Challenge 2018 Maths 2 solutions

1) £1.38

2) Sam – 18.5 seconds for 100m ((2x60+28)/8)
Tom – $18\frac{7}{15}$ seconds for 100m ((4x60+37)/15)
So Tom is faster on average (just)

3) a) i) $1\frac{1}{2}x + 1$
ii) $\frac{a^2}{2b^2}$
b) $V = \frac{RT+bP}{P}$
c) $x = 1\frac{2}{5}$

4) $721cm^2$

5) a) $3704cm^3$
b) 51,951 Pascals

6) a) Maximum 807, minimum 606 (rounding to 605 will give less than 30%)
b) Maximum 504, minimum 203

7) a) 163p to 175p (assuming £14 is included in the range)
b) £1.63

8) a) A = x+2
B = x+4
C = 6+2x
D = 10+3x
E = 8+4x
F = 8+5x
G = 16+4x
b) 5cm

9) a) 10, 16, 25, 40
b) The pattern repeats in threes as even, odd, even so every nth term where n is a multiple of 3 is even.
First even + second odd – 1 = third even
Second odd + third even – 1 = fourth even
Third even + fourth even -1 = fifth odd
Fourth even + fifth odd – 1 = sixth even
So if the first, second and third are even, odd, even then the fourth, fifth and sixth are too, and this pattern repeats.
c) Every number is one more than a multiple of 3.
The first two numbers are one more than a multiple of 3.

If two consecutive numbers are 1 more than a multiple of 3 (3m+1 and 3n+1) then the next is 3(m+n) + 2 – 1 = 3(m+n) + 1.
So all of them must be one more than a multiple of 3.

10)a) 24.3 seconds
b) 17.2 seconds

11)a) i) 2.8cm
ii) $6.3cm^2$
iii) 2.38cm
b) $16.8cm^2$

12)a) (2,7)
b) $98cm^2$

13) 8cm

14)a) $325cm^2$
b) $2391cm^2$
c) $21.3cm$