

### Challenge 2017 Maths 2 solutions

1) £375

2) 13m

3) a) i)  $\frac{x}{9}$

ii)  $2x$

b)  $\frac{1}{6}x - \frac{5}{6}$

c)  $\frac{29}{3}$

4) 42.01cm

5) a) £30,220

b) 9.5%

6) B=24, G=20

7) 11,12,13,14,15,16

8)

	Tuk-tuk	Moped	Total
Fuel	22 km/l	28 km/l	
Speed	36 km/h	24 km/h	
A distance	21 km	21 km	42km
A time	$21/36 = 35$ min	$21/24 = 52.5$ min	<b>87.5 min</b>
A fuel	21/22 litres	$21/28 = \frac{3}{4}$ litres	$75/44 = 1.70$ litres
B time (see below)	$x = 42$ minutes	$x = 42$ minutes	$2x = 84$ min
B distance (see below)	$36x = 25.2$ km	$24x = 16.8$ km	42km
B fuel	$25.2/22 = 63/55$ litres	$16.8/28 = 0.6$ litres	$96/55 = 1.75$ litres

Calculation for B time and distance

$$36x + 24x = 42 \text{ so } x = 0.7 \text{ hours} = 42 \text{ minutes}$$

9) a)  $A = LH - H^2$

b)  $L = \frac{A+H^2}{H}$

10) a) i)  $AEB = 142 - x$  (angles in triangle add to  $180^\circ$ )

ii)  $BED = x$  (alternate angles)

$BDE = x$  (BED isosceles)

$EBD = 180 - 2x$  (angles in triangle add to  $180^\circ$ )

$DBC = 33^\circ$  (BCD is isosceles and angles in triangle add to  $180^\circ$ )

$EBC = 213 - 2x$  (sum of EBD and DBC)

- b) If ABE is isosceles then  $\angle ABE (x) = \angle AEB (142-x)$  so  $x=71^\circ$   
From a)ii)  $\angle EBC = 213 - 2x = 71^\circ$ .  
So  $\angle AEB = \angle EBC$  and AE and BC are parallel by alternate angles.

- 11)a) £460  
b) £540  
c) Less by £12

- 12)a) (6,12)  
b) i) (10,-1)  
b) ii)  $84\text{cm}^2$

13)a)

	White	Black	Grey
i)	160	80	80
ii)	153	81	72
iii)	110	63	48

- b) 136  
c)  $14 \times 22$ ,  $14 \times 23$ ,  $15 \times 22$ ,  $15 \times 23$  (length and width in no particular order)
- 14)a)  $780.3\text{cm}^2$   
b)  $173.4\text{cm}^2$