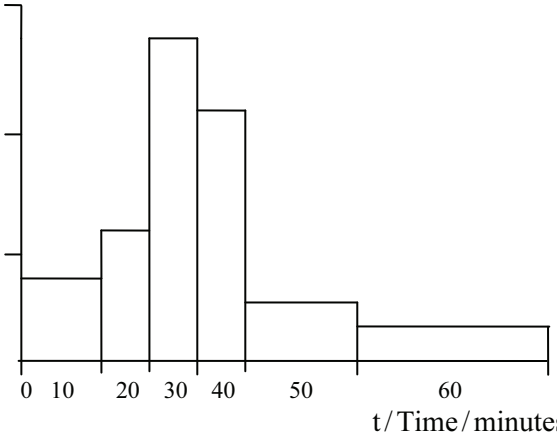
1	**(i)**	P (A Later) = 0.5 × 0.2 = 0.1	B1	[1]	
	(ii)	P(L given I) = (0.2 × 0.1) / (0.5 × 0.8 + 0.3 × 0.6 + 0.2 × 0.1)	B1		0.2 × 0.1 seen on its own as num or denom of a fraction
			M1		Attempt at P(I) summing 2 or 3 2-factor prods, seen anywhere
		= 0.02 / 0.6	A1		Correct unsimplified P(I) as num or denom of a fraction
		= 0.0333 (1 / 30)	A1	[4]	Correct answer accept 0.033
2	**(i)**	$z_1 = \frac{12-6.4}{5.2} = 1.077$	M1		Standardising, can be all in thousands, no mix, no cc no sq rt no sq
		$z_2 = \frac{10-6.4}{5.2} = 0.692$	M1		$\Phi_2 - \Phi_1$, Φ_2 must be > Φ_1
		$\Phi(z_1) - \Phi(z_2) = 0.8593 - 0.7556$ $= 0.104$	A1	[3]	Correct answer
	(ii)	P(loss) $= P(z < \frac{0-6.4}{5.2}) = P(z < -1.231)$ $= 1 - 0.8909$	M1		Standardising using $x = 0$, accept $\frac{0.5-6.4}{5.2}$
		$= 0.109$	A1		Correct prob
		P(1) $= (0.1091)^1(0.8909)^3 \times 4C1$	M1		Binomial term ${}_4C_x p^x(1-p)^{4-x}$ any p $x \neq 0$
		$= 0.309$ or 0.308	A1	[4]	Correct answer
3	**(i)**	median in 15–20 mins,	B1		
		UQ in 25–40 mins	B1	[2]	
	(ii)	fd 1.9, 2.4, 5.6, 4.4, 1.2, 0.65 or Scaled freq 9.5, 12, 28, 22, 6, 3.25	M1		Attempt at fd or scaled freq [f / (attempt at cw)]
			A1		Correct heights seen on diagram
			B1		Correct bar widths visually no gaps
			B1	[4]	Labels (time / mins and fd or freq per 5 min) and correct bar ends

	(iii) $(5 \times 19 + 12.5 \times 12 + 17.5 \times 28 + 22.5 \times 22 + 32.5 \times 18 + 50 \times 13)/112 = 2465/112$ $= 22.0$ minutes	M1 A1	[2]	Attempt at Σxf / 112 using mid-points, NOT classwidths, NOT upper class bounds Correct answer accept 22
4	**(i)** $z = 1.036$ or 1.037 $1.036 = \frac{5-4s}{s}$ $s = 0.993$ $\mu = 3.97$	B1 B1 M1 A1	[4]	± 1.036 or ± 1.037 seen $\frac{5-4\sigma}{\sigma}$ seen or $\frac{5-\mu}{\mu/4}$ oe One variable and sensible solving attempt z-value not nec Both answers correct
	(ii) $p = 0.85$ $\mu = 200 \times 0.85 = 170$, var $= 200 \times 0.85 \times 0.15 = 25.5$ P(at least 160) $= P\left(z > \frac{159.5-170}{\sqrt{25.5}}\right)$ $= P(z > -2.079)$ $= 0.981$	 B1 M1 M1 M1 A1	[5]	 200×0.85 (170) and $200 \times 0.85 \times 0.15$ (25.5) seen Standardising, sq rt and must have used 200 continuity correction 159.5 or 160.5 correct area (> 0.5) must have used 200 correct value
5 (a)	Boys in:10C1 × 9C3 = 840 ways Boys out: 10C3 × 9C3 = 10080 ways Total = 10920 ways (10900)	M1 B1 A1	[3]	summing two 2-factor products, C or P Any correct option unsimplified Correct final answer
(b) (i)	${}_{12}P_8 = 19,958,400$	B1	[1]	or 20,000,000
	(ii) together: ${}_{11}P_7 = 1663200 \times 2 = 3326400$ Not tog: 19958400 – 3326400 =16,632,000 (16,600,000) OR M at end then not F in 10 × 10P6 × 2=3024000 ways not at end in 10 × 9 × 10P6 = 13608000 ways Total = 16,632,000 ways	B1 M1 A1 M1 B1 A1	[3]	${}_{11}P_7$ seen 19958400 or their (i) – their together (must be >0) correct final answer summing options for M at end and M not at end one correct option correct final answer
	(iii) $8! \times 5 = 201600$ ways	B1 M1 A1	[3]	8! seen mult by equivalent of integer ≥ 1 Mult by 5 Correct answer SR $8! \times 5! = 4838400$ B2

6	**(i)** P(9) = P(1,4,4) × 3 + P(2,3,4) × 6 + P(3,3,3) = 10/64 (5/32) (0.156) AG	M1 M1 A1	[3]	Listing at least 2 different options Multiplying P(4,3,2) by 6 or P(1,4,4) by 3 Correct answer must see numerical justification
	(ii) probs 1/64, 3/64, 6/64, 10/64, 12/64, 12/64, 10/64, 6/64, 3/64, 1/64.	B1 B1 B1	[3]	3 or more additional correct probs 5 or more correct All correct
	(iii) P(S) = 6/64(3/32) P($R \cap S$) = 3/64, $\neq$ 15/1024 ie P(R) ×P(S) OR $P(R\|S) = \frac{3/64}{6/64} = 1/2, \neq 10/64$ ie P(R) Not independent	M1 A1 B1 M1 A1ft	[5]	An attempt at P(S) 4,4,1 or 4,2,2 Correct P(S) Correct P($R \cap S$) in either intersection or cond prob cases comparing their P($R \cap S$) with their P(R) × P(S) or their $P(R\|S)$ with their P(R) need numerical vals correct conclusion ft wrong P(S) or P($R \cap S$) only