

Eton King's Scholarship 2009 Maths B solutions

- 1) a) $\frac{xz}{y}$
 b) $8.4l$
 c) 12.5 hours
- 2) a) i) $10-x$
 ii) 2.5km
 iii) £3.10
- 3) a) $m^2 - n^2$
 b) $3 \times 7 \times 13$ so 1,273; 3,91; 7,39; 13,21
 c) 47^2 and 44^2 ; 23^2 and 16^2 ; 17^2 and 4^2
- 4) a) 1.6cm
 b) 0.9cm
 c) 5m
- 5) a) -6
 b) $m = w + 6$; $3m - 3w = 18$
 $\frac{2}{3}(w + 10) - \frac{1}{2}(m - 4) = 14$
 $4w + 40 - 3m + 12 = 84$; $4w - 3m = 32$
 $w = 50, m = 56$
- 6) a) Shaded perimeter = $AC + CD + AD$
 $= 5\pi + 3\pi + 8\pi = 16\pi$
 Unshaded perimeter = $AB + BD + AD$
 $= 4\pi + 4\pi + 8\pi = 16\pi$
 b) 'AD' means semicircle with diameter AD.
 Shaded area = $AD - AC + CD$
 $= 64\pi - 25\pi + 9\pi = 48\pi$
 Unshaded area = $AC + AB + BD - CD$
 $= 25\pi + 16\pi + 16\pi - 9\pi = 48\pi$
- 7) a) $28 = 2 \times 2 \times 7$
 $44 = 2 \times 2 \times 11$
 $56 = 2 \times 2 \times 2 \times 7$
 $144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$
 b) $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7 \times 11$
 c) $672 = 2^5 \times 3 \times 7$
 $504 = 2^3 \times 3^2 \times 7$
 $2352 = 2^4 \times 3 \times 7^2$
 Greatest number of groups = $2^3 \times 3 \times 7 = 168$
- 8) a) i) 3, 4
 ii) 23, 25
 b) $16\frac{4}{5}$
 c) $x = 15, 17$

x	x/4	x+ x/4	5x/3	5x/3 -7
14	3	17	23	16
15	3	18	25	18
16	4	20	26	19
17	4	21	28	21

- 9) a) $x^2 - 2xy + y^2$
b) $x^3 - 2x^2y + xy^2 + x^2y - 2xy^2 + y^3 = x^3 - x^2y - xy^2 + y^3$
c) $(x - y)^2 \geq 0$
 $x^2 - 2xy + y^2 \geq 0$
 $x^2 + y^2 \geq 2xy$
 $\frac{x}{y} + \frac{y}{x} \geq 2$, by dividing by xy , which is positive
d) $(x - y)^2(x + y) \geq 0$, for positive x and y .
 $x^3 - x^2y - xy^2 + y^3 \geq 0$
 $x^3 + y^3 \geq x^2y + xy^2$
 $\frac{x^2}{y} + \frac{y^2}{x} \geq x + y$, by dividing by xy , which is positive
- 10)a) $\frac{xh}{2}, xh$
b) i) $\frac{q}{2}$
ii) $\frac{3q}{10}$
iii) $\frac{q}{10}$