x - 2$.

_____ _____

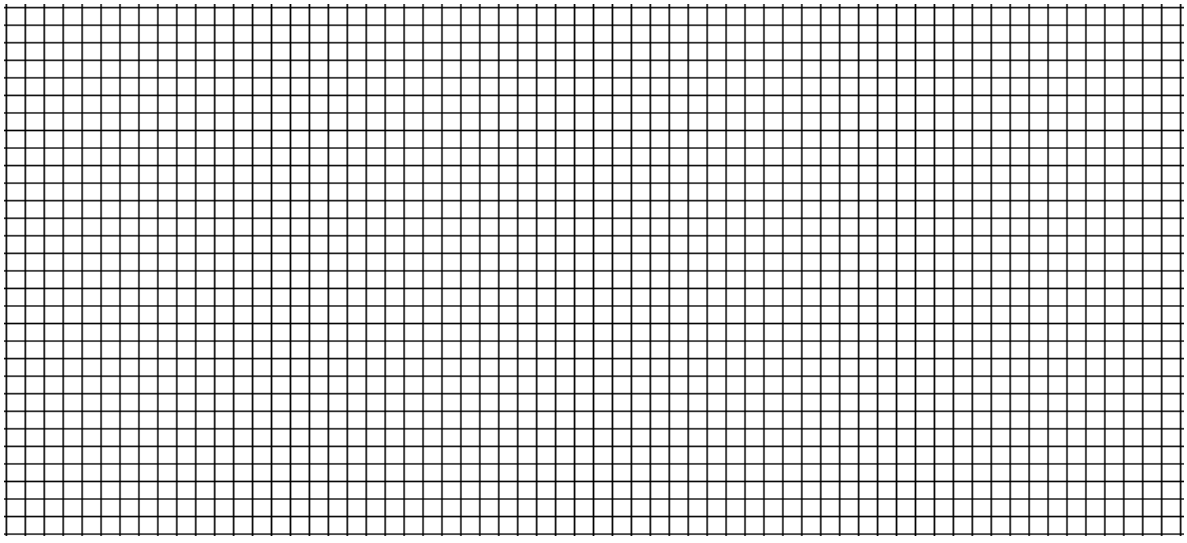
Q2 Plot the graphs of the following functions and estimate the roots.

i) $y = 2x^2 + x - 5$



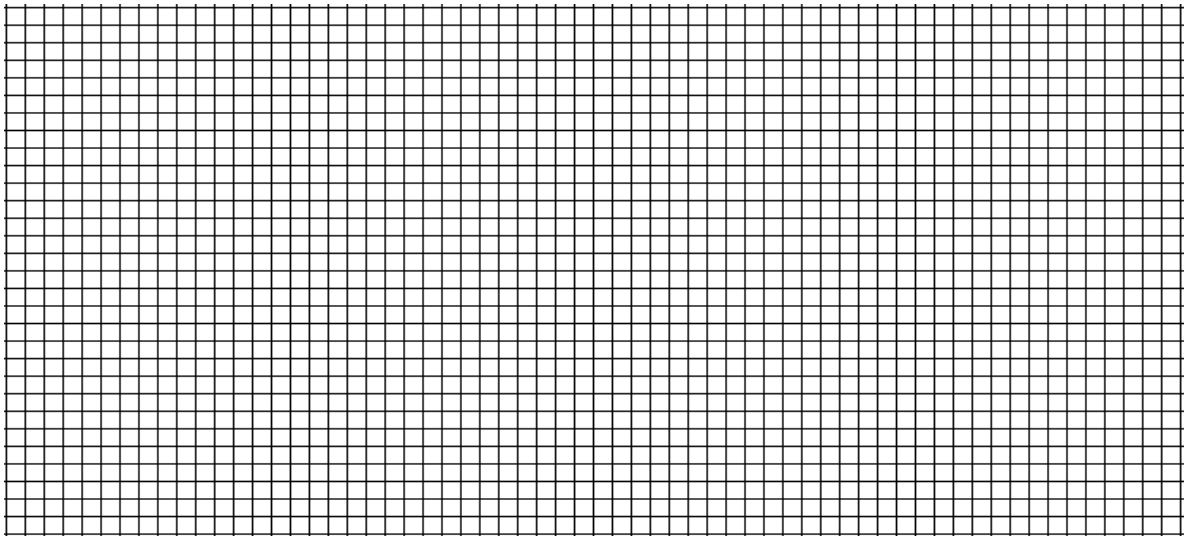
_____ _____

ii) $y = x^2 - 4x - 6$



_____ _____

iii) $y = 3x^2 - 2x - 4$



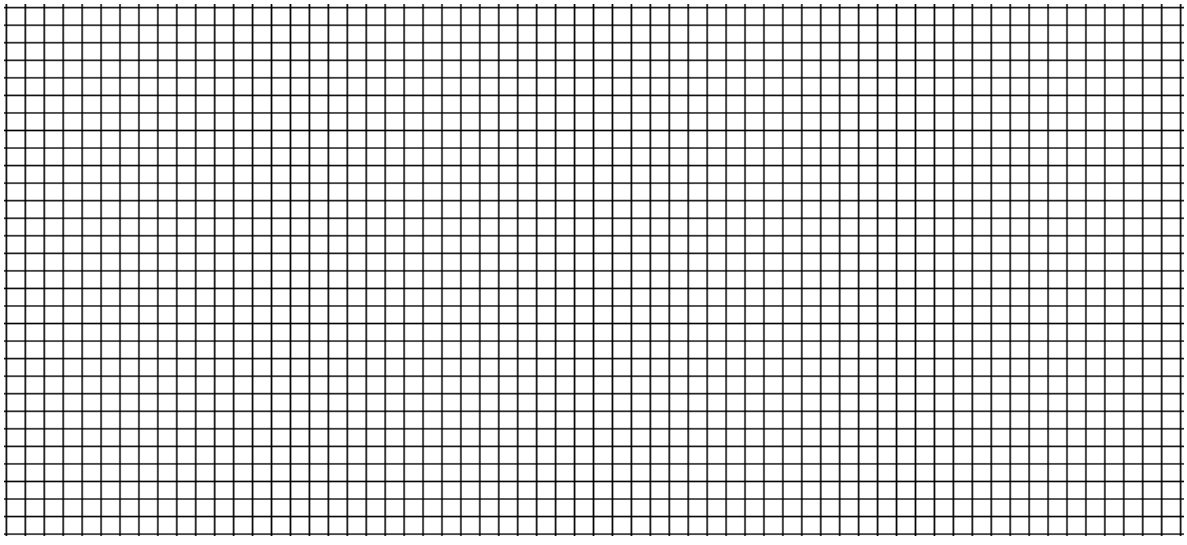
_____ _____

Q3 Answer the following questions.

i) Complete the table of values for $y = -x^2 + 8x - 2$

x	-1	0	1	2	3	4
y						

ii) Plot the graph $y = -x^2 + 8x - 2$



iii) Use your graph to estimate the roots of the equation $y = -x^2 + 8x - 2$

_____ _____

Q4 For each function

i) Find the coordinates of the turning point.

ii) Find the y intercept.

iii) Sketch the graph in your exercise book.

a) $y = 2x^2 + 3x - 4$

i) (_____ , _____)

ii) _____

b) $y = -2x^2 - 5x - 2$

i) (_____ , _____)

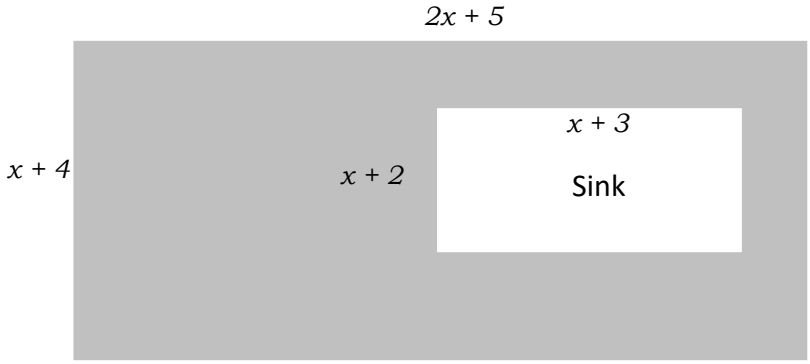
ii) _____

c) $y = x^2 - 7x - 3$

i) (_____ , _____)

ii) _____

Q5 Kumar has just fitted a new cement area around his sink, which is shown below.



a) Find an expression in x for the area of the cement.

_____

b) The actual area of the cement is 580 inches square. Find the dimension of our sink.

_____

Exercise 3F

Solving Quadratic equations (Trial and Improvement)

Q1 Solve the equations by trial and improvement. *Calculator may be used.*

i) $3x^4 - 5x = 1850$ _____

ii) $y^4 - 3y = 244$ _____

iii) $2y^3 - 3y = 12$ _____

iv) $x^3 - x = 25$ _____

v) $x^5 + 2x = 35$ _____

vi) $y^3 + 2y = 33$ _____

vii) $x^3 + 1 = 4$ _____

viii) $2y^3 - 2 = 23$ _____

ix) $y + \sqrt{y} = 5$ _____

x) $p + \sqrt{p} = 7$ _____

Q2 Solve the equations by trial and improvement. *Calculator may be used.*

i) $3x^3 - 2x = 8$ _____

ii) $6x^3 - x^2 = 125$ _____

iii) $x^4 - 4x = 240$ _____

iv) $y^3 + 2y = 31$ _____

v) $3x^3 + 2 = 5$ _____

vi) $9x^4 + 2x = 28$ _____

vii) $8x^5 + 2x = 21$ _____

viii) $x^3 - 1 = 11$ _____

ix) $2x^3 - x = 13$ _____

x) $3x^3 - x = 15$ _____

Probability Chapter 4

Exercise 4A — Basic probability

Q1 A die is thrown once. Find the probably that it shows:

a) Seven _____ b) A three _____

c) A five _____ d) A prime number _____

e) A square number _____ f) A triangular number _____

g) A number less than five _____

Q2 A bag contains 3 yellow balls, 5 red balls and two white balls. If a ball is taken at random, find the probability that it is:

a) Yellow _____ b) Red _____

c) White _____ d) Blue _____

e) Not yellow _____ f) Either white or yellow _____

Q3 The numbers from 1 to 10 are written on separate cards. One card is chosen at random. What is the probability that the number is:

a) Prime _____ b) Odd _____

c) Even _____ d) Divisible by 5 _____

e) Multiple of 4 _____ f) Divisible by 3 _____

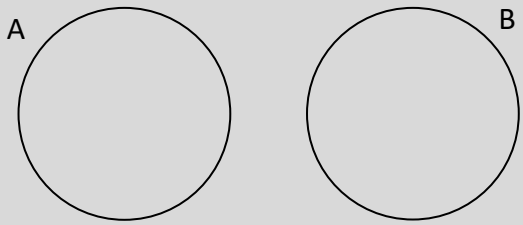
Q4 From the letters of the word **CONGRATULATION**, one letter is selected at random. What is the probability that the letter is:

a) A consonant _____ b) The letter N _____

c) The letter A _____ d) The letter T or U _____

Exercise 4B **Mutually exclusive events**

Mutually Exclusive Events



P (A or B) = P (A) + P (B)

Q1

A card is taken from a standard pack of 52 playing cards. State the probability that the card is:

i) The 10 of diamonds _____

ii) A red 10 _____

iii) A black 10 _____

iv) A 10 _____

Q2

A bag contains coloured discs. Of these three are red, two are blue and five are green. One disc is removed from the bag. State the probability that the disc is:

i) Blue _____

ii) Red or green _____

iii) Blue or green _____

iv) Not green _____

Q3

A book contains 20 red, 10 blue and 30 yellow sweets. What is the probability of a sweet selected at random being:

i) A red or blue _____

ii) A yellow or blue _____

iii) Red, blue or yellow _____

Q4

Two fair dice, one coloured red and one coloured blue are thrown. Calculate the probability that:

i) the score on the red die is 4 _____

ii) either die shows a score of 6 _____

iii) the core on the blue die is either 3 or 5 _____

iv) the score on the red die is neither 1 nor 2 _____

Q5

A pair of dice is rolled. What is the probability that the sum of the numbers rolled is 4?

_____

Q6

Peter's dad asks him to draw one card from the standard pack of 52 cards. What is the probability that the card will be a Jack card?

_____

Q7

What is the probability of drawing the seven or King of diamonds from a pack of standard cards?

_____

Q8

Vimala has a pair of dice and she throws them, what is the probability that the sum of the numbers appearing is 10?

_____

Q9

Two fair coins are tossed and heads come up for all of them. If they are tossed again, what is the probability that tails will come up for all of them?

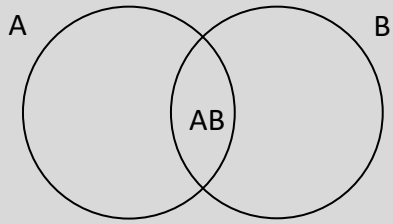
Q10

On a plate there are 20 dairy milk toffees and 15 snicker bars. Drawing a chocolate without watching, what is the probability that the chocolate is a snicker bar?

_____

Exercise 4C | **Independent events**

Independent Events



P (A and B) = P (A) x P (B)

Q1

The spinner on the right is spun once and a card is drawn from a pack of 4 cards labelled A,B,C and D. Find the following probabilities:

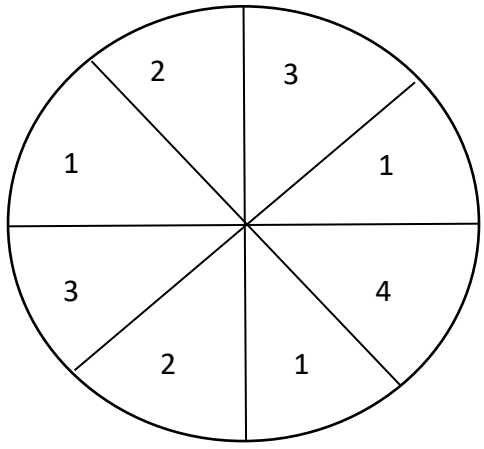
i) P (3 and A) _____

ii) P (4 and B or C) _____

iii) P (not 4 and C) _____

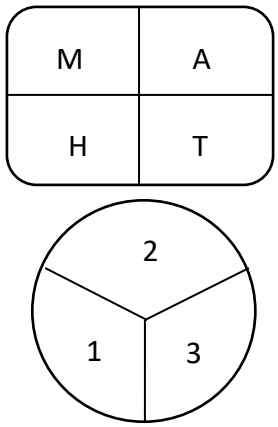
iv) P (1 and not D) _____

v) P (5 and C) _____



Q2

Each of the spinners at the right is spun once. Find the probabilities:



i) P (M and an odd) _____

ii) P (a vowel and < 3) _____

iii) P (not H and a prime) _____

iv) P (a letter and a number) _____

Q3 In a group there are 3 boys and 9 girls. If three students are chosen, what is the probability of choosing three girls sequentially?

_____

Q4 One integer is selected at random from integers 1 through 15. Find the probability that the number is even.

_____

Q5 What is the probability that a randomly selected number from 20 to 30 is divisible by 3 and then divisible by 12 after replacing it?

_____

Q6 In a group there are 5 teachers and 15 students. What is the probability of choosing two students sequentially?

_____

Q7 A bottle contains 18 brown sweets, 12 black sweets and 15 white sweets. What is the probability of drawing a brown sweet first then a black sweet with replacement?

_____

Q8 Cards are chosen at random from a pack. What is the probability of getting a diamond and then a heart?

_____

Q9 A box contains 30 balls. 10 are red, 12 are yellow, and 8 are white. What is the probability of picking a red ball and then a yellow ball without replacing the first?

_____

Q10 Four dice are rolled sequentially. What is the probability that the first die shows six and other die shows an odd number?

_____

Exercise 4D — Tree Diagrams

Q1 A bag contains 7 yellow balls and 5 white balls. One ball is taken from the bag at random. A second ball is then taken from the bag.

i) Draw a tree diagram

ii) What is the probability that:

a) both balls are white _____

b) both balls are the same colour _____

c) the balls are a different colour _____

d) at least one ball is yellow _____

Q2 There are 3 boys and 6 girls who are hoping to be selected for a school quiz team. Two of them are selected at random to be in the team.

i) Draw a tree diagram

ii) What is the probability that:

a) 2 boys are chosen _____

b) at least 1 girl is chosen _____

c) 1 girl and 1 boy are chosen _____

Q3 Peter is going to play one badminton match and one tennis match. The probability that he will win the badminton match is $\frac{1}{2}$. The probability that he will win the tennis match is $\frac{1}{3}$.

i) Draw a tree diagram

ii) Work out the probability that Peter will win both matches?

_____

Q4 There are 6 white marbles and 4 yellow marbles. Seetha takes a marble at random from the bag. She does not put the marble back in the bag. Seetha takes a second marble at random from the bag.

i) Draw a tree diagram

ii) Work out the probability that Seetha takes marbles that are different colours?

_____

Q5 A bag contains 7 red counters, 4 green counters, 2 yellow counters and 3 black counters. 3 counters are taken at random from the bag without replacement.

i) Draw a tree diagram

ii) What is the probability that they are all the same colour?

`

Q6 A coin is tossed three times sequentially.

i) Draw a tree diagram

ii) Using the tree diagram from part i, find the probability of:

a) Three tails _____

b) One head and two tails _____

c) One tail and two heads _____

d) At least one tail _____

Q7 A bag contains 9 coloured marbles. There are three red, four white and two brown. One marble is taken randomly and not replaced. Then a second marble is taken out from the bag.

i) Draw a tree diagram to represent the outcome of this event.

ii) Find the probability of both the marbles being same colour.

_____

iii) Find the probability of having a different colour marble.

_____

iv) Find the probability of having a white and a brown marble.

_____

Q8 In a family, there are three children.

i) Draw a tree diagram to help find the probability of the gender of the children.

ii) Find the probability of the following:

a) Three boys _____

b) Two boys and one girl _____

c) One boy and two girls _____

d) Three girls _____

Q9 Three dice are thrown together.

i) Draw the tree diagram.

ii) What is the probability of getting three 6's? _____

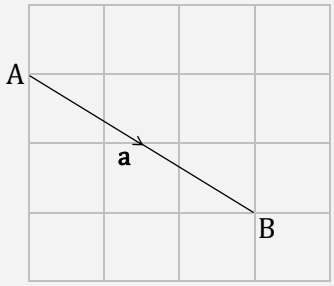
iii) What is the probability of getting two 3's and one 2's? _____

Vectors

Definition:
A vector describes a movement from one point to another.

Notation:
A vector has both direction and magnitude. A vector can be written in more than one way.

Look at the example below:



The arrow shows the movement from point A to point B.

This vector can be written as $\overrightarrow{AB}$, **a** or $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$.

A (2, 3) ⟶ This is called the co-ordinates of point A.

A $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ ⟶ This is called a columned vector.

Equal vectors:
Equal vectors must have the same magnitude and same direction.

Adding vectors:

$\mathbf{a} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $\mathbf{a} + \mathbf{b} = \begin{pmatrix} 1 \\ 4 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix} = \begin{pmatrix} 3 \\ 7 \end{pmatrix}$

Subtracting vectors:

$\mathbf{a} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $\mathbf{a} - \mathbf{b} = \begin{pmatrix} 1 \\ 4 \end{pmatrix} - \begin{pmatrix} 2 \\ 3 \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$

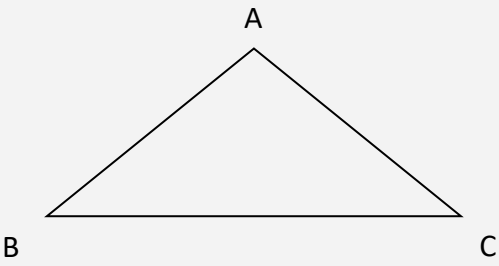
Multiplying vectors by scale:

a = $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$ To calculate 2**a**: 2**a** = 2 $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$ = $\begin{pmatrix} 2 \\ 8 \end{pmatrix}$

Using Vectors:

Addition Rules:

Look at the example below:



To travel from **B** to **C**, it is possible to go via BA then AC.

Therefore the vector $\overrightarrow{BC}$ is equal to the sum of vectors $\overrightarrow{BA}$ and $\overrightarrow{AC}$.

This can be written as $\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AC}$

Negative vectors:

These two vectors **are** equal to each other: $\overrightarrow{AB} = -\overrightarrow{BA}$

BUT these two vectors **are not** equal to each other: $\overrightarrow{AB} = -\overrightarrow{AB}$

Exercise 5A **Vectors and notifications**

Q1 Using the information below find the following :

a = $\begin{pmatrix} 1 \\ 5 \end{pmatrix}$ **b** = $\begin{pmatrix} -3 \\ 7 \end{pmatrix}$ **c** = $\begin{pmatrix} -1 \\ -5 \end{pmatrix}$

i) **a** + **b** = _____

ii) **b** + **c** = _____

iii) **a** + **b** - **c** = _____

iv) 2**a** = _____

v) 2(**a** + **c** - **b**) = _____

Q2 Using the information below find the following :

P = $\begin{pmatrix} 2 \\ 7 \end{pmatrix}$ **Q =** $\begin{pmatrix} -8 \\ -4 \end{pmatrix}$ **R =** $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$

i) 2(**P** + **Q** - **R**) = _____

ii) 2(**P** + **Q**) = _____

iii) **P R** = _____

Q3 Find the value of x.

$\begin{pmatrix} 1 \\ 2 \end{pmatrix} + \begin{pmatrix} x \\ 3 \end{pmatrix} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}$ _____

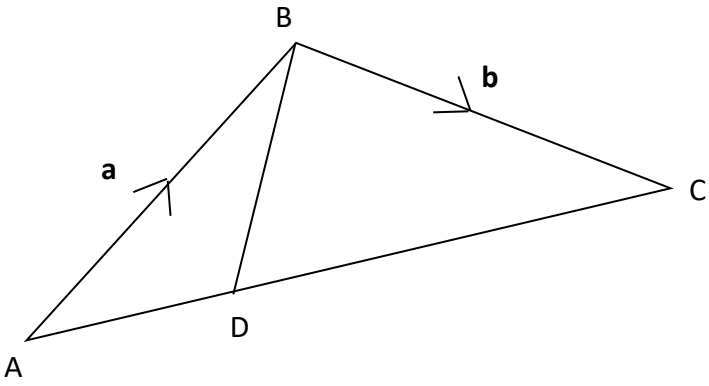
Q4 Find the value of y.

$\begin{pmatrix} -7 \\ 6 \end{pmatrix} + \begin{pmatrix} -1 \\ y \end{pmatrix} = \begin{pmatrix} -8 \\ 10 \end{pmatrix}$ _____

Q5 Find the value of p.

$2\begin{pmatrix} p \\ 2 \end{pmatrix} + \begin{pmatrix} 2 \\ 1 \end{pmatrix} = \begin{pmatrix} 8 \\ 3 \end{pmatrix}$ _____

Q6 Find the following in terms of **a** and **b**.



AD : DC = 2 : 3

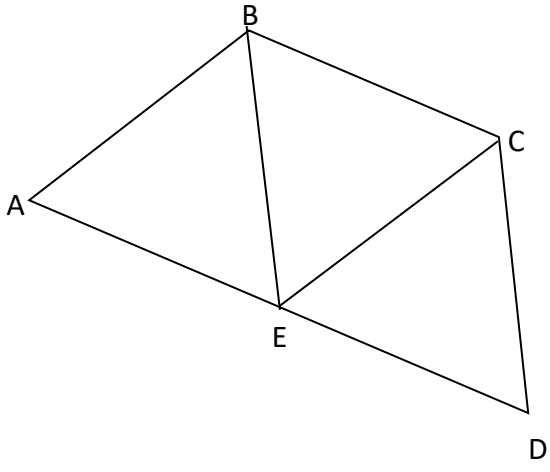
i) $\overrightarrow{AC}$ _____

ii) $\overrightarrow{AD}$ _____

iii) $\overrightarrow{DC}$ _____

iv) $\overrightarrow{BD}$ _____

Q7 Find the following in terms of **a** , **b** and **c**



AE = ED

$\overrightarrow{AB}$ = 2**a**

$\overrightarrow{BC}$ = **c**

$\overrightarrow{CD}$ = **b**

i) $\overrightarrow{AD}$ _____

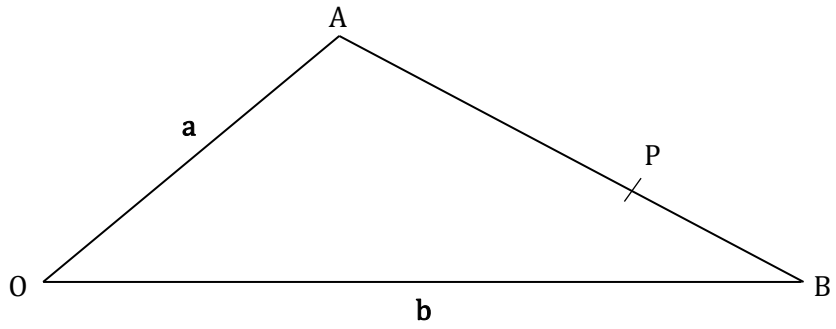
ii) $\overrightarrow{AE}$ _____

iii) $\overrightarrow{DC}$ _____

iv) $\overrightarrow{BD}$ _____

Q8 OAB is a triangle.

$\overrightarrow{OA}$ = **a** $\overrightarrow{OB}$ = **b**



i) Find the vector $\overrightarrow{AB}$ in terms of **a** and **b**. _____

ii) P is the point on AB so that AP : PB = 2 : 1

Find the vector $\overrightarrow{OP}$ in terms of **a** and **b**. Give your answers in its simplest form.

_____

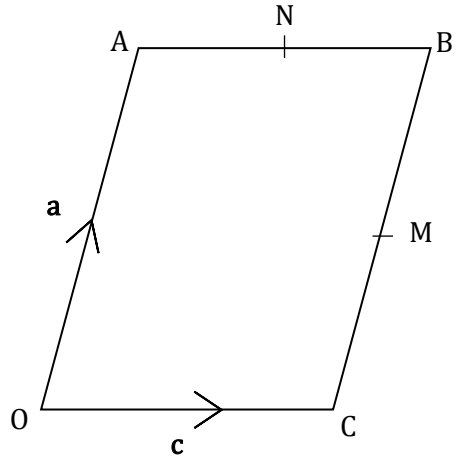
Q9 OABC is a parallelogram. M is the midpoint of CB. N is the midpoint of AB.

$\overrightarrow{OA}$ = **a** $\overrightarrow{OC}$ = **c**

a) Find in terms of **a** and **c**, the vectors

i) $\overrightarrow{MB}$ _____

ii) $\overrightarrow{MN}$ _____



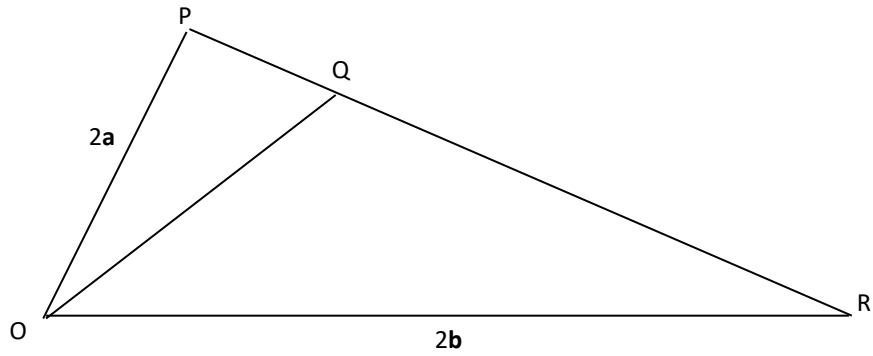
b) Show that $\overrightarrow{CA}$ is parallel to $\overrightarrow{MN}$

_____

_____

_____

Q10 Complete the following questions :



Q is the point on the side PR of the triangle OPR. The ratio of PQ and QR is 3 : 1.

Given that $\overrightarrow{OR}$ = 2**b** and $\overrightarrow{OP}$ = 2**a**, find in terms of **a** and **b**, expressions for:

a) $\overrightarrow{PR}$

b) $\overrightarrow{QP}$

c) $\overrightarrow{OQ}$

_____
_____
_____
_____
_____
_____
_____
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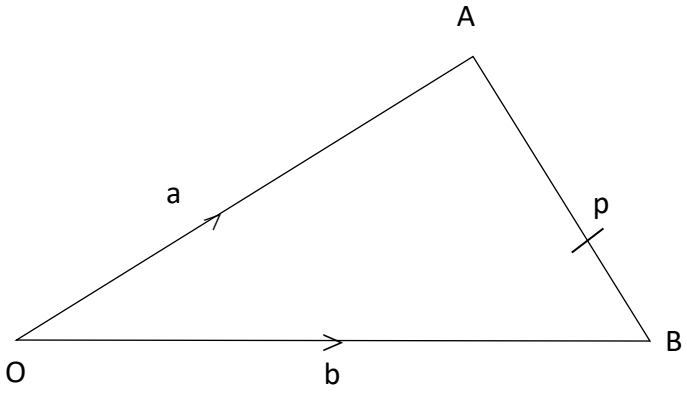
Q11 OAB is a triangle.



$\overrightarrow{OA}$ = **a**

$\overrightarrow{OB}$ = **b**

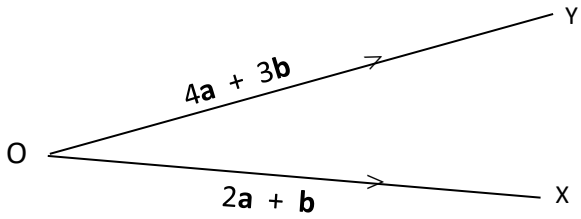
a) Find the vector in terms of **a** and **b**.
p is the point on AB such that AP : PB = 3 : 2

_____
_____
_____
_____
_____

b) Show that **AB** = (2**a** + 3**b**)

_____
_____
_____
_____
_____

Q12 Find the following in terms of **a** and **b :**



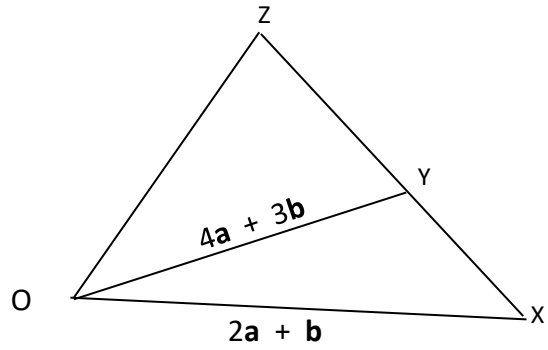
$\overrightarrow{OX} = 2\mathbf{a} + \mathbf{b}$

$\overrightarrow{OY} = 4\mathbf{a} + 3\mathbf{b}$

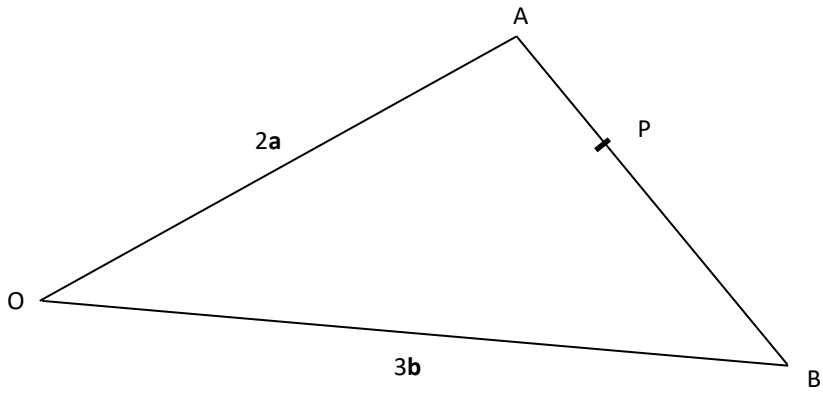
a) Express the vector $\overrightarrow{XY}$ in terms of **a** and **b**

b) Express the vector $\overrightarrow{OZ}$

XYZ is a straight line. XY:YZ = 2:3



Q13 Find the following in terms of **a** and **b :**



$\overrightarrow{OA} = 2\mathbf{a}$

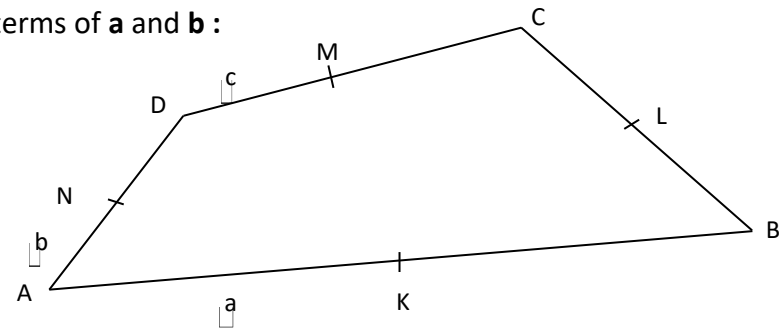
$\overrightarrow{OB} = 3\mathbf{b}$

a) Find the vector $\overrightarrow{AB}$ in terms of **a** and **b**.

P is the point on AB such that AP : PB = 2 : 3

b) Find the vector $\overrightarrow{OP}$ is terms of **a** and **b.**

Q14 Find the following in terms of **a** and **b :**



K is the midpoint of AB.

L is the midpoint of BC.

M is the midpoint of CD.

N is the midpoint of AD.

$\overrightarrow{AK}$ = **a**

$\overrightarrow{AN}$ = **b**

$\overrightarrow{DM}$ = **c**

a) Using the information provided, find in terms of **a**, **b** and **c**, the vectors of

i) KN _____

ii) AC _____

iii) BC _____

iv) LM _____

b) Write down two geometrical facts about the lines KN and LM which could be deduced from your answers to part (a).

_____

_____

_____

Function
A function is a special mapping such that every element of set A (the domain) is mapped to exactly one element of set B (the range).

Composite function

fg is a composite function. To workout fg(x), first workout g(x) and then substitute your answer into f(x)

Inverse function

$f^{-1}(x)$ is the inverse function.

Exercise 6A — Simple functions

Q1 $f(x) = 5x$. Work out:

a) $f(4)$ _____ b) $f(-3)$ _____ c) $f(1/2)$ _____

d) $f(-7)$ _____

Q2 $f(x) = \frac{3}{2x-1}$. Work out:

a) $f(25)$ _____ b) $f(-5)$ _____

c) $f(100)$ _____ d) $f(\frac{1}{5})$ _____

Q3 Find:

a) $f(5)$ where $f(x) = 5x + 1$

_____

b) $g(-3)$ where $g(x) = 2x^2 - 1$

_____/-

Q4 Calculate the values of a and b given that

a) $f(a) = 15$ where $f(x) = 3x + 2$

_____

_____

b) $f(b) = 16$ where $f(x) = 2x^2 - 1$

_____

_____

Q5 $f(x) = 4x - 3$, write out in full:

a) $f(x) + 3$ _____

b) $f(x) - 8$ _____

c) $5f(x)$ _____

d) $f(5x)$ _____

Exercise 6B

Composite function

Q1 Given the function $f(x) = 3x + 2$, $g(x) = x^3 - 1$ and $h(x) = \frac{1}{x}$

Find:

a) $fg(x)$ _____

b) $gf(x)$ _____

c) $fh(x)$ _____

d) $hf(x)$ _____

e) $hg(x)$ _____

Q2 If $f(a) = 2a + 3$ and $g(a) = \frac{a-3}{2}$ =

Prove that $fg(a) = a$

Q3 $f(x) = x - 1$, $g(x) = x^2 - 1$, $h(x) = \frac{1}{x}$

Find:

a) $fg(x)$

b) $gf(x)$

c) $fh(x)$

d) $hf(x)$

e) $gh(x)$

f) $hg(x)$

Exercise 6C

Inverse functions

Q1 Find the inverse of each function.

a) $x \longrightarrow 3x - 1$

b) $x \longrightarrow \frac{7}{x} + 2$

c) $x \longrightarrow 3(x - 2)$

d) $x \longrightarrow 3(x - 5) + 5$

_____

_____

Q2 f$(x) = 4(x + 1)$ and $g(x) = 2(x - 1)$

a) Find $f^{-1}(x)$

_____

b) Find $g^{-1}(x)$

_____

c) Work out $f^{-1} + g^{-1}$

_____

d) Work out a

$f^{-1} + g^{-1} = 4$

_____

Q3 Find the inverse of the function $f(x) = 3x^2 - 7$

_____

_____

Q4 Find the inverse of the function $f(x) = \frac{2}{x-1}$ by changing the subject of the formula.

_____

_____

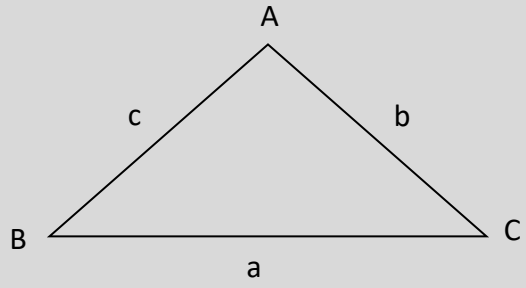
Q5 The function f and g are defined by $f(x) = 4x - 1$, $g(x) = \frac{3}{2x-1}$

Find its simplest form

a) $f^{-1}(x)$ _____

b) $gf(x)$ _____

Sine rule



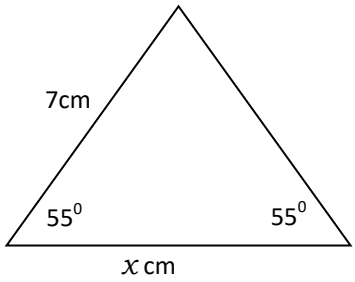
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Exercise 7A

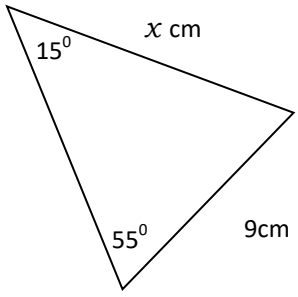
Finding a side

Q1 Find each side marked with a letter

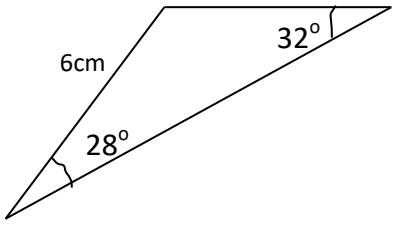
a)



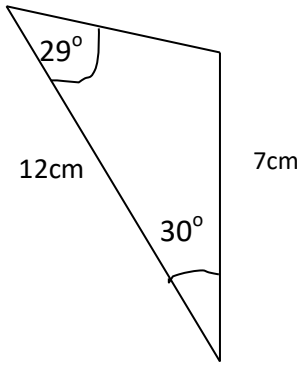
b)



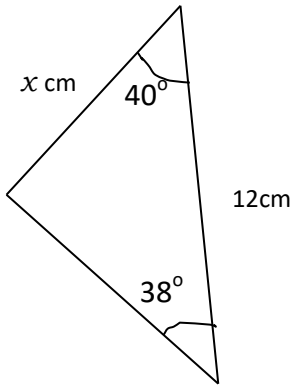
c)



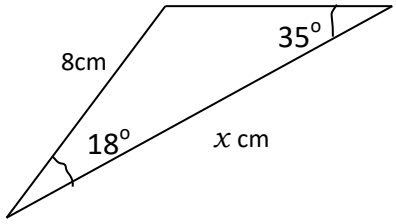
d)



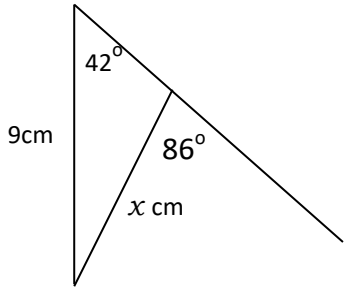
e)



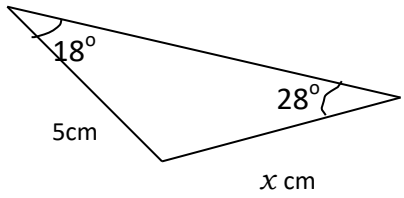
f)



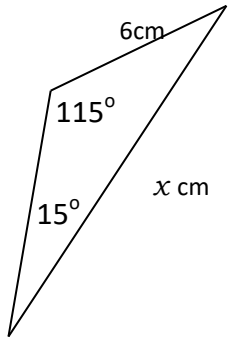
g)



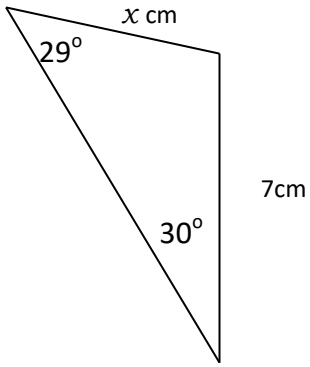
h)



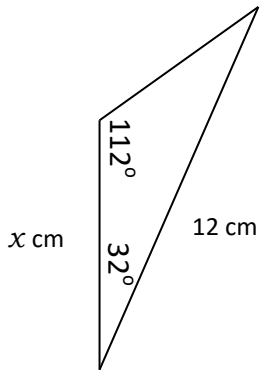
i)



j)



k)

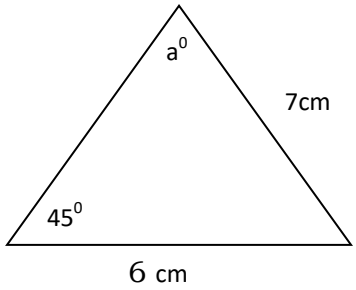


Exercise 7B

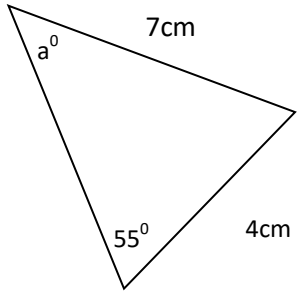
Finding an angle

Q2 Find the angle marked with a letter

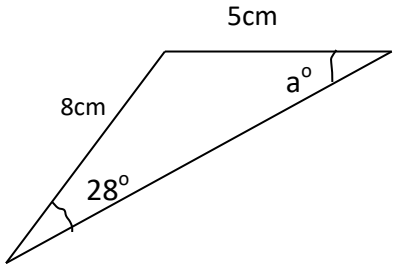
a)



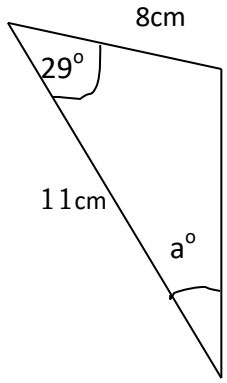
b)



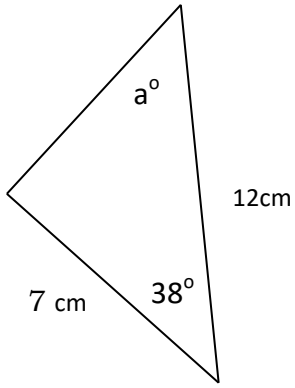
c)



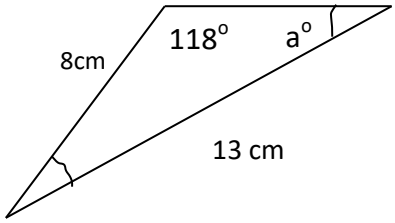
d)



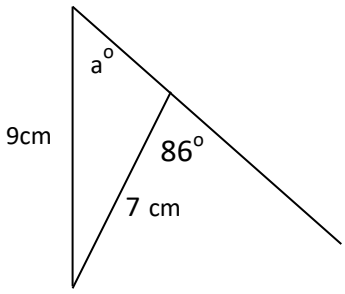
e)



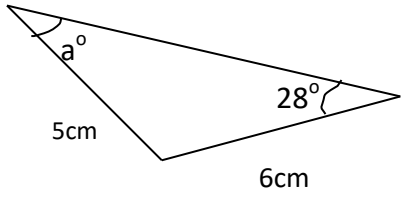
f)



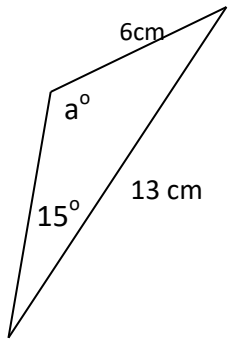
g)



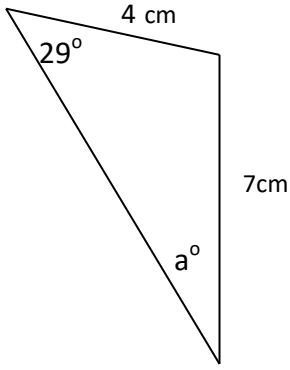
h)



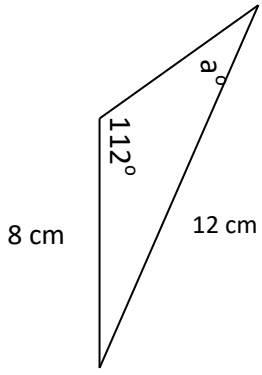
i)



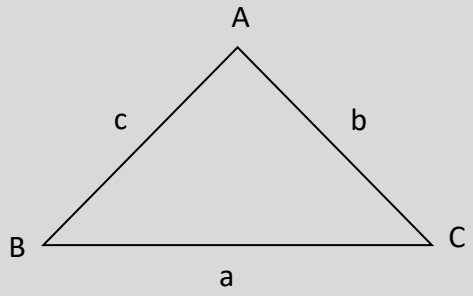
j)



k)



Cosine rule



$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

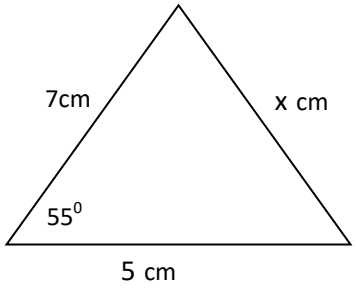
$$c^2 = b^2 + a^2 - 2ab \cos C$$

Exercise 8A

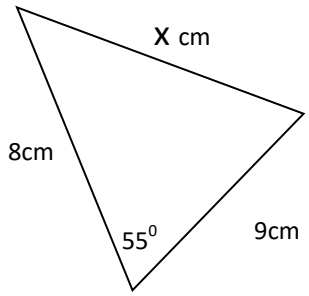
Finding a side

Q1 Find each side marked with a letter

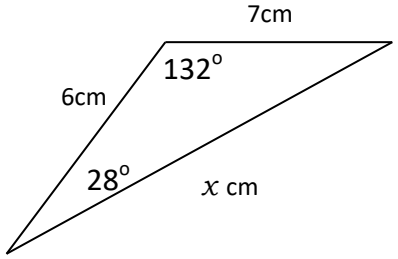
a)



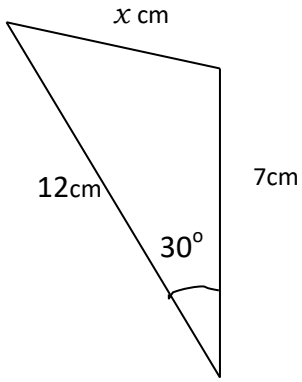
b)



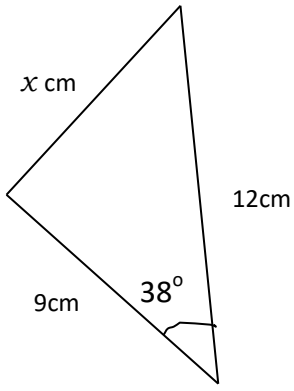
c)



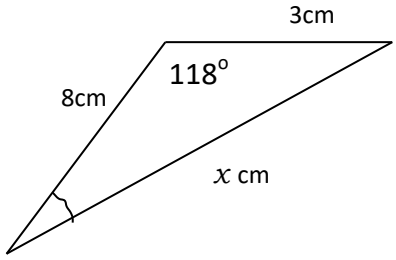
d)



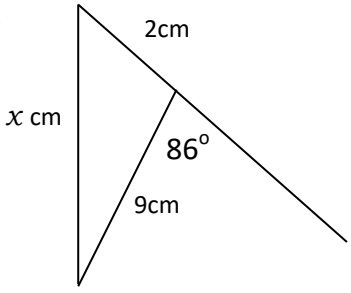
e)



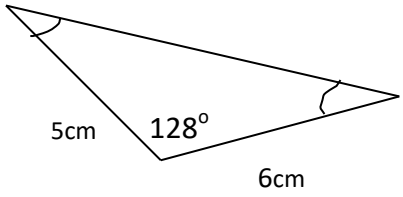
f)



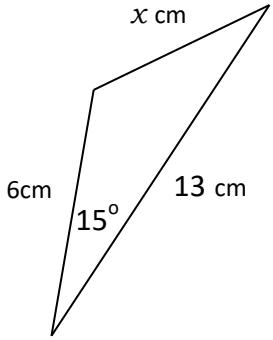
g)



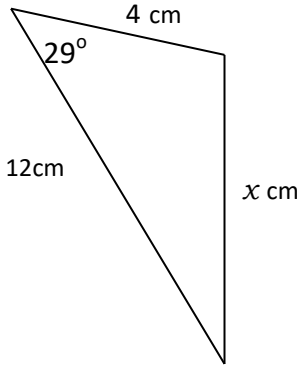
h)



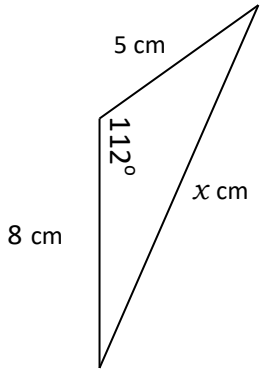
i)



j)



k)

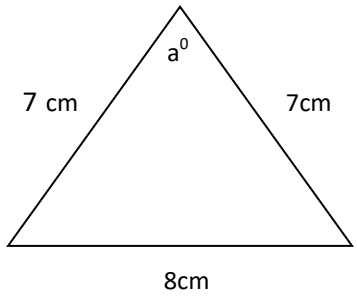


Exercise 8B

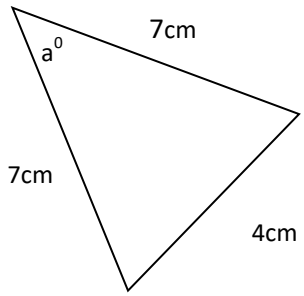
Finding an angle

Q1 Find the angle marked with a letter

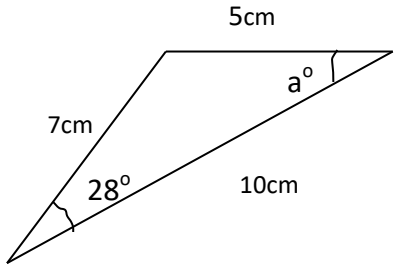
a)



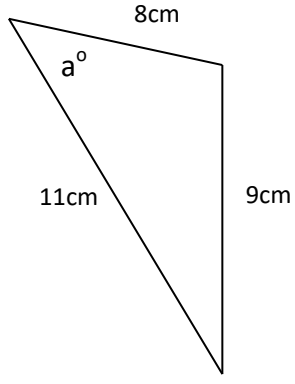
b)



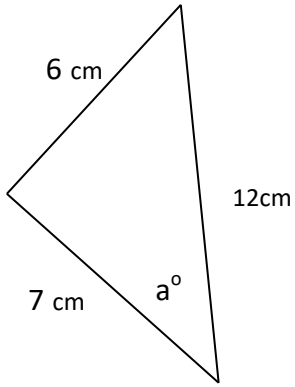
c)



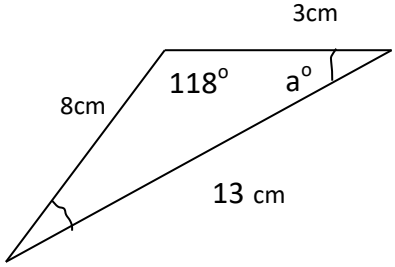
d)



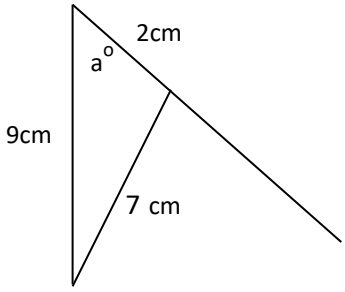
e)



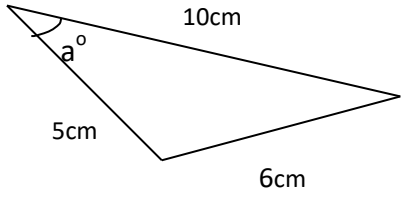
f)



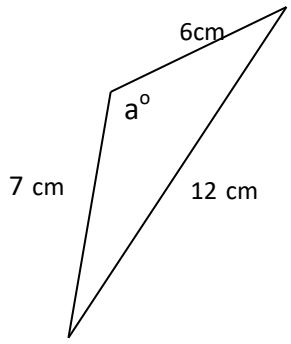
g)



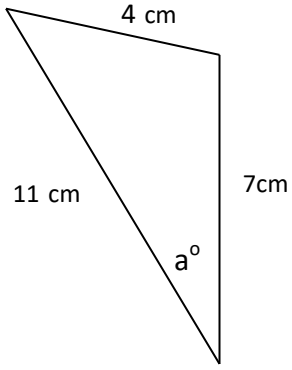
h)



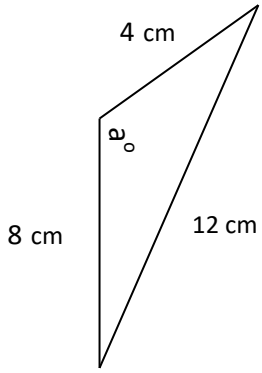
i)



j)



k)

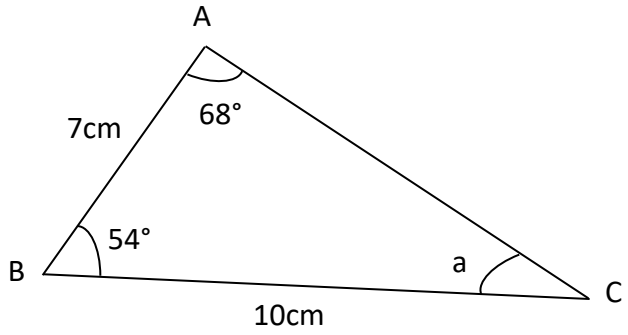


Exercise 8C

Mixed

Q1 Using the diagram, answer the questions.

a)



i) Find the angle C

_____

_____

_____

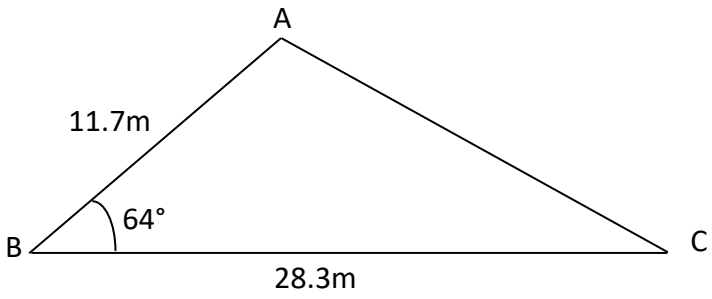
ii) Find AC

_____

_____

_____

b)



i) Find the length of AC. Give your answer correct to 3 significant figures.

_____

_____

_____

_____

_____

ii) Calculate the area of the triangle ABC. Give your answer correct to 3 significant figures.

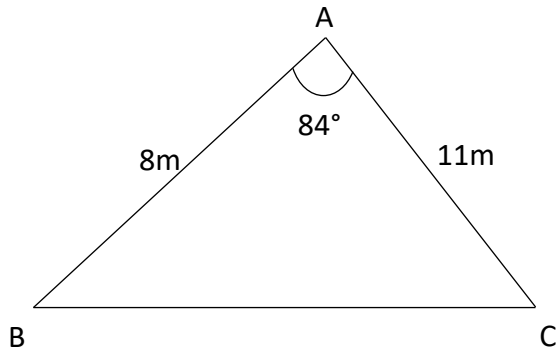
_____

_____

_____

_____

c)



AB = 8cm

BC = 28.3cm

Angle ABC = 84°

i) Calculate the area of the triangle ABC. Give your answer correct to 3 significant figures.

_____

_____

_____

_____

ii) Calculate the length of AC. Give your answer correct to 3 significant figures.

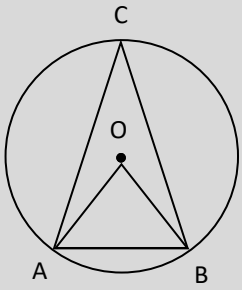
_____

_____

_____

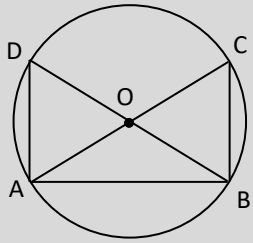
_____

Theorem 1



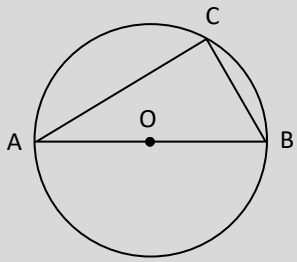
$A\hat{O}B = 2\,A\hat{C}B$

Theorem 2



$\angle D = \angle C$

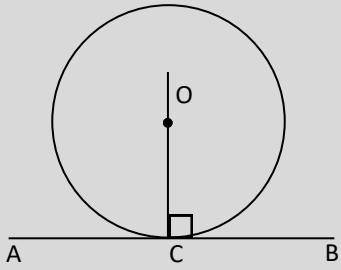
Theorem 3



AB is a diameter

$\angle C = 90°$

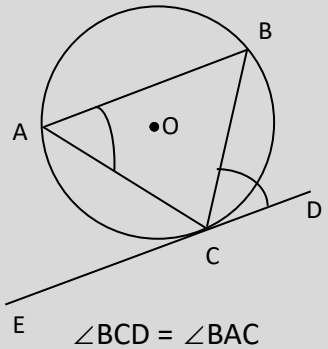
Theorem 4



ACB is a tangent so

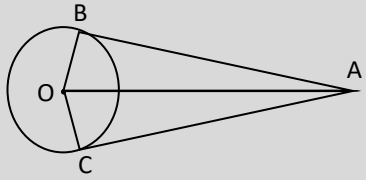
$O\hat{C}B = 90°$

Theorem 5



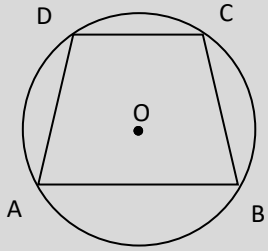
$\angle BCD = \angle BAC$

Theorem 6



AB and AC are tangents from A, so AB = AC and $B\hat{A}O = C\hat{A}O$

Theorem 7

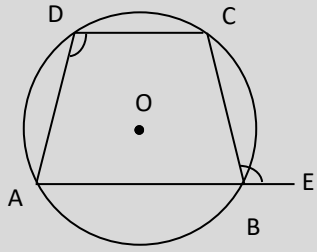


ABCD is a cyclic quadrilateral.

$\angle B + \angle D = 180$

$\angle A + \angle C = 180$

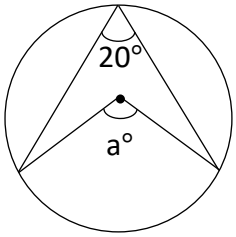
Theorem 8



$\angle CBE = \angle ADC$

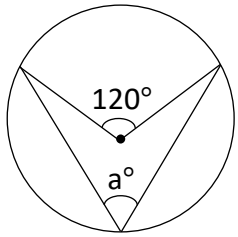
Q1 Using the diagrams, answer the following questions.

a)



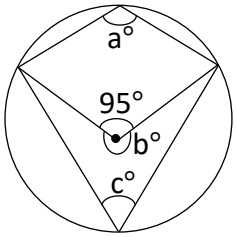
a° = _____

b)



a° = _____

c)

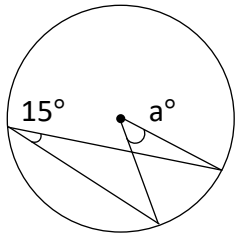


a° = _____

b° = _____

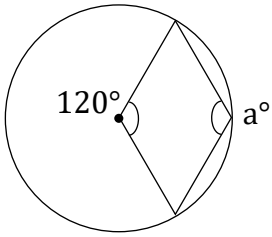
c° = _____

d)



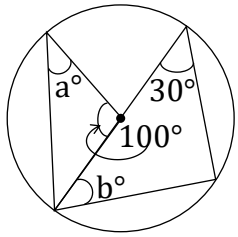
a° = _____

e)



a° = _____

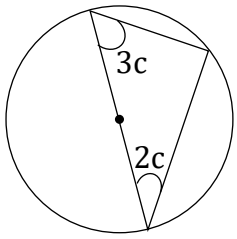
f)



a° = _____

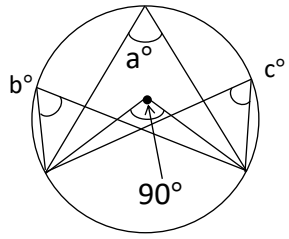
b° = _____

g)



c = _____

h)

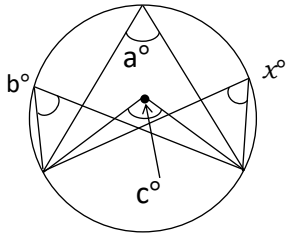


a° = _____

b° = _____

c° = _____

i)



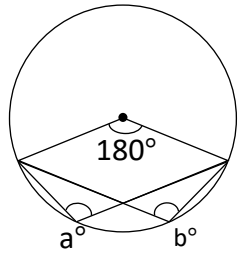
Give your answer in terms of x

a° = _____

b° = _____

c° = _____

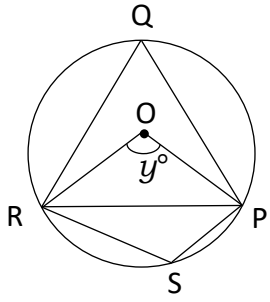
j)



a° = _____

b° = _____

k) PQRS is a cyclic quadrilateral. O is the centre of the circle. Using the following information answer the questions in terms of y.



i) What is the reflex angle PÔR?

_____

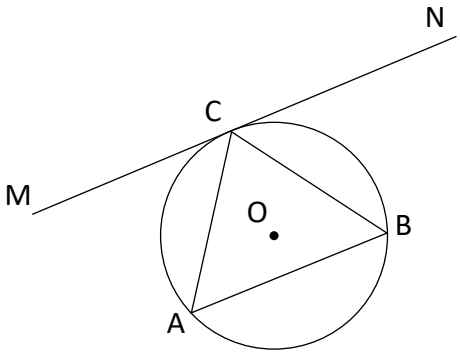
ii) What is the obtuse angle PŜR?

_____

iii) What is the acute angle PQ̂R?

_____

l)



A, B and C are three points on the circumference of a circle, centre O. The straight line MCN is the tangent to the circle at C.

CAB = x and NCB = y.

Prove that x = y.

_____

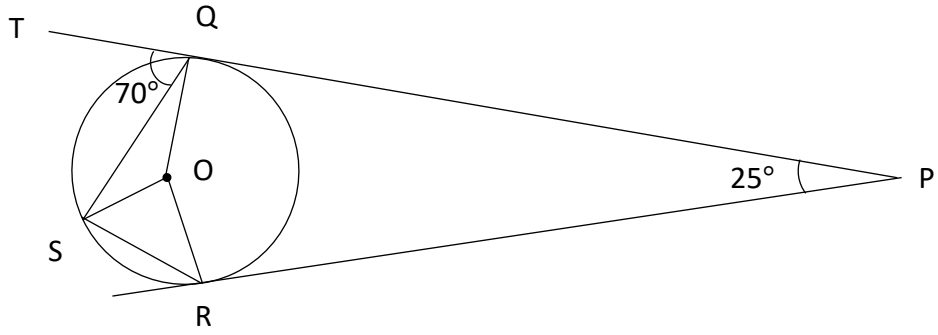
_____

_____

_____

_____

m)



Looking at the above diagram answer the following questions

i) SQ̂O _____

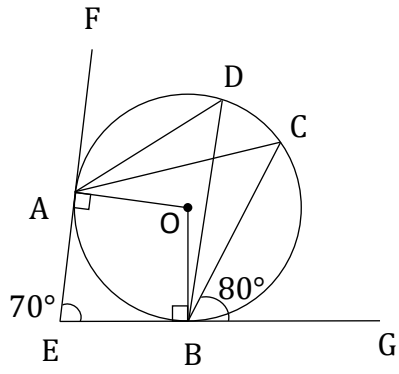
ii) QÔR _____

iii) QÔS _____

iv) SÔR _____

v) SR̂O _____

n)



A, B, C and D are points on the circumference of a circle with centre O. EAF and EBG are tangents to the circle.

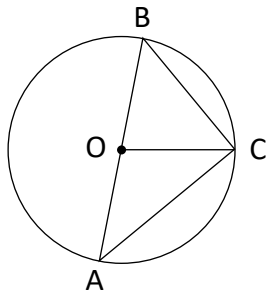
Angle CBG = 80° and angle AEB = 70°.

i) angle ADB _____

ii) angle OAC _____

iii) angle ACB _____

o)



Peter says that just from knowing the angle CAO, he can work out all the angles inside the triangles CBO and ACO

i) Prove that Peter is correct.

_____

_____

_____

_____

_____

If angle CÂO = 35°, work out the size of the following angles.

ii) CÂO _____

iii) CÔB _____

OUR PUBLICATIONS (LEC)

NO	NAME	STATUS	AUTHOR
1	Year 10 Easy Going Maths	Published	M.Nat
2	Year 11 Easy Going Maths 1	Published	M.Nat
3	Easy Going Verbal reasoning B1 &2	Published	M.Nat
4	Easy Going Non Verbal reasoning B1&2	Published	M.Nat
5	Easy Going Mathematics Book 1	Published	M.Nat
6	Easy Going Mathematics Book 2	Published	M.Nat
7	Easy Going Mathematics Book 3	Published	M.Nat
8	Easy Going Mathematics Book 4	Published	M.Nat
9	Easy Going Mathematics Book 5	Published	M.Nat
10	Easy Going Mathematics Year 3	Published	M.Nat
11	Easy Going English Year 3 Book 1 & 2	Published	J. Suki
12	Easy Going Mathematics Year 4	Published	M.Nat
13	Easy Going Verbal reasoning year 4	Published	M.Nat
14	Easy Going Non Verbal Reasoning Year 4	In Print	M.Nat
15	Easy Going English Year 4	In Print	M.Nat
16	Easy Going Maths Year 6	Published	M.Nat
17	Easy Going Maths KS3 (Y7,Y8,Y9)	Published	M.Nat
18	Year 11 Physics work book	In print	M. Nat
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