

# **MARKSCHEME**

**November 2000**

**MATHEMATICAL STUDIES**

**Standard Level**

**Paper 1**

1. (a)  $2.79 \times 10^{-6}$  (M1)(A1)  
 (b)  $1.024 \times 10^{-2}$  (accept  $1.02 \times 10^{-2}$ ) (M1)(A1)  
**Total [4 marks]**

2. (a)  $A = 2(8x) + 2x(10 + 2x)$  or  $2(10x) + 2x(8 + 2x)$  or  $(10 + 2x)(8 + 2x) - 80$  (M1)  
 $= 4x(x + 9)$  (or equivalent) (A1)  
 (b)  $A = 4x(x + 9) = 208$  (follow through from part (a)) (M1)  
 $\Rightarrow x = 4$  (or Width = 4) (A1)  
**Total [4 marks]**

3. (a)  $X(1.005)^{12}$  (A1)  
 (b)  $X(1.005)^{12} = X\left(1 + \frac{r}{100}\right)$  (M1)

**Note:** Award (M1) for equating follow through from (a).

$r = 100(1.0617) - 100$  (or equivalent) (M1)

**Note:** Award (M1) for isolating  $r$  correctly.

Rate = 6.17% (A1)

**Total [4 marks]**

4. (a)  $0.75 \times 0.82$  (M1)  
 $= 0.615$  (accept 61.5% or  $\frac{123}{200}$ ) (A1)  
 (b)  $0.25 \times 0.18$  (M1)  
 $= 0.045$  (accept 4.5% or  $\frac{9}{200}$ ) (A1)

**Total [4 marks]**

5. (a) Interval 11 – 15 (A1)  
 (b) Mid-intervals 3, 8, 13, 18 ... (M1)

**Note:** Award (M1) for all correct numbers.

$\sum xf = 48 + 224 + 338 + \dots$  (M1)

**Note:** Award (M1) for attempt to obtain sum.

Mean = 13 (A1)

**Total [4 marks]**

6.  $4^{\text{th}}$  term =  $a + 3d$   
 $8^{\text{th}}$  term =  $a + 7d$   
 $20^{\text{th}}$  term =  $a + 19d$  (M2)

**Note:** Award (M1) for each correct answer up to a maximum of [2 marks].

$$a + 7d = 2(a + 3d)$$

$$a + 19d = 4000$$
 (M1)

**Note:** Award (M1) for any one correct equation.

$$d = 200$$
 (A1)

**Total [4 marks]**

7. (a)  $y = 2x$  (A1)  
 (b)  $y = 2x + 8$  (follow through from part (a)) (A1)  
 (c)  $2x + 8 = 0$  (or other method) (M1)  
 $(-4, 0)$  (follow through from part (b)) (A1)

**Total [4 marks]**

8. (a)  $\vec{AC} = \vec{AO} + \vec{OC}$  (M1)  
 $= -3\mathbf{p} + 4(3\mathbf{q})$  (A1)  
 $= 12\mathbf{q} - 3\mathbf{p}$  (AG)
- (b)  $\vec{ON} = \vec{OA} + \vec{AN}$   
 $= 3\mathbf{p} + \frac{1}{3}\vec{AC}$  (M1)  
 $= 3\mathbf{p} + \frac{1}{3}(12\mathbf{p} - 3\mathbf{q})$   
 $= 2\mathbf{p} + 4\mathbf{q}$  (A1)

**Total [4 marks]**

9. (a) High positive *or* high *or* positive *or* good *correlation* etc. (A1)

**Note:** For (A1) accept any correct answer.

- (b) Correct point M(29, 31) (A1)  
 (c) Suitable line which should pass through the candidate's M and have nearly as many crosses (plotted points) below it as above it. (A1)  
 (d) Accept **only** value (including non-integers) obtained using candidate's line of best fit. (Follow through from part (c).) (A1)

**Total [4 marks]**

10.  $\widehat{ACD} = 120^\circ$  (M1)  
 $AD^2 = 3^2 + 4^2 - 2(3)(4)\cos 120^\circ$  *or*  $AD^2 = 3^2 + 7^2 - 2(3)(7)\cos 60^\circ$  (M1)

**Note:** Award (M1) for correct substitution only.

$AD = \sqrt{37}$  (A1)  
 $= 6.08 \text{ cm (2 d.p.)}$  (A1)

**Total [4 marks]**

11. (a)  $(p \vee \neg q)$  (A1)  
 (b) *If you have understood this topic and will not be able to do this question, then you have not understood this topic.* (A3)

**Note:** Award (A1) for each correct translation of  $\neg q$ ,  $\neg p$ , and  $\Rightarrow$ . Maximum 3 marks.

**Total [4 marks]**

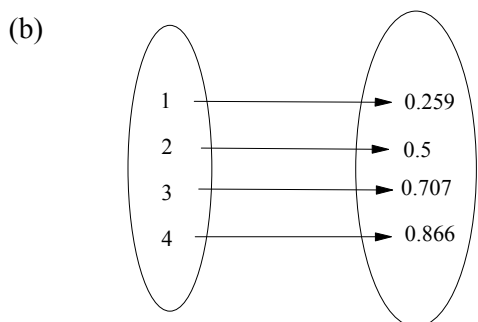
12. (a)  $\mathbb{R}^+$  (A1)  
 (b)  $P(0, 1)$  (A1)  
 (c) Decreases towards 0 *or*  $\rightarrow 0$  (A1)(A1)

**Note:** Award (A1) for ‘Decrease’, and (A1) for  $\rightarrow 0$ .

**Note:** Marks awarded at examiner’s discretion.

**Total [4 marks]**

13. (a)  $f : x \mapsto 3x - 2$  (A1)  
 $x \in \{-1, 0, 1, 2, 3\}$  (A1)



(A2)

**Note:** Award (A1) for the correct domain, (A1) for the correct range.

**Total [4 marks]**

14. (a) (i)  $q = 1, r = 2, s = 7$  (A1)

**Note:** Award (A1) for other sensible estimates of  $q, r$  and  $s$

- (ii)  $p = 3$  (A1)

**Note:** Follow through from (a) (i)

- (b) Two decimal places (accept three significant figures). (A1)  
Because two decimal places is given (accept reason related to chosen degree of accuracy). (A1)

**Note:** Award marks for correct reason only

*Total [4 marks]*

15.  $x \geq 0, y \geq 0$  (A1)(A1)  
 $x + y \leq 20, 2x + y \leq 32$  (A1)(A1)

**Note:** Award (A1)(A0) for strict inequalities  $x > 0, y > 0$ ,  
(A1)(A0) for strict inequalities  $x + y < 20, 2x + y < 32$ .

*Total [4 marks]*

---