

Challenge 07 Answers

1. A FAMILY QUESTION

Let x be the number of years to pass:

$$26 + x = 3(6 + x)$$

$$26 + x = 18 + 3x$$

$$26 - 18 = 3x - x$$

$$8 = 2x$$

$$4 = x$$

I.e. 4 years will pass, so Ted will be 30 and Ned 10.

2. MAKE ME A MATCH

Any of the following:

$$\sqrt{1} = 1$$

$$VI \neq 1$$

$$VI \geq 1$$

$$VII > 1$$

3. SCOUTS PACE

It is faster to use the minutes method than the lamp post method.

13 minutes v 14minutes and 33 seconds

Minute	R/W	Distance	Cumulative Distance	Lamp post	R/W	Distance covered	Time	Min	Sec
1	R	0.10	0.10	2	R	0.11	1.14	1	8
2	W	0.05	0.15	3	W	0.23	2.27	3	25
3	R	0.10	0.25	4	R	0.34	1.14	4	33
4	W	0.05	0.30	5	W	0.45	2.27	6	49
5	R	0.10	0.40	6	R	0.57	1.14	7	57
6	W	0.05	0.45	7	W	0.68	2.27	10	14
7	R	0.10	0.55	8	R	0.80	1.14	11	22
8	W	0.05	0.60	9	W	0.91	2.27	13	38
9	R	0.10	0.70	Remaining	R	1.00	0.91	14	33
10	W	0.05	0.75	160 yards					
11	R	0.10	0.85						
12	W	0.05	0.90						
13	R	0.10	1.00						

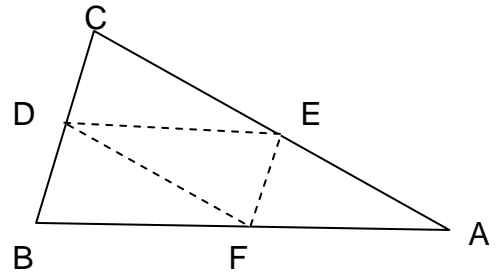
(Bonus mark for anyone who spots the uniform is out of date or that the Scout insignia is on the wrong side!)

4. DAY TRIPPER

City	Date
London	Wednesday 1 st February 2006
Cardiff	Wednesday 8 th February 2006
Edinburgh	Wednesday 1 st March 2006
Liverpool	Wednesday 8 th March 2006

5. TREE-MENDERS

Let ABC be the original triangular field, and D, E, F be the given midpoints of the sides BC, AC, AB, respectively. DEF gives the dotted triangle shown on the diagram, which we know. There are several ways of retrieving ABC from DEF, two of which are:



Method 1

Rotate DEF by 180 about the midpoint of each side, e.g. DE. This is NOT the same as flipping or reflecting it along each side.

Method 2

The sides of ABC are parallel to the sides of DEF, so you get ABC by drawing:

- 1) the straight line that passes through D and is parallel to EF,
- 2) the straight line that passes through E and is parallel to DF,
- 3) the straight line that passes through F and is parallel to DE.

The resulting 3 lines meet at the required vertices A, B, C of the triangle.

A solution is unique provided that the given points D, E, F do not lie in a straight line. The above sketch is not to scale.

6. TRUE GRIT

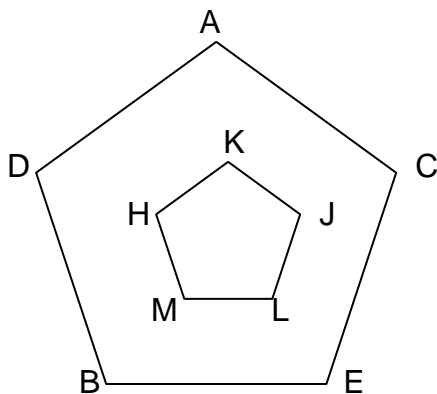
The shortest distance is 7800m.

Since A, B, C and D are all odd nodes, (i.e. they have an odd number of roads going into them), at least two roads need to be repeated. The pair of roads AB and CD is the shortest option available.

7. ANYONE FOR TENNIS

There are 13 possible combinations:

AH	AH	AH	AH	AJ	AJ	AJ	AJ	AK	AK	AK	AK	AK
BL	BL	BM	BM	BH	BH	BL	BM	BH	BH	BL	BM	BM
CJ	CK	CJ	CL	CK	CL	CK	CK	CJ	CL	CJ	CJ	CL
DK	DM	DK	DK	DM	DK	DH	DH	DM	DM	DH	DH	DH
EM	EJ	EL	EJ	EL	EM	EM	EL	EL	EJ	EM	EL	EJ



In this configuration, each of A - E is prepared to play with the three nearest from H - M.

One solution with each boy paired with the nearest partner,

five with three adjacent boys paired with the nearest and the other two swapped,

five with only 1 boy paired with the nearest girl and two pairs of swaps, and

two with none paired with the nearest girl

(i.e. AJ, CL, EM, BH, DK
and AH, DM, BL, EJ, CK)

This gives a total of 13 combinations.

As part of the Challenge evening on 22nd May, we will present a full set of solutions.