

Eton King's Scholarship 2013 B Solutions

- 1) a) i) 1963.5cm^2
ii) 177cm
b) 50.1cm
- 2) a) 79.0%
b) 8.820km/hr
- 3) a) 1666
b) 714
c) 238 are divisible by 21. $1666+714-238=2142$.
d) 1978
- 4) a) $5,000 \times 0.25 + 10,000 \times 0.4 + 70,000 \times 0.6 = \text{£}47,250$
b) $\text{£}3,250$
c) 50%
d) $\text{£}25,000$
- 5) a) 53,59,61,67
b) $3 \times 11 \times 61$
c) $x^2 - y^2$
d) $x^2 - y^2 = 2013$
 $(x-y)(x+y) = 3 \times 11 \times 61$
We are told $x-y < 10$ so $x-y=3$ and $x+y=671$.
By simultaneous equations $x=337$ and $y=334$.
Answer 334.
- 6) a) $\text{£}31$
b) $\text{£}51$
c) $\text{£}73$
- 7) a) i) Always as $21n^2 = 3 \times 7n^2$
ii) Always as $33n + 15m = 3 \times (11n + 5m)$
iii) Sometimes:
if $n=3, m=3$ we get 36 (divisible by 3)
if we **take** $n=2, m=1$ we get 17 (not divisible by 3)
iv) Never:
 $9m + 6n + 13 = 3(3m + 2n + 4) + 1$, which is a multiple of 3 plus one.
- b) i) $9n^2 + 6n + 1$
ii) $9n^2 - 6n + 1$
iii) $9n^2$
- c) Any number is either a multiple of 3 ($3n$), a multiple of 3 plus one ($3n+1$) or a multiple of 3 plus two (which is the same as a multiple of 3 minus 1: $(3n-1)$). When squared those give the results in part b.
 $9n^2$ is a multiple of 3
 $9n^2 + 6n + 1$ is a multiple of 3 plus one: $3(3n^2 + 2n) + 1$
 $9n^2 - 6n + 1$ is a multiple of 3 plus one: $3(3n^2 - 2n) + 1$
- 8) a) Let the volume be V .
 $v/(\text{rate A}) = 0.5$ so rate A = $2v$
 $v/(\text{rate B}) = 1/3$ so rate B = $3v$
So rate A + rate B = $5v$ and $v/(\text{rate A} + \text{rate B}) = 1/5$ hours = 12 minutes
b) 2 hours 15 minutes

- 9) a) 5.61cm
b) i) 6545mm
ii) $20,027,700mm^2$
iii) 90 degrees
iv) 11088mm
- 10) a) 200
b) Each is the same: 1407
c) The first number gets 7 larger, the second gets 7 smaller
d) 200 numbers, so 100 pairs, each pair is 1407 so sum = $100 \times 1407 = 140,700$
e) i) 1,501,500
ii) 507,522
iii) 406,224