OPEN CHALLENGE '11
SOLUTIONS

1. MONGO MONEY

Let the three coins be a, b and c. Thus Flash has 2a+b+c=28 and Dale has either 3a+b+c=21 (impossible as a would be negative), 2a+2b+c=21 (impossible as b would be negative), a+2b+2c=21 or a+3b+c=21.
Doubling Flash's equation and subtracting Dale's third equation gives 3a=35 (impossible as a is a whole number).

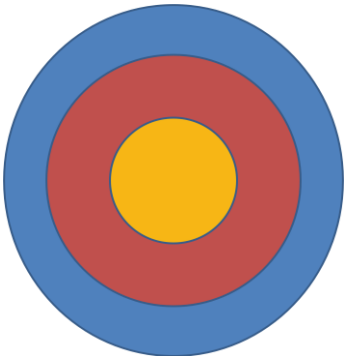
So subtracting Dale's equation from Flash's gives a-2b=7. Thus a≥9 (as b≥1) and a is odd.

As b+c≥3 then 2a≤25. Thus a≤12 and so a is 9 or 11.

If a=9 then b=1 and from Flash's original equation c would also be 9 (impossible as a≠b≠c).
If a=11then b=2 and c=4.

Check: Flash has 2x11+2+4=28✓ Dale has 11+3x2+4=21✓
Thus the value of the 3 coins were 11 mingols, 4 mingols and 2 mingols.

2. HAWKBALL



Let the number of golds, reds and blues be g, r and b.
Now g+r+b=16 and 7g+4r+2b=*7

As 4r+2b is even then 7g must be odd and g≤16.

It can be shown that g can be any odd number between 1 and 15 inclusive and the resulting score of *7 can be achieved.
eg. 1g+5r+10b=47, 1g+10r+5b=57 etc.

Now the number of golds equals the number of reds and this is ≤8 (as total=16).

As the number of golds is odd we only have a choice of 1, 3, 5 or 7.

1g+1r+14b=39✗ 3g+3r+10b=53✗ 5g+5r+6b=67✓ 7g+7r+2b=81✗

Thus the only solution is 5 golds, 5 reds and 6 blues giving a winning total of 67 points.

3. MINGO CITY

2312	Males	Females	Total
Adults	40%	25%	65%
Children	20%	15%	35%
Total	60%	40%	100%

2362	Males	Females	Total
Adults	30%	45%	75%
Children	15%	10%	25%
Total	45%	55%	100%

Let m = number of adult males
and w = number of adult females
In 2362 we know that w = m + 15%
w + m = 75%
thus 2m = 60%
m = 30%

Let the population in 2312 be x and thus the population in 2362 is x + 30 000
We know that 25%(x + 30 000) = 40%x thus x = 50 000
Hence the number of women in 2312 is 25%x50 000 = 12 500
and the number of women in 2362 is 45%x 80 000 = 36 000

4. THE ARBORIA CUP

For Team A as they have identical speeds they will each run half the distance and cycle half the distance and finish together. Hence the time taken will be

21km at $12kmh^{-1}$ + 21km at $28kmh^{-1}$ = 1.75 + 0.75 hours

= 2.5 hours

For Team B as Ronkol can run faster than Rena can cycle the time taken will be for Rena to cycle the 42km

42km ÷ $15kmh^{-1}$ = 2.8 hours

For Team C the optimum time is when we equate the times for Undina and Hanak.

Hence $\frac{x}{10} + \frac{42-x}{35} = \frac{x}{25} + \frac{42-x}{14}$

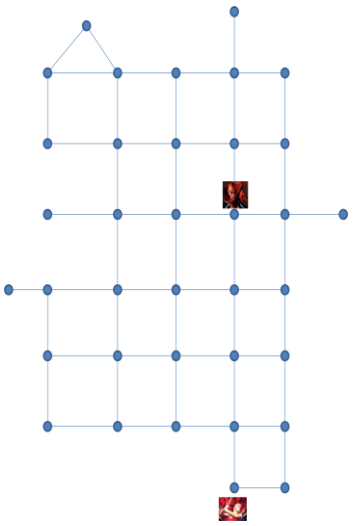
This gives a value of 17.5 for *x*

Hence the time taken is $\frac{17.5}{10} + \frac{42-17.5}{35} = 1.75 + 0.7$

This gives a time of 2.45 hours

Thus Team C of Undina and Hanak win the Arboria Cup in a time of 2 hours 27 minutes

5. MING'S CAPTURE



Flash is originally an even number of planets away from Ming and if this situation is maintained Ming will avoid capture.

For Flash to capture Ming there must be an odd number of planets between them.

In order for this to occur, Flash (or Ming if he is foolish) must go round the triangular arrangement of planets.

Flash can always do this and so will be able to capture Ming.

6. MONGO'S KINGS

Name	Date
Barin	1 – 33
Tyber (son)	34 – 47
Zann (son)	48 – 50
Urai (brother)	51 – 61
Urai II (uncle)	62 – 84
Zann II (brother)	85 – 92
Barin II (brother)	93 – 115
Urai III (son)	116 – 132
Urai IV (son)	133 – present