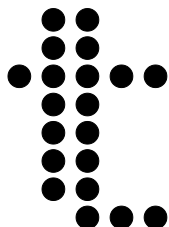# Geometry (Intermediate UKMT)

These questions must be attempted ***without a calculator***
Topics covered in the questions below may not necessarily be from the topic of the title.
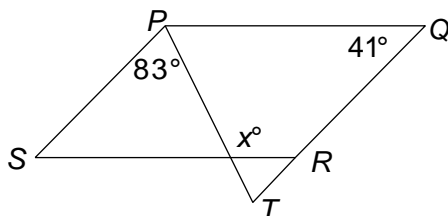
1. The information display on a train shows letters by illuminating dots in a rectangular 5 × 8 array. In the letter 't' shown, what fraction of the dots in the array is illuminated?
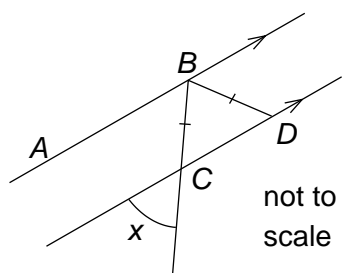
A $\dfrac{9}{20}$
B $\dfrac{19}{40}$
C $\dfrac{1}{2}$
D $\dfrac{21}{40}$
E $\dfrac{11}{20}$

2. What is the value of $0.75 \div \dfrac{3}{4}$?

A 0.5
B 1
C 1.5
D 2
E 2.5

3. In the diagram the lines *PQ* and *SR* are parallel, as are the lines *PS* and *QT*.

What is the value of *x*?

A 139
B 138
C 124
D 98
E 97

4. Lines *AB* and *CD* are parallel and *BC = BD*.

Given that *x* is an acute angle not equal to 60°, how many *other* angles in this diagram are equal to *x*?

not to scale

A 1
B 2
C 3
D 4
E 5

5. *ABCD* is a square with sides of length 9cm.

How many points (inside or outside the square) are equidistant from *B* and from *C*, and are exactly 6cm from *A*?

A 0   B 1   C 2   D 3   E more than 3

6. Two sides of a triangle have lengths 6 cm and 5 cm. Perry suggests the following possible values for the perimeter of the triangle: (i) 11 cm (ii) 15 cm (iii) 24 cm.

Which of Perry's suggestions could be correct?

A (i) only   B (i) or (ii)   C (ii) only   D (ii) or (iii)   E (iii) only

7. You have to draw two (infinite) lines parallel to the *x*-axis, three (infinite) lines parallel to the *y*-axis, and four (infinite) lines parallel to the line $x = y$.

What is the smallest possible total number of crossing points among the nine lines you draw?

A 10   B 12   C 14   D 16   E 18

8. In a leisure park there are three running tracks, all with the same Start and Finish, and all made from either one or two semicircles with centres on the same line. Three runners *P*, *Q* and *R* start together at the Start and run at the same constant speed along the tracks as shown.

In what order do they reach the Finish?
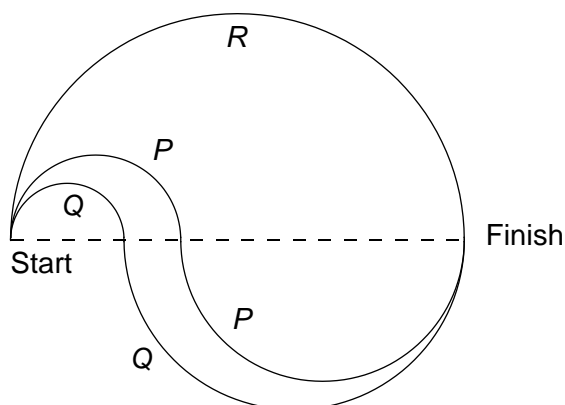
A *P* then *Q* then *R*   B *R* first then *P* and *Q* together
C *R* then *Q* then *P*   D all three together

E more information needed