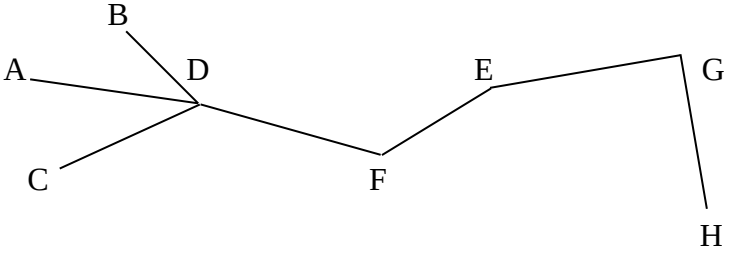
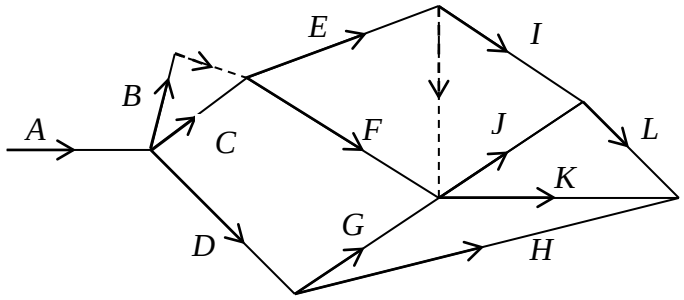
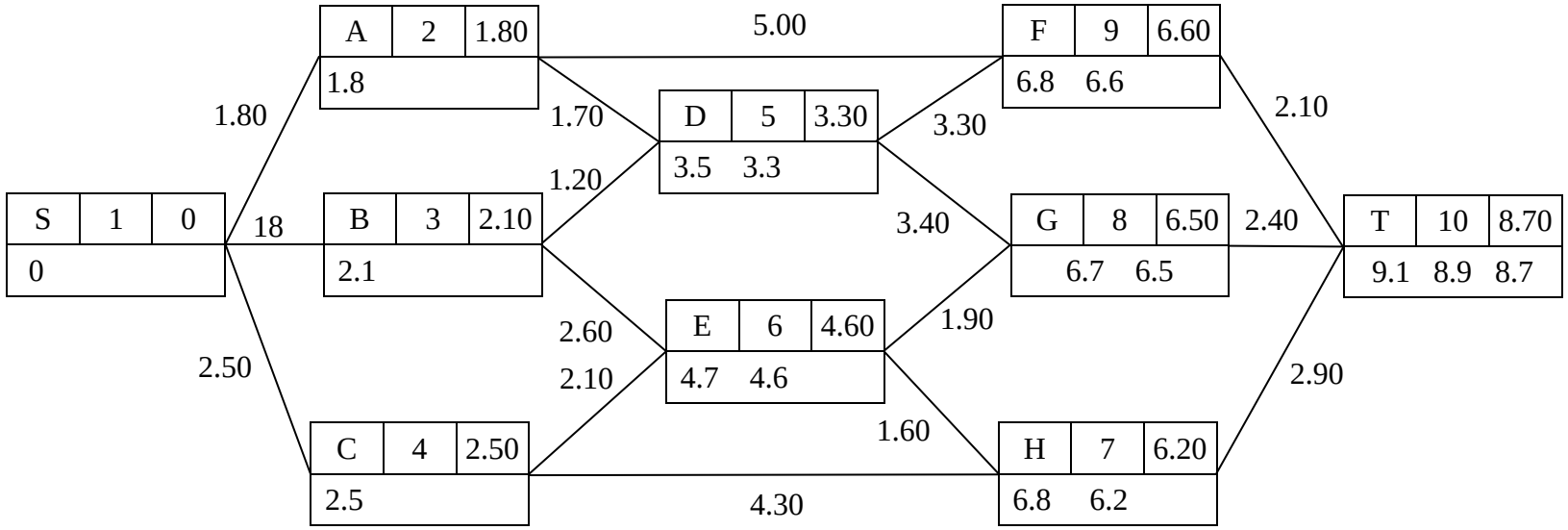
## Decision Mathematics D1 (6689)

## Mock paper mark scheme

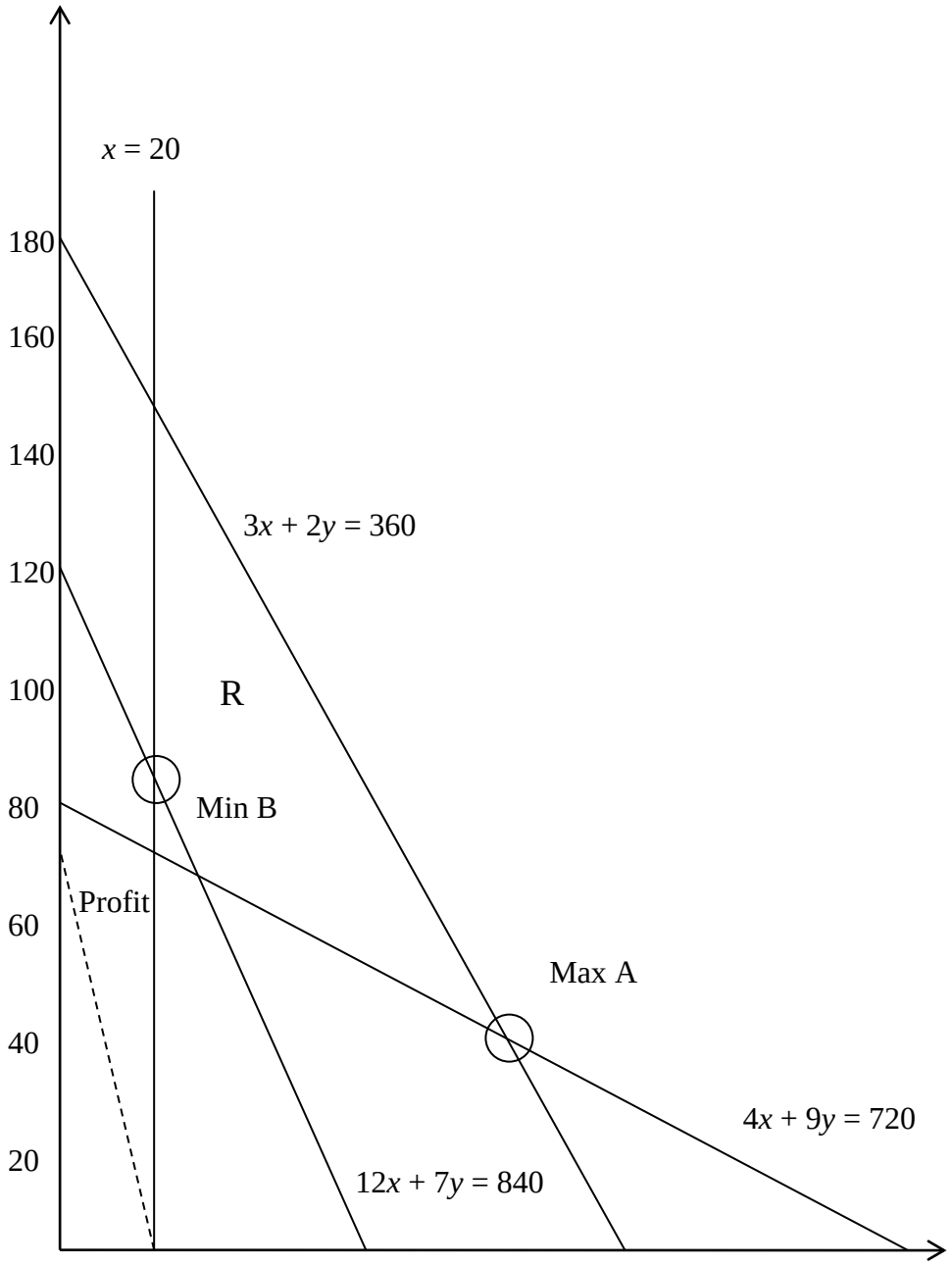
| Question number | Scheme | Marks |
|---|---|---|
| **1.** (a) | For example: | |
| | 28 31 14 18 24 11 7 | M1, A1 |
| | 31 28 18 24 14 11 7 | A1 |
| | 31 28 24 18 14 11 7 | A1 (4) |
| (b) | $\frac{133}{40}$ = 3.325, so 4 lorries | M1, A1 (2) |
| (c) | Bin 1: 31 + 7 | M1 |
| | Bin 2: 28 + 11 | A1 |
| | Bin 3: 24 + 14 | A1 (3) |
| | Bin 18 | |
| | | **(9 marks)** |
| **2.** | $\left\lceil \frac{1+9}{2} \right\rceil = 5$ Freya reject top | M1 |
| | $\left\lceil \frac{6+9}{2} \right\rceil = 8$ Richard reject bottom | A1 |
| | $\left\lceil \frac{6+7}{2} \right\rceil = 7$ Jenny reject bottom | A1 |
| | 6 is Greg so Hannah is not on list | A1 |
| | | **(4 marks)** |
| **3.** (a)(i) | DF GH EG $\begin{bmatrix} CD \\ EH \times \end{bmatrix}$ EF AD $\begin{bmatrix} FH \times \\ AC \times \end{bmatrix}$ CF× BD | M1 A1 A1 |
| (ii) | AD DF DC FE EG GH BD | M1 A1 A1 (6) |
| (b) | 188 m | B1 (1) |
| (c) |   | B1 (1) |
| | | **(8 marks)** |

| Question number | | Scheme | Marks |
|---|---|---|---|
| **4.** | (a) | A –1 = D – 2 c.s. A = 1-D = 2 | M1 A1 |
| | | A = 1 M = 4 S – | A1 (3) |
| | | D = 2 P = 6 T – | |
| | (b) | E.g. S – 6 = P – 3 c.s. S = 6 – P = 3 | M1 A1 |
| | | T – 4 = M – 5 c.s. T = 4 – M = 5 | M1 A1 |
| | | A = 1 M = 5 S = 6 | A1 (5) |
| | | D = 2 P = 3 T = 4 | |
| | | | **(8 marks)** |
| **5.** | (a) |  | M1 A1<br>A1<br>A1<br>(4) |
| | (b) | One dummy needed so that *B* and *C* can be *uniquely* expressed in terms of end events<br>Other due to *precedence* (*I* depends only on *E*, *J* and *K* depends upon *E*, *F* and *G*) | B3, 2, 1, 0<br>(3) |
| | | | **(7 marks)** |
| **6.** | (a) | AB + FG = 16 + 23 = 39 ← | M1 A1 |
| | | AF + BG = 21 + 21 = 42 | A1 |
| | | AG + BF = 29 + 15 = 44 | A1 |
| | | Shortest route length = 185 + 39 = 224km | A1 (5) |
| | (b) | Repeat BF, since it is the smallest. | B1 |
| | | So start/finish at A and G. | B1 (2) |
| | | | **(7 marks)** |

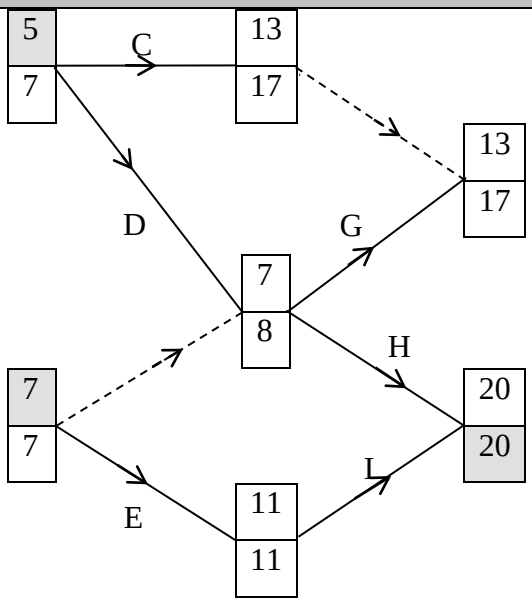
| Question number | Scheme | Marks |
|---|---|---|
| **7.** (*a*) |  | |
| | S-B-D-F-T Length £8.70 | A1 A1 (2) |
| (b) | E.g. 8.7 – 2.1 = 6.6 FT<br>6.6 – 3.3 = 3.3 DF<br>3.3 – 1.2 = 2.1 BD<br>2.1 – 2.1 = 0 SB | B2, 1, 0 (2) |
| (c) | S – C – E – G – T cost £8.90 | B1 B1 (2) |
| | | **(10 marks)** |

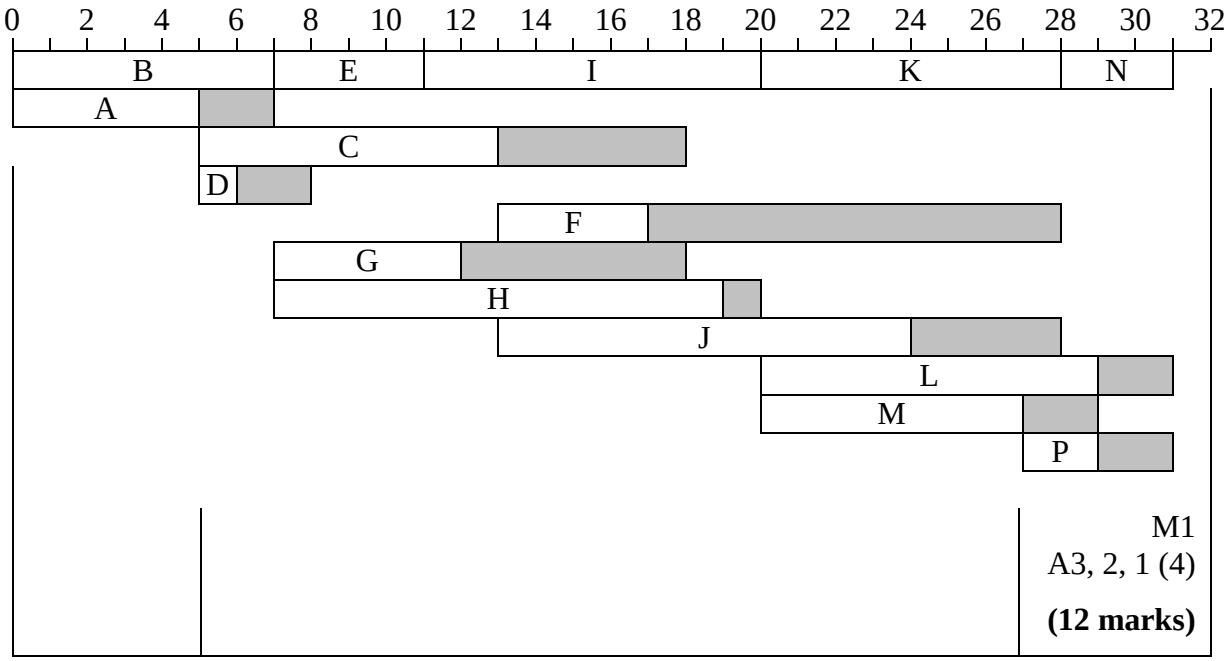
*Or* trace back from T including arc *XY* if *Y* lies on the path and the length of *XY* = difference in arc weights of *X* and *Y*.

| Question number | | Scheme | Marks |
|---|---|---|---|
| **8.** | (a) | $x \geq 20$ Line + shading | B2, 1, 0 |
| | | $3x + 2y \leq 360$ Line + shading | B2, 1, 0 (4) |
| | (b) | R correctly labelled – see graph paper | B1 (1) |
| | (c) | $P = 0.7x + 0.2y$ | B1 (1) |
| | (d) | Profit line or point testing | M1, A1 |
| | | A and B correctly labelled | B1, B1 |




**(10 marks)**

| Question number | Scheme | Marks |
|---|---|---|
| **9.** (a) |  | M1 A1 (top boxes)<br>M1 A1 (bottom boxes)<br>(4) |
| (b) | B E I K N | B2, 1, 0 (2) |
| (c) | $\frac{94}{31} = 3.032$ so 4 workers | M1, A1 (2) |
| (d) | As below | |




M1
A3, 2, 1 (4)

**(12 marks)**