

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE AS/A LEVEL – May/June 2012	9709	61

<p>1 $z_1 = \frac{30-28.3}{\sqrt{4.5}} = 0.8014$</p> <p>$z_2 = \frac{25-28.3}{\sqrt{4.5}} = -1.5556$</p> <p>$\Phi_1 - (1 - \Phi_2) = 0.7884 + 0.9401 - 1$ $= 0.729$</p>	<p>M1</p> <p>M1</p> <p>A1 [3]</p>	<p>Standardising at least one value, sq rt.ess; no cc</p> <p>$\Phi_1 + \Phi_2 - 1$ oe</p> <p>Correct answer</p>
<p>2 (i) $0.25p = 0.075$ $p = 0.075/0.25 = 0.3$</p> <p>(ii) $P(2 M) = \frac{P(2 \text{ and } M)}{P(M)}$</p> <p>$= \frac{0.45 \times 0.85}{0.3 \times 0.1 + 0.45 \times 0.85 + 0.25 \times 0.3}$</p> <p>$= \frac{0.3825}{0.4875}$</p> <p>$= 0.785$</p>	<p>B1 [1]</p> <p>M1</p> <p>B1</p> <p>A1</p> <p>A1 [4]</p>	<p>Answer given, must show some working</p> <p>attempt at cond prob with single prod in num and Σ three 2-factor o.e prods in denom</p> <p>correct numerator of a fraction</p> <p>correct unsimplified denom</p> <p>correct answer</p>
<p>3 (i) $p = 0.1$</p> <p>(ii) (a) $P(X=1, Y=3) = 0.3 \times 0.2 = 0.06$ $P(X=2, Y=2) = 0.15 \times 0.5 = 0.075$ $P(X=3, Y=1) = 0.3 \times 0.3 = 0.09$ $P(\text{sum is } 4) = 0.225$</p> <p>(b) $P(X=1, Y=\text{anything}) = 0.3$ $P(X=2, Y=\text{anything}) = 0.15$ $P(X=3, Y=1, 2) = 0.3 \times 0.8 = 0.24$ $P(X=4, Y=1) = 0.2 \times 0.3 = 0.06$ $P(X=5, Y=1) = 0.05 \times 0.3 = 0.015$ $P(\text{product} < 8) = 0.765$</p> <p>OR $P(Y=1, X=\text{anything}) = 0.3$ $P(Y=2, X=1, 2, 3) = 0.5 \times 0.75 = 0.375$ $P(Y=3, X=1, 2) = 0.2 \times 0.45 = 0.09$ $P(\text{product} < 8) = 0.765$</p>	<p>B1 [1]</p> <p>M1</p> <p>B1</p> <p>A1 [3]</p> <p>M1</p> <p>B1</p> <p>A1 [3]</p> <p>M1</p> <p>B1</p> <p>A1</p>	<p>Summing 2 or 3 options</p> <p>One option correct unsimplified</p> <p>correct final answer</p> <p>Σ 3 or more two-factor options</p> <p>Two correct options</p> <p>Correct answer</p>
<p>4 (i) $P(X < 5) = 1 - P(5, 6, 7)$ $= 1 - (0.21)^5(0.79)^2 - {}_7C_5(0.21)^6(0.79)^1 - {}_7C_6(0.21)^7$ $= 0.994$</p> <p>(ii) $P(\text{at least } 1) = 1 - P(0) = 1 - (0.79)^7 = 0.808$ $P(\text{exactly } 3 \text{ weeks}) = (0.808)^3(0.192)_4C_3 = 0.405$</p>	<p>M1</p> <p>A1</p> <p>A1 [3]</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1 [4]</p>	<p>Binomial expression with powers $\Sigma 7$ and probs $\Sigma = 1$, and ${}_7C_r$</p> <p>Correct unsimplified expression</p> <p>Correct answer</p> <p>Attempt to find $P(\text{at least } 1)$ or $1 - P(0 \text{ and } 1)$</p> <p>Rounding to correct answer</p> <p>Bin expression with powers $\Sigma 4$ and their 0.808 etc. and ${}_4C_3$</p> <p>Correct answer</p>

Page 5	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE AS/A LEVEL – May/June 2012	9709	61

<p>5 (i) Flat screen conventional</p> <table style="margin-left: 40px;"> <tr><td>6</td><td>5</td><td>7</td><td>9</td></tr> <tr><td>6</td><td>7</td><td>1</td><td>4</td><td>5</td><td>7</td></tr> <tr><td>9</td><td>5</td><td>8</td><td>5</td><td>6</td></tr> <tr><td>6</td><td>4</td><td>2</td><td>1</td><td>9</td></tr> <tr><td>7</td><td>4</td><td>10</td></tr> </table> <p>key 5 8 4 means 0.85 m for flat screen and 0.84 m for conventional</p> <p>(ii) Conventional median = 0.74 conv IQ range = 0.81 – 0.68 = 0.13</p> <p>(iii) mean = 0.927 sd = 0.0882</p>	6	5	7	9	6	7	1	4	5	7	9	5	8	5	6	6	4	2	1	9	7	4	10	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1 [4]</p> <p>B1</p> <p>M1</p> <p>A1 [3]</p> <p>B1</p> <p>B1 [2]</p>	<p>Correct stem must be integers</p> <p>Correct flat screen leaves</p> <p>Correct conventional screen leaves</p> <p>Key must have units and TV type</p> <p>Correct median Their UQ – their LQ Correct answer</p> <p>Need 3 s.f. (Accept 0.0878 to 0.0889)</p>
6	5	7	9																						
6	7	1	4	5	7																				
9	5	8	5	6																					
6	4	2	1	9																					
7	4	10																							
<p>6 (i) $-1.253 = \frac{6 - \mu}{\sigma}$</p> <p>$0.648 = \frac{12 - \mu}{\sigma}$</p> <p>$\mu = 9.9$ $\sigma = 3.15$ or 3.16</p> <p>(ii) need $P(z < -1$ or $z > 1)$ $= 1 - \Phi(1) + \Phi(-1)$ $= 2 - 2 \times 0.8413$ $= 0.3174$ number = 317</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>[Indpt]</p> <p>A1 [5]</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>A1 [4]</p>	<p>$Z = \pm 1.253$</p> <p>$Z = \pm 0.648$</p> <p>Any equation with μ and σ and a reasonable z value not a prob. Allow cc or –, not $\sqrt{\sigma}$ or σ^2</p> <p>Att. to solve by substitution or elimination</p> <p>$z = 1$ or -1 seen Correct area i.e. $2 - 2\Phi$ Mult their prob if sensible, by 1000</p> <p>Accept 317, 317.4, 318</p>																							
<p>7 (a) (i) 7 couples in 7! ways each couple in 2 ways so $7! \times 2^7$ $= 645120$</p> <p>OR $14 \times 12 \times 10 \times 8 \times 6 \times 4 \times 2 = 645120$</p> <p>(ii) $7! \times 7! \times 2$ $= 50,803,200$ (50,800,000)</p> <p>OR $14 \times 6! \times 7!$</p>	<p>B1</p> <p>M1</p> <p>A1 [3]</p> <p>B2</p> <p>A1</p> <p>B1</p> <p>B1 [2]</p> <p>B1</p> <p>B1</p>	<p>7! seen multiplied mult by 2^7 correct final answer</p> <p>correct unsimplified answer correct answer</p> <p>7! \times 7! seen Correct answer</p> <p>14 \times 7! seen Correct answer</p>																							

Page 6	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE AS/A LEVEL – May/June 2012	9709	61

<p>(b) (i) $7C2 = 21$</p> <p>(ii) all in: 1 all not in: $5C4 = 5$ total 6</p> <p>(iii) 2 girls in: $6C2 \times 3C2 = 45$ 3 girls in: $6C1 = 6$ Total 51</p>	B1	[1]	
	M1		Considering both cases
	A1	[2]	Correct answer
	M1		Attempt at summing 2 and 3 girls in the team need not see $3C2$
	A1	[2]	Correct answer