Algorithms 1A

1 a

A	B
~~244~~	~~125~~
~~122~~	~~250~~
61	500
~~30~~	~~1000~~
15	2000
7	4000
3	8000
1	16 000
Total	30 500

b

A	B
125	244
~~62~~	~~488~~
31	976
15	1952
7	3904
3	7808
1	15 616
Total	30 500

c

A	B
~~256~~	~~123~~
~~128~~	~~246~~
~~64~~	~~492~~
~~32~~	~~984~~
~~16~~	~~1968~~
~~8~~	~~3936~~
~~4~~	~~7872~~
~~2~~	~~15 744~~
1	31 488
Total	31 488

2 a 1 $\frac{a}{b}=\frac{9}{4}$ $\frac{c}{d}=\frac{4}{3}$ $a=9,\ b=4,\ c=4,\ d=3$

2 $e=ad=9\times3=27$

3 $f=bc=4\times4=16$

4 answer is $\frac{27}{16}$

b It divides the first fraction by the second fraction.

3 a

Instruction step	n	*A*	**Print**
1	1	1	
2			1
3		4	
4	2		
5	$2 \leqslant 10$ go to step 2		
2			4
3		9	
4	3		
5	$3 \leqslant 10$ go to step 2		
2			9
3		16	
4	4		
5	$4 \leqslant 10$ go to step 2		
2			16
3		25	
4	5		
5	$5 \leqslant 10$ go to step 2		
2			25
3		36	
4	6		
5	$6 \leqslant 10$ go to step 2		
2			36
3		49	
4	7		
5	$7 \leqslant 10$ go to step 2		
2			49
3		64	
4	8		
5	$8 \leqslant 10$ go to step 2		
2			64
3		81	
4	9		
5	$9 \leqslant 10$ go to step 2		
2			81
3		100	
4	10		
5	$10 \leqslant 10$ go to step 2		
2			100
3		121	
4	11		
5	$11 \leqslant 10$ continue to step 6		
6	Stop		

Output 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

b The algorithm produces the squares of the first 10 natural numbers.

4 a i

Step	A	r	c	$\lvert r-c \rvert$	s	Print r
1	253	12				
2			21.083			
3				9.083		
4					16.542	
5		16.542				
$6 \rightarrow 2$			15.294			
3				1.248		
4					15.918	
5		15.918				
$6 \rightarrow 2$			15.894			
3				0.024		
4					15.906	
5		15.906				
$6 \rightarrow 2$			15.906			
$3 \rightarrow 7$				0		
7						$r = 15.906$
8 stop						

ii

Step	A	r	c	$\lvert r-c \rvert$	s	Print r
1	79	10				
2			7.900			
3				2.1		
4					8.950	
5		8.95				
$6 \rightarrow 2$			8.827			
3				0.123		
4					8.889	
5		8.889				
$6 \rightarrow 2$			8.887			
$3 \rightarrow 7$				0.002		
7						Print 8.889

4 a iii

Step	A	r	c	$\lvert r-c \rvert$	s	**Print *r***
1	4275	50				
2			85.500			
3				35.5		
4					67.750	
5		67.75				
$6 \rightarrow 2$			63.100			
3				4.65		
4					65.425	
5		65.425				
$6 \rightarrow 2$			65.342			
3				0.083		
4					65.384	
5		65.384				
$6 \rightarrow 2$			65.383			
$3 \rightarrow 7$				0.001		
7						Print 65.384

b Finds the square root of A correct to 1 decimal place.