Mark Scheme 4771
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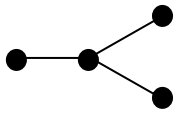
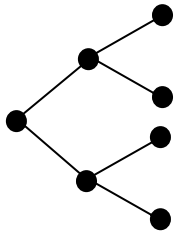
1.

(i) 	B1
(ii) Any two of 1 or 2 or 3 or 5 or 7	B1 B1
(iii) 	M1 branching tree A1
(iv) 	M1 branching tree A1
(v) A tree	B1

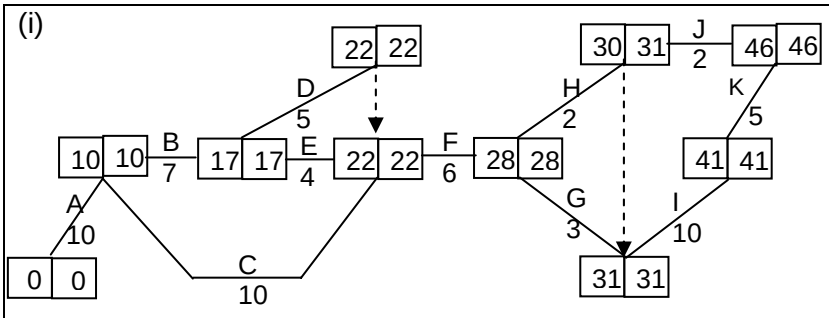
2.

(i) 109; 32; 3; 523; 58 32; 3; 109; 58; 523 4 comparisons and 3 swaps 3; 32; 58; 109; 523 3 and 2 3; 32; 58; 109; 523 2 and 0 3; 32; 58; 109; 523 1 and 0 10 and 5 in total	M1 A1 only if all iterations completed B1 B1
(ii) 523; 109; 58; 32; 3 10 swaps	B1 B1
(iii) 1.5×100^2 = 15000 seconds = 4 hrs 10 mins	M1 A1 hours and minutes

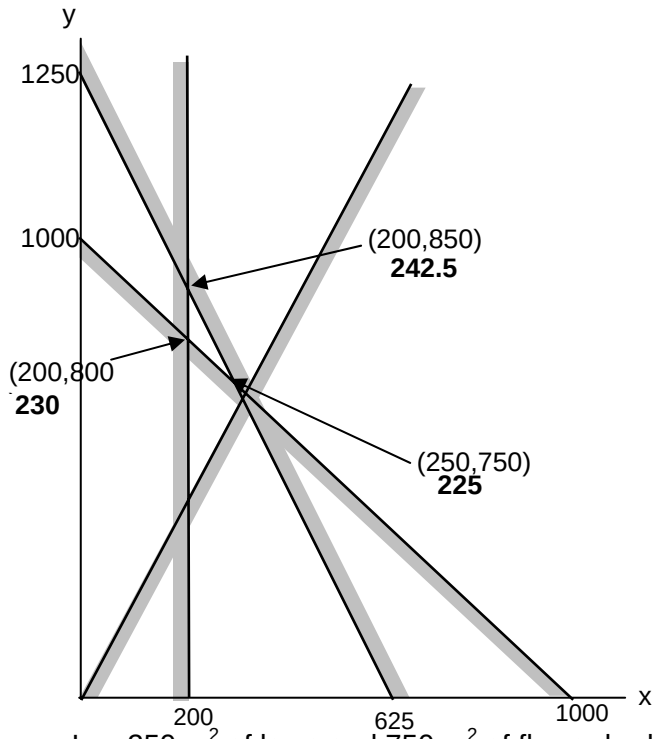
3.

(i) e.g. 0, 1 → A 2, 3 → B 4, 5 → C 6, 7 → D 8, 9 → E	M1 A1 proportions OK B1 efficient
(ii) e.g: 3, 4, 4, 4, 1	M1 A1
(iii) In the above simulation mean = 3.2 (Correct expectation is 2.5 – geometric rand variable)	M1 A1
(iv) More repetitions	B1

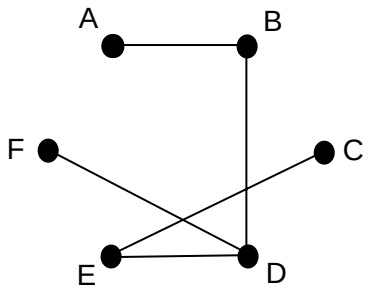
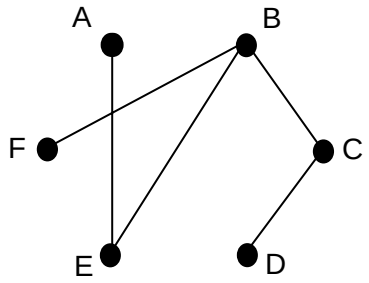
4.

(i)		M1 activity-on-arc A1 single start and end A1 dummy 1 A1 dummy 2 A1 rest
(ii)	See above Critical activities: A; B; D; F; G; I; K Duration = 46	M1 A1 forward pass M1 A1 backward pass B1 critical activities B1 duration
(iii)	E: total float = 1; independent float = 1 H: 1 and 0 J: 14 and 13 C: 2 and 2	B1 total floats B1 independent floats
(iv)	Tiler (I) – 2 days – £500 Electrician (D) – 1 day – £300 Bricklayer (B) – 1 day – £350	B1 tiler B1 electrician B1 bricklayer

5.

(i) Let x be the number of m^2 of lawn. Let y be the number of m^2 of flower beds.	B1
$x + y \geq 1000$	B1
$0.80x + 0.40y \leq 500$, i.e. $2x + y \leq 1250$	B1
$y \geq 2x$	B1
$x \geq 200$	B1
Minimise $0.15x + 0.25y$	B1 B1
(ii) & (iii) 	B1 axes labelled + scaled B4 lines B1 shading
Lay 250 m^2 of lawn and 750 m^2 of flower beds. Annual maintenance = £225.	M1 A1
(iv) Intersection of $y \geq 2x$ & area constraint is at (333.33,666.67) so max useful capital is £533.33. So £33.33.	B1 (allow £533.33)

6.

(i) DtoE; BtoD; CtoE; DtoF; AtoB	M1 A1 no BC nor BE A1
	B1
Total length = 20	B1
(iii) e.g.	
1 3 4 6 2 5 A B C D E F A – – – – 12 – B – – 5 – 6 6 C – 5 – 8 – 7 D – – 8 – – – E 12 6 – – – 7 F – 6 7 – 7 –	B1 reduced table M1 delete/select/delete A1 first 2 rows A1 rest of table A1 order
	B1
Total length = 37	B1
(iii) Lengths are 27 and 28. Shorter and more nearly equal.	B1 B1 B1 B1