Paper B

Non-Calculator

1. $3(2x-4)-4(3x+1)$
$= 6x-12 \checkmark -12x-4 \checkmark$
$= -6x-16 \checkmark$ (3)

2. $(3x^2-5x-2)$
$= (3x+1)(x-2)$ ✓ ✓ (2)

3. $1\frac{5}{8} \div \frac{3}{4}$

$= \frac{13}{\cancel{8}_2} \times \frac{\cancel{4}^1}{3}$ ✓

$= \frac{13}{6} = 2\frac{1}{6}$ ✓ (2)

4.
$5x-4 < 2(1-2x)$
$5x-4 < 2-4x$ ✓ (3)
$9x < 6$ ✓
$x < \frac{6}{9}$
$x < \frac{2}{3}$ ✓

5. (0, 12) (90, 82)

$m = \frac{82-12}{90-0} = \frac{70}{90} = \frac{7}{9}$ ✓

$g-12 = \frac{7}{9}(h-12)$ ✓ (3)

$9g-108 = 7h-84$

$9g-7h-24 = 0$ ✓

6. $f(4) = 3^4$ ✓

$= \underline{81}$ ✓ (2)

7. $3\begin{pmatrix} 2 \\ 4 \\ 5 \end{pmatrix} + 2\begin{pmatrix} -4 \\ 2 \\ 0 \end{pmatrix}$

$= \begin{pmatrix} 6 \\ 12 \\ 15 \end{pmatrix} + \begin{pmatrix} -8 \\ 4 \\ 0 \end{pmatrix}$ ✓

$= \begin{pmatrix} -2 \\ 16 \\ 15 \end{pmatrix}$ ✓ (2)

8. $a = 2$ ✓ $b = 4$ ✓ (2)

9. $y = k(x+1)(x-3)$ $(0, -6)$

b) $-6 = k(0+1)(0-3)$ ✓

$-6 = -3k$

$k = 2$ ✓ (2)

a) $a = -1$ ✓, $b = 3$ ✓ (2)

c) x-value $\frac{-1+3}{2} = 1$ ✓

$y = 2(1+1)(1-3)$

$y = -8$

$(1, -8)$ ✓ (2)

Paper B (NC)

10. $\cos 60° = 0.5$

$\cos 240° = -\cos 60° = \underline{-0.5}$ ✓ (1)

11. a) $2x + 3y = 580$ ✓ (1)

b) $x + y = 250$ ✓ (1)

c) $2x + 3y = 580$ — ①
$x + y = 250$ — ② ✓

② × 2 $= 2x + 2y = 500$ — ③ ✓

① − ③ $y = 80$ ✓ (4)

$x + 80 = 250$
$x = 170$
$\underline{170}$ tickets sold to member ✓

12 $O\hat{S}P = 28°$ ✓
$O\hat{S}R = 90°$
$P\hat{S}R = 118°$ ✓ (3)
$Q\hat{R}S = 180° - (118° + 28°) = 34°$ ✓

13. $4x + 3y = 12$

a) $3y = -4x + 12$
$y = \frac{-4}{3}x + 4$ ✓ (2)

$m = \frac{-4}{3}$ ✓

b) x-axis $y = 0 \Rightarrow -\frac{4}{3}x + 4 = 0$ ✓ (2)

$-\frac{4}{3}x = -4 \Rightarrow x = 3$ ✓

14.

$$\frac{\sin^2 A}{1-\sin^2 A}$$

$$= \frac{\sin^2 A}{\cos^2 A} = \frac{(\sin A)^2}{(\cos A)^2}$$ ✓

$$= \tan^2 A \quad \text{as } \frac{\sin A}{\cos A} = \tan A$$ ✓ (2)

15. a) $BC = CD$

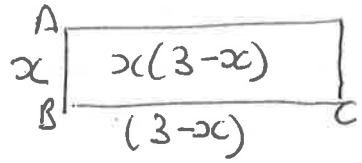
$2x + BC + CD = 6$

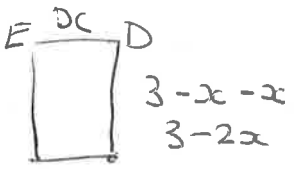
$2x + 2BC = 6$ ✓

$x + BC = 3$

$BC = 3 - x$ ✓ (2)

b)





$x(3-2x)$

✓ ✓

Area = $x(3-x) + x(3-2x)$

$= 3x - x^2 + 3x - 2x^2$

$= \underline{6x - 3x^2}$ ✓ (3)

c) $3x(2-x)$

roots $x = 0$, $x = 2$ ✓

Max Tpt $x = 1$ ✓

(3)

$\therefore$ Max area $= 6 \times 1 - 3 \times 1^2$

$= 6 - 3$

$= \underline{3\ m^2}$ ✓

Paper B - Calculator

1. $x^2 + 14x - 19$

$= (x+7)^2 - 19 - 49$ ✓

$= (x+7)^2 - 68$ ✓ (2)

2. £150 ÷ 1.175 ✓

$= £127.659...$ ✓ (3)

$= £127.67$ ✓

3. $\begin{pmatrix} -5 \\ -3 \\ 4 \end{pmatrix}$ $|\underline{v}| = (-5)^2 + (-3)^2 + 4^2$ ✓

$= 25 + 9 + 16$ ✓

$= \underline{\underline{50}}$ (2)

4. $\bar{x} = \frac{49+44+41+52+47+43}{6} = 46$

a)

mean $= \underline{\underline{46}}$ ✓ (1)

b)

x	$x - \bar{x}$	$(x-\bar{x})^2$
49	3	9
44	-2	4
41	-5	25
52	6	36
47	1	1
43	-3	9

$\Sigma (x-\bar{x})^2 = 84$

$sd = \sqrt{\frac{\Sigma (x-\bar{x})^2}{n-1}}$

$= \sqrt{\frac{84}{5}}$ ✓

$= \underline{\underline{4.01}}$ ✓

(3)

4 c) S.d of milk = 4.01

Since the S.d. of price of milk is higher than the S.d. of price of sugar then the price of sugar is more consistent. ✓ (1)

5 $Q = p^2 + 3T$

$Q - p^2 = 3T$ ✓ (2)

$T = \frac{Q - p^2}{3}$ ✓

6.

$2 + 3\sin x = 0$

$3\sin x = -2$

$\sin x = \frac{-2}{3}$ ✓

$\sin^{-1}\left(\frac{2}{3}\right) = 41.8$ ✓

Solutions in 3rd + 4th quadrants

$x = \underline{\underline{221.8^\circ}}$ or $\underline{\underline{318.2^\circ}}$ ✓ (3)

7. $(1.05)^3 \times 90\,000 = 104186.25$ ✓

$(0.92)^3 \times 60000 = 46721.28$ ✓

Total Value = £150 907.53 ✓

(3)

8. $\pi r^2 h$

$\pi \times (3.25)^2 \times 15 = \pi \times r^2 \times 12$ ✓

$(3.25)^2 \times 15 = 12r^2$

$r^2 = \dfrac{(3.25)^2 \times 15}{12}$ ✓

$r = \sqrt{\dfrac{(3.25)^2 \times 15}{12}}$ ✓

$r = 3.6336\ldots$ } ✓
diameter = 7.3 cm }

(4)

9. B (0, 6, 6) ✓
C (3, 3, 9) ✓ (2)

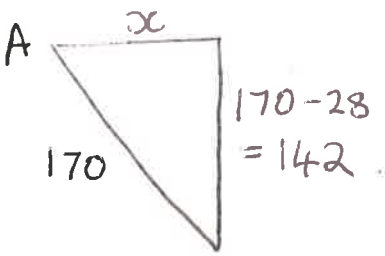
10. $\vec{PR} = \vec{PQ} + \vec{QR}$
$= \underline{d} - \underline{c}$ ✓ (1)

11.

$60^2 + 90^2$	110^2
$= 11700$ ✓	$= 12100$ ✓

Since $60^2 + 90^2 \neq 110^2$ then by the converse of Pythagoras the slab is not in the shape of a right-angled triangle. ✓

(3)

12. 

✓

$x^2 = 170^2 - 142^2$ ✓

$x^2 = 8736$

$x = \sqrt{8736}$

$x = 93.466...$ ✓

$AB = 2x = 186.9\text{m}$ ✓ (4)

13 a) $V = \pi r^2 h$

$= \pi \times 1.5^2 \times 15$ ✓

$= 106.03\text{m}^3$ ✓

b) $V_{cone} = 5.7\text{m}^3$

$\frac{1}{3}\pi r^2 h = 5.7$ ✓

$\pi r^2 h = 17.1$

$h = \frac{17.1}{\pi \times 1.5^2}$

$h = 2.419\text{m}$ ✓

Total height $= 17.419\text{m}$ ✓ (5)

14 Arc $= \frac{160}{360} \times \pi \times 60$ ✓

$= 83.78\text{cm}$ ✓ (3)

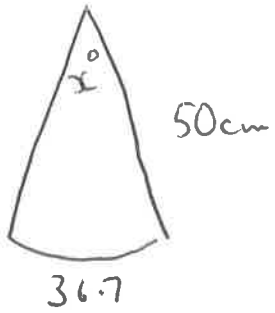
15 $\frac{x}{2} - \frac{x+1}{3} = 14$

$3x - 2(x+1) = 84$ ✓

$3x - 2x - 2 = 84$

$x = 86$ ✓ (3)

16.



$$\text{Arc} = \frac{x}{360} \times \pi d$$

$$36.7 = \frac{x}{360} \times \pi \times 100 \quad \checkmark$$

$$(\times 360) \quad 13212 = x \times \pi \times 100 \quad \checkmark$$

$$(\div 100\pi) \quad x = 42.055\ldots$$

$$= \underline{\underline{42.06^{\circ}}} \quad \checkmark \qquad (3)$$