1. Trigometric ratios 3

1. Complete the table below by filling in the blank spaces.

X^0	0^0	30^0	60^0	90^0	120^0	150^0	180^0	210^0	240^0	270^0	300^0	330^0	360^0
Cos x	1.00		0.50			-0.87		-0.87					
2cos½x	2.00	1.93					0.50						

(2mks)

On the grid provided, using a scale of 1 cm to represent 30^0 on the horizontal axis and 4cm to represent 1 unit on the vertical axis draw the graph of $y = \cos x^0$ and $y = 2 \cos ½ x^0$. (4mks)

(a) State the period and amplitude of $y = 2 \cos ½ x^0$ (2mks)

(b) Use your graph to solve the equation $2 \cos ½ x - \cos x = 0$. (2mks)

2. a) Complete the table below by filling in the blank spaces

x	-90	-75	-60	-45	-30	-15	θ	15	30	45	60	75	90
3cos2x-1	-40	-3.6		-1.0	0.5	1.6		1.6	0.5		-2.5	-3.6	-4.0
2sin (2x+30)	-1.0	-1.73		-1.73	-1.0	0		1.73	2.0		1.0	0	-1.0

b) On the grid provided, draw on the same set of axes the graphs of $y = 3\cos 2x - 1$ and $y = 2\sin(2x + 30^0)$ for $-90^0 \le x \le 90^0$. Using a scale o 1 cm for 15^0 on axis and 2 cm for I unit on the y-axis (5mks)

c) State the period of $y = 3\cos 2x - 1$ (1mk)

d) Solve the equation $2\sin(2x + 30^0) - 3\cos 2x + 1 = 0$ (2mks)

3. Complete the table below by filling in the blank spaces.

x°	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
Cos x	1.00		0.5			-0.87°		-0.87°					
2 cos ½ x°	2.00	1.93				0.52			-1.00				-2.00

Using the scale 1 cm to represent 30^o on the horizontal axis and 4cm to represent 1 unit on the vertical axis, draw on the grid provided, the graph of y = cos x° and y = 2 cos ½ x°

a) Find the period and amplitude of y = 2cos ½ x° (2mks)

b) Describe the transformation that maps the graph of y = Cos x° on the graph of y = 2 cos ½ x°. (2mks)

4. The table below gives some values of y = sin 2x and y = 2 cox is the range given.
(a) Complete

X^o	-225	-180	-135	-90	-45	0	45	90	135	180	225
$y - \sin 2x^3$	-1.0		1.0			0			-1.0		1.0
$y = 2\cos x^3$	-1.4		-1.4			2.0			-1.4		-1.4

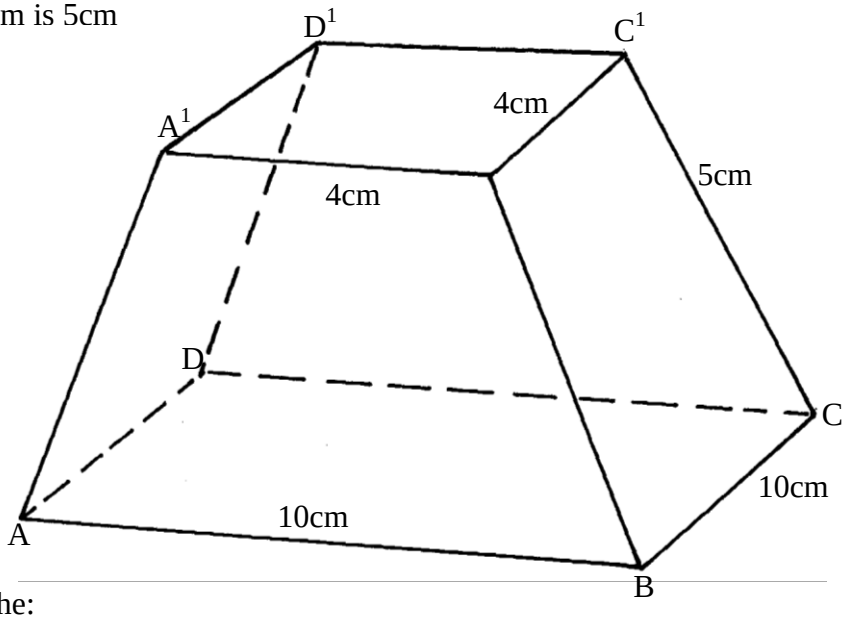
(b) On the same axes, draw the graphs of $y = \sin 2x$ and $y = 2\cos x$.
(c) Use your graph to find in values of x for which $\sin 2x - 2\cos x = 0$.
(d) From your graph
(i) Find the highest point of graph $y = \sin 2x$.
(ii) The lowest point of graph $y = 2\cos x$.

5. (a) Copy and complete the table below for $y = 2\sin(x + 15)^o$ and $y = \cos(2x - 30)^o$ for $0^o \leq x \leq 360^o$

x	0	30	60	90	120	150	180	210	240	270	300
$y = 2\sin(x+15)$											
$y = \cos(2x-30)$											

(b) On the same axis draw the graphs:
$y = 2\sin(x + 15)$ and $y = \cos(2x - 30)$ for $0^o \leq x \leq 360^o$
(c) Use your graph to:
(i) State the amplitudes of the functions $y = 2\sin(x + 15)$ and $y = \cos(2x - 30)$
(ii) Solve the equation $2\sin(x+15) - \cos(2x - 30) = 0$

6. The diagram below shows a frustum of a square based pyramid. The base ABCD is a square of side 10cm. The top $A^1B^1C^1D^1$ is a square of side 4cm and each of the slant edges of the frustum is 5cm



Determine the:
i) Altitude of the frustrum
ii) Angle between AC1 and the base ABCD
iii) Calculate the volume of the frustrum

7. (a) Compete the table below:

$y = 3\sin(2x + 15)^o$

x	-180	-150	-120	-90	-60	-30	0	30	60	90	120
y	0.8			-0.8			0.8		21		

(b) Use the table to draw the curve **$y = 3\sin(2x + 15)$** for the values **$-180^o \leq \theta \leq 120^o$**
(c) Use the graph to find:
(i) The amplitude
(ii) The period
(iii) The solution to the equation:-
$\sin(2x + 15)^o = {}^1/_3$

8. Make **q** the subject of the formula in $\frac{A}{B} = \sqrt{\frac{P + 3q}{q - 3p}}$

9. a) Complete the table below for the functions $y = \cos (2x + 45)^o$ and $y = -\sin (x + 30^o)$for $-180^o \leq x \leq 180^o$.

	-180	-150	-120	-90	-60	-30	0	30	60	90	120	150	180
$y=\text{Cos}(2x + 45^o)$	0.71		-0.97	-0.71			0.71		-0.97			0.97	
$y = -\sin(x + 30^o)$	0.5	0.87			0.5			-0.87		-0.87			0.5

b) On the same axis, draw the graphs of $y = \cos (2x + 45)^o$ and $y = -\sin (x + 30)^o$
c) Use the graphs drawn in (b) above to solve the equation.

$$\text{Cos } (2x + 45)^o + \sin(x + 30)^o = 0$$

10. Without using tables or calculators evaluate $\frac{\sin 60^o \cos 60^o}{\tan 30^o \sin 45^o}$ leaving your answer in surd form.

11. (a) Complete the table below for the functions $y = 3 \sin x$ and $y = 2 \cos x$

X	0	30	60	90	120	150	180	210	240	270	300	330	360
3sin x			2.6	3			0	-1.5	-2.6	-3		-1.5	
2cosx		1.7	1.0			-1.7	-2	-1.0			1.0	1.7	2

(b) Using a scale of 2cm to represent 1 unit on the y- axis and 1cm to present 30^o on the x-axis ,draw the graphs of $y = 3\sin x$ and $y = 2\cos x$ on the same axes on the grid provided
(c) From your graphs:
(i) State the amplitude of $y = 3\sin x$
(ii) Find the values of x for which $3\sin x - 2\cos x = 0$
(iii) Find the range of values of **x** for which $3\sin \mathbf{x} \geq \mathbf{2\cos x}$

12. (a) Fill in the following table of the given function:-

x	0	90	180	270	360	450	540	630	720	810
sin ½*x*	0			0.71					0	
3Sin (½*x* + 60)					-2.6					2.6

(b) On the grid provided draw the graph of the function **y = sin ½*x*** and **y = 3Sin (½*x* + 60)** on the same set of axes
(c) What transformation would map the function **y = sin ½ *x*** onto **y = 3 Sin (½ *x* + 60)**
(d) (i) State the period and amplitude of function : **y = 3 Sin (½*x* + 60**
(ii) Use your graph to solve the equation: **3Sin (½*x* + 60) – Sin ½*x* = 0**

13. a) Complete the table below giving your answer to 2 decimal places

x^o	0^o	30^o	60^o	90^o	120^o	150^o	180^o
$2\sin x^o$	0	1		2			
$1 - \text{Cos } x^o$			0.50	1			2

b) On the grid provided, using the same axis and scale draw the graphs of :-
$y = 2\sin x^o$, and $y = 1-\cos x$ for
$0^o \leq x \leq 180^o$, take the scale of

2cm for 30^o on the x-axis
2cm for 1 unit on the y-axis

c) use the graph in **(b)**above too solve the equation $2\sin x + \cos x^o = 1$ and determine the range of values of for which $2\sin x^o = 1 - \cos x^o$

14. Solve the equation **$2\sin(x + 30) = 1$ for $0 \leq x \leq 360$.**

15. (a) Complete the table below, giving your values correct to 1 decimal place

x	**0°**	**10°**	**20°**	**30°**	**40°**	**50°**	**60°**	**70°**	**80°**	**90°**	**100°**	**110°**	**120°**	**130°**	**140°**	**150°**	**160°**	**170°**	**180°**
10 sin x	**0**	**-**	**3.4**	**5.0**		**7.7**		**9.4**	**9.8**	**10**	**9.8**	**9.4**		**7.7**		**5.0**	**3.4**		**0**

(b) Draw a graph of $y = 10 \sin x$ for values of x from 0^o to 180^o. Take the scale 2cm represents 20^o on the x-axis and 1cm represents 1 unit on the y axis

(c) By drawing a suitable straight line on the same axis, solve the equation: -
$500 \sin x = -x + 250$

16. Complete the table below for the functions $y = \cos x$ and $y = 2\cos(x\ 300)$ for $\theta \leq x \leq 3600$

x	0^o	30^o	60^o	90^o	120^o	150^o	180^o	210^o	240^o	270^o	300^o	330^o	360^o
Cos *x*	1	0.87	0.5		-0.5	-0.87	-1.0		0.5	0		0.87	1
2 cos ($x + 30^o$)	1.73		0	-1.0		-2.0	-1.73	-1.0		1	1.73	2.00	1.73

(a) On the same axis, draw the graphs of $y \cos x$ and $y\ 2\cos(x - 30)$ for $O<x < 360°$.

(b) (i) State the amplitude of the graph $y = \cos x^o$.
(ii) State the period of the graph $y = 2\cos(x + 30°)$.

c) Use your graph to solve
$\cos x = 2\cos(x+30°)$

17. Solve the equation $\sin(2\theta + 10) = -0.5$
for $0 \leq \theta \leq 2\pi^c$

18. Solve the equation
$4 \sin 2x = 5 - 4 \cos^2 x$ for $0° \leq x \leq 360°$

19. (a) Complete the table given below by filling in the blank spaces

X	0	15	30	45	60	75	90	105	120	135	150	165	870
4cos 2x	4.00		2.00	0	-2.00	-3.46	-4.00	-3.46	-2.00	0	2.00		4.00
$2\sin(2x + 30^o)$	1.00	1.73	2.00	1.73		0	-1.00	-1.73	-2.00	-1.73		0	1.00

(b) On the grid provided; draw on the same axes, the graphs of **$y = 4\cos 2x$ and $y = 2\sin(2x + 30^o)$ for $0^o \leq x \leq 180^o$**. Take the scale: 1cm for 15^o on the **x-axis** and 2cm for 1unit on the y-axis

(c) From your graph:-
(i) State the amplitude of **$y = \cos 2x$**
(ii) Find the period of **$y = 2\sin(2x + 30^o)$**

(d) Use your graph to solve:-
$4\cos 2x - 2\sin(2x + 30) = 0$