Hong Kong Mathematics Olympiad (1992 – 93)

Final Event 1 (Individual)

香港數學競賽 (1992 – 93)

決賽項目 1 (個人)

(i) Given that $7^{2x} = 36$ and $7^{-x} = (6)^{-\frac{a}{2}}$, find the value of a.

已知 $7^{2x} = 36$ 及 $7^{-x} = (6)^{-\frac{a}{2}}$，求 a 的值。

$a =$

(ii) Find the value of b if $\log_2\left\{\log_2\left[\log_2(2b) + a\right] + a\right\} = a$.

若 $\log_2\left\{\log_2\left[\log_2(2b) + a\right] + a\right\} = a$，求 b 的值。

$b =$

(iii) If c is the total number of positive roots of the equation $(x-b)(x-2)(x+1) = 3(x-b)(x+1)$, find the value of c.

若方程 $(x-b)(x-2)(x+1) = 3(x-b)(x+1)$ 正根的總數為 c，求 c 的值。

$c =$

(iv) If $\sqrt{3-2\sqrt{2}} = \sqrt{c} - \sqrt{d}$, find the value of d.

若 $\sqrt{3-2\sqrt{2}} = \sqrt{c} - \sqrt{d}$，求 d 的值。

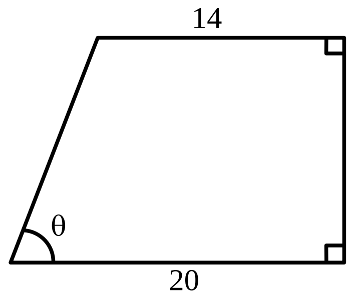
$d =$

Hong Kong Mathematics Olympiad (1992 – 93)
Final Event 2 (Individual)
香港數學競賽 (1992 – 93)
決賽項目 2 (個人)

(i) If $\sin\theta = \frac{4}{5}$, find a, the area of the quadrilateral.

$a =$

若 $\sin\theta = \frac{4}{5}$，求四邊形面積 a。



(ii) If $b = 126^2 - a^2$, find b.

$b =$

若 $b = 126^2 - a^2$，求 b。

(iii) Dividing \$ $(3000 + b)$ in a ratio $5 : 6 : 8$, the smallest part is \$ c. Find c.

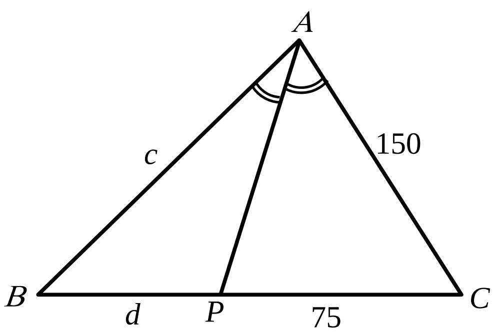
$c =$

將 \$ $(3000 + b)$ 按 $5 : 6 : 8$ 分成 3 份，最小的一份為 \$ c。求 c。

(iv) In the figure, AP bisects $\angle BAC$. Given that $AB = c$, $BP = d$, $PC = 75$ and $AC = 150$, find d.

$d =$

圖中 AP 等分 $\angle BAC$。已知 $AB = c$，$BP = d$，$PC = 75$ 及 $AC = 150$，求 d。



Hong Kong Mathematics Olympiad (1992 – 93)
Final Event 3 (Individual)
香港數學競賽 (1992 – 93)
決賽項目 3 (個人)

(i) If a is the remainder when 2614303940317 is divided by 13, find a.

若 a 為以 13 除 2614303940317 的餘數，求 a。

$a =$

(ii) Let $P(x, b)$ be a point on the straight line $x + y = 30$ such that slope of $OP = a$ (O is the origin). Determine b.

設 $P(x, b)$ 為直線 $x + y = 30$ 上的點且滿足 OP 斜率為 a (O 乃原點)。求 b。

$b =$

(iii) Two cyclists, initially $(b + 26)$ km apart travelling towards each other with speeds 40 km/h and 60 km/h respectively. A fly flies back and forth between their noses at 100 km/h. If the fly flied c km before crushed between the cyclists, find c.

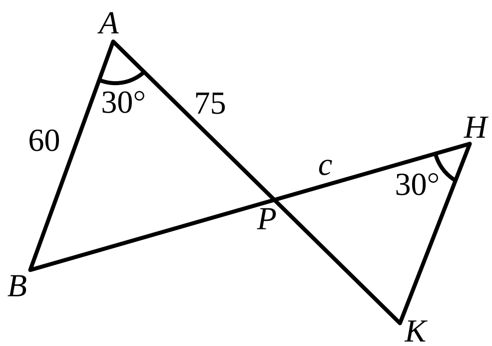
兩人踏單車，起始時相距 $(b + 26)$ km，以時速 40 km/h 及 60 km/h 相向而行。一蒼蠅以時速 100 km/h 往返兩人鼻尖，若牠在兩人碰上前共飛 c km，求 c。

$c =$

(iv) In the figure, APK and BPH are straight lines. If d = area of triangle HPK, find d.

圖中 APK 及 BPH 為直線。若 $d = \Delta HPK$ 的面積，求 d。

$d =$



Hong Kong Mathematics Olympiad (1992 – 93)
Final Event 4 (Individual)
香港數學競賽 (1992 – 93)
決賽項目 4 (個人)

(i) Given that the means of x and y, y and z, z and x are respectively 5, 9, 10. If a is the mean of x, y, z, find the value of a.

已知 x 和 y 、y 和 z 、z 和 x 的平均值分別為 5 、9 、10 。若 x 、y 、z 的平均值是 a，求 a 的值。

$a =$

(ii) The ratio of two numbers is $5:a$. If 12 is added to each of them, the ratio becomes $3:4$. If b is the difference of the original numbers and $b > 0$, find the value of b.

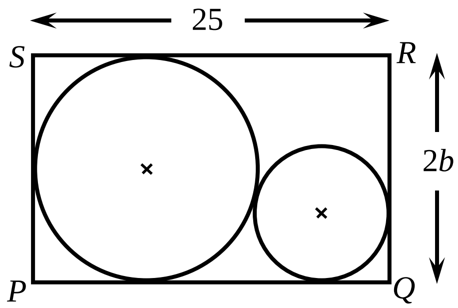
某兩數的比例為 $5:a$。當每邊加 12 時，兩數的比例變為 $3:4$ 。若 b 為原本兩數之差及 $b > 0$，求 b 的值。

$b =$

(iii) $PQRS$ is a rectangle. If c is the radius of the smaller circle, find the value of c.

$PQRS$ 為一長方形，若細圓的半徑為 c，求 c 的值。

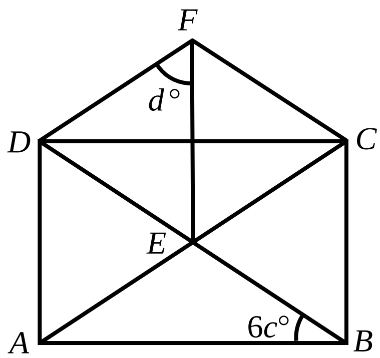
$c =$



(iv) $ABCD$ is a rectangle and CEF is an equilateral triangle, $\angle ABD = 6c^\circ$, find the value of d.

$ABCD$ 為一長方形及 CEF 為一等邊三角形，$\angle ABD = 6c^\circ$，求 d 的值。

$d =$



Hong Kong Mathematics Olympiad (1992 – 93)
Final Event 5 (Individual)
香港數學競賽 (1992 – 93)
決賽項目 5 (個人)

(i) Two opposite sides of a rectangle are increased by 50 % while the other two are decreased by 20 %. If the area of the rectangle is increased by a %, find a.

長方形兩對邊同時加長 50 %，而其餘兩對邊則縮短 20 %。若長方形的面積增加 a %，求 a。

$a =$

(ii) Let $f(x) = x^3 - 20x^2 + x - a$ and $g(x) = x^4 + 3x^2 + 2$. If $h(x)$ is the highest common factor of $f(x)$ and $g(x)$, find $b = h(1)$.

設 $f(x) = x^3 - 20x^2 + x - a$ 及 $g(x) = x^4 + 3x^2 + 2$。若 $h(x)$ 為 $f(x)$ 和 $g(x)$ 的最大公因子，求 $b = h(1)$。

$b =$

(iii) It is known that $b^{16} - 1$ has four distinct prime factors, determine the largest one, denoted by c.

已知 $b^{16} - 1$ 共有四質因子，求其中最大的一個，以 c 表它。

$c =$

(iv) When c is represented in binary scale, there are d '0's. Find d.

當以二進制表示 c，則其中有 d 個 '0'。求 d。

$d =$