1. Joe Urban and three other professional footballers each have contracts which allow for bonuses to be paid after good performances, and each earned a different amount of bonus money after the latest round. From the clues below, and with the aid of the grid supplied, work out the bonus payment each footballer received, and the club to which each player is signed. (One club is the Pumas)

	Panthers	Pumas	Scorpions	Wests	$	$	$	$2,000
Rogers								
Smith								
Thomas								
Urban								
$				
$				
$				
$2,000				

i. The Scorpions player, who isn't Smith, received the highest bonus of $2,000.

ii. Rogers got twice as much as the Panthers player.

iii. The one who got $1,250 doesn't play for Wests.

iv. Thomas doesn't play for Wests either. He got $250

2. ## LETTER PATTERN

Five of the six pairs of letters below belong, and their pattern is consistent. One pair of letters does not fit the pattern. Can you tell which pair does not belong?

CI, GM, PV, NT, BH, TW

3. ## Figure It Out

Bert scores an average of 73% over each of his first three tests. What will he need to score on his fourth and final test to bump his average up to 80%?

4. ## 1 + 23 + 4 + 5 + 67 =100

is one way of inserting plus signs into 1234567 so that the total is 100.
Find another way.

5.

TWO SUDOKU PUZZLES

9			6	5		1		8
8	5			2	1		3	
	1	6			3	9		4
	3	9	2			8	6	
5		2		9	8		4	
1			5	4		3		2
3	4		7			5	2	
	9	1			2		8	6
		5	1	8			7	3

	1	4	5			9		2
9				3	2		4	6
6	2			8		9		5
2		8	6				3	1
	3	9	4			8	2	
5				2	1	4	9	
4		1		7		3		2
	5		2		3		8	9
	8	2	9	1		6		

Figure It Out

6.

A house painter was asked to mix 6 litres of grey paint in the ratio of two parts white paint to one part black paint.

By mistake, he mixes 4 litres of black paint with two litres of white paint.

He decides to pour away some of the incorrect mixture and to correct the remainder by adding sufficient volume of white paint to achieve 6 litres of grey paint in a 2:1 white:black ratio.

What is the minimum volume he needs to pour away?

7.   Seven Quick Questions

You might try to answer these against the clock; five correct out of seven in fifteen minutes would be a pretty good result.

(a)   If half of a certain number plus one quarter of that same number is equal to 9, what is the number?

(b)   Adam, Brett and Charles dined together. The bill came to $41. Brett contributed twice as much as Charles, and Adam paid $20. How much did Charles contribute?

(c)   If 8 times a certain number exceeds half of that number by 15, what is that number?

(d)   A carpenter has to cut three 15 metre planks into 3 metre sections. If he cuts each plank individually, how many 3 metre sections will he end up with, and how many cuts will he have to make?

(e)   A number multiplied by 16 gives the same result as if it had 105 added to it. What is the number?

(f)   The length of a rectangle is its width plus 6 metres. Find its dimensions if it has an area of 112 m^2.

(g)   A certain number consists of five digits. The sum of those digits is 24. The first digit is half of the third digit and the second digit is a quarter of the fourth digit. The last digit is equal to the sum of the first three digits. What is the number?

8. An improper fraction is a fraction written as a numerator over a denominator with a value greater than 1.

What is the lowest value improper fraction (in other words that has a value greater than but closest to 1) you can write using the digits 1, 2, 3, 4, 5 and 6 once each?

For example,

612/354

has a value of 1.728, but the correct answer is smaller than that.

9. (a) Using each of the digits 1 to 4 once only, write down two two-digit numbers and multiply them together.

For example, **12 X 34 = 408**

but that isn't the biggest number you can make following these rules:

What is?

(b) Using each of the digits 1 to 6 once only, write down two three-digit numbers and multiply them together.

For example, **123 X 456 = 151,074**

but that isn't the biggest number you can make following these rules:

What is?

(c) Using each of the digits 1 to 8 once only, write down two four-digit numbers and multiply them together.

For example, **1,234 X 5,678 = 7,006,652**

but that isn't the biggest number you can make following these rules:

What is?

10. In a car trial event, four drivers (Alf, Bronwyn, Carl and Dell) were each paired up by lot with a navigator (the available navigators being Eric, Fran, Geoff and Helen).

From the clues below, work out which driver was paired with which navigator, and the order in which each pair finished.

i.   Eric and his driver finished before Carl and his navigator, who were not the last pair to finish.
ii. Dell and her navigator drove in a yellow car and finished after Fran and her driver.
iii. Helen, who wasn't navigating for Carl, competed in a red car. Her pair did not win.
iv. Bronwyn and her navigator came second.

Answers:

1. Rogers plays for Wests and earned $500
   Smith plays for Pumas and earned $1,250
   Thomas plays for the Panthers and earned $250
   Urban plays for the Scorpions and earned $2,000

2. TW is the odd pair.

3. It is arithmetically not possible for Bert to achieve an 80% average over four tests.

4. 1 + 2 + 34 + 56 + 7 = 100

5.

9	7	3	6	5	4	1	2	8
8	5	4	9	2	1	6	3	7
2	1	6	8	7	3	9	5	4
4	3	9	2	1	7	8	6	5
5	6	2	3	9	8	7	4	1
1	8	7	5	4	6	3	9	2
3	4	8	7	6	5	2	1	9
7	9	1	4	3	2	5	8	6
6	2	5	1	8	9	4	7	3

8	1	4	5	6	9	7	2	3
9	7	5	1	3	2	8	4	6
6	2	3	7	8	4	9	1	5
2	4	8	6	9	7	5	3	1
1	3	9	4	5	8	2	6	7
5	6	7	3	2	1	4	9	8
4	9	1	8	7	6	3	5	2
7	5	6	2	4	3	1	8	9
3	8	2	9	1	5	6	7	4

6. 3 Litres

7. (a) 12   (b) $7   (c) 2   (d) 15 pieces, 12 cuts   (e) 7   (f) 8 m   (g) 22488

8. 512/463

9. (a) 41 X 32 = 1,312

   (b) 631 x 542 = 342,002

   (c) 8,531 X 7,642 = 65,193,902

10. The team of Alf (driver) and Eric (navigator) came first.
    The team of Bronwyn (driver) and Helen (navigator) came second.
    The team of Carl (driver) and Fran (navigator) came third.
    The team of Dell (driver) and Geoff (navigator) came fourth.

SOLUTIONS:

1. The bonuses received are $250, $1,250, $2,000 and a fourth bonus.

	Panthers	Pumas	Scorpions	Wests	$?	$250	$1,250	$2,000
Rogers	X							
Smith			X					
Thomas				X		✓		
Urban								
$?__?__								
$250_								
$1,250				X				
$2,000	X		✓					

From the clues,

The Scorpions player earned $2,000

The Scorpions player isn't Smith

Rogers isn't the Panthers player

The Panthers player didn't get the most money ($2,000)

The one who got $1,250 didn't play for Wests

Thomas didn't play for Wests

Thomas got $250

	Panthers	Pumas	Scorpions	Wests	$?	$250	$1,250	$2,000
Rogers	X					X		
Smith			X			X		
Thomas				X	X	✓	X	X
Urban						X		
$?__?__			X					
$250_			X					
$1,250			X	X				
$2,000	X	X	✓	X				

Since there are four players each with a different team, and each earning a different sized bonus, these crosses can be added to the table.

	Panthers	Pumas	Scorpions	Wests	$?	$250	$1,250	$2,000
Rogers	X					X		
Smith			X			X		X
Thomas			X	X	X	✓	X	X
Urban						X		
$?__?__			X					
$250_			X	X				
$1,250			X	X				
$2,000	X	X	✓	X				

The player who plays for the scorpions and the player who earned $2,000 are the same person.

Thomas and the player who earned $250 are the same person.

More crosses can be added to the table

NOTE THAT THIS MEANS THE Wests player earned the unknown" bonus

	Panthers	Pumas	Scorpions	Wests	$500	$250	$1,250	$2,000
Rogers	X				✓	X	X	X
Smith			X		X	X		X
Thomas			X	X	X	✓	X	X
Urban					X	X		
$500	X	X	X	✓
$250	✓	X	X	X
$1,250	X		X	X
$2,000	X	X	✓	X

Clue ii says

Rogers got twice as much as the Panthers player.

The Panthers player can't have got $1,250, because then Rogers would have earned $2,500 – more than the highest bonus of $2,000.

The Panthers player earned $250. Twice that amount is $500, which must be the amount of the unknown" bonus. Rogers got $500.

	Panthers	Pumas	Scorpions	Wests	$500	$250	$1,250	$2,000
Rogers	X	X	X	✓	✓	X	X	X
Smith	X	✓	X	X	X	X	✓	X
Thomas	✓	X	X	X	X	✓	X	X
Urban	X	X	✓	X	X	X	X	✓
$500	X	X	X	✓
$250	✓	X	X	X
$1,250	X	✓	X	X
$2,000	X	X	✓	X

Filling in the table

2. It's about position in the alphabet. In all the other pairs, the two letters are separated by five other letters. in the alphabet. T and W are separated by only U & V

3. Assuming each test carries the same weight; The first three tests account for a score of (3 X 73) or 219 marks out of 300. An average of 80% over four tests is equivalent to 320 marks out of 400. Bert would need to score 101% on his fourth test to achieve that.

4. See above   5. See above

6. The final result will have 4 litres of white paint mixed with 2 litres of black paint for a total volume of 6 litres of grey paint.

Trial & error:

Starts with		Pours away		remainder				adds	result	
4L black	2L white	1L grey	5L grey	[3.33L black]	[1.67L white]	1L white	3.33L black	2.67L white
4L black	2L white	2L grey	4L grey	[2.67L black]	[1.33L white]	2L white	2.67L black	3.33L white
4L black	2L white	3L grey	3L grey	[2L black]	[1L white]	3L white	2L black	4L white

7. (a) Half the number plus a quarter of the number is three quarters of the number. If three quarters of the number is 9, one quarter is 3, four quarters is 12.

   (b) Let Charles's contribution equal C dollars

$$2C + C + 20 = 41$$
$$3C + 20 = 41$$
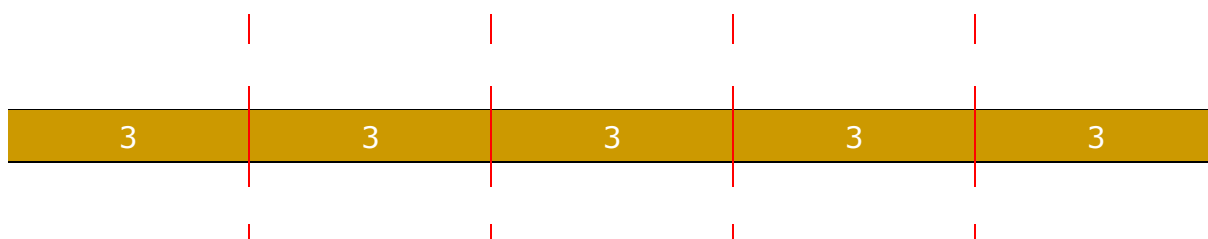$$3C = 21$$
$$C = 7$$

   (c) $8n = n/2 + 15$

     Multiply both sides by 2

$$16n = n + 30$$
$$15n = 30$$
$$n = 2$$

  (d) Each 15 metre plank can be sawn into five 3 metre sections, hence 15 sections will be produced. However, only four cuts are required for each plank, so 12 cuts overall

   (e) $16n = n + 105$

$$15n = 105$$
$$n = 7$$

   (f) Although this could be solved algebraically,

$$L \times (L - 6) = 112$$
$$L^2 - 6L = 112$$
$$L^2 - 6L - 112 = 0$$
$$(L + 8)(L - 14) = 0$$
$$L = -8 \text{ (not an option) or } 14$$

    It's easier to do it by trial-and-error or just mental arithmetic.

Try L = 12   12 X 6 =72
Try L = 13   13 X 7 = 91
Try L = 14   14 X 8 = 112

   (g) The fact that five digits add up to no more than 24 means that most of the digits will be quite low in value.

Try	Digit 1	Digit 2	Digit 3	Digit 4	Digit 5	total	
	1	1	2	4	8	16	Too low
	1	2	2	8	5	18	Too low
	1	3	2	12	8	26	Too high
	2	2	4	8	8	24	✔

8. Although the question does not stipulate how many digits there will be in the numerator and the denominator;
- if the value approximates 1, there must be three digits in the numerator and three in the denominator.
- the first digit of the numerator must be 1 greater than that of the denominator.
- the second and third digits in the numerator (hence the denominator) should be selected and ordered so as to reduce the value as close to 1.00 as possible.
Try: 234/165 is ~ 1.48
314/265 is ~ 1.18
412/365 is ~ 1.13
512/463 is ~1.11
612/543 is ~1.13

9. (a) The answer is most likely to be either 41 X 32 or 42 X 31
Try 41 X 32 = 1,312   42 X 31 = 1,302

(b) To get the highest possible product, you require the two highest possible 3-digit numbers under these rules to multiply each other.
- one of the numbers will commence with 6, one will commence with 5.
- the other two digits in each number will reduce in size from left to right
Try: 640 X 530 = 339,200   630 X 540 = 340,200
Try: 632 X 541 = 341,912   631 X 542 = 342,002

(c) To get the highest possible product, you require the two highest possible 4-digit numbers under these rules to multiply each other.
- one of the numbers will commence with 7, one will commence with 8.
- the other three digits in each number will reduce in size from left to right
Try: 8600 X 7500 = 64,500,000   8500 X 7600 = 64,600,000
Try: 8540 X 7630 = 65,160,200   8530 X 7640 = 65,169,200
Try: 8,532 X 7641 = 65,193,012   8531 X 7642 = 65,193,902

NOTE THE RECURRING PATTERN

10.
Possible positions from the clues: if Bronwyn came second, and Carl was neither first nor last, then Carl came third. Dell did not come first, so must have come fourth.
Eric and his driver must have finished first or second.
Helen and her driver did not come first
Fran and her driver did not come last
It's possible to assign the four drivers their correct finishing position.
Helen was not Carl's navigator
Helen did not navigate for Dell (different colour cars)

DRIVER	NAVIGATOR	ORDER
Alf	Eric, Fran, Geoff, ~~Helen~~	1
Bronwyn	Eric, Fran, Geoff, Helen	2
Carl	~~Eric,~~ Fran, Geoff, ~~Helen~~	3
Dell	~~Eric,~~ ~~Fran,~~ Geoff, ~~Helen~~	4

So by elimination, Geoff is Dell's navigator. By further elimination, Fran is Carl's navigator. Eric is the only candidate left as Alf's navigator, so Helen is Bronwyn's navigator.

DRIVER	NAVIGATOR	ORDER
Alf	Eric	1
Bronwyn	Helen	2
Carl	Fran	3
Dell	Geoff	4