Grade 11 Mathematics: Memorandum Paper 2

1.1.1 $AB = \sqrt{(5-2)^2 + (4-0)^2}$ ✔
$= \sqrt{25}$
$=5$ ✔ 2

1.1.2 Both points have the same x-value therefore
$x = 4$ ✔ 1

1.1.3 $m = \frac{5-2}{4-0} = \frac{3}{4}$ ✔
$\therefore y = \frac{3}{4}x + 2$ ✔ 2

1.1.4 $\tan\theta = \frac{3}{4}$ ✔
$\therefore \theta = 36{,}87^\circ$ ✔ 2

1.2 $m = \frac{2}{3}$ ✔ ✔ 2

1.3.1 0,81 ✔ 1

1.3.2 -1,92 ✔ ✔ 2

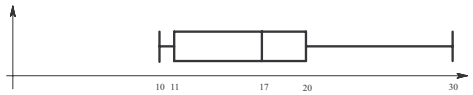
1.4 $\frac{-\sin A}{\cos A}$ ✔ ✔
$= -\tan A$ ✔ 3

1.5 $\tan 2x = \frac{1}{3}$ ✔
$\therefore$ Reference angle: 18,43° ✔
$\therefore 2x = 18{,}43^\circ + 180^\circ n$ ✔
$\therefore x = 9{,}22^\circ + 90^\circ n$ ✔ n ε Z ✔
$\therefore x = 9{,}22^\circ$ or 99,22° or 189,22° 4

1.6.1 $\frac{KT}{\sin 40^\circ} = \frac{5}{\sin 60^\circ}$ ✔ ✔
$\therefore$ KT = 3,71 cm ✔ 3

1.6.2 $PT^2 = 7^2 + 5^2 - 2(7)(5)\cos 30^\circ$ ✔ ✔
$\therefore$ PT = 3,66 cm ✔ 3

1.7 Basic shape ✔
Minimum = 10 ✔
Median and lower quartile ✔
Upper quartile and maximum ✔
Scale shown ✔



5

1.8 h = 12 ✔ (Pythagoras)
$V = \frac{1}{3}\pi r^2 h$
$= \frac{1}{3}\pi(5)^2(12)$ ✔
$= 314.16\ mm^3$ ✔ 3

2.1 Diagonals are equal ✔
Adjacent sides are perpendicular ✔ 2

2.2 $AC = \sqrt{(21-0)^2 + (20-5)^2}$ ✔
$= \sqrt{666}$ ✔
$BD = \sqrt{(11-10)^2 + (25-0)^2}$ ✔
$= \sqrt{626}$ ✔

2.3 $m_{AB} = \frac{25-20}{11-0} = \frac{5}{11}$ ✔ ✔
$m_{AD} = \frac{20-0}{0-10} = -2$ ✔ ✔ 4

2.4 No
AC and BD are not equal diagonals. ✔
$m_{AB} \cdot m_{BC} = -1 \times$ ∴ AB and BC are not perpendicular to each other. ✔ 2

3.1 $A'(-5;3)$ ✔ ✔
$B'(-4;8)$ ✔ ✔
$C'(-2;2)$ ✔ 5

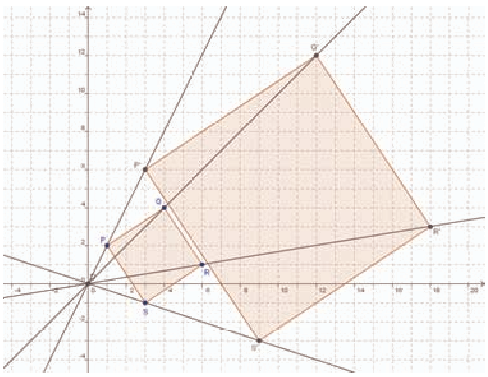
3.2 $(-y\ ;\ x)$ ✔ ✔ 2

3.3 Midpoint of BB′ is $(\frac{8-4}{2};\frac{4+8}{2}) = (2;6)$ ✔ ✔
$m_{BB'} = -\frac{1}{3}$ ✔
Equation of perpendicular:
$y = 3x + c$ ✔
$\therefore 6 = 6 + c$ ✔
$\therefore 0 = c$
$\therefore y = 3x$ 5

3.5 Ay point of intersection $-4x = 3x$ ✔
$\therefore 7x = 0$
$\therefore x = 0$ ✔
$\therefore y = 0$ ✔
$\therefore$ (0 ; 0) is the point of intersection of AA′ and BB′. 3

3.6 $A''(-3;-5)$ ✔
$B''(8;-4)$ ✔
$C''(2;-2)$ ✔ 3

4.1



$P'(3;6)$ ✔
$Q'(12;12)$ ✔
$R'(18;3)$ ✔
$S'(9;-3)$ ✔
Lines of enlargement ✔ ✔
P′Q′R′S′ on graph ✔ 7

4.2 $PQ = \sqrt{(3-1)^2 + (4-2)^2} = \sqrt{13}$ ✔

$P'Q' = \sqrt{(3\times3-12)^2 + (6-12)^2} = \sqrt{117}$ ✔

$\sqrt{9\times13} = 3\sqrt{13}$

Area $PQRS = \sqrt{13}\times\sqrt{13} = 13$ ✔

Area $P'Q'R'S' = 3\sqrt{13}\times3\sqrt{13}$ ✔

$= 9\times 13 = 117$

The length of the sides of $PQRS$ increase by a factor of 3 to give the length of the sides of $P'Q'R'S'$. ✔

The area of $PQRS$ increased by a factor of 9 to give the area of $P'Q'R'S'$. This is 3^2 i.e the square of the increase of the length of the sides. ✔ 6

5.1.1 $\dfrac{-\tan x.\cos x}{-\sin x} - \dfrac{\tan x}{-\sin x}$ ✔✔✔✔

$= \dfrac{\sin x}{\cos x}.\dfrac{\cos x}{\sin x} + \dfrac{\sin x}{\cos x}.\dfrac{1}{\sin x}$ ✔

$1 + \dfrac{1}{\cos x}$ or $\dfrac{\cos x+1}{\cos x}$ ✔ 6

5.1.2 $\dfrac{-\cos 60^\circ}{\tan 45^\circ}$ ✔✔

$= \dfrac{-\frac{1}{2}}{1}$ ✔✔

$-\dfrac{1}{2}$ 4

5.2.1 $\cos x\,(2\cos x - 1)$ ✔ 1

5.2.2 $\cos x = 0$ ✔

$\therefore x = 90^\circ + 360^\circ n$ or $270^\circ + 360^\circ n$ ✔ $n \in Z$ (add on the period of the cos graph i.e.360°n to get general solution)

OR

$\cos x = \dfrac{1}{2}$ ✔

$\therefore x = 60^\circ + 360^\circ n$ or $300^\circ + 360^\circ n$ ✔, $n \in Z$ ✔ 5

5.3.1 $\sin(180^\circ+58^\circ) = -\sin 58^\circ$ ✔ $= -k$ ✔ 2

5.3.2 $\sin^2 58^\circ + \cos^2 58^\circ = 1$ ✔

$\therefore \cos^2 58^\circ = 1 - k^2$

$\cos 58^\circ = \sqrt{1-k^2}$ ✔✔ 3

6.1 0,5 or $\dfrac{1}{2}$ ✔ 1

6.2 Sipho, Ray and Vishnu get - 0,17 ✔✔

Lorraine gets 0,23 ✔✔ 4

6.3 $\dfrac{1-\dfrac{\sin^2\theta}{\cos^2\theta}}{1+\dfrac{\sin^2\theta}{\cos^2\theta}}$ ✔

$= \dfrac{\cos^2\theta - \sin^2\theta}{\cos^2\theta + \sin^2\theta}$ ✔ 7

$\cos^2\theta - \sin^2\theta$ ✔

$1 - \sin^2\theta - \sin^2\theta \quad 1 - 2\sin^2\theta$ ✔✔

or $\cos^2\theta - (1 - \cos^2\theta) \quad 2\cos^2\theta - 1$ ✔✔

7.1 39,69 cm ✔ 1

7.2 $\sin 18x = -\dfrac{3}{5}$ ✔

Reference angle is 36,87° ✔

$18x = 216,87 + 360^\circ n$

$x = 12 + 20^\circ n$ ✔

OR

$18x = 323,13 + 360^\circ n$

$x = 18 + 20^\circ n$ ✔

$\therefore x = 12$, 18, 32 or 38 ✔✔ 6

8.1 $y - x$ ✔✔ 2

8.2 In ΔPAB:

$\dfrac{PB}{\sin(90^\circ + x)} = \dfrac{5}{\sin(y-x)}$ ✔✔

$PB = \dfrac{5\cos x}{\sin(y-x)}$ ✔ 3

8.3 In ΔPBT:

$\sin y = \dfrac{PT}{PB}$ ✔

$PT = \dfrac{5\cos x\sin y}{\sin(y-x)}$ ✔ 2

9.1 $\dfrac{1}{2}bc\sin x$ ✔ 1

9.2 $D\hat{A}K = 360 - 90 - 90^\circ - x =$

$180^\circ - x$ ✔

$DAK = \dfrac{1}{2}bc\sin(180^\circ - x)$ ✔

$= \dfrac{1}{2}bc\sin x$ ✔

$= \Delta ABC$ 3

10.1 Sum of lengths is 42,4 ✔

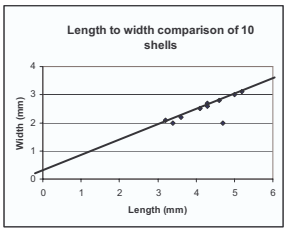
Mean length is 4,24 ✔ 2

10.2

Length (cm)	$x_i - \bar{x}$	$(x_i - \bar{x})^2$
3,2	-1,04	1,0816
3,6	-0,64	0,4096
5	0,76	0,5776
4,1	-0,14	0,0196
4,3	0,06	0,0036
4,7	0,46	0,2116
3,4	-0,84	0,7056
5,2	0,96	0,9216
4,6	0,36	0,1296
4,3	0,06 ✔✔	0,0036 ✔✔
		4,064 ✔

Standard deviation = $\sqrt{\dfrac{4,064}{9}} = 0,67$ ✔ 6

10.3

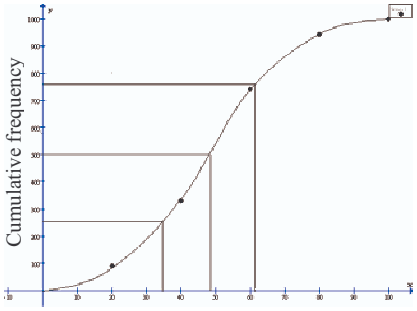


$y = \frac{1}{2}x + \frac{1}{2}$ ✔ ✔

Line on graph ✔ 3

11.1 90, 330, 740, 940, 1000 ✔ ✔ 2

11.2 Length of pebble/cumulative frequency graph



Length of pebble

✔ Values plotted at ends of intervals
✔ ✔ Accurate points
✔ Accurate curve
✔ Labels (Length of shell, cumulative frequency, title) 5

11.3 Median: 49 (47 – 51) ✔
Upper quartile: 61 (59 – 63) ✔
Lower quartile: 35 (33 – 37) ✔ 3