

	A	B	C	D	E	F	G	H	I	J	K	L
1	Question 1 (SMA 4.53)											
2												
3	Mine data											
4		Production cost	Ash content	Sulfur content	Capacity							
5	Mine 1	\$50	0.08	0.05	120	tons						
6	Mine 2	\$55	0.06	0.04	100	tons						
7	Mine 3	\$62	0.04	0.03	140	tons						
8												
9		Maximum %	0.06	0.035								
10												
11	Customer demands											
12		Customer 1	Customer 2	Customer 3	Customer 4							
13	Demand	80	70	60	40	tons						
14												
15	Unit shipping costs											
16		Customer 1	Customer 2	Customer 3	Customer 4							
17	Mine 1	\$4	\$6	\$8	\$12							
18	Mine 2	\$9	\$6	\$7	\$11							
19	Mine 3	\$8	\$12	\$3	\$5							
20												
21	Action Plan											
22						Model	Model					
23		Customer 1	Customer 2	Customer 3	Customer 4	Output	Requiremen	units				
24	Mine 1	15	0	0	0	15	<=	120	tons			
25	Mine 2	10	35	30	20	95	<=	100	tons			
26	Mine 3	55	35	30	20	140	<=	140	tons			
27	Supply	80	70	60	40				tons			
28		>=	>=	>=	>=							
29	Demand	80	70	60	40				tons			
30												
31		Customer 1	Customer 2	Customer 3	Customer 4							
32	Ash Content	4	3.5	3	2				tons			
33		<=	<=	<=	<=				tons			
34	Max Ash Content	4.8	4.2	3.6	2.4				tons			
35												
36		Customer 1	Customer 2	Customer 3	Customer 4							
37	Sulpher Content	2.8	2.45	2.1	1.4				tons			
38		<=	<=	<=	<=				tons			
39	Max Sul Content	2.80	2.45	2.10	1.40				tons			
40												
41	Cost Data											
42												
43												
44	Transportation Costs										\$1,840	
45	Manufacturing Costs										\$14,655	
46	Total Costs										\$16,495	
47												
48												
49												
50	5 marks for Total Cost Section;											
51	Students may set the Total Cost section up with more detail.											
52												
53												
54												
55	This is fine and in fact is probably better.											
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5 marks total for input data
(2 of these marks for Max % data)

6 marks total
1 mark for each of the 5 constraints
1 mark for units

2 marks

2 marks

Coalco Production and Shipping Plan:

Mine 1 should produce 15 tons and ship 15 tons, 0 tons, 0 tons to Customers 1,2,3 and 4 respectively

Mine 2 should produce 95 tons and ship 10 tons, 35 tons, 30 tons, and 20 tons to Customers 1,2,3 and 4 respectively

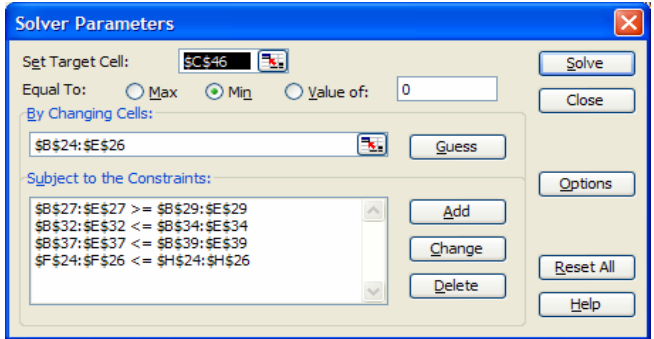
Mine 3 should produce 140 tons and ship 55 tons, 35 tons, 30 tons, and 20 tons to Customers 1,2,3 and 4 respectively

Total Cost (Shipping and Production) \$16,495

3 marks
info in bold must be included in answer to receive marks

2 marks

5 marks for including Solver Dialogue Box



Problem 2 (15 marks)

Question 2(a) QMB problem 2.16 (9 marks)

Let A = event that Supplier A delivers in 4 days
 Let B = event that Supplier B delivers in 4 days

Given: P (A) = .55
 and P (B) = 0.35

(a) Want P (A and B) = P (A) x P (B) } 2 marks
 = 0.55 x 0.35 }
 = **0.1925** } 1 mark

(b) Want P (A or B) = P(A) + P(B) - P(A and B) } 2 marks
 = 0.55 + 0.35 - 0.1925 }
 = **0.7075** } 1 mark

c) Want P (notA and notB) = 1 - P(notA) x 1 - P(notB) } 2 marks
 = 1 - 0.55 x 1 - 0.35 }
 = **0.2925** } 1 mark

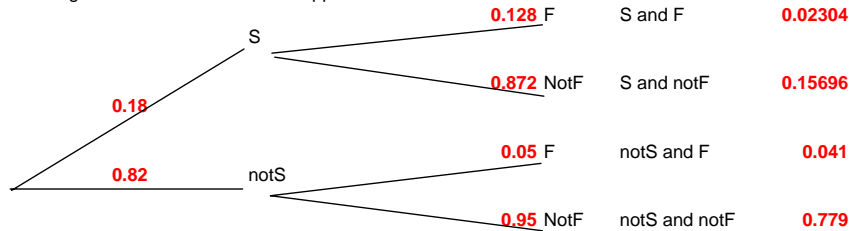
Question 2(a) QMB problem 2.24 (6 marks)

Let S = event that a small car is involved in an accident
 Let F = event that an accident involves a fatality

Given P (S) = 0.18,
 and P (F | S) = 0.128
 and P (F | not S) = 0.05

Note:
 It is customary to leave your probability answers to 4 decimal places; do not deduct if students leave 3 decimal places but deduct if they leave answers with 2 decimal places

One way to do this problem is to use a tree diagram to build the Joint Table approach we used in class



Joint Probability table

and	F	notF	
S	0.02304	0.15696	0.18
notS	0.041	0.779	0.82
	0.06404	0.93596	1

} 4 marks for **either**
 * this joint table or
 * the probability tree above or
 * tabular approach (shown below)

From the table above we observe that

$P(S | F) = \frac{0.02304}{0.06404} = 0.3598$ } 2 marks

TABULAR APPROACH (correct but not recommended- refer to Page 48 in QMB textbook if interested)

Events	P(Si)	P(F Si)	P(Si and F)	P(Si F)
S	0.18	0.128	0.02304	0.3598
notS	0.82	0.05	0.041	0.6402
			0.06404	1

→ P(S | F)