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) $077°$

4) £1

5) a) $x = 11$
   b) $x \leq 5\frac{1}{4}$

6) 13

7) a) 7600m
   b) 6800m

8) a) 5.9×10^{20}
   b) 1.011×10^{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 (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 x 4 = 32 hours later.
So real time is 14:00:00.
So Tom's watch shows 14:00:00 – 5mins x 32 = 14:00:00 – 160 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 24x60 minutes.
So 24x60/8 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 3x180 minutes = 3x180/60 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 = $\frac{1}{2} base \times height$

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

NQ = 24cm

ii) NQ = 24cm and NO = 25cm so by table OQ = 7cm.
So QP = 18cm

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 $\frac{1}{2} = 30 \times 56 \times \frac{1}{2} = 840cm^2$