

Hong Kong Mathematics Olympiad (1986 – 87)

Sample Event (Individual)

香港数学竞赛 (1986 – 87)

决赛项目 – 样本 (个人)

- (i) If $x^2 - 8x + 26 \equiv (x+k)^2 + a$, find a .

$a =$

若 $x^2 - 8x + 26 \equiv (x+k)^2 + a$, 求 a 。

- (ii) If $\sin a^\circ = \cos b^\circ$, where $270 < b < 360$, find b .

$b =$

若 $\sin a^\circ = \cos b^\circ$, 其中 $270 < b < 360$, 求 b 。

- (iii) X sold an article to Y for $\$b$ at a loss of 30%. If the cost price of the article for X is $\$c$, find c .

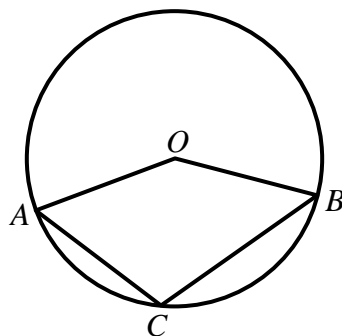
$c =$

X 以 $\$b$ 出售一货品与 Y 而亏蚀 30%。若 X 购入该货品之成本为 $\$c$, 求 c 。

- (iv) In the figure, O is the centre of the circle. If $\angle ACB = \frac{3c^\circ}{10}$ and $\angle AOB = d^\circ$, find d .

$d =$

附图中, O 为圆心。若 $\angle ACB = \frac{3c^\circ}{10}$ 及 $\angle AOB = d^\circ$, 求 d 。



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Event 1 (Individual)

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决赛项目 1 (个人)

- (i) If $A = 11 + 12 + 13 + \cdots + 29$, find A .

$A =$

若 $A = 11 + 12 + 13 + \cdots + 29$, 求 A 。

- (ii) If $\sin A^\circ = \cos B^\circ$, where $0 < B < 90$, find B .

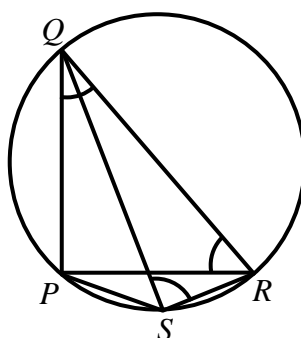
$B =$

若 $\sin A^\circ = \cos B^\circ$, 其中 $0 < B < 90$, 求 B 。

- (iii) In the given figure, $\angle PQR = B^\circ$, $\angle PRQ = 50^\circ$. If $\angle QSR = n^\circ$, find n .

$n =$

附图中, $\angle PQR = B^\circ$, $\angle PRQ = 50^\circ$ 。若 $\angle QSR = n^\circ$, 求 n 。



- (iv) n cards are marked from 1 to n and one is drawn at random. If the chance of it being a multiple of 5 is $\frac{1}{m}$, find m .

$m =$

由 1 至 n 号卡片中随意抽出一张。若得到 5 之倍数之概率为 $\frac{1}{m}$, 求 m 。

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Event 2 (Individual)

香港数学竞赛 (1986 – 87)

决赛项目 2 (个人)

- (i) The volume of a sphere with radius r is 36π , find r .

$r =$

某球体之半径为 r ，体积为 36π ，求 r 。

- (ii) If $r^x + r^{1-x} = 4$ and $x > 0$, find x .

$x =$

若 $r^x + r^{1-x} = 4$ ，且 $x > 0$ ，求 x 。

- (iii) In $a : b = 5 : 4$, $b : c = 3 : x$ and $a : c = y : 4$, find y .

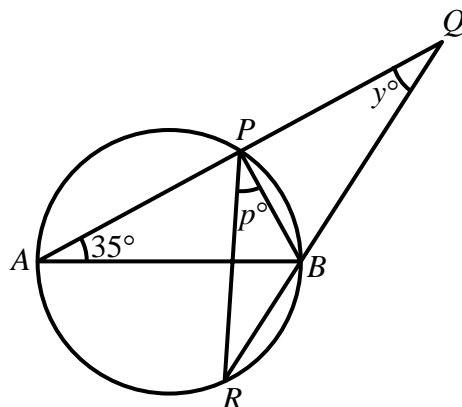
$y =$

若 $a : b = 5 : 4$ ， $b : c = 3 : x$ 且 $a : c = y : 4$ ，求 y 。

- (iv) In the figure, AB is a diameter of the circle. APQ and RBQ are straight lines. If $\angle PAB = 35^\circ$, $\angle PQB = y^\circ$ and $\angle RPB = p^\circ$, find p .

$p =$

附图中， AB 为该圆之直径。 APQ 及 RBQ 为直线。若 $\angle PAB = 35^\circ$ ， $\angle PQB = y^\circ$ 及 $\angle RPB = p^\circ$ ，求 p 。



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Event 3 (Individual)

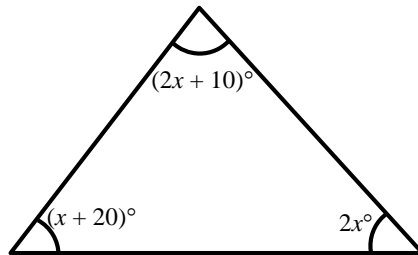
香港数学竞赛 (1986 – 87)

决赛项目 3 (个人)

- (i) In the figure, find x .

$x =$

如图所示，求 x 。



- (ii) The coordinates of the points P and Q are $(a, 2)$ and $(x, -6)$ respectively. If the coordinates of the mid-point of PQ is $(18, b)$, find a .

$a =$

P , Q 之坐标依次为 $(a, 2)$ 及 $(x, -6)$ 。若 PQ 的中点之坐标为 $(18, b)$ ，求 a 。

- (iii) A man travels from X to Y at a uniform speed of a km/h and returns at a uniform speed of $2a$ km/h. If his average speed is c km/h, find c .

$c =$

某人以均匀速度 a km/h 由 X 往 Y ，并以均匀速度 $2a$ km/h 由 Y 返 X 。若其平均速度为 c km/h，求 c 。

- (iv) If $f(y) = 2y^2 + cy - 1$, find $f(4)$.

$f(4) =$

若 $f(y) = 2y^2 + cy - 1$ ，求 $f(4)$ 。

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Event 4 (Individual)

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决赛项目 4 (个人)

- (i) If the curve $y = 2x^2 - 8x + a$ touches the x -axis, find a .

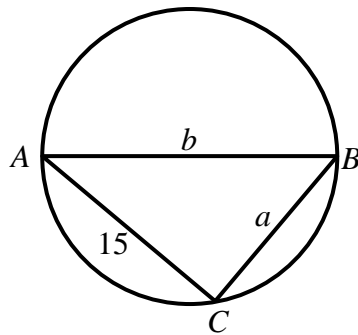
$a =$

若曲线 $y = 2x^2 - 8x + a$ 与 x -轴相切，求 a 。

- (ii) In the figure, AB is a diameter of the circle. If $AC = 15$, $BC = a$ and $AB = b$, find b .

$b =$

附图中， AB 为该圆之直径。若 $AC = 15$ ， $BC = a$ 及 $AB = b$ ，求 b 。



- (iii) The line $5x + by + 2 = d$ passes through $(40, 5)$. Find d .

$d =$

直线 $5x + by + 2 = d$ 过点 $(40, 5)$ 。求 d 。

- (iv) X sold an article to Y for $\$d$ at a profit of 2.5%. If the cost price of the article for X is $\$K$, find K .

$K =$

X 以 $\$d$ 出售一货品与 Y ，得利润 2.5%。若 X 购入该货品之成本为 $\$K$ ，求 K 。

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Event 5 (Individual)

香港数学竞赛 (1986 – 87)

决赛项目 5 (个人)

- (i) Let $x = 19.\dot{8}\dot{7}$. If $19.\dot{8}\dot{7} = \frac{a}{99}$, find a .

(Hint: $99x = 100x - x$)

$a =$

设 $x = 19.\dot{8}\dot{7}$ 。若 $19.\dot{8}\dot{7} = \frac{a}{99}$ ，求 a 。

(提示： $99x = 100x - x$)

- (ii) If $f(y) = 4\sin y^\circ$ and $f(a-18) = b$, find b .

若 $f(y) = 4\sin y^\circ$ ，且 $f(a-18) = b$ ，求 b 。

$b =$

- (iii) If $\frac{\sqrt{3}}{b\sqrt{7}-\sqrt{3}} = \frac{2\sqrt{21}+3}{c}$, find c .

若 $\frac{\sqrt{3}}{b\sqrt{7}-\sqrt{3}} = \frac{2\sqrt{21}+3}{c}$ ，求 c 。

$c =$

- (iv) In the figure, ST is a tangent to the circle at P . If $\angle MQP = 70^\circ$, $\angle QPT = c^\circ$ and $\angle MRQ = d^\circ$, find d .

$d =$

附图中， ST 与圆相切于 P 。若 $\angle MQP = 70^\circ$ ， $\angle QPT = c^\circ$ 及 $\angle MRQ = d^\circ$ ，求 d 。

