

## Eton 2019 King's Scholarship A Solutions

1) a)  $1\frac{1}{5}$

b)  $\frac{2}{5}$

c)  $17\frac{8}{9}$

2) a) 10.2

b) 1320

c) 0.00000001

3)  $077^\circ$

4) £1

5) a)  $x = 11$

b)  $x \leq 5\frac{1}{4}$

6) 13

7) a) 7600m

b) 6800m

8) a)  $5.9 \times 10^{20}$

b)  $1.011 \times 10^5$

9) 96

10) £1.60

11)a) Interior angle of pentagon = 108

EDA is isosceles so due to above  $EAD = 36$

$$108 - 36 = 72 \text{ (DAB)}$$

ABD isosceles so  $ADB = 36$ , hence result

b) 3:1

12)a) 5372, 5376

b) 72180, 72189

c) 2376, 4374, 6372, 8370, 9378

d) 1123452, 1323432, 1523412, 1623492, 1823472

13)a)

15	0	18
14	11	8
4	22	7

Magic number 33

b)

$x-y$	$x+y-z$	$x+z$
$x+y+z$	$x$	$x-y-z$
$x-z$	$x-y+z$	$x+y$

Magic number  $3x$

- c) The difference between top-right and bottom-middle is both  $y$  and  $7$ :  $y=7$ .  
Bottom-right:  $x+7=16$  so  $x=9$ . So  $z=16$ .

2	0	25
32	9	-14
-7	18	16

- 14)a) One hour later (Monday 7am):

Tom's watch shows 06:55:00

Dick's watch shows 07:02:30

Harry's watch shows 07:03:00

- b) Tom's watch shows 04:00:00

Harry's watch shows 07:12:00

- c) 7m30s difference between the watches per hour.

So  $60/7.5 \times 4 = 32$  hours later.

So real time is 14:00:00.

So Tom's watch shows  $14:00:00 - 5\text{mins} \times 32 = 14:00:00 - 160\text{ mins} = 11:20:00$

- d) Tom and Harry's watches differ by 8 minutes per hour.

They must be out by a day which is  $24 \times 60$  minutes.

So  $24 \times 60 / 8$  hours must have passed = 180 hours.

180 hours = 7 days and 12 hours.

So the real time is Monday 6pm.

Tom's watch slows by 5m =  $1/12$  hours per hour.

So in 180 hours it slows by  $180/12 = 15$  hours.

So Tom's watch shows 03:00:00 (on Monday)

Checking: Harry's watch advances  $3 \times 180$  minutes =  $3 \times 180 / 60$  hours = 9 hours.

So it shows 6pm + 9 hours = 03:00:00 (as if it were Tuesday).

- 15)a)

a	b	c
3	4	5
5	12	13
8	15	17
7	24	25
18	24	30
15	36	39

- b) i) Area of triangle =  $\frac{1}{2} \text{base} \times \text{height}$

$$300 = \frac{1}{2} \times 25 \times NQ$$

$$NQ = 24\text{cm}$$

- ii)  $NQ = 24\text{cm}$  and  $NO = 25\text{cm}$  so by table  $OQ = 7\text{cm}$ .

$$\text{So } QP = 18\text{cm}$$

NQ = 24cm and QP = 18cm so NP = 30cm from table.

iii) Half NP = 15cm and NM = 39cm (using the perimeter).

So from M to the midpoint of NP is 36cm.

From the same midpoint to O is 20cm by Pythagoras.

So area = NP x OM x  $\frac{1}{2}$  =  $30 \times 56 \times \frac{1}{2} = 840\text{cm}^2$