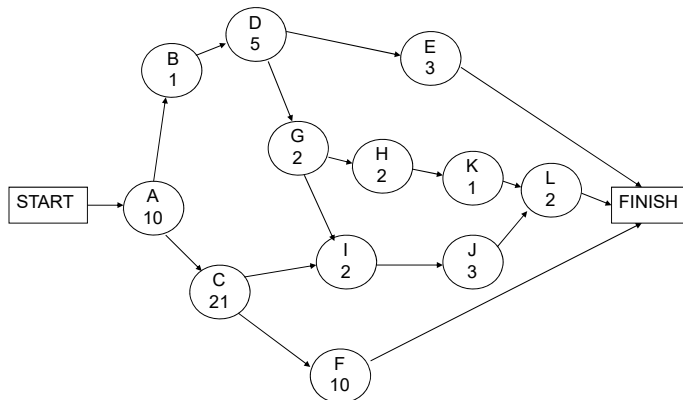21. The AON diagram for the office renovation project is below.

The calculations of the time statistics are contained in the following table.

Activity	Optimistic	Most Likely	Pessimistic	Expected Time	Variance
START	0	0	0	------	------
A	6	10	14	10	1.78
B	0	1	2	1	0.11
C	17	20	30	21	4.69
D	4	5	6	5	0.11
E	2	3	5	3	0.25
F	7	10	13	10	1.00
G	1	2	4	2	0.25
H	1	2	5	2	0.44
I	2	2	2	2	0.00
J	1	3	5	3	0.44
K	0	1	3	1	0.25
L	0	2	4	2	0.44
FINISH	0	0	0	------	------

a. The critical path is A – C - F at 41 days.

Standard Deviation = SQRT (1.78 + 4.69 + 1.00) = 2.73.

$z = (40 - 41)/ 2.73 = -0.3663$, which can be rounded to 0.37. $P(z) = 0.357$. Therefore, $P(T < 40 \text{ days}) = 0.357$.

b. We want to find the project completion time so that the probability of completion is 85 percent. The z value for 85 percent is 1.04. Consequently,
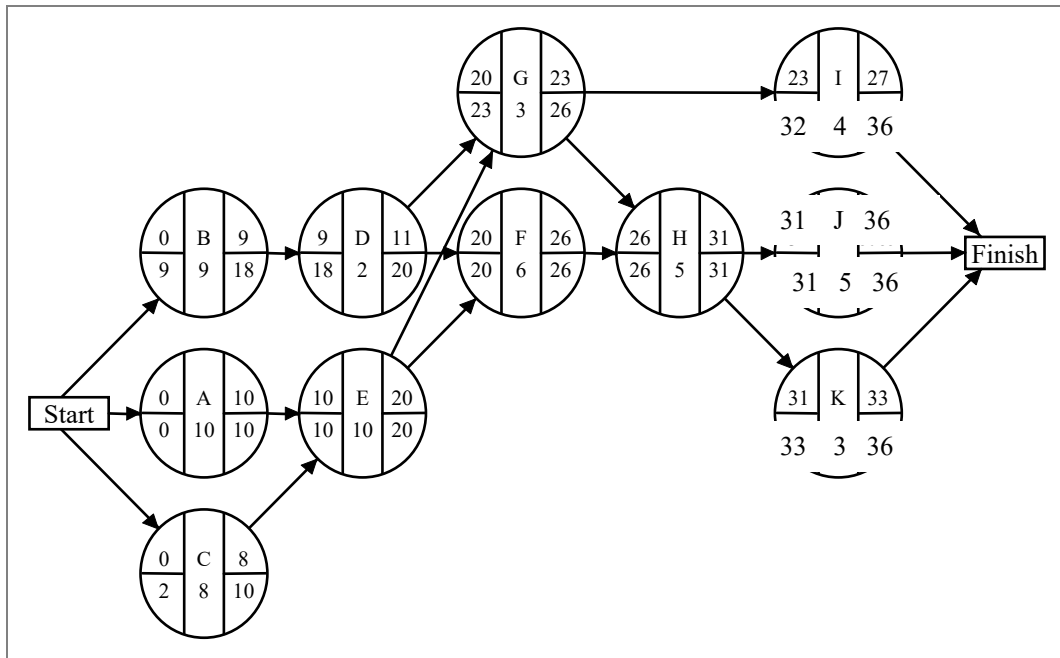
$(T-41)/2.73 = 1.04$

$T = 1.04\,(2.73) + 41$

$T = 44$ days.

22. a. Calculation of the activity statistics:

	a	m	b	Mean	Var
A	7	10	13	10	1.00
B	4	8	16	9	4.00
C	7	8	9	8	0.11
D	1	2	4	2	0.25
E	7	10	11	10	0.44
F	4	6	7	6	0.25
G	1	3	6	3	0.69
H	1	5	7	5	1.00
I	1	4	6	4	0.69
J	3	5	9	5	1.00
K	3	3	3	3	0.00

The AON diagram for the advertising campaign is shown below.

The critical path is A–E–F–H–J, the expected project duration is 36 days, and the sum of the variances of the critical path activities is

$$(1 + 0.44 + 0.25 + 1.00 + 1.00) = 3.69$$

b.

$$z = \frac{T - T_E}{\sqrt{\sigma^2}} = \frac{37 - 36}{\sqrt{3.69}} = \frac{1.00}{1.92} = 0.52$$

The probability that the project will take more than 37 days is
$$1 - 0.6986 \text{ or } 0.3014$$

c.   The path A–E–G–H–J has a duration of 33 weeks with variance of 2.03 weeks.

Therefore, $z = \frac{T - T_E}{\sqrt{\sigma^2}} = \frac{37 - 33}{\sqrt{4.14}} = 1.97$

The probability that the path A–E–G–H–J exceeds 37 weeks is $1 - 0.9754$, or 0.0246.