KZN12 SUGGESTED ANSWERS
MATHEMATICS SUPPORT PAPER 2

1.1 $m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{11-2}{-1+4}$

$= 3$

1.2 $m_{BC} = \frac{2-1}{-4+1}$

$= -\frac{1}{3}$

$m_{AB} \times m_{BC}$

$= 3 \times \left(-\frac{1}{3}\right)$

$= -1$

$\therefore AB \perp BC$

1.3 $Area = \frac{1}{2}.BC.AB$

$= \frac{1}{2}\sqrt{(-4+1)^2 + (2-1)^2}.\sqrt{(-1+4)^2 + (11-2)^2}$

$= 15$ units^2

1.4 $m_{AD} = \frac{p-11}{2+1} = \tan 135^0$

$p - 11 = -3$

$p = 8$

1.5 $y - y_1 = m(x - x_1)$

$(-1;11)$ $y - 11 = -\frac{1}{3}(x+1)$

$y = -\frac{1}{3}x - \frac{1}{3} + 11$

$= -\frac{1}{3}x + \frac{32}{3}$

1.6 $\tan\theta_1 = m_{AB}$ and $\theta_2 = 135^0$

$= 3$

$\theta_1 = 71,57^0$

$\theta = 135^0 - 71,57^0$

$= 63,43^0$

1.7 $E(-4;4)$

2.1 $r = \sqrt{(-1-2)^2 + (3+1)^2}$

$= \sqrt{25}$

$= 5$

2.2 $(x-2)^2 + (y+1)^2 = 25$

$x^2 - 4x + 4 + y^2 + 2y + 1 - 25 = 0$

$x^2 + y^2 - 4x + 2y - 20 = 0$

2.3 $(x-2)^2 + (y+1)^2 = 25$

$(x-2)^2 + 1 = 25$

$(x-2)^2 = 24$

$x - 2 = \sqrt{24}$

$x = 2 + \sqrt{24}$

$= 6,9$

$B(6,9;\ 0)$

2.4 $m_{QM} = \frac{3+1}{-1-2}$

$= -\frac{4}{3}$

2.5 $y - y_1 = m(x - x_1)$

$(-1;3)$ $y - 3 = \frac{3}{4}(x+1)$

$y = \frac{3}{4}x + 3\frac{3}{4}$

2.6 $(-7;k)$ $k = \frac{3}{4}(-7) + \frac{15}{4}$

$k = -\frac{3}{2}$

2.7 $A\left(-4;\frac{3}{4}\right)$ *and* $(-1;3)$

$(x+4)^2 + \left(y - \frac{3}{4}\right)^2 = 9 + \frac{81}{4}$

$= \frac{225}{16}$

3.1.1 $P'\left(\sqrt{5};-2\right)$

3.1.2 $\left(2;-\sqrt{5}\right)$

3.2 $(-2y\ ;\ 2x)$

3.3.1 $A(1;2)$; $B'(2;4)$; $C'(4;3)$; $D'(2;1)$

3.3.2 $(6;3)$

3.3.4 40,5 units^2

3.3.5 $\frac{1}{3}$

4.1 $(x\cos\theta - y\sin\theta\ ;\ y\cos\theta + x\sin\theta)$

$= \left(x\cos 60^0 - -y\sin 60^0; y\cos 60^0 + x\sin 60^0\right)$

$= \left(\frac{1}{2}x - \frac{\sqrt{3}}{2}y\ ;\ \frac{1}{2}y + \frac{\sqrt{3}}{2}x\right)$

4.2 $(x\cos\theta - y\sin\theta\ ;\ y\cos\theta + x\sin\theta)$

$= \left(x\cos\left(-60^0\right) - -y\sin\left(-60^0\right); y\cos\left(-60^0\right) + x\sin\left(-60^0\right)\right)$

$= \left(\frac{1}{2}x + \frac{\sqrt{3}}{2}y\ ;\ \frac{1}{2}y - \frac{\sqrt{3}}{2}x\right)$

$= \left(2 + \frac{5\sqrt{3}}{2}\ ;\ \frac{5}{2} - 2\sqrt{3}\right)$

5.1.1 $\cos\left(180^0 + 17^0\right)$

$= -\cos 17^0$

$= -m$

5.1.2 $\sin\left(180^0 - 17^0\right)$

$= \sin 17^0$

$= \sqrt{\sin^2 17^0}$

$= \sqrt{1 - \cos^2 17^0}$

$= \sqrt{1 - m^2}$

5.1.3 $\frac{\cos 17^0}{\tan 17^0} + \frac{\sin 17^0}{1}$

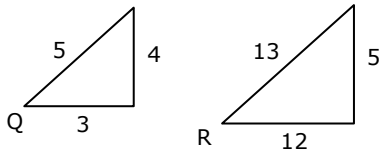
$= \frac{\cos 17^0}{\frac{\sin 17^0}{\cos 17^0}} + \sin 17^0$

$= \frac{\cos^2 17^0}{\sin 17^0} + \frac{\sin 17^0}{1}$

$= \frac{\cos^2 17^0 + \sin^2 17^0}{\sin 17^0}$

$= \frac{1}{\sin 17^0} = \frac{1}{\sqrt{1 - m^2}}$

5.2 $\sin Q = \frac{4}{5}$ and $\sin R = \frac{5}{13}$



$P = 180^0 - (Q + R)$

$\sin P = \sin\left[180^0 - (Q + R)\right]$

$= \sin(Q + R)$

$= \sin Q\cos R + \cos Q\sin R$

$= \left(\frac{4}{5} \times \frac{24}{25} + \frac{3}{5} \times \frac{7}{25}\right)$

$= \frac{117}{125}$

5.3 $\frac{2\cos\left(90^0 + 15^0\right).\cos 15^0}{\cos\left(30^0 - x + x\right)}$

$= \frac{-2\sin 15^0.\cos 15^0}{\cos 30^0}$

$= \frac{-\sin 30^0}{\cos 30^0}$

$= -\tan 30^0$

$= -\frac{\sqrt{3}}{3}$

6.1.1 $\sin 2x = 1$ or $\sin x = \cos x$

$2x = 90^0$ tanx=1

$x = 45^0$

6.1.2 L.H.S $= \frac{2\sin^2 x - 2\sin x\cos x}{\sin^2 x - 2\sin x\cos x + \cos^2 x}$

$= \frac{2\sin x(\sin x - \cos x)}{(\sin x - \cos x)^2}$

$= \frac{2\sin x}{\sin x - \cos x}$

= R.H.S

6.2.1 $\sin 2x + \cos^2 x - \sin^2 x + \sin^2 x$

$= 2\sin x\cos x + \cos^2 x$

$= \cos x(2\sin x + \cos x)$

6.2.2 $\cos x(2\sin x + \cos x) = 0$

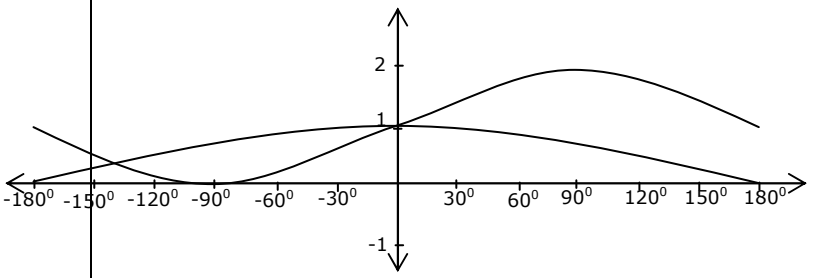
$\cos x = 0$ *or* $2\sin x = -\cos x$

$x = 90^0 + k.360^0$ $\tan x = -\frac{1}{2}$

$x = 153.43^0 + k.180^0$

where k $\in \mathbb{Z}$.

7.1



7.2.1 $\left[0^0; 90^0\right)$

7.2.2 $\cos\frac{1}{2}x(\sin x + 1) = 0$

$x = -180^0$ or x=-90⁰ or x=180⁰

8.1 $\Delta PAC \equiv \Delta PBC$ $(S.A.S)$

8.2 $\cos y = \frac{p}{PA}$

$PA = \frac{p}{\cos y}$

8.3 $B\hat{P}A = 180^0 - (P\hat{A}B + P\hat{B}A)$

$= 180^0 - 2x$

8.4 $$\frac{AB}{\sin(180^0 - 2x)} = \frac{PA}{\sin x}$$

$$AB = \frac{PA.\sin 2x}{\sin x}$$

$$= \frac{p.2\sin x \cos x}{\cos y.\sin x}$$

$$= \frac{2p\cos x}{\cos y}$$

8.5.1 $$AB = \frac{2.100.\cos 64,2^0}{\cos 17,3^0}$$

$= 91$ metres.

8.5.2 $$\tan y = \frac{PC}{p}$$

$$\tan 17,3^0 = \frac{PC}{100}$$

$$PC = 100\tan 17,3^0$$

$= 31$ metres.

9.1 55,92%

9.2 11,43%

9.3 130,74

9.4 6 scores between 44,49 and 67,35.

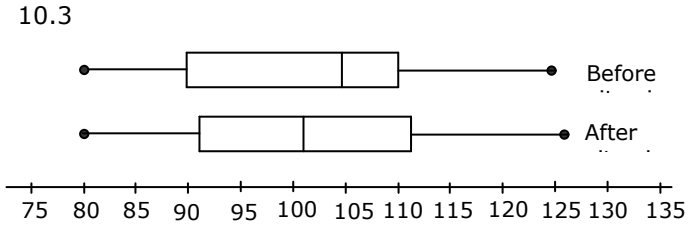
10.1

12	5
11	**0** 2 6
10	1 2 **5** 5 6 7
9	**0** 5
8	0 3 7

median 105.

10.2 lower : 90
upper : 110

10.3

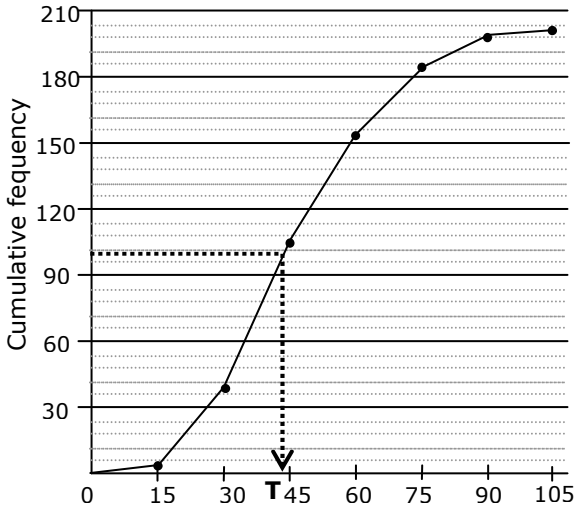


10.4 No. The minimum and maximum values does not show any significant change in the performances of the learners.The slight increase in the maximum score could be attributed to other factors. Before the vitamins were taken the scores were negatively distributed whereas after the vitamins the scores where more evenly distributed about the mean.

11.1

TIME in minutes	FREQUENCY	CUMULATIVE FREQUENCY
0 < d ≤ 15	3	3
15 < d ≤ 30	37	40
30 < d ≤ 45	65	105
45 < d ≤ 60	49	154
60 < d ≤ 75	31	185
75 < d ≤ 90	13	198
90 < d ≤ 105	2	200

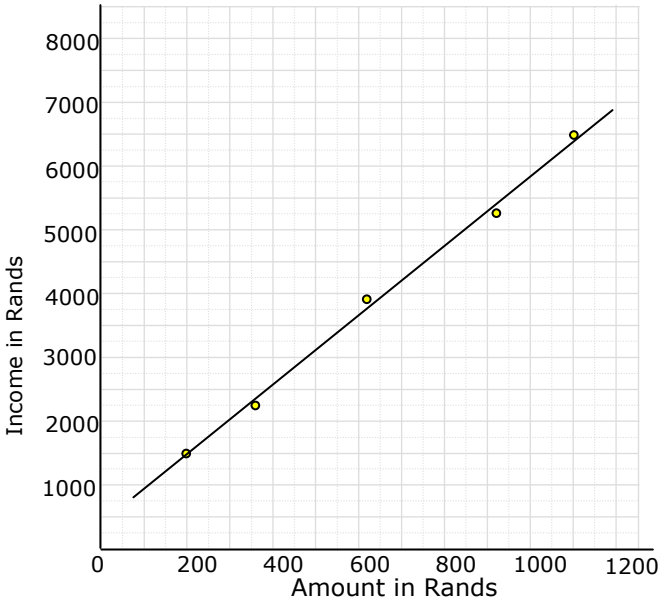
11.2



11.3 done on graph

11.4 46,125

12.1



12.2 done on graph

12.3 The higher the income the more money was spent on telephone calls.