

Challenge 2018 Maths 3 solutions

- 1) $\frac{65}{90} = \frac{13}{18} = \frac{143}{18 \times 11}$
 $\frac{80}{110} = \frac{8}{11} = \frac{144}{11 \times 18}$
 So Ravi scored higher in Mathematics.
- 2) 20p each
- 3) 24 miles per gallon
- 4) a) $\frac{8}{25}$
 b) $\frac{7}{34}$
- 5) 36%
- 6) $x=5, y=15$
- 7) A has 32 sides and internal angle 168.75 degrees
 B has 160 sides and internal angle 177.75 degrees
- 8) a) 45cm^2
 b) 125cm^2
- 9) a) i) $138 - 2x^\circ$
 ii) $10 + 2x^\circ$
 b) If PD parallel to AQ then $21+x+21 = 10+2x$ by alternate angles.
 Hence $x=32$ and $AQB = 10+2x = 74$ and $ABQ = 138-2x = 74$. Hence result.
- 10) 7:9
- 11) a) i) $(3^3 \times 7)^2 = 3^6 \times 7^2$ so $3^3 \times 7 = \sqrt{3^6 \times 7^2}$ by square rooting both sides.
 ii) 5^8
 iii) 3×5^2
 b) i) A square number but not a cube number
 ii) A square number and a cube number
 iii) A cube number
 iv) A square number and a cube number
 v) A cube number
 vi) A square number
- c) 18
- d) $n = 2^x \times 5^y$
 $2n = 2^{x+1} \times 5^y$ is square so $x+1$ is even i.e. x is odd, and y is even
 $5n = 2^x \times 5^{y+1}$ is a cube so x is a multiple of 3 and $y+1$ is a multiple i.e. y is one less than a multiple of 3
 So the smallest possible x is 3 and the smallest possible y is 2
 $n = 2^3 \times 5^2 = 200$
- e) $m=128$
- 12) a) $a=1, b=13$
 $a=9, b=7$
 $a=13, b=4$
 $a=17, b=1$
- b) $c=4, d=6$ - yes
 $c=6, d=14$ - no, not lowest terms
 $c=7, d=42$ - no, not lowest terms

13)a) i) $4x+6$

ii) AMM

iii) AAMAMA

b) i) $x+2$

ii) MAD

iii) MMAMAD or MMMADA

14)a) Area of each of P and Q = $\frac{1}{2}ab$

Area of r = $\frac{1}{2}(a - b)^2$

b) Area of T = $\frac{1}{2}a^2 - \frac{1}{2}b^2$

c) a and b are 31,29 or 17,13 or 13,7 or 11, 1, respectively