KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

MATHEMATICS PAPER 2

NOVEMBER 2024

MARKS: **100**

TIME: **2 hours**

This question paper consists of 9 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

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

QUESTION 1

Amahle recorded the amount of data (in MB) that she had used daily in the past 15 days.

3	10	12	13	15	15	16	18	24	26	34	40	42	43	45

1.1 Calculate the range of the data. (2)

1.2 Calculate the mean data usage. (2)

1.3 Write down the five number summary of the data. (3)

1.4 Draw a box and whisker diagram to represent the data. (3)

1.5 Determine the interquartile range. (3)

[13]

QUESTION 2

The company HEALTHCRAZY conducted a survey at a gym in KwaZulu – Natal, to find out which age group most frequently uses their health supplements.

AGES	FREQUENCY
$20 \leq x < 30$	29
$30 \leq x < 40$	28
$40 \leq x < 50$	21
$50 \leq x < 60$	15
$60 \leq x < 70$	10
$70 \leq x < 80$	2

2.1 Identify the modal class for the data. (1)

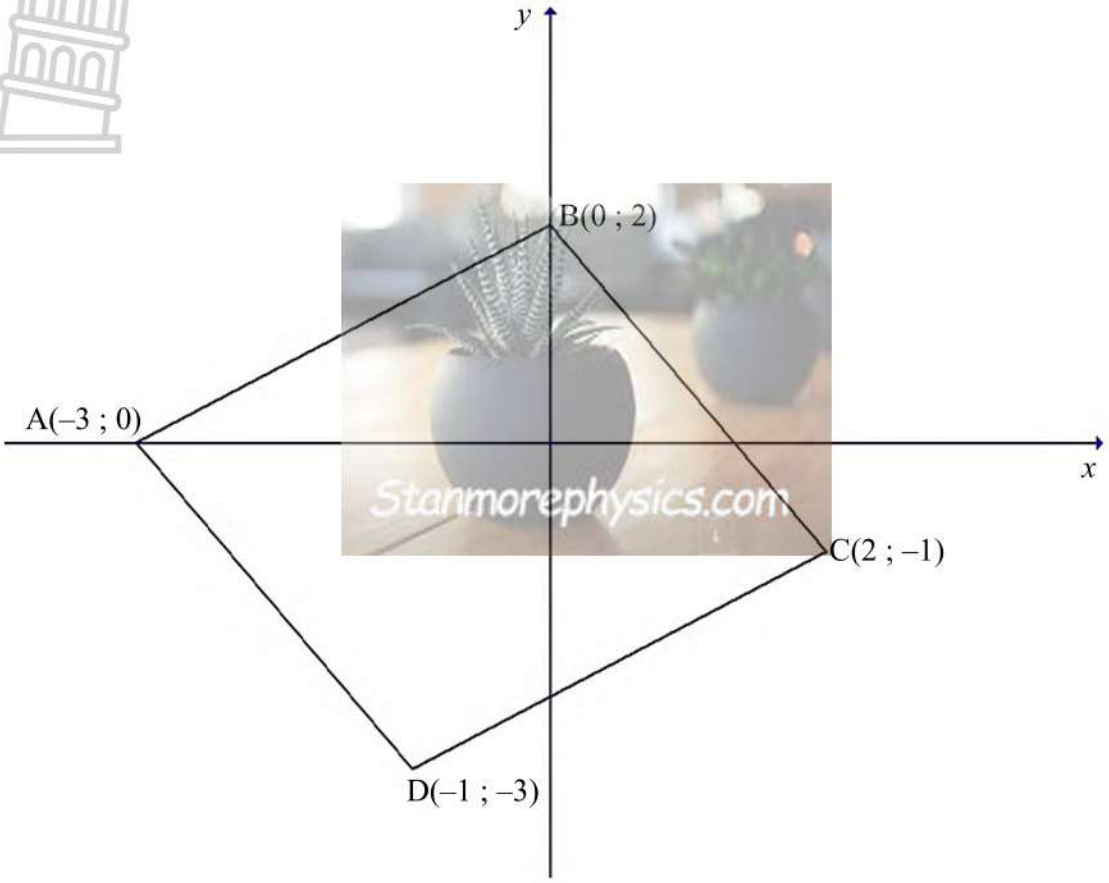
2.2 Determine the interval in which the median lies. (1)

2.3 Estimate the mean age of the people that use the health supplements. (4)

[6]

QUESTION 3

In the cartesian plane below, $A(-3;0)$, $B(0;2)$, $C(2;-1)$ and $D(-1;-3)$ are points on a quadrilateral.



3.1 Determine the coordinates of R , the midpoint of AC. (3)

3.2 Calculate the gradient of the line AB. (2)

3.3 Calculate the length of AC. (3)

3.4 If ABCD is a rhombus, calculate the area of ABCD. (5)

[13]

QUESTION 4

If $4\tan\theta = -3$ and $\cos\theta > 0$, WITHOUT using a calculator, determine the value of:

4.1 $\sin\theta$ (3)

4.2 $10\cos^2\theta$ (2)

4.3 $3\cot\theta + 5\sin\theta$ (3)

[8]

QUESTION 5

5.1 In each of the following equations, solve for x where $0^\circ < x < 90^\circ$. Give your answers correct to TWO decimal places.

5.1.1 $\cos x = \frac{2}{3}$ (2)

5.1.2 $\frac{4}{\cot x} + 1 = 3$ (3)

5.2 Simplify fully, WITHOUT the use of a calculator.

$$\frac{\tan 45^\circ . \text{cosec}\, 60^\circ}{\cot 30^\circ . \cos^2 45^\circ}$$ (5)

5.3 If $x = 56{,}3^\circ$ and $y = 97{,}5^\circ$, evaluate the following correct to TWO decimal places.

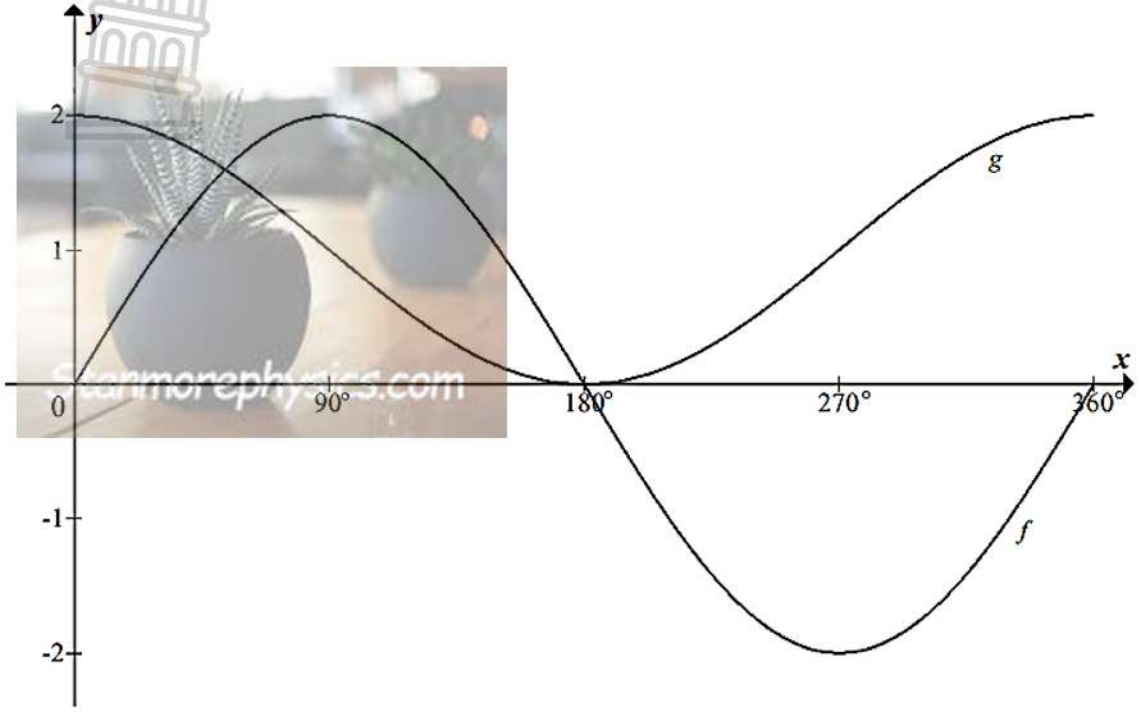
5.3.1 $\cos(x + y)$ (2)

5.3.2 $\frac{2\sin^2 x - 2}{\cos y}$ (3)

[15]

QUESTION 6

The graphs of $f(x) = p\sin x$ and $g(x) = \cos x + q$ for $x \in [0\ ;\ 360°]$ are sketched below:



6.1 Determine the value of p and q. (2)

6.2 Write down the amplitude of g. (1)

6.3 Write down the range of f. (2)

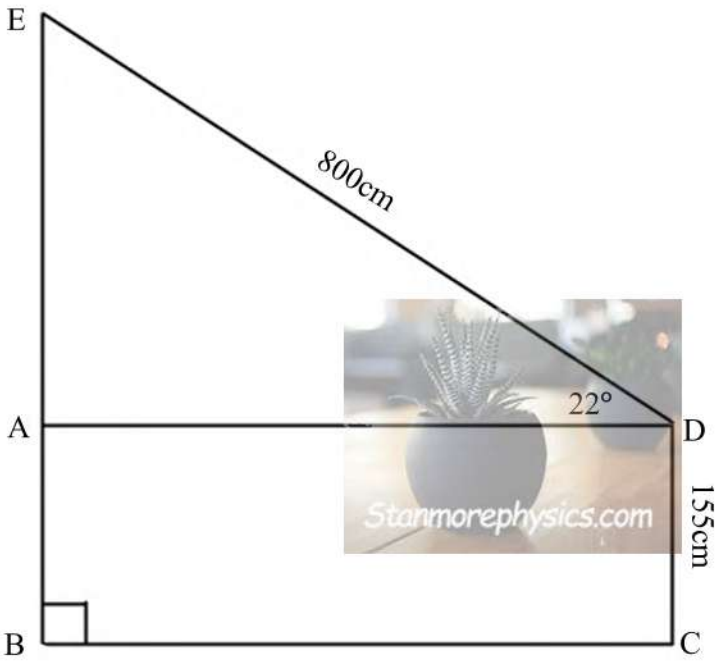
6.4 For which value(s) of x will $f(x) > 0$? (2)

6.5 The graph of g is reflected about the x-axis and then shifted 2 units upwards to obtain the graph h. Write down the equation of h. (2)

[9]

QUESTION 7

In the diagram below ABCD is a rectangle. DC = 155cm and DE = 800cm. The angle of elevation from D to E is 22°.



7.1 Calculate the length of BE. (4)

7.2 Determine the distance of BC. (3)

[7]

QUESTION 8

A metal marble has a diameter of 16 millimetres.

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

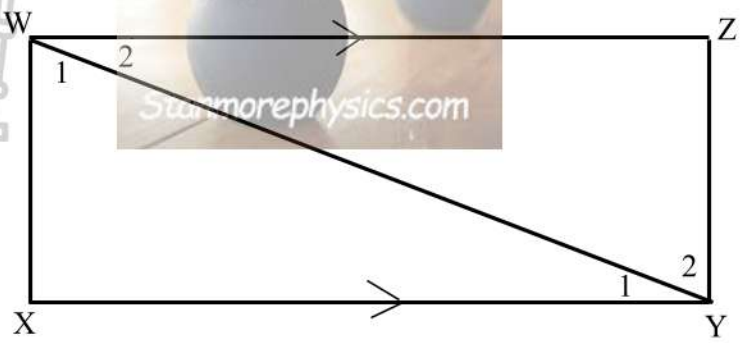
8.1 Calculate the volume of metal used to make this marble. Give your answer correct to TWO decimal places. (3)

8.2 If the radius of the marble is doubled, write down the ratio of the new volume to the original volume. (3)

[6]

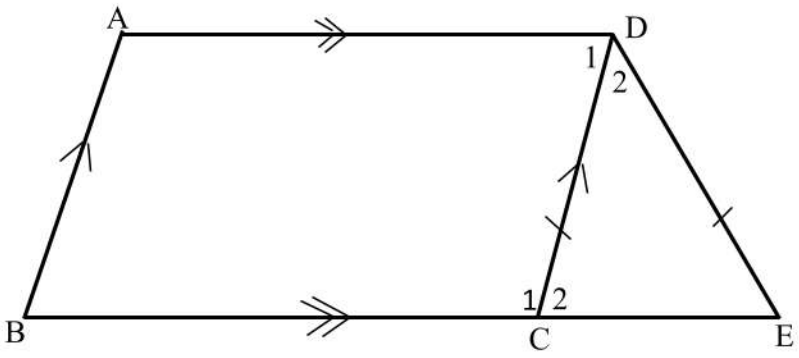
QUESTION 9

9.1 In quadrilateral WXYZ, $WZ \parallel XY$ and $\hat{X} = \hat{Z}$.



Prove that WXYZ is a parallelogram. (5)

9.2 In the sketch below, ABCD is a parallelogram. $DC = DE$ and $\hat{A} = 120°$.



9.2.1 Calculate the size of:

a) $\hat{B}$ (2)

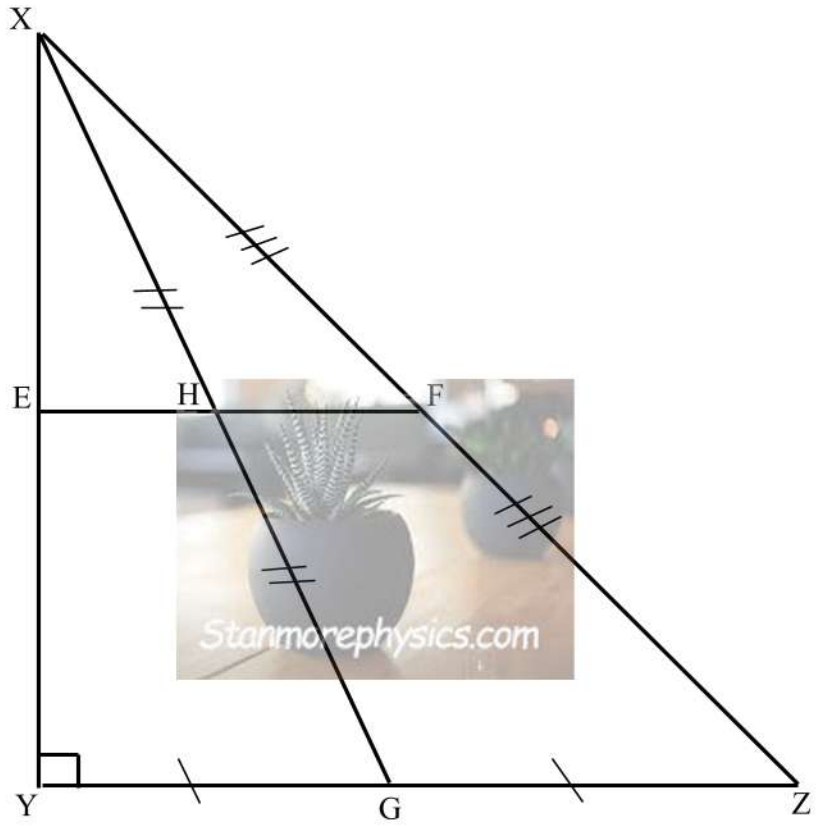
b) $\hat{C}_2$ (2)

9.2.2 If $\hat{D}_2 = 4x$. Calculate the value of x. (4)

[13]

QUESTION 10

ΔXYZ is right angled at Y. F and G are the midpoints of XZ and YZ respectively. H is the midpoint of XG. E lies on XY such that FHE is a straight line.



10.1 Prove that E is the midpoint of XY. (3)

10.2 If $EH = 3,5\text{cm}$ and the area of $\Delta HEX = 9,5\text{cm}^2$. Calculate the length of XY. (4)

10.3 Hence, calculate the area of ΔXYZ. (3)

[10]

TOTAL: 100

FINAL

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

MATHEMATICS P2

COMMON TEST

NOVEMBER 2024

MARKING GUIDELINES

NATIONAL SENIOR CERTIFICATE

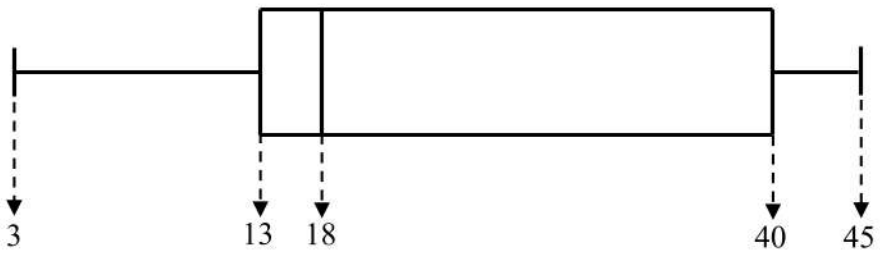
GRADE 10

MARKS: 100

The marking guidelines consist of 10 pages.

GRADE 10
Marking Guideline

QUESTION 1

1.1	Range = Max – Min = 45 – 3 = 42 **Answer only, full marks**	✓A substitution ✓CA answer (only if subst was shown) (2)
1.2	$\bar{x} = \frac{356}{15}$ = 23,73 **Answer only, full marks**	✓A 356 ✓CA answer (only if divided by 15) (2)
1.3	Min = 3 Q_1 = 13 Q_2 = 18 Q_3 = 40 Max = 45	✓A Min and Max ✓A Q_2 ✓A Q_1 and Q_3 (3)
1.4		✓CA Min and Max ✓CA Q_2 ✓CA Q_1 and Q_3 (3)
1.5	IQR = $Q_3 - Q_1$ = 40 – 13 = 27 **Answer only, full marks**	✓A formula ✓CA substitution ✓CA answer (3)
		[13]

QUESTION 2

2.1	$20 \le x < 30$	✓A answer (1)
2.2	$30 \le x < 40$	✓A answer (1)
2.3	$\bar{x} = \frac{(25\times29)+(35\times28)+(45\times21)+(55\times15)+(65\times10)+(75\times2)}{105}$ $= \frac{4275}{105}$ = 40,71 **Answer only, full marks**	✓A midpoints ✓CA 4275 ✓A 105 ✓CA answer (4)
	Penalise for Rounding here	**[6]**

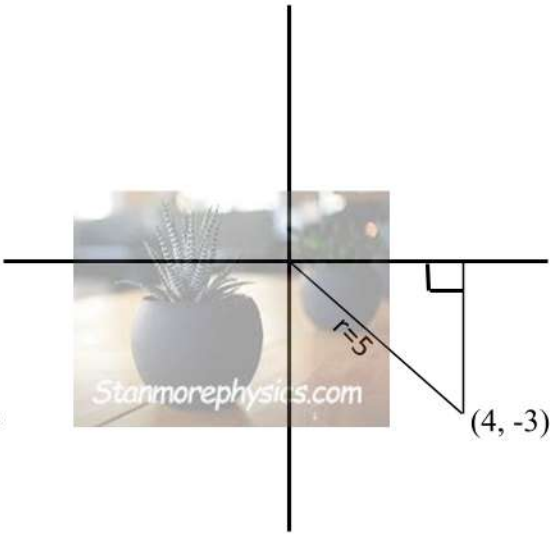
GRADE 10
Marking Guideline

QUESTION 3

3.1	$M_{AC}\left(\frac{x_1+x_2}{2};\frac{y_1+y_2}{2}\right)$ $R\left(\frac{2+(-3)}{2};\frac{-1+0}{2}\right)$ $R\left(\frac{-1}{2};\frac{-1}{2}\right)$ **Answer only, full marks**	✓A substitution ✓CA $x-$value ✓CA $y-$value On condition the coordinates of A and C are used ONLY (3)
3.2	$m_{AB}=\frac{y_2-y_1}{x_2-x_1}$ $m_{AB}=\frac{2-0}{0-(-3)}$ $m_{AB}=\frac{2}{3}$ **Answer only, full marks**	✓A substitution ✓CA answer (2)
3.3	$AC=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $AC=\sqrt{(2-(-3))^2+(-1-0)^2}$ $AC=\sqrt{26}$	✓A formula ✓A substitution ✓CA answer (3)
3.4	$BR=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $BR=\sqrt{\left(\frac{-1}{2}-0\right)^2+\left(\frac{-1}{2}-2\right)^2}$ $BR=\frac{\sqrt{26}}{2}$ $Area\ of\ ABCD=2\left(\frac{1}{2}(AC)(BR)\right)$ $=\left(\sqrt{26}\right)\left(\frac{\sqrt{26}}{2}\right)$ $=13 units^2$	✓CA substitution ✓CA distance of BR ✓CA area of $\Delta\times 2$ ✓CA substitution ✓CA answer

	OR $d_{AD} = \sqrt{(-3+1)^2 + (0+3)^2}$ $= \sqrt{13}$ $d_{DC} = \sqrt{(-1-2)^2 + (-3+1)^2}$ $= \sqrt{13}$ $Area\ of\ ABCD = base \times height$ $= d_{AD} \times d_{DC}$ $= \sqrt{13} \times \sqrt{13}$ $= 13\ units^2$	**OR** ✓CA length of AD ✓CA length of DC ✓A formula for area ✓CA substitution ✓CA answer
	OR $diagonal\ AC\ \&\ BD = \sqrt{26}\ units$ $Area\ of\ ABCD = \frac{1}{2}(d_{AC} \times d_{BD})$ $= \frac{1}{2}(\sqrt{26} \times \sqrt{26})$ $= 13\ units^2$	**OR** ✓CA✓CA subst & length of DB ✓A formula for area ✓CA substitution ✓CA answer (5)
		[13]

QUESTION 4

4.1	$\tan\theta = \frac{-3}{4}$  $r^2 = x^2 + y^2$ $r^2 = 4^2 + (-3)^2$ $r = 5$ $\therefore \sin\theta = \frac{-3}{5}$	✓A $\tan\theta = \frac{-3}{4}$ ✓A value of r ✓CA answer (3)

4.2	$10\cos^2\theta$ $=10\left(\frac{4}{5}\right)^2$ $=\frac{32}{5}$ **OR** $\frac{10}{\sec^2\theta}$ $=\frac{10}{\left(\frac{5}{4}\right)^2}$ $=\frac{32}{5}$		✓CA substitution ✓CA answer **OR** ✓CA substitution ✓CA answer (2)
4.3	$3\cot\theta+5\sin\theta$ $=3\left(\frac{-4}{3}\right)+5\left(\frac{-3}{5}\right)$ $=-4-3$ $=-7$ **OR** $\frac{3}{\tan\theta}+5\sin\theta$ $=\frac{3}{\left(\frac{-3}{4}\right)}+5\left(\frac{-3}{5}\right)$ $=-4-3$ $=-7$	**Answer only, max 2/3** **See notes on last page** **Answer only, max 2/3** **See notes on last page**	✓CA $\frac{-4}{3}$ ✓CA simplification ✓CA answer **OR** ✓CA $\frac{-3}{4}$ ✓CA simplification ✓CA answer (3)
			[8]

QUESTION 5

5.1.1	$\cos x=\frac{2}{3}$ $x=\cos^{-1}\left(\frac{2}{3}\right)$ $x=48{,}19^\circ$	**Answer only, full marks**	✓A simplification using arc cos ✓A answer (2)

5.1.2	$\frac{4}{\cot x}=2$ $\cot x=2$ $\frac{1}{\tan x}=2$ $\tan x=\frac{1}{2}$ $x=26,57°$	✓A $\cot x=2$ ✓A $\frac{1}{\tan x}=2$ ✓CA answer (3)
5.2	$\frac{\tan 45°.\cos ec60°}{\cot 30°.\cos^2 45°}$ $=\frac{(1)\left(\frac{2}{\sqrt{3}}\right)}{(\sqrt{3})\left(\frac{\sqrt{2}}{2}\right)^2}$ $=\frac{\frac{2}{\sqrt{3}}}{\frac{2\sqrt{3}}{4}}$ $=\frac{4}{3}$ **See notes on last page** **OR** $\frac{\tan 45° \tan 30°}{\sin 60° \cos^2 45°}$ $=\frac{(1)\left(\frac{1}{\sqrt{3}}\right)}{\frac{\sqrt{3}}{2}\left(\frac{\sqrt{2}}{2}\right)^2}$ $=\frac{\frac{1}{\sqrt{3}}}{\frac{2\sqrt{3}}{8}}$ $=\frac{4}{3}$ **See notes on last page**	✓A $\frac{2}{\sqrt{3}}$ ✓A $\sqrt{3}$ ✓A $\left(\frac{\sqrt{2}}{2}\right)^2$ ✓CA simplification ✓CA answer **OR** ✓A $\frac{1}{\sqrt{3}}$ ✓A $\frac{\sqrt{3}}{2}$ ✓A $\left(\frac{\sqrt{2}}{2}\right)^2$ ✓CA simplification ✓CA answer (5)

5.3.1	$\cos(x+y)$ $=\cos\left(56,3^\circ+97,5^\circ\right)$ $=\cos\left(153,6^\circ\right)$ $=-0,90$	✓A substitution ✓CA answer (2)
5.3.2	$\frac{2\sin^2 x-2}{\cos y}$ $=\frac{2\left(\sin 56,3^\circ\right)^2-2}{\cos 97,5^\circ}$ $=4,72$	✓A substitution in numerator ✓A substitution in denominator ✓CA answer (3)
		[15]

QUESTION 6

6.1	$p=2$ $q=1$	✓A ✓A (2)
6.2	$amplitude=1$	✓A (1)
6.3	$-2\le y\le 2$ **OR** $y\in[-2,2]$	✓A interval ✓A notation **OR** ✓A interval ✓A notation (2)
6.4	$0^\circ < x < 180^\circ$ **OR** $x\in(0^\circ;180^\circ)$	✓A interval ✓A notation **OR** ✓A interval ✓A notation (2)
6.5	$h(x)=-\cos x+1$	✓A $-\cos x$ ✓CA $+1$ (2)
		[9]

GRADE 10
Marking Guideline

QUESTION 7

7.1	$\frac{AE}{ED} = \sin 22^o$ $AE = 800.\sin 22^o$ $AE = 299,69cm$ $\therefore BE = 299,69 + 155$ $BE = 454,69cm$	✓A correct trig ratio ✓A AE=299,69 ✓ CA 299,69 + 155 ✓CA answer (4)
7.2	$\frac{AD}{ED} = \cos 22^o$ $AD = 800\cos 22^o$ $AD = 741,75$ $\therefore AD = BC\ (opposite\ sides\ of\ a\ rectangle)$ $BC = 741,75\ cm$ **OR** $AD^2 + AE^2 = ED^2$ $AD^2 + (299,69)^2 = (800)^2$ AD=741,75 $BC = 741,75cm$	✓A correct trig ratio ✓CA AD= 741,75 ✓CA answer **OR** ✓CA substitution ✓CA AD=741,75 ✓CA answer (3)
		[7]

QUESTION 8

8.1	$d = 2r$ $16 = 2r$ $r = 8$ $V = \frac{4}{3}\pi r^3$ $V = \frac{4}{3}\pi(8)^3$ $V = 2144,66\ mm^3$	✓A $r=8$ ✓A substitution ✓CA answer (3)
8.2	$r = 2 \times 8\,mm$ $= 16\,mm$ $V_{new} = \frac{4}{3}\pi(16)^3$ $= 17157,28467....$ $ratio = \frac{V_{new}}{V_{old}}$ $ratio = \frac{17157,28467}{2144,66}$ $ratio = \frac{8}{1}$ $\therefore V_{new} : V_{old} = 8 : 1$ **OR** $\frac{4}{3}\pi(16)^3 : \frac{4}{3}\pi(8)^3$ $(16)^3 : (8)^3$ $16^3 : 8^3$ $4096 : 512$ $8 : 1$	✓A substitution with new r ✓CA division of volumes ✓CA answer **OR** ✓A $\frac{4}{3}\pi(16)^3$ ✓CA simplification ✓CA answer (3)
		[6]

GRADE 10
Marking Guideline

QUESTION 9

9.1	In ΔWXY and ΔYZW 1) WY is common 2) $\hat{Y}_1 = \hat{W}_2$ (Alternate angles WZ // XY) 3) $\hat{X} = \hat{Z}$ (Given) $\therefore \Delta WXY \equiv \Delta YZW$ $(\angle, \angle, S)$ $XY = WZ$ $(\Delta WXY \equiv \Delta YZW)$ $\therefore$ WXYZ is a parallelogram (one pair of sides equal and //)	✓A ✓A ✓A ✓A ✓A ✓A	S S/R R S/R R (5)
9.2.1(a)	$\hat{B} = 180° - 120°$ (co-interior angles AD // BC) $\hat{B} = 60°$ **Penalise for parallel lines here**	✓A ✓A	S/R answer (2)
9.2.1(b)	$\hat{A} = \hat{C}$ opposite sides of a parm $\hat{C}_1 = 120°$ $\hat{C}_2 = 60°$ angles on a str. line **OR** $\hat{C}_2 = 180° - 120°$ (corr. angles AB//DC) $\hat{C}_2 = 60°$	✓A ✓A **OR** ✓A ✓A	S/R S **OR** S/R answer (2)
9.2.2	$\hat{E} = \hat{C}_2$ angles opposite equal sides $\hat{E} + \hat{C}_2 + \hat{D}_2 = 180°$ sum of Δ $4x = 180° - 120°$ $4x = 60°$ $x = 15°$	✓A ✓A ✓A ✓A	S/R R substitution answer (4)
			[13]

GRADE 10
Marking Guideline

QUESTION 10

10.1	In ΔXGZ F and H are midpoints (Given) $\therefore$ HF//GZ (midpoint theorem) FE//YZ (same straight line) In ΔXYG H is the midpoint EH//YG (Proved) $\therefore$ E is the midpoint (line through midpt // to second side)	✓A S/R ✓A S ✓A R (3)
10.2	$X\hat{E}H = 90°$ (corr. angles EF//YZ) $\text{Area} = \frac{1}{2}(EH)(XE)$ $9,5 = \frac{1}{2} \times 3,5 \times XE$ $XE = \frac{38}{7} = 5,43$ $\therefore XY = \frac{76}{7} = 10,86cm$	✓A R ✓A Sub Corr formula ✓A $\frac{38}{7} = 5,43$ ✓CA $\frac{76}{7} = 10,86$ (4)
10.3	YG = 7 (midpt theorem) YZ = 14 (YG = GZ) $\text{Area} = \frac{1}{2} \times 14 \times \frac{76}{7}$ Area = $76cm^2$	✓A S ✓CA sub ✓CA answer (3)
		[10]

TOTAL: 100

NOTES:

QUESTION 4.3
Learners must show the **simplification** step to be awarded full marks.

QUESTION 5.2
Learners must show the **simplification** step to be awarded full marks.