

Eton 2020 King's Scholarship A Solutions

- 1) a) $1\frac{1}{3}$
 b) $\frac{3}{11}$
 c) $1\frac{2}{5}$
- 2) a) 0.0114
 b) 3000
 c) 0.00000081
- 3) a) 550
 b) 304.05
- 4) $x=1$
- 5) $x \leq -0.8$
- 6) $x = 11, y = 4$
- 7) 17.8
- 8) 32.5%
- 9) 134°
- 10) $\frac{1017-9-2 \times 90}{3} = 828$
 $\frac{828}{3} = 276$
 So 375 pages
- 11)a) $PBS = SPB = 45^\circ$ as ABC is isosceles.
 So triangle PBS is isosceles and $BS = x$
 $\frac{x^2}{2}$
- b) Similarly area of APQ = $\frac{y^2}{4}$ (split APQ vertically)
- c) $\frac{y^2}{4} + 2 \times \frac{x^2}{2} + xy = 225$
 $\frac{16x^2}{4} + x^2 + 4x^2 = 225$
 $9x^2 = 225$
 $x = 5\text{cm}$
- 12)a) 6 edges
 b) 8 vertices, 12 edges
 c) 6 vertices, 12 edges
 d) $\frac{12 \times 5 + 20 \times 6}{3} = 60$ vertices ('each vertex is counted 3 times'), and $\frac{12 \times 5 + 20 \times 6}{2} = 90$ edges ('each edge is counted twice')
- 13)a) $\frac{2x+2}{2} = x + 1$
 b) $OB = OC - BC = x + 1 - 2 = x - 1$
 c) $BD^2 = OD^2 - OB^2 = (x + 1)^2 - (x - 1)^2 = 4x$
 d) $122\pi = \pi r$ (half of circumference)
 $122 = r$
 $122 = x + 1$
 $x = 121$
 $BD = 2\sqrt{x} = 2 \times 11 = 22$
- 14)a) $\frac{m}{6} = \frac{n}{11}$ (both those things are 'one part' so $11m = 6n$)
 b) $\frac{m-3}{3} = \frac{n+14}{7}$ so $7m - 21 = 3n + 42$ so $7m - 3n = 63$

- c) $m = 42, n = 77$
- 15)a) $\frac{243}{1.2+1.5} = 90$
 $90 \times 1.2 = 108m$
- b) $\frac{243 \times 3}{1.2+1.5} = 270s$ until meet for the second time
 $\frac{243}{1.2} = 202.5$
 $270 - 202.5 = 67.5s$
- c) $5c - 1000$

 3 Lengths