INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

MARKSCHEME

November 2001

MATHEMATICAL STUDIES

Standard Level

Paper 1

11 pages

1. (a) 300×3600 ***(M1)***
$= 1080000$ ***(A1)***

(b) (i) 1100000 ***(A1)***

(c) (ii) 1.08×10^6 or 1.1×10^6 ***(A1)***

[4 marks]

2. (a) 30 ***(A1)***

(b) 6 ***(A1)***

(c) $\frac{1}{30}\left((3\times 2)+(4\times 4)+\ldots+(10\times 1)\right)=5.9$ ***(M1)***
= 6 (nearest whole number) ***(A1)***

[4 marks]

3. (a) (i) $\neg(p \vee q)$ alternatively $\neg p \wedge \neg q$ ***(A1)***

(ii) $\neg(p \wedge q)$ alternatively $\neg p \vee \neg q$ ***(A1)***

(b)

p	q	$\neg p$	$\neg p \vee q$
T	T	**F**	**T**
T	F	**F**	**F**
F	T	**T**	**T**
F	F	**T**	**T**

(A2)

Note: Award ***(A1)*** for each bold column.

[4 marks]

4. (a) $4256 \div 266 = 16$ GBP ***(A1)***

Note: Penalize only once in parts (b) and (c) if the buying and selling price are consistently confused throughout the question. Allow **(ft)** marks.

(b) $600 \times 2.798 = 1678.80$ DM ***(A1)***

(c) $1678.80 - 824 = 854.80$ DM
$= (854.80 \div 2.854)$ GBP ***(M1)***
= 299.51 GBP (2 d.p.) ***(A1)***

Note: Penalize only once for answer not given to 2 d.p.

[4 marks]

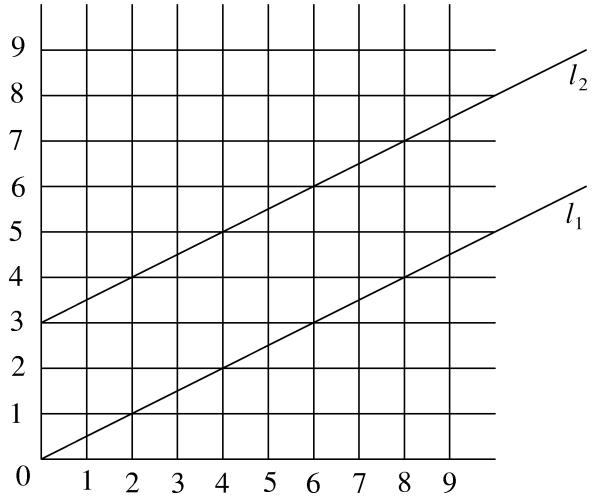
5. **Note:** The lines representing l_1 and l_2 should be straight lines. Penalize once only for poorly drawn lines.

(a) See diagram below ***(A1)***

(b) l_1 is parallel to l_2 (alternatively l_2 is l_1 shifted vertically by 3 units) ***(A1)***

(c) $y = \frac{1}{2}x + 3$ ***(A1)***

(d) See diagram ***(A1)***



[4 marks]

6. (a) $\vec{AB} = \boldsymbol{b} - \boldsymbol{a}$ ***(A1)***

(b) $\vec{OP} = \boldsymbol{b} - \frac{1}{2}(\vec{AB})$ or $\boldsymbol{a} + \frac{1}{2}(\vec{AB})$ ***(M1)***

$= \frac{1}{2}(\boldsymbol{a} + \boldsymbol{b})$ ***(A1)***

(c) $\vec{AX} = -\boldsymbol{a} + \frac{1}{2}\boldsymbol{b}$ or $\left(\frac{\boldsymbol{b}}{2} - \boldsymbol{a}\right)$ or $\frac{1}{2}\boldsymbol{b} - \boldsymbol{a}$ ***(A1)***

[4 marks]

7. (a) $4n - 3$ ***(A1)***

(b) 397 ***(A1)***

(c) $S_{100} = \frac{100}{2}[(2\times1) + (99\times4)]$ or $50(1 + 397)$ ***(M1)***

$= 19900$ ***(A1)***

[4 marks]

8. (a) $AC = \sqrt{(22.5)^2 + 30^2}$ ***(M1)***

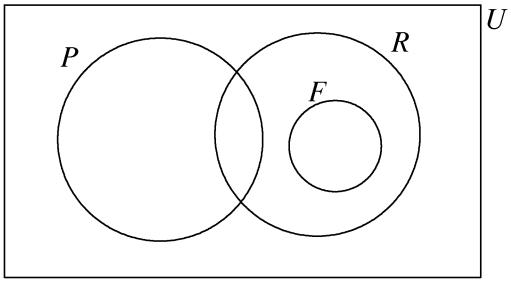
$= 37.5 \text{ cm}$ ***(A1)***

(b) $\tan G\hat{A}C = \frac{40}{37.5}$ ***(M1)***

$G\hat{A}C = 46.8°$ (or 0.818 radians) ***(A1)***

[4 marks]

9.



(A4)

Note:	Award ***(A1)*** for rectangle, ***(A1)*** for F entirely within R, ***(A1)*** for F disjoint from P, ***(A1)*** for $P \cap R$ non-empty.

[4 marks]

10. $y \geq 0$ ***(A1)***

$y < -\frac{3}{2}x + 9$ or $3x + 2y < 18$ (or equivalent) ***(M1)(A1)***

$y < \frac{3}{4}x$ (or equivalent) ***(A1)***

Note:	Penalize once only in the question for incorrect use of $<$ or $\leq$, or for $y > 0$.

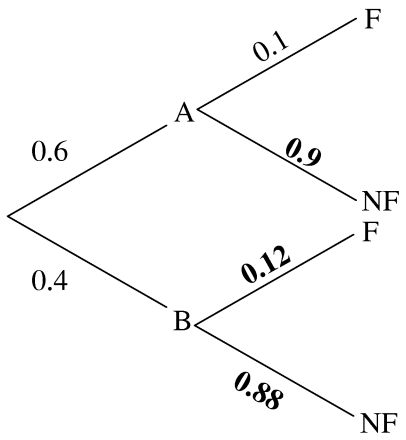
[4 marks]

11. (a) $(2x-5)(x+1)$ ***(A1)(A1)***

(b) $x=\dfrac{5}{2}=2.5$ or -1 ***(A1)(A1)***

[4 marks]

12. (a)



(A1)

Note: Award ***(A1)*** for two or three bold entries correct.

(b) (i) $0.6\times0.1=0.06$ ***(A1)***

(ii) $0.6\times0.9+0.4\times0.88=0.892$ ***(M1)(A1)***

[4 marks]

13. (a) $\pi(y^2-x^2)$ ***(A1)***

(b) (i) $y=\dfrac{1}{2}\left(\sqrt{4900}\right)$ ***(M1)***

$=35$ m ***(A1)***

(ii) Area $=\pi(35^2-21^2)$

$=784\pi$ or 2460 to 3 s.f. ***(A1)***

[4 marks]

14. $c = -10$ (asymptote of graph) ***(M1)(A1)***

$0 = k(2^1) - 10 \Rightarrow 2k = 10$ ***(M1)***

$\Rightarrow k = 5$ ***(A1)***

OR

$k + c = -5$ ***(M1)***

$2k + c = 0$ ***(M1)***

Therefore, $k = 5$ ***(A1)***

$c = -10$ ***(A1)***

[4 marks]

15. (a) $\mathrm{M} = (150, 125, 150)$ ***(A2)***

Note: Award ***(A2)*** for all three correct, ***(A1)*** for one or two correct.

(b) $\mathrm{MB} = \sqrt{(200-150)^2 + (250-125)^2 + (0-150)^2}$ $\left(or \frac{1}{2}\sqrt{100^2 + 250^2 + 300^2}\right)$ ***(M1)***

$= \sqrt{50^2 + 125^2 + 150^2} \quad = \sqrt{40625}$

$= 201.556$

$= 202$ m to 3 s.f. ***(A1)***

[4 marks]